Portfolio Construction in University Teacher Education: Design, Implementation, and Evaluation of a Portfolio-Based Instructional System for Deep Learning

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Dissertation abstract

Portfolio construction has come to be an integral element of teacher education programs around the world. The conceptualizations and the concretizations of portfolio-based learning environments – in theory as well as in practice – show considerable diversity. Studies reporting substantive original research on the effectiveness of portfolio as an approach for learning and instruction in teacher education continue to be scarce; their research focuses and, thus, their contents are rather mixed. Yet, there is also an element of similarity: The evidence available on the effects of portfolio construction – as identified and reviewed for this dissertation – is predominantly positive. Thus, it seems warranted to continue implementing portfolio in teacher education practice and to further research its effects.

The aim of this dissertation is to contribute to the theory and practice of teacher education in higher education settings by investigating portfolio as an educational tool, and by evaluating one particular portfolio-based learning environment designed for and implemented in initial teacher education. To this end, after an initial clarification of key concepts, essential theories, and fundamental terminology, available empirical studies were systematically researched, identified, analyzed, and collated on an international scale. Then, on the basis of various theoretical approaches, portfolio concepts, and relevant empirical research findings, a concrete portfolio-based learning environment was designed, implemented, and evaluated in the context of university teacher education for vocational schools.

The review of original research considered to be of adequate explanatory power confirms a major criticism repeatedly noted in the literature, i.e., that there still seems to exist a limited body only of substantive research of portfolio as an educational instrument for the design of learning environments. This means that both the current evidence on portfolio and the common practice of portfolio construction are in need of additional substantiation. The findings of the study conducted suggest that the portfolio-based learning environment designed for university teacher education has the potential to support both students' learning and their reflection.

This dissertation contributes to the theory and practice of teacher education – both in general and for vocational schools in particular – by means of a comprehensive, critical synthesis of available portfolio literature and findings of original research and by the investigation of one concrete portfolio-based learning environment in one clearly specified context of university teacher education. In addition, this dissertation provides a contribution to teacher educators' everyday practice, proposing the principles and details of the design of a portfolio-based learning environment successfully implemented to support students' reflective learning in university teacher education.

Keywords: Portfolio; teacher education; pre-service teachers; learning; reflection; deep learning

Zusammenfassung

Weltweit hat sich Portfolioarbeit zu einem integralen Bestandteil der Lehrerbildung entwickelt. Die Konzeptualisierungen und die Konkretisierungen portfoliobasierter Lernumgebungen zeigen – in der Theorie wie auch in der Praxis – eine erhebliche Vielfalt. Studien, die substantielle empirische Forschung zur Wirksamkeit von Portfolio als Herangehensweise für Lernen und Lehren in der Lehrerbildung darstellen, sind nach wie vor rar; ihre Forschungsschwerpunkte und damit ihre Inhalte sind eher unterschiedlich. Doch gibt es auch ein Element der Übereinstimmung: Die vorliegende Evidenz zu den Effekten von Portfolioarbeit – wie für diese Dissertation ermittelt und durchgesehen – ist überwiegend positiv. Somit scheint die Grundlage für die weitere Verfolgung des Portfolioansatzes in der Praxis der Lehrerbildung und für die weitere Erforschung der Effekte von Portfolioarbeit gegeben.

Das Ziel dieser Dissertation besteht darin, basierend auf der Untersuchung von Portfolio als pädagogischem Instrument und der Evaluation einer spezifischen portfoliobasierten Lernumgebung, die für die erste Phase der Lehrerbildung gestaltet und dort umgesetzt wurde, einen Beitrag zur Theorie und zur Praxis der Lehrerbildung im tertiären Bereich zu leisten. In einem ersten Schritt wurden hierzu auf internationaler Ebene verfügbare empirische Studien systematisch recherchiert, ermittelt, analysiert und zusammengestellt. Sodann wurde auf Grundlage unterschiedlicher theoretischer Ansätze, Portfoliokonzepte und relevanter empirischer Befunde eine konkrete portfoliobasierte Lernumgebung gestaltet und im Rahmen der universitären Lehrerbildung für berufliche Schulen praktisch umgesetzt und evaluiert.

Die Durchsicht empirischer Forschungsergebnisse, die als von hinreichender Aussagekraft erachtet werden, bestätigt das in der Literatur wiederholt angeführte gewichtige Monitum, dass der Umfang der vorliegenden Forschung zu Portfolio als didaktischem Instrument zur Gestaltung von Lernumgebungen nach wie vor begrenzt ist. Dies bedeutet, dass sowohl die aktuell verfügbare Evidenz zu Portfolio als auch die verbreitete Praxis der Portfolioarbeit zusätzlicher Substantiierung bedürfen. Die Ergebnisse der durchgeführten Eigenstudie legen nahe, dass die für die universitäre Lehrerbildung gestaltete portfoliobasierte Lernumgebung über das Potential verfügt, das Lernen wie auch die Reflexion der Studierenden zu unterstützen.

Diese Dissertation trägt zur Theorie und zur Praxis der Lehrerbildung bei – sowohl im Allgemeinen als auch für den Bereich der beruflichen Schulen im Speziellen –, durch die umfassende, kritische Synthese verfügbarer Portfolioliteratur und empirischer Forschungsergebnisse und durch die Untersuchung einer konkreten portfoliobasierten Lernumgebung in einem bestimmten, klar spezifizierten Kontext universitärer Lehrerbildung. Darüber hinaus bietet diese Dissertation einen Beitrag zur täglichen Praxis von Lehrerbildnerinnen und Lehrerbildnern, indem sie die Grundlagen und Details einer portfoliobasierten Lernumgebung darlegt, die zur Unterstützung des reflexiven Lernens von Studierenden in der universitären Lehrerbildung erfolgreich umgesetzt wurde.

Schlüsselwörter: Portfolio; Lehrerbildung; Lehrerausbildung; Lernen; Reflexion; Tiefenlernen

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3P	Presage – Process – Product
ALACT	Action – Looking back on the Action – Awareness of Essential Aspects – Creating Alternatives – Trial
CFA	Confirmatory Factor Analysis
CPD	continuous professional development
cit. by	cited by
edTPA	Teacher Performance Assessment
e.g.	for example (*exempli gratia*)
ECTS	European Credit Transfer System
EFA	Exploratory Factor Analysis
ELP	European Language Portfolio
EPOSTL	European Portfolio for Student Teachers of Languages
ERIC	Educational Resources Information Center
et al.	and others (*et alii*)
IBM	International Business Machines Corporation
ICT	Information and Communications Technology
i.e.	that is (*id est*)
ILO	intended learning outcome
ISD	Instructional Systems Design
LX	learning experience

MSLQ	Motivated Strategies for Learning Questionnaire
NB	note well (*nota bene*)
p.	page
para.	paragraph
pp.	pages
PCA	Principal Component Analysis
R-SPQ-2F	Revised Two Factor Study Process Questionnaire
SPS 1	*Schulpraktische Studien 1* (first school practicum, embedded in the bachelor's program of study; student teaching accompanied by the university; a course comprising a seminar at university and a two-week practicum at a vocational school in the field of economics, business, and administration)
SAL	Student Approaches to Learning
SDT	Self-Determination Theory
SPSS	Statistical Package for the Social Sciences
SRL	Self-Regulated Learning
SOLO	Structure of the Observed Learning Outcome
TAMPST	Technology Acceptance Measure for Pre-Service Teachers
viz.	namely, that is to say (*videlicet*)
vs.	versus

1 Introduction

"All that society has accomplished for itself is put, through the agency of the school, at the disposal of its future members."

John Dewey, *The School and Society* (1915)

"Teachers are the mechanism by which our societies pass on knowledge and values. Teachers, in that sense, are uniquely responsible for carrying on our cultural, intellectual, and aesthetic achievements."

Lee Shulman, in *Appreciating Good Teaching – A Conversation with Lee Shulman* (Tell, 2001)

1.1 Problem statement: Teacher education under constant (re-)construction – the quest for quality

TEACHING IS A COMPLEX, CHALLENGING UNDERTAKING (Beutel, 2010; Brandt, 1986; Darling-Hammond, 2006; Oakley, Pegrum, & Johnston, 2014; Sparks-Langer & Colton, 1991; Zeichner, 2009), and so are teacher education (Cochran-Smith, Ell, Ludlow, Grudnoff, & Aitken, 2014; Zeichner, Payne, & Brayko, 2015) as well as learning to be a teacher (Britzman, 1986; Lambe, McNair, & Smith, 2013; Valencia, Martin, Place, & Grossman, 2009).[1] For decades, both teachers and teacher education have been subject to continuous criticism and constant calls for change and reform (Berliner, 2000; Cochran-Smith & Fries, 2001; Cochran-Smith & Zeichner, 2009; Darling-Hammond, 2000; Shulman, 1987a; Wiens, 2012), while concurrently with actual, constant (re)-construction of teacher education[2], there has been – and still is – no general consensus among policy-makers, educational researchers, teacher educators, and teachers as to the values, purposes, curriculum, and methods relative to a model design of teacher education programs preparing prospective teachers for the profession of teaching, providing them

[1] Learning *to be* a teacher, as will be argued throughout this dissertation, comprises much more than merely learning to teach professionally in the sense of carrying out instructional activities effectively from a purely instrumental perspective. It comprises learning *to think and act* as a pedagogue – with motivation, deliberation, reflection, and responsibility.

[2] Mainly based on political demands, often evoking the impression of measures being taken against the background of ideological convictions; reforms introduced in the hope of increasing – or countering a decrease in – students' achievements; and/or action taken merely for the sake of doing something.

effectively as well as efficiently with a sustainable, expandable base of knowledge, skills, and dispositions to successfully manage the challenge of teaching at the beginning stages – and, so far as possible, over the course – of their teaching careers. In case it were possible to outline such a model design, well-founded on scientific evidence, the observations that there is a lack of comprehensive teacher education research (Wiens, 2012) and that the research undertaken is not systematic or coherent (Sleeter, 2014) certainly do not make things easier. The perennial pursuit of the "expert pedagogue" (Berliner, 1986, p. 5) continues – and, accordingly, the constant quest for teacher quality and quality teacher education (Cochran-Smith & Zeichner, 2009) keeps going on.

Despite the differences in the views of stakeholders, it seems reasonable to agree – in a first step, as a basic assumption, to find some common ground to start with – that the fundamental aim of teacher education must be the preparation of *effective* as well as *responsible* prospective teachers, capable of professional quality teaching in the sense of effective teaching, but also *caring* for their students' achievements and well-being as well as for their own welfare and growth.[3] This general aim, with its implied values, may serve as a guiding principle for the design of teacher education programs and courses: for the specification of intended learning outcomes (ILOs; with a view to both professional development and personal growth; including desired general graduate attributes) and, based on these intended learning outcomes, for the design of curricula, tasks, and learning environments. It may also – and undoubtedly does – serve as a starting point for the orientation of teacher education institutions and departments at universities and colleges around the world.

[3] These two elements are inseparably linked to each other; for caring in teaching see, e.g., Dunn and Rakes (2010), Isenbarger and Zembylas (2006), and Nilsson, Ejlertsson, Andersson, and Blomqvist (2015). A systematic review published in 2016 illustrates the importance of teacher-student relationships on adolescent students' engagement in school (see Quin, 2016). The growing interest in the motivational dimension in teachers and researchers' increasing awareness that emotion and motivation, in addition to cognitive aspects, play an important role in teaching, are noted, e.g., by Evelein, Korthagen, and Brekelmans (2008) and by Korthagen and Evelein (2016). On the importance of cognition *and* emotion for teacher education, also see Russell and Martin (2017).

As is argued by Darling-Hammond (2000), teacher education matters, and teachers with more or longer formal training tend to fare better as teachers than those who have not had this training. Assuming on this basis that teacher preparation should take place in a formal, methodical way at institutions of professional higher education, i.e., at universities and colleges, questions arise as to *how* to design and implement *effective* program structures, courses, curricula, and tasks for the *purposeful, efficient* education of teachers that are both professionally effective and responsible when teaching at schools. The importance of teachers is noted by Cochran-Smith and Zeichner (2009), who state widespread agreement that teachers are among the most significant factors – if not *the* most significant factor – taking effect on students' learning – and that it is teachers who are "the linchpins in educational reforms of all kinds" (Cochran-Smith & Zeichner, 2009, p. 1). Hattie (2012), an author frequently cited in Germany in discussions on teacher education, points out that it is not teachers in general that make a difference in student learning, but it is *good* teachers who make this difference and are thus of central importance to student learning at schools. In a democratic society committed to excellence in teaching and learning for all its participants, issues related to teacher quality and quality teacher education always represent a priority (Cochran-Smith & Zeichner, 2009).

If the attributes of teacher education – and, thus, the basis for the design of any teacher education program, course, learning environment, and instructional activity – are to be looked at, this can be done against two different, but closely related, backgrounds, one of them related to professional higher education in general, the other focusing on teaching and teacher education in particular: With regard to professional higher education in general, the seminal works by Donald Schön (1983, 1987) brought about what might be called a 'reflective turn' (Schön, 1991). In academic fields, such as law, medicine, and teaching, practitioners are expected to be capable – i.e., able and willing – to reflect on their professional practice, which requires professional programs of study with a corresponding orientation, supporting students' reflection.[4] Following the re-

[4] The concepts of reflection, reflective thinking, reflective practice, reflectivity, etc. in professional development, personal growth, and professional action will be examined and defined – as far as this is possible on the present basis of educational research and practice – in Chapter 2. Throughout this

flective turn, reflection had come to be claimed a goal in many teacher education programs by the mid-1990s (Hatton & Smith, 1995), and at present has become an accepted component of teacher education programs (Beauchamp, 2015). As was stated by Newman (1996) more than 20 years ago, there can be little doubt of the importance of the notion of reflective practice for teacher education.

With regard to teaching and learning in any institutional context, at school as well as in higher education, constructivism (e.g., Jonassen & Duffy, 2016; Merriënboer & de Bruin, 2014; Sims, 2014) has become one of the prominent theories teaching and learning are based on. In recent years, higher education, including university teacher education, has turned towards constructive alignment (e.g., Biggs, 1996; Biggs & Tang, 2011) and assessment for learning (Brown, 2004) in order to support students' quality learning. There are various ways of designing learning environments that correspond to constructive alignment, allow assessment for learning, and facilitate students' learning. Portfolio is assumed to be one of these approaches. While Biggs (1999) explicitly mentions the learning portfolio as a system of aligned teaching and learning, Klenowski,

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dissertation, it is important to keep in mind that reflection is not an end in itself: It is a way of learning – for professional development, personal growth, and continuous (self-)improvement for present and future professional practice –, and an indispensable element of learning from experience. As was famously noted by John Dewey (1933, p. 78), who by many is considered to be the originator of the concept of reflection in modern education (e.g., Lundgren and Poell, 2016): "We do not learn from experience … we learn from reflecting on experience." This position – i.e., that experience in itself is necessary, but by no means sufficient for comprehensive, elaborate learning – will be taken up in Section 2.2.2. In human existence, experience is an integral element of everyday life, both in the professional and in the personal domains. Yet, individuals do not always learn from experience if they do not reflect; more often than not they simply plod along, not making use of valuable opportunities for learning and reflection that might lead to changed representations of knowledge, skills, and dispositions, to insight and continuous (self-)improvement. With a view to learning, in general, and in professional domains in particular, Kilgore, Sattler, and Turns (2013, p. 807) point out that "… experiences, if unexamined, are not necessarily educative." The Greek philosopher Socrates is credited with the famous quote that an unexamined life is not worth living. This statement might seem a bit of an exaggeration; yet the bottom line of Socrates' saying can be seen in the position that inquiry and reflection for learning and the (self-)knowledge gained on that basis contribute to a succeeding, meaningful, happy, good life, both in the professional and in the personal domains.

Askew, and Carnell (2006) present portfolios in relation to assessment for learning – for learning, assessment, and professional development. Reports stating a multitude of beneficial effects of portfolio construction in higher education, including teacher education, abound, while there are only few critical voices. Yet, when it comes to the scientific foundation of portfolio construction, there seems to be an odd incongruence compared to many practitioners' enthusiasm and advocacy of the instrument: To date, there seems to be no comprehensive systematic literature review of empirical studies on portfolio construction in teacher education, statements as to the theoretical basis of portfolio construction diverge, and statements as to the scope of available original research on portfolio are contradictory. A look at scholarly journals quickly leads to the impression that it is hard to find substantive original research on the topic. Yet, portfolio has come to be an integral, often mandatory,[5] element of teacher education programs around the globe, as can be seen from recent studies and reports on portfolio use in teacher education published by authors from all over the world.[6]

For more than two and a half decades, numerous authors have claimed – some on the basis of empirical research, some otherwise[7] – that they believe portfolio to have the potential to support reflection in various fields and at different stages of professional learning, including pre-service teachers' learning in higher education (e.g., Adams, Swicegood, & Lynch, 2004; Barrett, 2004; Berg & Lind, 2003; Chetcuti, Buhagiar, & Cardona, 2011; Cole et al., 1991; Driessen, 2008; Fernsten & Fernsten, 2005; Jenson, 2011; Kenney & LaMontagne, 1999; Kovalchick, Milman, & Elizabeth, 1998; Mansvelder-Longayroux, Beijaard, & Verloop, 2007; Mansvelder-Longayroux, Beijaard, Verloop, &

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5 Recently, portfolio has been introduced as a mandatory element of teacher education to be constructed by all students enrolled in pre-service teacher education programs in the *Land* of Baden-Württemberg, one of the federal states of Germany, as will be described in detail in Chapter 4.

6 With a view to recent publications on a global scale see, e.g., Davis, Mountjoy, and Palmer (2016) for the United States; Goodnough, Falkenberg, and MacDonald (2016) for Canada; Pegrum and Oakley (2017) for Australia; and Korthagen (2016) for Europe. A comprehensive list of selected articles, books, and handbooks on portfolio with dates of publication ranging from 1990 to 2015 has been published some time ago by Orland-Barak and Maskit (2017).

7 On the basis of theoretical considerations, e.g., Shulman (1998), and/or based on anecdotal reports of portfolio implementation, e.g., Guillaume and Yopp (1995).

Vermunt, 2007; McAllister, 2015; McKinney, 1998; Milman, 2005; Oakley et al., 2014; Oner & Adadan, 2011; Panos, 2015; Pelliccione, Dixon, & Giddings, 2005; Scott, 2010; Sung, Chang, Yu, & Chang, 2009; Tigelaar, Dolmans, de Grave, Wolfhagen, & van der Vleuten, 2006). Statements as to the scope of existing research on portfolio use in teacher education are contradictory (e.g., Bataineh, Al-Karasneh, Al-Barakat, & Bataineh, 2007; Imhof & Picard, 2009), and there appears to be only a limited amount of high-quality research to support this belief. Thus, there is the need for an up-to-date literature review of what is currently known on the effects of portfolio development in teacher education.[8] In order to provide such a review, dealing with essential aspects of portfolio development, five research questions were formulated. These questions will be presented, along with a clear statement of the purpose of the literature review, after a short outline of the background of two aspects that are fundamental to the topic at hand: the evolution and current practices of portfolio construction in teacher education, and the processes of learning and reflection as seen from an educational point of view.

So, what can be considered up-to-date issues worth addressing and examining with regard to portfolio construction for students' professional development and personal growth, in higher education in general as well as in teacher education in particular?

1. With a view to establishing a sound pedagogic foundation, the theoretical bases of portfolio construction as an educational method, dispersed throughout the literature, need to be identified and synthesized.

2. An overview of key purposes and current practices of portfolio construction on an international scale could help to illustrate the large range of ends the instrument can be used for.

[8] In this dissertation, the terms 'portfolio development' and 'portfolio construction' are used synonymously, unless otherwise stated or illustrated. Students developing (i.e., constructing) portfolios is a process, with teachers offering guidance and support. There is also another usage of the term 'portfolio development', where 'portfolio developers' is meant to refer to those developing and refining the design of portfolio implementation(s) in education – thus *developing* portfolio as an educational tool –, while learners and teachers actually *using* (creating, building, maintaining – thus, using) portfolios are termed 'portfolio users' (for an example of this usage of the terms, see Driessen, 2017).

3. In view of the design of higher education and the organization of teacher professional development, it remains to be further researched whether portfolio as an educational practice has the potential to support learning processes that are deemed desirable and the learning outcomes that are intended to be achieved in the instances of portfolio construction described in the literature. As has been noted, assumptions and claims regarding potential positive effects of portfolio construction – i.e., portfolio construction effectiveness, portfolio construction impact – often seem to be based on small-scale interview studies as well as on anecdotal reports by teacher education practitioners. It remains to be seen whether portfolio construction has the potential to foster crucial variables of student learning, such as students' disposition for deep learning, and to support students' actual learning for understanding, higher-order cognitive processing, and productive, critical reflection. Judging from an overview of the relevant literature and a systematic review of original research, it would be interesting to consider and preliminarily state whether – and if so: under what conditions and to what effects – portfolio has the potential to support student learning and reflection within the contemporary context of constructive alignment in higher education. This knowledge could then be used in further research on portfolio as well as in portfolio practice.

4. Taking into account the apparently unabated enthusiasm that these days seems to surround every instructional approach based on some arrangement of digital teaching and learning,[9] including electronic portfolios (e-portfolios), it seems worthwhile to investigate the effects of both traditional, paper-based portfolios and digital e-portfolios of more recent date and then compare these effects,

[9] 'Digitization' of teaching and learning has become a buzzword in educational debates, in Germany as well as in other countries worldwide. Yet, while there seems to be widespread agreement that 'digitization' at schools and institutions of higher education is desirable, discussions regarding plausible *purposes* of digitization are rare. In many instances, the impression can be gained that 'digitization' seems to have lost its instrumental character, there being a lack of consideration of possible *purposes* of digitization in supporting learning, and that it has become an end in itself. Yet, technology does not educate by itself. It is necessary to consciously and responsibly use technology to support learning and attain intended learning outcomes (ILOs) set by expert pedagogues.

based on both the findings of prior original research and an empirical study to be conducted.[10]

5. Finally, it would be helpful for teacher education practitioners – for teacher educators in higher education as well as for cooperating teachers at schools (i.e., in the practicum setting) – to be provided with an up-to-date summary of observations regarding portfolio construction in university-based teacher education, both paper-based and electronic.

Following this introduction, outlining the educational context of interest as well as issues worth studying, the aim of this dissertation will now be set out.

1.2 Aim of this dissertation: A contribution to portfolio theory and practice

In a seminal article on teaching portfolios in US teacher education programs, published by Zeichner and Wray (2001), the subtitle "what we know and what we need to know" brings to mind that in scientific research of teacher education as well as in teacher education practice it is crucial to continually examine what is known at any

[10] In many cases, this enthusiasm might well be described as bordering on hype, ranging from moderate to rather severe forms, as the case may be. With regard to professional teaching, it is important to bear in mind that all learning environments are to be designed *first and foremost* with a view to initiate and support learning with a view to achieving the learning outcomes intended, and *only then* with a view to the curriculum and the instructional methods and processes considered appropriate for these learning outcomes to be achieved. With the present hype surrounding many forms of digital teaching and learning, the impression is that the use of digital technology in school and university classrooms is often taken as an end in itself, with intended learning outcomes being considered only secondarily – if being considered at all. While the affordances of digital technology for education are immediately clear if its use serves the learning process (e.g., in cases where students are to process digital media and learn in groups set up via the internet) or an intended learning outcome (e.g., teacher education students' acquisition of skills in technology use and their readiness to use technology in their own classrooms), its benefits seem less evident in the context of individual reflective learning as practiced long before the advent of e-learning. Independent of the questions surrounding any revolutionary potential of digital teaching and learning claimed, with a view to the effects of portfolio construction in teacher education, it is important to investigate the outcomes of both generic forms of portfolio – paper-based and electronic – and to compare them.

given point in time and what knowledge still has to be obtained in order to further develop research, teaching, and learning, i.e., to summarize the body of (sound) scientific knowledge available and, at the same time, to identify existing gaps in research. More than one and a half decades have passed since the publication of the article by Zeichner and Wray (2001), often referred to in the portfolio literature, and via-à-vis a plethora of texts on portfolio in teacher education – comprising theoretical considerations as well as original research articles and a large number of practice reports and evaluations by teacher educators –, the aim of this dissertation is to revisit and expand with regard to portfolio construction in university teacher education the considerations expressed by Zeichner and Wray (2001) in the subtitle of their article as well as to conduct an original research study evaluating one specific, concrete portfolio-based instructional system designed and implemented for pre-service teachers at a university in Germany. The intention is to make in that way an up-to-date contribution to the theory and the practice of portfolio construction in university teacher education.

Against the background of the issues worth addressing to advance portfolio theory and practice, the project undertaken to achieve this is tripartite: (1) An overview of the broad theoretical and conceptual background to portfolio construction for student learning and reflection is followed by (2) a systematic review of international portfolio literature, focusing on publications in the years from 2004 to 2014[11] and (3) the presen-

[11] In fact, literature on portfolio in teacher education published over the course of a quarter of a century, i.e., in the 25 years from 1993 to 2017, was identified and analyzed. With a view to the developing work on this dissertation as a whole, it was the literature published between the years of 2004 and 2014 that was given particular attention in the systematic search for literature, while additional texts were considered as seemed appropriate. Details regarding the total of original research considered can be found in Appendix A (p. 436). While we are down here, a note on the structure and the contents of the appendices of this dissertation, which will be referred to throughout, will provide additional orientation for readers: Appendix A (p. 436) contains detailed information on the process and the findings of the systematic review of international portfolio literature. In Appendix B (p. 536), details of the design of the portfolio-based learning environment implemented in one particular setting of pre-service teacher education – i.e., in the course *Schulpraktische Studien 1 (SPS 1)* – will be provided. Appendix C (p. 543) comprises statistical data relative to the design, the validation, and the adaption of the disposition questionnaire used in the original research conducted (see Chapter 4) as well as descriptive statistics regarding the students participating in the main study in the fall semester of

tation of an original research study evaluating portfolio construction for learning and reflection, both paper-based and electronic, in one specific portfolio-based learning environment in university teacher education.[12] Following the presentation and discussion of the original research studies, there will be observations for teacher education practitioners, gained both from the literature as well as from the experience of more than a decade of portfolio construction with pre-service teachers. It is both possible and necessary to divide the broad aim set for this dissertation into goals related to these three parts, which in turn can be subdivided into objectives to be followed in a structured way, and the attainment of which can be assessed.

In face of the ubiquity of the term of 'portfolio', e.g., in the arts and the sciences, in politics, as well as in business and economics, there needs to be an initial clarification of what is understood by the term of 'portfolio' in the field of education. Theoretical bases as well as concepts fundamental to portfolio construction in education are summarized, and teacher education being the focus of this dissertation, there will be a presentation of the characteristics of teacher education. Following this introductory sections, in order to collate and examine what is known about portfolio construction in university teacher education and to identify possible gaps in research, a systematic review of international portfolio literature is carried out. An original research study was conducted in order to investigate portfolio construction in one concrete context of university pre-service teacher education for commercial vocational schools.

The structure of this doctoral dissertation, corresponding to the project set out, is as follows:

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the academic year 2013–2014, their learning, and their reflection. Finally, Appendix D (p. 570) presents to readers key scales used in the empirical study, both in their original and in their adapted forms.

[12] The context could also be characterized as 'university-based teacher education', a characterization instances of which can be found in the literature (e.g., in an article by Wray, 2007), expressing that the learning environment is extended beyond the university classroom, as is the case with the integration of practical elements into a teacher education program in the form of school practicums comprising student teaching.

Following the opening statements of the problem and the aim of this dissertation in Chapter 1, *Chapter 2* will begin with a summary of the theoretical and conceptual background of portfolio construction in teacher education. The origins and the development of portfolio as an educational tool will be outlined, and considerations regarding the characteristics of teacher professional education as a context of educational portfolio construction will be laid out. In the succeeding sections, fundamental theories and conceptualizations of student learning and reflection will be presented in the form of an overview to illustrate different scientific approaches to these cognitive, emotional, motivational, and social processes.[13] With regard to both learning and reflection, frameworks for the assessment of the levels of learning and reflection will be given. Both processes and their combination in the form of reflective learning will be related to teacher education, with a focus on pre-service teacher education and the 'reflective turn' in professional teacher education taking place since the 1980s (e.g., Bengtsson, 1995; Schön, 1991).

Chapter 3 contains a comprehensive systematic review of the international literature on portfolio in pre-service teacher education. Renowned academic journals publishing peer-reviewed original research articles in the universal scientific language of English were searched for empirical studies on portfolio in pre-service teacher education that were published in the years between 1993 and 2017, i.e., over the course of 25 years. While the focus was laid on portfolio construction at the first stage of institutionalized teacher education, findings from other fields (e.g., medicine, nursing) and other stages of teacher education (e.g., in-service teacher education) were taken into consideration, too, where appropriate, in order to complete the picture and corroborate the current state of research on the use of educational portfolios for professional development and personal growth in higher education.[14]

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[13] Throughout this dissertation, learning and reflection – as well as their combination in the form of reflective learning – will be regarded as complex, holistic, deeply human processes.

[14] The processes and intended learning outcomes of portfolio construction for professional development and personal growth are considered to be comparable in higher education for teaching and in higher education for other professions, e.g., for the health sciences, such as medicine and nursing, where there exists a large range of scientific research on the uses of educational portfolios. There are

In *Chapter 4*, the design of an empirical study conducted in university teacher education will be described. First of all, an adaption of the 3P model for constructivist teaching and learning – based on the extensive work of John Biggs –, as related to teaching and learning in the portfolio-based learning environment created and arranged, will be presented. Then, the design and the implementation of the portfolio-based learning environment will be described: The context of teacher education for commercial vocational schools in the *Land* of Baden-Württemberg will be depicted as the background to the study, and details of the portfolio designed – including the purposes, contents, and tasks set for reflective learning – will be given. In the following sections, the research questions guiding the investigation will be summarized, and hypotheses derived from theory and previous research will be formulated. Methodological considerations regarding the study will be laid out at the end of the chapter: Detailed information on the design of the study, the participants, and the development and use of the instruments in the surveys undertaken will be provided.

Chapter 5 comprises the presentation of key findings of the study. It focuses on students' dispositions towards learning (i.e., on students' preferred ways of learning), their actual approaches to learning in task processing within the portfolio-based learning environment, and their levels of cognitive task processing realized in portfolio construction. The links of students (pre-)dispositions towards learning to their actual approaches to learning in the portfolio-based learning environment as well as to their levels of cognitive task processing realized in portfolio construction will be investigated. It will also be examined whether reflective learning in the portfolio-based learning environment takes effect on the development of students' dispositions for deep learning – and, thus, on students' academically desirable dispositions towards learning for

numerous references in the educational literature pointing out the similarities of these professions and, thus, of professional preparation for these areas. For a comparison of teaching and medicine, see, e.g., Shulman (1987b) and Driessen (2008). Lessons for initial professional preparation of higher education students, with a special view to practicum settings, were derived from the fields of teacher and nurse education conjointly by Hatton, Owens, and Powell (1994). This again shows that there can be assumed to be considerable similarities in the educational processes in both domains.

understanding. In addition, the implementation of traditional, paper-based portfolios and e-portfolios as a more recent form of portfolio will be compared and evaluated.

In *Chapter 6* the findings of the study will be discussed. They will be linked to empirical research findings reported in the portfolio literature, i.e., to earlier original research identified in the course of the review of the literature, in order to corroborate what can be assumed to be empirically known about portfolio construction in pre-service teacher education. Limitations of the present study, both methodological and bound to the context, will be presented and critically examined, as will be boundaries related to the whole project undertaken.

The final chapter of this dissertation is *Chapter 7*. In its first section, implications for portfolio practice in the form of observations on portfolio – derived from the extensive study of the literature and gained on the basis of personal teaching experience and research findings – will be provided. While the form of the portfolio, task design, etc., depend on the purpose of portfolio construction, it is possible to assemble from portfolio research a set of observations that can be assumed to support the design of a portfolio-based learning environment for university teacher education. Then, in the second section, suggestions for further research on portfolio in teacher education will be made, based both on the findings of the literature review and of the original research study undertaken. The third and last section of Chapter 7 concludes this dissertation: Vis-à-vis the lasting general enthusiasm for portfolio as an educational instrument, which more often than not, especially in anecdotal practitioner reports, seems to lack adequate scientific foundation and reflection, this final section contains an evidence-based summary of the effectiveness and the effects[15] of portfolio for meaningful learn-

[15] While the issue of *effectiveness* in general is seen as related to the *impact* of portfolio construction in university teacher education (i.e., to considerations as to whether portfolio construction has an impact on student learning and reflection that can be operationalized and measured), various effects of portfolio construction will have to be distinguished in case portfolio actually proves to be effective. Issues of efficiency are not to be examined in this dissertation. While there is general agreement in the literature that in comparison to other, more traditional forms of assessment the implementation of portfolio in education may entail additional work, both for students (in constructing their individual portfolios) and for teachers (in providing appropriate feedback), there appears to be a paucity of

ing and reflective thinking, geared at an outlook in the form of an attempt of an answer to a question of paramount importance to policy-makers and teacher educators alike: Portfolio construction in university teacher education – merely another educational fad?[16]

studies comparing the efficiency of portfolio for reflective learning to other forms of teaching and learning (e.g., journaling). Thus, it seems to be difficult against the background of the current state of research to evaluate the efficiency of portfolio construction as compared to other educational practices. In fact, not one single study comes to the author's mind where portfolio and another instrument would have been compared with a view to their *efficiency* in achieving the same intended learning outcomes. In addition, the conceptual borders are vague (portfolio, journaling, etc.). Examination of efficiency would be a suggestion for further research, as summed up in Section 7.2.

[16] While, with a view to objectivity, researchers are well-advised to strive for detachment and dispassion, pedagogues – comprising teachers as well as teacher educators – in their respective roles do not have to (and by any means: should not be) passionless. Thus, while it may be stated from a pedagogical perspective that it would be regrettable indeed if portfolio as a lauded instrument in higher and teacher education were found to be overestimated, lacking substantive scientific evidence regarding its effectiveness, the situation in the *Land* of Baden-Württemberg would be aggravated additionally from a practical point of view, portfolio as an instrument having recently been made a *mandatory* element in all programs of teacher professional preparation at institutions of higher education. So, at this point of the dissertation, let us hope for the best, i.e., that on the basis of the scientific evidence to be gathered, portfolio as an approach to designing and implementing teacher professional preparation in higher education can be shown to be potentially worthy of all the praise.

2 Theoretical and conceptual background

"We do not learn from experience ... we learn from reflecting on experience."

John Dewey, *How We Think* (1933)

2.1 Portfolio construction in teacher education

2.1.1 Portfolio as an educational tool: Origins and development

THE CONCEPT OF PORTFOLIO HAS A LONG TRADITION in creative fields such as the fine arts and architecture (Milman, 2005; Woodward & Nanlohy, 2004b). Over time, the term of 'portfolio', denoting a purposeful collection of items geared towards a particular aim, has come to be employed in a broadened sense in various domains of human activity, such as economics, business administration, politics, etc. So the notion of portfolio is neither new nor original to the field of education (Bataineh et al., 2007). Yet, while the concept of portfolio in general is not new, the idea of *educational* portfolios can indeed be considered an innovation of quite recent date, both with regard to the distinctive meaning of 'portfolio' as a technical term in education, setting *educational* portfolios apart from portfolios *in general*, and with regard to the way portfolio construction is related to – and varies from – principles and practices well-established in education.

Portfolio as an instrument in teacher education originated in the United States, where it was introduced the 1980s (Bannink, 2009; Delandshere & Arens, 2003; Jones, 2010a; Shepherd & Hannafin, 2009) within the context of the alternative assessment movement (Delandshere & Arens, 2003; Mokhtari, Yellin, Bull, & Montgomery, 1996; Zidon, 1996), part of which was a move towards authentic, performance-based assessment (Clarke, Madaus, Horn, & Ramos, 2000). Lyons (1998b) also relates the introduction of portfolio to the discussion of a new teacher professionalism at that time. Portfolio was quickly taken up by teacher education institutions, so that little more than a decade after its introduction, Salzman, Denner, and Harris (2002) reported on the basis of a survey that nearly 90 % of the American schools, colleges, and departments of education (SCDEs) questioned made use of portfolio to measure candidate outcomes. Several authors point out the popularity of portfolio in teacher education (Avraamidou &

Zembal-Saul, 2006; Breault, 2004; Darling, 2001);[17] 'portfolio' had come to be a buzz word in teacher education as early as about a decade after its introduction (Carroll, Potthoff, & Huber, 1996), and it continues to be so, which has led Lombardi (2008, p. 7) to ask whether portfolios are "helpful or hyped", while Sandford and Hsu (2013, p. 217) – with an obviously critical undertone and with allusion to the pedagogical aim of student-centered learning – call portfolios "another of education's latest heralded methodologies of being student-centered vs. teacher-centered".[18] While the verve of many authors and teacher education practitioners – primarily founded in educational practice with systematic research yet to follow – is remarkable indeed, it can be noted that critical voices on portfolio in teacher education (e.g., Breault, 2004; Orland-Barak, 2005) seem to be rare, while a large majority of authors considers portfolio apt to bring about positive effects.

The 1990s saw the advent of electronic portfolios (also called e-portfolios, digital portfolios, etc.), which were also readily taken up in teacher education (Lynch & Purnawarman, 2004). This move from paper-based portfolios first to electronic formats and then to the Web led to a dramatic change in portfolio authoring tools, with e-portfolios being rooted in the traditions of their paper-based predecessors (Fiedler, Mullen, & Finnegan, 2009). Technological progress, especially the development of the internet, now makes it possible to construct web-based portfolios comprising hyper-

[17] Judging from the popularity of portfolio practice, it seems safe to assume that the percentage of higher education institutions implementing portfolio is unlikely to have decreased since the beginning of the millennium. In recent years, the edTPA (Teacher Portfolio Assessment) has been introduced by teacher education institutions across the United States (for more information on the edTPA see Chapter 7). Before, pre-service teacher portfolios had become a standard required component of most teacher education programs in the United States (see Takona, 2002). Portfolio has come to be a required element of higher/teacher education programs and courses in other countries, too, e.g., in Malta (Chetcuti, Murphy, & Grima, 2006) and, as has already been pointed out, in Germany. Looking at the contents of the portfolio, some components (artefacts, reflective entries) may be required, whereas other components may be optional.

[18] The remarkable enthusiasm surrounding portfolio leads to the question whether portfolio construction in university teacher education (being not the first and certainly not the last innovation in teacher education) is just another educational fad – a question a preliminary answer to which will be attempted at the end of Chapter 7, as a conclusion to this dissertation.

media, blogs, etc., and to share both the process and the product of portfolio construction with others. Proponents usually claim e-portfolios to have quite a number of advantages over their paper-based predecessors (e.g., Avraamidou & Zembal-Saul, 2006); however, with a view to the stated scarcity of research on e-portfolios (e.g., Cummings & Maddux, 2010) it seems advisable to take a critical stance, keeping in mind that traditional and technology portfolios are basically similar (Kovalchick et al., 1998) and thus share the same pedagogies. Furthermore, while the affordances of technology may indeed have the potential to enhance learning and reflection in portfolio construction, the educational effectiveness of technology for teaching and learning in higher education is still open to question despite its widespread use (Price & Kirkwood, 2013).

Nowadays, educational portfolios are a global phenomenon (Çimer, 2011), which can be found at all stages of education, ranging from pre-school level in kindergarten up to the higher education sector (Mokhtari et al., 1996). In higher education, portfolio seems to be most common in the fields of teacher education (Jones, 2010a) and in the fields of medical and nursing education, which as academic domains share a number of features with a view to professional and personal development and the development of graduate attributes, e.g., the emphasis on the development of reflective practice. Within the field of teacher education, portfolio is used with kindergarten teachers (e.g., Niikko, 2002) as well as with elementary (e.g., Avraamidou & Zembal-Saul, 2006; Chuang, 2010; Deveci, Ersoy, & Ersoy, 2006; Lin, 2008; Thomas & Liu, 2012), secondary (e.g., Chetcuti, 2007; Denney, Grier, & Buchanan, 2012; Hartmann & Calandra, 2007; Mansvelder-Longayroux, Beijaard, Verloop et al., 2007; Wilson, Wright, & Stallworth, 2003) and university teachers (e.g., Dinham & Scott, 2003). Overviews of portfolio use in teacher education programs in the United States are provided by Anderson and DeMeulle (1998) and by Zeichner and Wray (2001).

So, what is a denoted by the educational term of 'portfolio', i.e., – to quote the question put by Paulson, Paulson, and Meyer (1991, p. 60) as the title of their well-known article – "[w]hat makes a portfolio a portfolio?" A review of the relevant educational literature suggests that there exists no universal definition of an educational portfolio which would allow researchers and practitioners to easily decide that one instrument is to be considered a portfolio whereas the other is not. The large array of tools and practices

subsumed under the educational concept of 'portfolio' has been described as a 'chameleon aspect' of portfolios (Dysthe & Engelsen, 2011). In teacher education literature, the concept of portfolio is assigned different labels, such as an 'assignment' (Pleasants, Johnson, & Trent, 1998), a 'catalyst' (Green & Smyser, 1995), an 'instrument' (Chamoso, Cáceres, & Azcárate, 2012) a 'measure' (Orland-Barak, 2005), a 'method' (Birgin, 2011; Imhof & Picard, 2009), a 'strategy' (Loughran & Corrigan, 1995), a 'technique' (e.g., Beck, Livne, & Bear, 2005; Green & Smyser, 1995), or a 'tool' (e.g., Bataineh et al., 2007; Borko, Michalec, Timmons, & Siddle, 1997; Chetcuti, 2007; Mansvelder-Longayroux, Beijaard, & Verloop, 2007; Oakley et al., 2014; Oner & Adadan, 2011; Wade & Yarbrough, 1996; Yao, Aldrich, Foster, & Pecina, 2009; Yoo, 2009). The frequent occurrence of the label of 'tool' illustrates that portfolio construction should not be considered as an end in itself; it should rather be seen as an educational *means* to be implemented in order to achieve specific purposes and intended learning outcomes. Metaphorically, portfolio has been labeled as 'sonnet, mirror, and map' (Diez, 1994) as well as a 'window and mirror' (Fox, Kidd, Painter, & Ritchie, 2007), and 'a lens' through which preservice teachers focused their growth as reflective teachers (Silveira, Beauregard, & Bull, 2017), while the portfolio process has been figuratively labeled a 'journey' (e.g., Çimer, 2011; Oakley et al., 2014).[19]

The difficulty of stating a universal definition of 'portfolio' in view of the diversity of products that might be classified as such was stated by Wade and Yarbrough (1996), who also pointed out that there were at least some generally accepted notions about portfolio, including the presence of evidence of self-reflection. As far back as two decades ago, Carroll et al. (1996) listed examples of a large range of different portfolio def-

[19] There are numerous metaphors related to portfolio. A collection of portfolio metaphors in the form of an overview is presented by Barrett (2009). The metaphor of portfolio as a sonnet comprises the suggestion of the aesthetic element of a portfolio, while the analogy of portfolio as a mirror can be related to the ancient counsel to (first recognize and subsequently) know oneself. Portfolio as a map has the potential to show the way that has been so far while showing the path for continual further professional development and personal growth that lies ahead. Portfolio as a window can be taken to be a window into the portfolio author's learning and reflection, portfolio as a lens illustrates the use of portfolio for focused reflection, while portfolio as a journey emphasizes the passing of time: Lifelong learning – as well as life itself – is a journey, a trajectory through time.

initions – and thus: portfolio conceptualizations – they had then found in the literature. More recently, Imhof and Picard (2009, p. 149) provided a list of what they consider "the smallest common denominator" of portfolio methods; here again, (self-) reflection is deemed to be one of the defining features of portfolio in education. Reflection, the crucial importance of which is emphasized throughout the literature on portfolio (e.g., Senne & Rikard, 2002), can be considered one of the key features – even: *the* key feature – of *educational* portfolio development in higher and teacher education. The variability in portfolio development and the paramount importance of reflection is accentuated by Bataineh et al. (2007, p. 437):

> The nature and content of a portfolio may vary according to the purpose of its use. It is not important what it looks like but rather how its content is selected, collected and reflected upon. A mere collection of work does not make a portfolio. It has to be transformed into a meaningful learning experience with a reflective account of one's development over time.[20, 21]

[20] There are several elements to this quote that are worth noting: As will be argued in the following, it is the choice of *portfolio contents* as well as the *design of the tasks to be carried out* in the course of portfolio construction that are of supreme importance with regard to the potential of portfolio for reflective learning. These two decisions, taken by policymakers, faculty, and individual teacher educators, are considered to be more important than the decision of whether it is paper-based or electronic portfolios that are to be used – which is underlined by Bataineh et al. (2007) in their quote when they state that the form of the portfolio – i.e., paper-based or electronic – is subordinate to the importance of the cognitive processes involved in portfolio construction (here: selection, collection, and reflection on contents). Portfolio has to be transformed into a meaningful learning experience by means of productive reflection – which makes portfolio much more than a simple scrapbook collection of student work. Note the mention of meaningful learning (related to deep learning in the literature on student learning, see Chapter 2) as well as the term "learning experience": In phenomenographic approaches to the research of teaching and learning in (higher) education (e.g., Åkerlind, 2012; Ashworth & Lucas, 1998; Ashworth & Lucas, 2000; Booth, 1997; Dahlin, 2007; Entwistle, 1997; Harris, 2011; Hasselgren & Beach, 1997; Marton, 1981; Marton, 1986; Marton & Pong, 2005; Pang, 2003; Richardson, 1999; Rovio-Johansson & Ingerman, 2015; Svensson, 1997; Tight, 2016), it is students' perceptions and experiences (see Chapter 2 and, with a view to the focus of recent research, Chapter 7) that are the focus of interest. Portfolio is about *meaningful*, deep learning for insight and understanding and for *productive* reflection. With regard to the decision by the stakeholders in charge whether

to implement traditional, paper-based portfolios that have been used for about three decades now or electronic portfolios of more recent date, the choice must be based on the cognitive processes as well as the emotional and motivational effects (intended learning outcomes as well as the support thereof) triggered and fostered by the respective form of portfolio, with an additional view to affordances such as the acquisition of technological skills by means of the construction of an e-portfolio or the possibility to cooperate with ease in a community of learners. This is what evidence-based instructional design with a view to attaining intended learning outcomes is all about. To focus on and be content with mere issues related to ease of use (e.g., benefits regarding logistics and storage frequently – and as such: quite justly – noted as a point in favor of the electronic form, e.g., by Johnson, Mims-Cox & Foyle-Nichols, 2010, and many others) would definitely *not* suffice in guiding teacher education: What teacher educator could wish for an ineffective educational tool, with little or no positive impact, but easy to access, store, and transport?

[21] At this point, the (technical) term 'learning experience' is mentioned for the first time in this dissertation. For a definition of this notion, which, as is revealed by a closer look at the pertinent literature, is very popular in current research on higher education, we can go way back to the seminal book by Ralph W. Tyler (1949), *Basic Principles of Curriculum and Instruction*, dealing with education at school, the contents of which can be transferred easily to tertiary education settings. In defining the term 'learning experiences', he notes that

> [e]ssentially, learning takes place through the experiences which the learner has; that is, through the reactions he makes to the environment in which he is placed. Hence, the means of education are educational experiences that are had by the learner. … The term 'learning experience' is not the same as the content with which a course deals nor the activities performed by the teacher. The term "learning experience" refers to the interaction between the learner and the external conditions in the environment to which he can react. Learning takes place through the active behavior of the student; it is what *he* does that he learns, not what the teacher does. It is possible for two students to be in the same class and for them to be having two different experiences. (Tyler and Hlebowitsh, 2013, p. 63; italics contained in the original citation, as is the use of the male gender only).

There are several points worth noting: While the author's stance is decidedly based on a behavioral view of learning – which against the background of the Bologna process in European higher education has come to be *en vogue* again in education –, it is congruent with a empiricist view of learning in philosophy, and, still more importantly, with a constructivist view of learning in education. Humans learn on the basis of what they experience, in general as well as in educational contexts, and it is what the learner makes of the experience in his mind that influences if – and if so: what – the individual in question makes of the experience, i.e., what he/she learns and to what extent he/she benefits from the learning experience. It is what the student does that is key to quality learning in univer-

The paramount importance of reflection in portfolio development is highlighted by the observation that

> [the] emerging corpus of international literature on the use of the portfolio in teacher education, although detailing different perspectives and highlighting different aspects of its development, has a unity of emphasis in portraying its use as [a] tool for promoting reflective practice (Groom & Maunonen-Eskelinen, 2006, p. 292).

Reflection being central to the portfolio process (Senne & Rikard, 2002), portfolios typically comprise artefacts as well as reflective writings (e.g., Chetcuti et al., 2011), and it is reflective portfolios that are considered conducive to learning, portfolios without reflection being mere scrapbooks (Barrett, 2000; Koçoğlu, 2008). The topics and contents of students' reflective writings can be related to artefacts in the portfolio or deal with issues of a more general nature.[22] Paper-based as well as e-portfolios are a way of designing a personalized learning environment which provides learners with specific learning experiences (Lin, 2008; Wang & Turner, 2006).[23] They are often used in con-

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sity education (Biggs and Tang, 2011). It can be assumed that the learning experiences of no two students are perfectly alike; there will always be differences on the basis of students' pre-conceptions, students' pre-dispositions, students' perceptions, etc. The term 'learning experience' referring to the interaction of the learner with the external world, i.e., the (learning) environment, reflection (see Section 2.2.2) seems an educational method apt to productively process this interaction and gain the most from it as regards every individual's professional development and personal growth.

[22] As is noted, e.g., by Knight, Hakel, and Gromko (2008) with a view to their realized approach to electronic portfolio construction.

[23] Here again, we are looking at learning experiences, as was the case with the quote by Bataineh et al. (2007). The 'portfolio experience' (e.g., Borko et al., 1997; Brown, 2001; Buzzetto-More, 2010; Chetcuti, 2007; Çimer, 2011; Fiedler & Mullen, 2009; Karsak, 2016; Oner & Adadan, 2011; Parker, Ndoye & Ritzhaupt, 2012; Thornton & Ferris, 2011; Wade & Yarborough, 1996; Yancey, 2009; Zidon, 1996) students are offered in teacher education, on the basis of a traditional, paper-based or a more recent electronic portfolio, as a way of cognitive, emotional, motivational processing of their (in the majority of cases: practicum/student teaching) experiences and the social negotiation of their meaning and significance (e.g., in the case of group work and discussions) processing of practicum experiences could be considered as a form of 'meta-experience' – experience of dealing with experience.

nection with clinical elements in programs of study,[24] i.e., in connection with field experience, which in teacher education is student teaching or a teaching practicum (e.g., Ayan & Seferoğlu, 2011; Oner & Adadan, 2011; Tang & Lam, 2014; Trent & Shroff, 2013).[25]

While practical recommendations for the productive use of portfolio in teacher education and anecdotal reports of portfolio proponents abound, questions concerning the

[24] Despite English native speakers' use of the term 'clinical experience' for practical elements in teacher education programs (as is the case, e.g., with Darling-Hammond, 2006), we will refrain from such terminology, as in German the attribute 'clinical' is generally used in a narrower sense, denoting issues relative to medicine, nursing, and care. In those domains, portfolio has come to be an integral element of professional education, too, with both research and educational practice being at an advanced state. Yet, the use of the term 'clinical' with German readers would trigger connotations alien to the topic on hand. Interestingly, in the definition of the term 'practicum' presented in the Merriam-Webster dictionary – "a course of study designed especially for the preparation of teachers and clinicians that involves the supervised practical application of previously studied theory" (Merriam-Webster, 2018b) –, (only) 'teachers' as well as 'clinicians' (comprising doctors and nurses) are mentioned explicitly. While this might be purely coincidental, in the definition of the term 'intern' – "an advanced student or graduate usually in a professional field (such as medicine or teaching) gaining supervised practical experience (as in a hospital or classroom)" (Merriam-Webster, 2018a) –, it is medicine and teaching (again) that are emphasized. Based on this observation, it may be assumed that practicums/internships with a view to the acquisition of (reflected) field experience are of relevance for the professional preparation of teachers, doctors, and nurses in particular – all of whom are educated in higher education, e.g., in the United States, and that university programs with a view to the preparation of competent professionals as reflective practitioners for the fields of teaching and medicine share a large range of commonalities, an observation which has already been stated above.

[25] Teacher educators agree that student teaching practicums need close monitoring and guidance. At virtually every teacher education conference attended by the author of this dissertation, effects of 'deprofessionalization' caused by the teaching practicum, familiar to the author and his colleagues, are discussed: Students approaching the teaching practicum haphazardly and with an uncritical mind tend to take their first steps in the classroom – if not evidently a blatant failure – as confirmation that they are right in choosing the teaching profession and that they already know most 'tricks of the trade'. Such effects of deprofessionalization can be countered by means of close monitoring and benevolent guidance against the background of a reflective practicum. No teacher education student is to be disillusioned, but it would seem irresponsible not to point out that it is (reflective) practice (in combination with theory) which makes perfect, and that it is highly unlikely for teacher education students to be experts in teaching from the very start of their careers.

extent and the quality of empirical research and, thus, available findings regarding the influence of portfolio on learning and reflection remain open. Fiedler et al. (2009, p. 100) note that numerous contradictory findings are offered by the portfolio literature, suggesting that perhaps "… the contradictions in the literature can be untangled after a closer look at the context of the activity." They go on to state that

> [a] few studies on portfolios and electronic portfolios have specifically examined the impact on preservice teachers (c.f. Carney, 2001; Placier et al., 2001; Wetzel & Strudler, 2006). An important weakness in the existing portfolio literature is that it is largely unconnected to broader theoretical frameworks. Numerous studies (Avraamidou & Zembal-Saul, 2003; Loughran & Corrigan, 1995; McKinney, 1998; McKinney, Perkins, & Jones, 1995; Piper, 1999; Richert, 1990; Snyder, Lippincott & Bower, 1998; Winsor, Butt, & Reeves, 1999) are atheoretical experience reports in which authors chronicled the progress of portfolio implementations in their classrooms or home institutions. (Fiedler et al., 2009, p. 101)[26]

The use of educational portfolios is growing internationally (Hauge, 2006); yet, there is little empirical research on electronic portfolios in teacher education (Hauge, 2006).[27] A paucity of research on portfolios in education was claimed more than 20 years ago by Herman and Winters (1994) as well as by Borko et al. (1997), the latter noting in addition the few empirical studies that existed while they wrote their research article con-

[26] In the German literature, Häcker (2011) in his study on portfolio construction in lower-secondary education mentions the lack of theoretical bases to portfolio as an educational tool, repeating this observation in a contribution to a handbook on portfolio construction at school and in teacher education (Häcker, 2017).

[27] More than ten years have passed since this observation was made. It seems worth noting that the increase in portfolio construction in various domains of higher education, including teacher education, has continued to grow, portfolio having come to be a mandatory element of teacher education programs in many countries (e.g., in the United States, in Malta, and, for some years, in some *Länder* in Germany). It is striking that the introduction of this mandatory element of teacher education was decided upon while there seems to continue the lack of substantial, systematic research on portfolio effects noted by many researchers (e.g., Koch-Priewe, 2013).

centrated on impact and not on factors facilitating or hindering the process of portfolio construction.[28]

2.1.1.1 Purposes of portfolio development

There is a broad conventional distinction between learning (process) portfolios, assessment (product) portfolios, and employment (showcase) portfolios (e.g., Wolf & Howard, 1999), which may be considered as an expression of the *type* of portfolio.[29] As has been stated by Meeus, van Petegem, and van Looy (2006), it is time for a clarifying

[28] A lack of portfolio research was noted as early as in the first half of the 1990s, when Herman and Winters (1994) published their article: "Portfolio research: A slim collection". 25 years later, Imhof and Picard (2009, p. 149) claimed that portfolio research was "few and far between". Two scholarly publications of recent date published in Germany (Boos, Krämer & Kricke, 2016; Koch-Priewe, Leonhard, Pineker & Störtländer, 2013), taking into account findings of both national and international research, conclude that at present there remains a lot of empirical research to be done on portfolio in teacher education. (It is to be noted, as an aside, that the German publications on portfolio in teacher education identified and read contain a large variety of observations which appear very familiar indeed on the basis of the author's own portfolio practice in university teacher education as well as against the background of many discussions with portfolio experts. Yet, the reviews of empirical research presented are neither systematic nor comprehensive, typically containing a limited range of references only, which mainly represents literature published in German.)

[29] Professional instructional design (Gagné & Briggs, 1974; Gagné, Wagner, Golas, & Keller, 2011; Reigeluth, 1983, 1999, 2013; Reigeluth, Beatty & Myers, 2016; Reigeluth & Carr-Chellman, 2009; Reiser, 2001a, 2001b; Schott & Seel, 2015; Seel, Lehmann, Blumschein, & Podolskiy, 2017; van Merriënboer & Kirschner, 2017; van Merriënboer, Kirschner & Kester, 2003; Willis, 2009) – comprising the design of every key element of an instructional system, from the setting of educational goals for a course/courses in a study program via the selection of topics for the curriculum via the design of the learning environment and the tasks to be completed to the organization of the assessment of student progress and achievement – invariably starts with the definition of the *purposes* of learning, i.e., of the intended learning outcomes. The typical sequence would typically be: (1) Formulation of the intended learning outcomes to be achieved, (2) determination of the topics of the curriculum (i.e., the contents to be covered), (3) determination of the tasks to be completed, and (4) design of further contextual variables relative to the learning environment (including the implementation of portfolio and, if so, the decision on what type and form of portfolio to implement). Here again, it becomes obvious that careless, uncompromising propagators of a special method or medium for learning and reflection jump to step 3, if not to step 4, of this sequential process.

framework in higher education, part of which is the formal professional preparation of teachers. Berrill and Addison (2010) with reference to the literature make a distinction between constructivist learning portfolios and positivist assessment portfolios only; this fundamental dichotomy is mirrored in the division 'formative/summative' recently stated by Greenhalgh and Koehler (2015). In fact, a simple distinction between portfolios focusing on the process – work in progress – and those focusing on the (final) product – best work to be shown for assessment and/or employment – seems viable. The elusive boundaries of the broad concept of portfolio (as noted, e.g., by Beckers, Dolmans, & van Merriënboer, 2016) and the potential individualization of portfolio design both for teachers designing the learning environment and for students composing their portfolios have led to considerable differences in its implementation. Hybrid types are possible,[30] and in many cases the two purposes of learning and assessment are expressly named together (e.g., Wickersham & Chambers, 2006), although this combination of purposes is not undisputed (e.g., Snyder, Lippincott, & Bower, 1998).[31]

[30] In fact, sometimes they are even desirable (see Greenhalgh and Koehler, 2015).

[31] In the following, we posit that the combination of learning and assessment in portfolio development is difficult only – or at least: particularly – if portfolio is used for high-stakes assessment. Assessment has the potential to negatively influence student learning, leading to a 'backwash effect' (e.g., Cheng, 2000; Watkins & Dahlin, 2005). In the literature, extensive considerations of the validity of portfolio assessment in teacher and medical education can be found (e.g., Admiraal, Hoeksma, van de Kamp, & van Duin, 2011; Driessen, Overeem, van Tartwijk, van der Vleuten, & Muijtjens, 2006; Roberts, Shadbolt, Clark, & Simpson, 2014), and such considerations are certainly justified if the result of assessment by means of portfolio has major consequences, e.g., in granting or not a teaching license. (For an outline of issues of validity relative to the edTPA in US teacher education, see Chapter 7.) Yet, if portfolio is used primarily as a basis for learning and reflection and the assessment consists of the simple dichotomy of 'pass' or 'fail' only (the latter combined with the chance to revise the portfolio and then pass in a second attempt), a backwash effect – if there should be any – can be assumed to be minimal. This personal experience of the author has been confirmed in conversations with teacher education colleagues who use portfolio in their courses, too. Much more important than the issue of basic assessment ('pass' and 'fail') are (1) a climate of mutual trust and appreciation, both on the part of the teacher educator and the students, (2) an assumption on the part of the students that portfolio construction has the potential to be beneficial to their professional development, their personal growth, and their future chances of employment, and (3) the portfolio-based learning environment as a safe haven for learning and reflection, with regard to the curriculum, the context, the

The literature gives the impression that most authors and portfolio practitioners seem to consider concurrent purposes of learning and assessment as reconcilable, if portfolio development is implemented with awareness of tensions that may arise from this combination. Dysthe and Engelsen (2011, p. 63), for example, state that "[the] majority of portfolios in Norwegian higher education can be classified as 'disciplinary-based course work portfolios' and they typically serve a combination of learning and assessment purposes." Portfolio is "… a learning and assessment tool conducive to student teachers' professional development" (Hauge, 2006, p. 23). With a view to the combination of purposes of assessment and reflection (see, e.g., Hoel & Haugaløkken, 2004), the two purposes must be reconcilable, with reflection as a pedagogical aim for professional development and personal growth, and assessment as an indispensable requirement in higher education. Portfolios can be used for formative and summative purposes concurrently – which is often done (e.g., Chetcuti et al., 2006). Portfolios can be used for a large range of purposes, and their contents and the cognitive tasks related to their construction can be flexibly adapted by teacher educators. This flexibility of the instrument can be considered an important strength with regard to the potential purposes and fields of portfolio implementation, but the related lack of standardization of portfolio and the highly different implementations that can be seen in the literature and in the daily practice of teacher education clearly constitute critical impediments when describing and examining its implementation, its use, and its effects.

2.1.1.2 Forms of portfolio development: Paper-based and electronic portfolios (e-portfolios)

While in the preceding section the broad conceptual division of purposes portfolio can be implemented for – learning, assessment, and employment – has been outlined and while the purposes that are actually followed by means of portfolio construction as reported in the literature are considered in Chapter 3, there is a general distinction

processes, and the outcomes. Pre-service teachers are willing and able to genuinely reflect on the knowledge, skills, and dispositions they bring to teacher education programs and courses and on the development thereof if – and only if! – they see a benefit and if they do not have to fear personal disadvantages resulting from issues of achievement or 'non-compliance'.

relative to the modality of portfolio construction – namely, traditional, paper-based portfolios and electronic portfolios (e-portfolios) of more recent date, which in the following will be referred to as *forms* of portfolio construction.[32]

While some authors simply depict e-portfolios as digital counterparts of their paper-based predecessors (e.g., Bryant & Chittum, 2013; Corley & Zubizarreta, 2012), e-portfolio proponents often convey the impression of e-portfolios representing a wholly new, revolutionary, unsurpassable avant-garde form of portfolio-based learning and reflection, with e-portfolios purportedly offering various benefits over paper-based portfolios (an overview of benefits claimed in the pertinent literature is provided by Buzzetto-More, 2010).[33] E-portfolios are based on the pedagogies of traditional, paper-

[32] Mason, Pegler, and Weller (2004) write about e-portfolios as the electronic 'version' of portfolios, while van Wesel and Prop (2009) use the terms portfolio 'variants' and portfolio 'media'. Avraamidou and Zembal-Saul (2002) use the term 'formats' in relation to different implementations and realizations of portfolio. It is to be noted at this point, in the form of a general remark, that in present-day educational contexts probably *all* portfolios constructed are – either completely or at least to some extent – electronic (digital) portfolios, even in the courses where paper-based portfolios are required. In paper-based portfolios, many integral elements are constructed by means of technology, e.g., word processing software, too. It is hard to imagine students in contemporary higher/teacher education constructing portfolios doing completely without digital devices such as a desktop computer or a laptop, e.g., when writing texts. Thus, in the distinction of paper-based and electronic (digital) portfolios, boundaries are fluid to some extent – which is also true to some, albeit probably lesser extent in the other direction: Student artefacts, such as mind maps, can be artistically and aesthetically designed on paper and then be inserted in e-portfolios in the form of a scan. Consequently, in considering the processes of learning and reflection on the basis of these two options of portfolio construction, it might be appropriate to think about *predominantly* paper-based and *predominantly* electronic portfolios, as the case may be. The distinction becomes much clearer when the common division is followed, where the primary way of portfolio storage and/or the way stipulated for bringing the portfolio to class and/or turning the portfolio in at the end of a course or a program of study are the basis of the division. Interestingly, referring to Barrett (1998), Avraamidou and Zembal-Saul (2002, p. 7) state that "[e]lectronic portfolios differ from traditional portfolios in that information is collected, saved, and stored in an electronic format." This observation illustrates that in the literature, it is often merely the form of storage that is considered crucial for the (dichotomous) differentiation of paper-based and electronic portfolios.

[33] A rather short summary of – actual as well as potential – e-portfolio benefits is given by Meyer and Latham (2008, p. 36):

based portfolio development (Barrett, 2000); so consequently, as with their paper-based predecessors, there have been various definitions (e.g., Joyes, Gray, & Hartnell-Young, 2010) – a fact that is also due to the many purposes that can be followed by means of e-portfolios and the many shapes e-portfolios can take (e.g., Duffy, Anthony, & Vickers, 2008). As is noted in the literature, the implementation of e-portfolios is complex (Joyes et al., 2010), and while none of the decisions that have to be taken when implementing paper-based portfolios can be avoided, additional aspects have to be decided on (e.g., whether to use a commercial solution, a custom-built product for e-portfolio construction, or open source e-portfolio software, see, e.g., Duffy et al., 2008).

Electronic portfolios (e-portfolios) can be divided into portfolios that are constructed in a digital form and then saved and retrieved locally or on a physically movable data storage device only (as was the case with early e-portfolios (e.g., Lankes, 1995) before access to the Internet was common and ubiquitous),[34] and portfolios that are con-

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> One of the most evident benefits of an e-folio system is the elimination of physical storage problems. A second benefit is accessibility. Faculty can tap into the e-folio wherever there is an Internet connection. And, e-folios give administrators the capability of tracking students, aggregating and disaggregating data, and organizing curricula around professional standards more easily than doing these tasks manually, especially at institutions with many students and large amounts of data.

This statement is striking insofar as *not one* of these considerations appears to be directly related to outcomes of quality learning on the basis of an e-portfolio environment. While the first two aspects are related to ease of use (conveying the strange impression that the focus of interest is solely on faculty, not on students), the following thoughts are concerned with purely organizational issues. Not one single consideration seems to be dealing with the processes and products of student learning – i.e., with two of the very basics of any educational process. With a view to the summary of "pedagogical benefits of e-portfolios" provided by Buzzetto-More (2010, p. 66), several of the benefits listed are not typical of e-portfolios only, but of paper-based portfolios, too.

[34] Reading early texts on e-portfolio construction can lead to amusement nowadays, the current state of technology being common knowledge, and the rapid advances in information and communication technologies (ICT) over the past two decades having contributed to the increasing use of technology in education (San Jose, 2017). In the mid-1990s, Zubizarreta (1994) described the storage of e-portfolio elements on computer disks as technologically sophisticated – which then, as many of us remember, certainly was the case. Yet, it may safely be assumed that most present-day university

structed by means of the Internet, thus being available online, for the author as well as for others, as is the case with Web-based portfolios, which may be constructed in collaboration, e.g., in exchange with and with support from the teacher educator, the co-operating teacher, and peers, and which can be made accessible online for presentation.

With a view to e-portfolio implementation in teacher education, there are currently to be found digital portfolios as 'e-portfolios' in the generic sense of the term (i.e., as digital/digitized collections of student work), usually in the form of web-based portfolios[35] (e.g., Avraamidou & Zembal-Saul, 2002; Avraamidou & Zembal-Saul, 2006; Chang, 2001; Herner-Patnode & Lee, 2009; McWhorter, Delello, Roberts, Raisor, & Fowler, 2013; Milman, 2005; Oner & Adadan, 2011; Oner & Adadan, 2016; Thomas, Lamson, & King, 2001; Zembal-Saul, Avraamidou, Severs, & Dana, 2002), as well as more specific forms of e-portfolios, such as video portfolios (e.g., Admiraal et al., 2011) and portfolios making use of specific technological innovations of recent date, such as portfolios based on weblogs ('blogs'; e.g., Chuang, 2008; Chuang & Liu, 2008; Chuang, 2010; Tang & Lam, 2014) or social media, e.g., Facebook® (e.g., Kabilan, 2016). Only a few years ago, at the beginning of the century, it was the multimedia aspect of e-portfolio construction that was of particular interest (e.g., Barrett, 2000; Glasson & McKenzie, 1999; Smith et al., 2001) and then considered state of the art (Read & Cafolla, 1999). [36] Basi-

students never held a computer disk in their hands. In the course *Schulpraktische Studien 1 (SPS 1)* (see Chapter 4), students were at a loss what to do when, a few semesters ago, they were asked to write their digital portfolios on a CD/DVD prior to handing them in for grading and archiving – there simply were no more CD/DVD devices in their desktop computers and laptops. In texts published in the late 1990s, concepts of e-portfolio construction involving use of the internet become evident (e.g., Aschermann, 1999; Purves, 1996). Today, students organize their lives, including their studies, by means of the internet. Yet, university teachers would be well-advised not to assume each and every student to be technologically literate and competent in the use of digital media, i.e., to critically examine the – grossly misleading and by no means accurate – popular notion of *all* students born after 1980 as being 'digital natives' (e.g., Akçayır, Dündar, & Akçayır, 2016; Bennett, Maton, & Kervin, 2008; Jones, Ramanau, Cross, & Healing, 2010).

[35] A form of hypermedia portfolios (Avraamidou and Zembal-Saul, 2002).

[36] It is to be noted that the variety of portfolio purposes as well as the multitude of portfolio forms designed and the different approaches to portfolio construction taken are illustrated by the large range

cally, independent of the form of portfolio chosen, portfolio development is – or from a pedagogical point of view: should be, at any rate– intended for students' professional development and personal growth.

As is the case with paper-based portfolios, the purpose(s) of e-portfolio implementation in teacher education can be assigned to one or more of the broad categories of portfolio construction: learning, assessment, and/or employment (e.g., Wolf & Dietz, 1998). In addition, e-portfolios as a digital form of portfolio construction may be deliberately chosen and implemented in order to introduce technology into teacher education programs, thus providing students with the opportunity to acquire and/or expand their technological skills (e.g., Lin, 2008), with a view to supporting and improving pre-service teachers' technology literacy and to encourage them to use technology in instructional design, both during practicums and in their professional teaching after completion of university teacher education.[37]

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of terms used to denote specific portfolio implementations (for an overview of portfolio terms in German, see Häcker, 2011). In the German language, like in the English language, composite nouns can be formed to denote particular features of a given portfolio approach – as in English is the case with such terms as 'webfolio' (e.g., Sorin, 2005) or 'processfolio' (e.g., Silveira, Beauregard, & Bull, 2017). With a view to the rise of e-portfolio in teacher education, Norton-Meier (2003) even goes so far as to coin the verb 'to efoliate' to correspond to the noun 'efolio'. The variety of purpose and design makes it complex to systematically investigate the impact of 'portfolio' as an educational tool (Koch-Priewe, 2013) and to make general statements on the effects of portfolio construction.

[37] Not surprisingly, practicing teachers' decisions to use information and communication technology (ICT) in the classroom depends on a number of factors (for a review of the literature on this issue, see Mumtaz, 2000), among those not only actual access to resources, but also teachers' motivation and their background in formal computer training (Mumtaz, 2000). In their review of pedagogies related to the use of information and communication technology (ICT) in primary and secondary schools, Webb and Cox (2004, p. 235) point out that

> [t]he evidence suggests that new affordances provided by ICT-based learning environments require teachers to undertake more complex pedagogical reasoning than before in their planning and teaching that incorporates knowledge of specific affordances and how these relate to their subject-based teaching objectives as well as the knowledge they have always needed to plan for their students' learning. In addition the research shows that teachers' beliefs about the value of ICT for learning and

So, what can be plausibly assumed as affordances specific to technology use in e-portfolio-based reflective learning? Due to the number and complexity of variables interacting in educational settings, the evaluation of the nature and the scope of the influence information and communications technology (ICT) has on the quality of learning is highly problematic (Kennewell, 2006). Research on the introduction of electronic portfolios was largely based on general portfolio research, yet factors and features specific to digital portfolios have to be considered, too (Woodward & Nanlohy, 2004b). In the literature reporting research on the electronic form of portfolio, there appear to be only few studies researching concurrent implementations of digital portfolios and their paper-based counterparts with a view to comparing them (e.g.. Driessen, Muijtjens, van Tartwijk, & van der Vleuten, 2007; van Wesel & Prop, 2009).[38] While numerous authors list potential benefits of electronic portfolios (as is done, e.g., by Barrett, 1999, within the scope of her extensive work on e-portfolio; by Oakley et al., 2014, on the basis of existing literature; and by Strudler & Wetzel, 2008, and Wetzel &

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the nature of successful learning environments are important in teachers' pedagogical reasoning.

It can be assumed that the educational outcomes of a purposeful use of ICT in school teaching, depending on the quality of instructional design and, thus on the quality of the learning environment and the learning experiences offered, are largely based on teachers' knowledge, skills, and dispositions in relation to the use of ICT (as an innovative element of teaching and teacher education) as well as on "the knowledge they have always needed to plan for their students' learning" (Webb and Cox, 2004, p. 235), i.e., teacher knowledge such as pedagogical knowledge and pedagogical content knowledge (as the traditional elements of teaching and teacher education; for seminal texts on the knowledge base of teaching, see the works of Lee Shulman, e.g., Shulman, 1987a). For the concept of pedagogical content knowledge, see Shulman (1986a). For the concept of TPACK (technology, pedagogy, and content knowledge), based on the Shulman's concept of pedagogical content knowledge (PCK) and integrating technology into processes of teaching and learning, see Koehler and Mishra (2009). In technology-based instructional processes, "[t]eachers create structure, give advice, and monitor progress" (Kozma, 2003, p. 1), all of which are professional tasks teachers have to be prepared for, in pre-service (e.g., Cydis, 2015) as well as in in-service (e.g., Kankaanranta, 2001) teacher education. For a review of the literature on strategies to incorporate technology into pre-service teacher education, see Kay (2006).

[38] An observation which would be all the more astounding if there were abounding research on electronic portfolios, as is claimed by some authors, e.g., Watty and McKay (2016).

Strudler, 2006, on the basis of questioning students and faculty at a teacher education institution), others enumerate what they consider to be drawbacks of traditional, paper-based portfolios (e.g., Avraamidou & Zembal-Saul, 2002).[39]

When opting for e-portfolios in the introduction of portfolio, or when moving from paper-based portfolios to e-portfolios, a word of caution is warranted, as is the case with any educational innovation (van Wesel & Prop, 2009).[40] In the literature, there are several texts noting not only potential advantages, but also potential disadvantages of e-portfolios (e.g., Chambers and Wickersham, 2007; Wickersham & Chambers, 2006). Highlighting "[o]ne of the inherent dangers with digital portfolios", Woodward and Nanlohy (2004b, p. 227) state that "… the technological novelty of the product could overshadow the purpose of the portfolio. The danger is that learning to use the technology itself could then subsume the learning opportunities of portfolio construction." It seems noteworthy that in the introduction to their article Woodward and Nanlohy (2004b, p. 227) acknowledge the "significance of technology"[41] which they realize, but which has to be brought into balance "so that the fundamental value of de-

[39] If we take an article published by Avraamidou and Zembal-Saul (2002) as one instance, it becomes particularly obvious that while there *does* exist a number of valid arguments for the implementation of e-portfolios in particular educational settings – viz., where they are in line with the intended learning outcomes (ILOs) and contextually appropriate –, not all arguments purportedly in favor of e-portfolios and/or against paper-based portfolios are of the same quality. With reference to Dollase (1996), Avraamidou and Zembal-Saul (2002) note that extensive photocopying costs were to be seen as a drawback of paper-based portfolios. While, interestingly, no such claim could be found among the key concerns listed in the article by Dollase (1996), we may safely assume that while the issue of the cost of instruction – both for faculty and for students – actually has to be taken into account when planning and arranging instructional processes, in this digital age the cost of printing or photocopying the items in a paper-based portfolio of reasonable size will be manageable for students. Thus, while some of the arguments for e-portfolios and/or against paper-based portfolios mentioned in the pertinent literature are immediately plausible – such as students' development of ICT skills, the inclusion of multimedia, and easier sharing of and access in the case of e-portfolios (van Wesel and Prop, 2009), other arguments seem to be rather far-fetched, and not immediately related to the quality of student learning.

[40] Watty and McKay (2016, p. 194) even note that "[s]ome suggest that the decision to use new technologies, like ePortfolios, is often made in ignorance of pedagogic evidence."

[41] Nota bene: The *significance*, not the *superiority* of technology.

veloping a portfolio is maintained." With a view to the implementation and use of web-based portfolios, Driessen, Muijtjens et al. (2007, pp. 1067–1068) note that

> … on the surface, WBPs appear to offer many advantages. It has been suggested that a possible drawback is that electronic presentation may diminish depth of reflection because it may deflect students' attention from content to form. So far, however, there is little evidence to substantiate either the positive or the negative claims. What evidence is available is mostly confined to descriptions of individual portfolios or different types of portfolios and measurements of students' and/or teachers' satisfaction with WBPs.

The question of whether in professional teacher development e-portfolios are to be (categorically) preferred over their paper-based counterparts has also been posed quite recently by Xerri and Campbell (2016), who address various challenges of e-portfolio implementation, among them a possible lack of technical know-how[42] and the risk that with e-portfolios "[t]he Glitz and Glitter of Web pages" (Goldsby & Fazal, 2000, p. 123) might distract attention from the substance of the portfolio.[43] Xerri and Campbell (2016) agree with (Woodward & Nanlohy, 2004a, p. 176) that the implementation of e-portfolios "… needs to include an alignment with previously developed successful portfolio principles and structures" and quote Pecheone, Pigg, Chung, and Souviney (2005) in stating that if technology brings about no benefit – or even leads to a deterioration of the situation –, the technology or the implementation thereof must be reassessed. While on an international scale electronic portfolios are being introduced into programs of initial teacher education (e.g., Oakley et al., 2014), questions as to the impact of the affordances of *technology* (such as multi- and hypermedia) on pre-service teach-

[42] Which may well occur on the part of teachers as well as on the part of learners.

[43] Similar concerns that there might be the risk of e-portfolios to favor form over content were raised by Conrad (2008), who, referring to Barrett (2000), posed the question whether assessors of e-portfolios might be distracted from the contents of a portfolio.

ers' learning and reflection remain, especially with a view to the comparison of electronic portfolios to their traditional, paper-based counterparts.[44]

As it is two key elements that constitute the topic of this dissertation – (1) portfolio as an educational tool for learning and reflection as well as (2) teacher education and the instructional design of learning environments for the (initial) education of (pre-service) teachers in higher education settings –, in the following section, some (very brief)[45] notes will be made on specific aspects of teacher professional preparation, before attention will be directed towards the theoretical and conceptual bases of learning and reflection for professional development and personal growth.

[44] Such a comparison of the two different portfolio forms in an otherwise similar learning environment would be a possible, feasible research design, as undertaken by Driessen, Muijtjens, van Tartwijk, and van der Vleuten (2007) as well as by van Wesel and Prop (2009).

[45] Brevity is in the eye of the reader. Yet, the following notes can be considered as very brief, keeping in mind what might be said in general about different aspects of teacher professional preparation and the perennial discussions surrounding them.

2.1.2 Teacher professional preparation in higher education: Some (very brief) notes

As illustrated by the pertinent literature, there are different terms to denote the path to professional teaching, such as 'teacher education', 'teacher preparation', and 'teacher training'.[46] While the three terms named convey predominantly the idea of a teaching/learning activity being offered to teachers as learners, a fourth term, 'teacher development', can be seen as development referring to both, the activity of educating teachers and the resulting change in teachers' knowledge, skills, and dispositions. One of the paramount aims of teacher professional development is teacher agency (e.g., Flessner, Miller, Patrizio, & Horwitz, 2012; Moate & Ruohotie-Lyhty, 2014).[47]

With regard to the preparation of teachers as professionals, advancing a normative position seems both necessary and justified: The aim of teacher professional preparation in higher education settings must be to provide (pre-service) teachers with learning environments that offer them the opportunity to construct and elaborate the knowledge, to acquire and practice the skills, and to form and critically reflect on the dispositions which are conducive to quality teaching, both in their first steps in student teaching as well as throughout their future careers.[48]

Reflection is a key activity in teachers' developing practice (Postholm, 2008). The importance of reflection can be derived from the consideration that although there is no

[46] Throughout this dissertation, the term 'teacher education' will be preferred to the term 'teacher training', the notion of education as related to the comprehensive concept of *Bildung*, both professionally and personally, comprising so much more than a simple 'training', e.g., of skills.

[47] For a theoretical review of teacher professional development see Postholm (2012). A review regarding the effectiveness of teacher professional development is provided by van Veen, Zwart, and Meirink (2012).

[48] While there seems to be no general agreement as to the details of what constitutes 'quality teaching', it is stated in the literature that quality teaching can be defined as comprising good and successful teaching (e.g., Maruli, 2014) – leading to the follow-up question of what constitutes 'good teaching' and 'successful teaching' (e.g., Strong, 2011). For the purposes of this dissertation, 'good teachers' are considered to be teachers who design learning environments that are conducive to pupils' learning, who support their pupils' learning, who care for their pupils' and their pupils' development – both with a view to the present and to the future –, who are motivated and willing to act professionally, effectively and responsibly, who are capable of doing so to the best of their pupils' interests while at the same time keeping in mind and not neglecting their own well-being.

common, definite agreement on what is to be included in the elements to be addressed in teacher professional preparation, it is possible indeed to prepare pre-service teachers for student teaching and their entry into a career of professional teaching – while it is certainly impossible in a complex, ever-changing world to anticipate everything and to equip teacher education students with every single element of knowledge, skills, and dispositions that they will or may need to successfully master everyday teaching as well as the pedagogic challenges they will be faced with over the course of their careers. So, with regard to the processes and outcomes of teacher education, teacher professional preparation must keep in mind both the importance of the initial 'setup' for teaching and the constant fine-tuning and re-adjustment teachers must carry out with regard to their competence – and thus a present-day qualification for future processes of continuous teacher (self-)adjustment and (self-)adaption. This is one of the considerations illustrating the importance of reflection for lifelong learning.

Generally, the professional preparation of teachers can be divided into two phases: pre-service education and in-service education. Pre-service teacher education is focused on the initial 'setup' for teaching, while in-service teacher education is to support the continuous fine-tuning of teacher competence.[49] As will be stated in the following section, teaching is a deeply moral undertaking, with knowledge, skills, and dispositions forming the bases of teacher competence and capability, which are complemented by further elements.[50] Thus, it can be stated that any given process of teaching as a professional activity is shaped significantly by the identity of the individual teacher.[51]

[49] For information on continuous professional development (CPD) in the form of in-service training, see, e.g., Fraser, Kennedy, Reid, and McKinney (2007); Kennedy (2005); and Kennedy (2014).

[50] Teaching and the quality of teaching are not only based on the triad of knowledge, skills, and dispositions, but also on teachers' motivation, will, values, beliefs, habits, attitudes, etc., depending on the conceptualizations of the terms. For the purposes of this dissertation, individual convictions, such as values and beliefs, as well as individual stimuli and inclinations, such as motives and attitudes, are seen as being comprised in a broad conceptualization of teacher dispositions.

[51] For an overview of issues related to teacher identity and implications for teacher education, see Beauchamp and Thomas (2009).

Teaching is shaped by teacher cognition, emotion, and motivation, and it is up to teacher education to take positive effects in these three domains.[52]

So, what can be considered aspects particular to teacher education, to teacher professional development in higher education?

1. As was noted at the very beginning of this dissertation, teaching is a complex task, as are teacher education and learning to teach. The challenge of teaching lies not only in its complexity, but also in the fact that it is an ever-changing task. In an ever-changing world as witnessed at the beginning of the 21st century, there is little constancy in teaching, neither with regard to instructional processes (e.g., the use of technology in the classroom, the inclusion of heterogeneous pupils), nor with regard to the intended outcomes of instruction (e.g., learning outcomes to be achieved, the subjects and topics to be included in the curriculum and the weighting thereof).[53] Teacher education has to prepare (pre-service) teachers for this complex and ever-changing environment as best it can.

2. There is no general agreement about what 'good teaching' (e.g., Devine, Fahie, & McGillicuddy, 2013) and 'good teachers' (e.g., Moore, 2004) look like, i.e., how these broad concepts are to be defined. While there is a growing body of research related to the characteristics of 'good teaching' (e.g., a clear lesson structure, coherence of contents, a supportive classroom climate, transparent expectations regarding achievement),[54] the thoughts of many – comprising pupils,

[52] There is a considerable body of literature dealing with teacher professional growth (e.g., Clarke & Hollingsworth, 2002), with teacher concerns at different stages of professional development from beginner to expert practitioner (e.g., Conway & Clark, 2003; Fuller, 1969; Smith & Sanche, 1993), etc. For a systematic literature review on issues related to early professional learning in teacher development, see Wilson, Hall, Davidson, and Lewin (2006).

[53] For a discussion of the purposes of 'good education', see, e.g., Biesta (2009).

[54] Overviews of what is known at present about the characteristics of 'good', i.e., effective, high-quality teaching, are provided in the German literature, in the form of summaries of research, by Meyer (2017) as well as by Helmke (2017). To the author's knowledge, the popular presentation by Meyer (2017) is widely used at the first stages of German teacher education (see Chapter 4 for a short presentation of the German teacher education system); it has recently reached its thirteenth edition.

pre-service teachers, and in-service-teachers – regarding 'good teaching' and, thus, 'good teachers' can be assumed to be largely based on beliefs (e.g., Arnon & Reichel, 2007; Devine et al., 2013; Murphy, Delli, & Edwards, 2004) – and to probably continue to be so.[55] Given teacher effectiveness research, there is a whole domain of research dealing with effective teaching (e.g., Campbell, Kyriakides, Muijs, & Robinson, 2003; Creemers, Kyriakides, & Antoniou, 2013a; Creemers, Kyriakides, & Antoniou, 2013b; Goe, Bell, & Little, 2008; Kyriakides, Demetriou, & Charalambous, 2007; Muijs, 2006; Muijs, Campbell, Kyriakides, & Robinson, 2005).[56] With a view to the search for the essence of a good teacher,

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The summary provided by Helmke (2017) seems to have met with equal success. For principles and practices of effective teaching also see international references, e.g., Brophy (2000), and Muijs and Reynolds (2018).

[55] Eliciting and challenging these beliefs held by pre-service teacher students, formed over the course of many years of experience as pupils at school, can be stated to be one important focus of (reflective) teacher education (Pajares, 1993). Everyone holds beliefs about almost everything, convictions and suppositions that are *felt* to be true, but lack critical examination in the light of reason and available evidence, yet guide humans' thinking and acting. Like knowledge, they are part of an individual's cognition, situated in the individual's mind, which is as unique as his or her fingerprint. When looking at beliefs in the course of this dissertation, the focus is on *pedagogical* beliefs, i.e., (pre-service) teachers' beliefs related specifically to the domain of teaching and learning (Tondeur, van Braak, Ertmer, & Ottenbreit-Leftwich, 2017). As is noted by Pajares (1992, p. 314), "[a]ll teachers hold beliefs, however defined and labeled, about their work, their students, their subject matter, and their roles and responsibilities …". The insertion of the comment "however defined and labeled", draws attention, in quite a refreshing way, to the fact that, quite unsurprisingly, similar to the situation relative to other educational technical terms like 'portfolio', 'learning', 'reflection', etc., with the concept of pedagogical beliefs there is – and in all probability will continue to be – a myriad of ways in which they are conceptualized in the pertinent literature (Tondeur et al., 2017). Teachers' beliefs form part of a complex and multifaceted belief system (e.g., Ertmer & Ottenbreit-Leftwich, 2010). A distinction that is of relevance for reflective teacher education is the differentiation between 'core beliefs' (e.g., Ertmer, 2005), the beliefs most stable and most difficult to change, and beliefs that are more peripheral, more recently formed, more dynamic, and more open to change (e.g., Fives & Gill, 2015).

[56] A summary of teacher effectiveness dimensions and related research is provided by Stronge, Ward, Tucker, and Hindman (2007). In an age of accountability, Campbell, Kyriakides, Muijs, and Robinson (2004) discuss the inclusion of a value dimension into the concept of teacher effectiveness, previous teacher effectiveness research having shown a tendency to neglect these values.

Korthagen (2004) advocates a more holistic approach in the form of an umbrella model incorporating teacher identity and mission.[57]

3. Despite the elusive concepts of 'good teaching' and 'good teachers', there is widespread agreement indeed as to various elements of a 'teacher knowledge base', e.g., content knowledge, pedagogical knowledge, and pedagogical content knowledge. In the literature, the extensive works by Lee Shulman are often referred to when teacher knowledge is considered (e.g., Shulman, 1986a; Shulman, 1987a).[58] Likewise, it can be assumed that there are skills conducive to effective teaching (e.g., observation skills, as presented by Borich, 2015) as well as there are dispositions contributing to what can be considered as good (e.g., Helm, 2006), effective (e.g., Giovannelli, 2003) teaching.

4. Teacher professional development can be regarded as a science (Griffin & Brownell, 2018), with teacher educators as experts in their field (e.g., Vanassche & Kelchtermans, 2014) and as role models (Izadinia, 2012; Lunenberg, Korthagen, & Swennen, 2007; Swennen, Lunenberg, & Korthagen, 2008). With teacher educators preparing future teachers, as educators of educators, teacher educator professional development is vital for successful teaching and learning in schools (Ben-Peretz, Kleeman, Reichenberg, & Shimoni, 2010). In the literature, there appears to be a growing body of research on teacher educator professionalism and professional development.

5. There continues to be the challenge of integrating theory and practice in preservice teacher education, with attempts to bridge the theory and practice gap (e.g., Cabaroglu, 2014) and make connections between theory and practice (e.g.,

[57] It is to be noted that Korthagen (2004) writes about the essence of *a* good teacher, not about the essence of *the* good teacher. It should also be kept in mind that there are various approaches to good teaching, depending on purpose, context, etc., as is pointed out by Helmke (2017).

[58] For more information on teacher knowledge, also see, e.g., Ball (1988); Ben-Peretz (2011); Gitomer and Zisk (2015); Loughran (2010); Meijer (2010); Santoro, Reid, Mayer, and Singh (2013); Turner-Bisset (1999); Verloop, van Driel, and Meijer (2001). In the literature, teacher knowledge is often named together with, and as distinct from/in opposition to, teacher beliefs (e.g., Calderhead, 1996; Hanrahan & Tate, 2001; Blömeke, Buchholtz, Suhl, & Kaiser, 2014; Tillema, 1995).

Hennissen, Beckers, & Moerkerke, 2017; Korthagen, 2010; Korthagen, Kessels, Koster, Lagerwerf, & Wubbels, 2001; Szabo, Scott, & Yellin, 2002; Tilson, Sandretto, & Pratt, 2017) by acting and reflecting (e.g., Eriksen, Larsen, & Leming, 2015) being made by means of the integration of practicums providing field experiences (e.g., Allen & Wright, 2014; Allsopp, DeMarie, Alvarez-McHatton, & Doone, 2006; Stenberg, Rajala, & Hilppo, 2016). Reflection is the key to the integration of theory and practice in teacher education and teaching practicums (e.g., Orland-Barak & Yinon, 2007; Stenberg et al., 2016).[59]

6. With regard to the effectiveness of educational measures taken, research remains to be done on the impact of teacher professional development on teachers' practice (e.g., Buczynski & Hansen, 2010; Desimone, 2009; Hascher & Neuweg, 2012; King, 2014; Nuttall, 2016).[60, 61]

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[59] In teacher education practice, three observations are constantly made by the author, which have repeatedly been confirmed by teacher education colleagues: (1) At the beginning of a course, university students tend to associate everything taking place in the university classroom with 'theory' and everything taking place at school with 'practice'. This is an issue related to students' concepts of 'theory' and 'practice' which has to be addressed. (2) Students usually favor 'practice' over 'theory', tending to discredit educational theory as being of little help in the practice of teaching. (3) When demonstrating to students the benefits of educational theory, e.g., by carrying out the steps of a reflective cycle integrating insights from theory with issues encountered and observations made in practice, it is of vital importance that not only the teacher educator, but also cooperating teachers at school underline and demonstrate the importance of the integration of theory and practice. Alas, in the practicum, 'practice' is often preferred to 'theory' (e.g., Hascher, Cocard, & Moser, 2004).

[60] In research on the impact of teacher professional development, particular aspects are singled out in the literature, e.g., the impact of student teaching on pre-service teachers (e.g., Burgess, Briscoe, & Williamson, 2006; Caires & Almeida, 2005; Tabachnick & Zeichner, 2016).

[61] At the *10. Bundeskongress der Zentren für Lehrerbildung* (10. National Congress of the Centers for Teacher Education in Germany), taking place on 23–24 March 2017 at the Ruhr-Universität Bochum, the educational researcher Ewald Terhart in his opening presentation on 23 March 2017 illustrated why it is so complicated to establish the impact of professional teacher education on teacher practice and on student achievement. Referring to Keller-Schneider and Albisser (2012), he presented issues related to the impact of teacher professional development on teacher practice and student achievement as an extended realization of the *Angebots-Nutzungs-Modell* ('Offer-and-Use-Model'), which currently is the most famous effect model in school and classroom teaching research (Wacker &

7. While teaching can be seen as a profession (e.g., Darling-Hammond, 2005; Hiebert, Gallimore, & Stigler, 2002), in the past there has been – and for many there still is – no agreement on this property (e.g., Goodwin, 2012). Independent of this controversy, pre-service teacher education can be seen – and in the literature is seen by many – as teacher professional development, teacher professionalism being the basis of quality teaching in schools. As professionals, teachers have to integrate knowledge, skills, and dispositions to form a coherent whole within their teacher identity, and they have to integrate reflections on experience.

8. Contemporary teacher education draws on a large array of scientific disciplines, e.g., pedagogy, psychology, and neuroscience. Findings from these domains have to be integrated into a coherent whole. This is the task both for the teacher educator, presenting the contents of the curriculum, and for the student, expected to engage in meaningful learning and productive reflection.

9. Pre-service teachers in teacher education programs and courses do not arrive with their minds as clean slates, but, from their own experience as pupils and from witnessing development in the educational sector of society, bring along knowledge, skills, and dispositions (as well as beliefs, values, etc.) related to teaching practice. Pre-existing 'habits of teaching', formed on the basis of the significant experience they have acquired in schools, can be divided in to three

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Kohler, 2013). In teacher professional education, learning opportunities are offered to (pre- and, as the case may be, in-service) teachers. The decision of whether and to what extent these learning opportunities are taken up, i.e., used, is basically up to the teachers as learners. The use made of the learning opportunities provided by teacher professional education influences teachers present or future teaching practice. While this can be seen as a first realization of the *Angebots-Nutzungs-Modell*, a second – original – realization of the *Angebots-Nutzungs-Modell* follows: Teachers in the form of their teaching practice provide, i.e., offer, learning opportunities for their pupils. Whether and to what extent these are taken up, is largely up to the pupils as learners. The use made of the learning opportunities provided influences pupils' achievements. Thus, "unpacking the flow of teacher education's impact on student learning" is complicated Diez (2010, p. 441), with numerous moderating and mediating variables on the way. For further discussion of the impacts of teacher education, also see Terhart (2012).

distinct categories: skills that (still) need to be learned, foundations that can be built upon, and approaches that need to be unlearned (Shaughnessy & Boerst, 2017). In order to uncover the elements making up these three categories, it is vital to elicit students' thinking.[62]

10. Analogous to considerations regarding the heterogeneity of pupils, it should be kept in mind that teacher education students as human beings are heterogeneous, too. They all have their own, individual capabilities, dispositions, beliefs, wishes, dreams, hopes, etc., and they all experience teaching and teacher education in their own, unique way. In pre-service as well as in in-service teacher education, it is important to take into account these differences between teacher education students as learners and the differences in their experiences of teaching/learning processes. There is no ready-made solution to that, no 'one size fits all' approach. Individualization and individual learning must be allowed for. Again, reflection is one way of taking into account the uniqueness of students and their individual experiences of teaching and learning.

The paramount aim of pre-service teacher education must be to provide students with an initial foundation of knowledge, skills, and dispositions that will certainly not suffice – neither at present nor in the future –, but serve as an initial 'setup', a sound basis for good, effective, high quality teaching, and an equipment containing the tools for continuous professional fine-tuning and re-adjustment. Teacher education is about preparing teachers to learn from teaching (Hiebert, Morris, Berk, & Jansen, 2016).[63] In paving the path to practical wisdom (Feldman, 1997; Shulman, 1987b, 2004, 2007; Tyson, 2016) and sound professional judgment (e.g., Dottin, 2009; Scales et al., 2017), *preparation* for teaching, not only *training* for teaching, must be the aim of teacher

[62] From a philosophical stance, shared by many teachers, education is not so much a 'putting in' as a 'drawing out', i.e., an elicitation of learners' thoughts (Blackburn, 2006) in order to use them as a basis for further learning and reflection.

[63] This is an undertaking which, among other things, involves showing students how to construct meaning from and reflect productively on the stream of consciousness during and related to (everyday) teaching. Here, as in teacher education in general, teacher educators can act as role models, commenting their reflection in and on their teaching that students witness.

education, with both teachers' professional development and teachers' personal growth being kept in mind.[64] Teacher education continues to be a challenging undertaking.[65]

Following this first section of Chapter 2, regarding key issues addressed with a view to the topic of this dissertation – the educational instrument of portfolio and teacher professional preparation as a domain of higher education –, a closer look will now be taken at the educational processes of learning and reflection as bases for professional development and personal growth in higher education settings; processes that are essential in and of vital importance for the success of portfolio construction and teacher education.

[64] The concurrent care for the professional as well as for the personal domain follows from teacher preparation being a human educational undertaking, where a focus on a merely professional qualification would be too narrow. In addition, the professional and the personal domains are inextricably linked within the teacher's identity, taking impact on his or her everyday teaching.

[65] Schneider (2017) in his essay tracks the history of teacher preparation, aptly choosing the title "Marching forward, marching in circles: A history of problems and dilemmas in teacher preparation".

2.2 Learning and reflection for professional development and personal growth

2.2.1 Theories and concepts of student learning: A closer look at complex ideas

The process as well as the outcomes of learning – including learning by reflection, i.e., reflective learning, as a particular form of learning –[66] can be regarded as being essential to any kind of professional development and personal growth, in higher education as well as before and beyond.[67] As in other domains of higher education, in teacher education there is the tripartite classification of knowledge, skills, and dispositions that is considered to comprise the key elements relevant to the preparation of competent professionals (e.g., Herner-Patnode & Lee, 2009; Lanas & Kelchtermans, 2015, Lin, 2008; Wray, 2007).

With a view to the *substance of learning* in teacher education, both with regard to the process and the product(s) of learning, the areas of knowledge, skills, and dispositions can be further subdivided. Considerations of teacher knowledge usually make reference to the seminal work by Shulman (1986b). While the ever-evolving knowledge base of teaching can be defined as "… all profession-related insights that are potentially relevant to the teacher's activities" (Verloop et al., 2001, p. 443), teacher knowledge is the knowledge that a particular teacher has at his or her disposal at a particular moment (Carter, 1990). It comprises elements such as subject content knowledge, general pedagogical knowledge, pedagogical content knowledge, and curriculum knowledge. Due to the huge impact of continuous technological progress in education and increasing technology integration into classrooms, the construct of technological pedagogical content knowledge has been introduced in recent years (e.g., Koehler & Mishra, 2009; Mishra & Koehler, 2006) as one more form of teacher knowledge. The field of teaching skills includes proficiency in areas such as classroom management and educational assessment, while one possible conceptualization of professional dispositions would be

[66] Reflection (for learning) as a particular way of processing experience (including thought, emotion, and action) is dealt with in detail in Section 2.2.2. As was stated by the great empiricist John Locke, all ideas come from sensation and reflection (Locke & Woolhouse, 2004).

[67] There can be no doubt regarding learning as a *conditio sine qua non* for professional development as well as for personal growth. As to the question of whether reflection in the form of reflective practice is to be considered an essential component of becoming a professional teacher, see Meierdirk (2016).

to consider them as 'habits of mind' related to the employment of particular skills, such as to critically examine the effectiveness of methods used in teaching and to make modifications where necessary (Katz & Raths, 1985). It is the views on the topics of competent, effective teachers and good teaching in a complex, changing world that shape the ideas and the recommendations of "what teachers should learn and be able to do" (Darling-Hammond & Bransford, 2005).

With a view to *the ways of learning*, in teacher education as well as in higher education in general, there are three distinct traditions of research on students' learning: (1) Research on students' self-regulated learning (SRL; e.g. Boekaerts, 1997; Nussbaumer, Dahn, Kroop, Mikroyannidis, & Albert, 2015; Pintrich, 2004; Winne & Hadwin, 2010) and, before research on SRL, (2) research on cognitive information processing (IP; e.g., Winne, 2001), which have been primarily followed in North America (Lonka, Olkinuora, & Mäkinen, 2004; Pintrich, 2004), as well as (3) research on student approaches to learning (SAL), which represents a predominantly European (Lonka et al., 2004; Pintrich, 2004) and Australasian (Pintrich, 2004) perspective originating in the works by Marton and Säljö (Marton & Säljö, 1976a, 1976b) with subsequent generalizations and extensions by numerous renowned authors up to the present (Biggs, 1988, 1989, 1996, 1999; Biggs & Tang, 2011; Entwistle, 1988, 1991, 2001; Entwistle, Hanley, & Ratcliffe, 1979; Entwistle & Peterson, 2004b; Entwistle & Tait, 1990; Entwistle & Waterston, 1988; McCune & Entwistle, 2011; Prosser & Trigwell, 2014; Trigwell & Prosser, 1991a, 1991b; Trigwell, Prosser, & Waterhouse, 1999).[68]

SRL and SAL are both important in their own rights: In order to educate students for independent, lifelong learning, which in complex professions such as teaching is indispensable in times of rapid change, students must be enabled to self-regulate their learning processes (Pintrich, 2004), with competencies for self-regulated learning being crucial for lifelong learning (Nussbaumer et al., 2015). Student approaches to learn-

[68] While research on SRL and SAL goes on, with both focuses of research being widespread in the higher education context, the amount of research in the field of classic information processing theory – discussing the processes and mechanisms through which learning occurs, with a focus on memory, information encoding, and information retrieval (see, e.g., the seminal model by Atkinson & Shiffrin, 1968) – seems to have decreased in recent years.

ing can be seen as a complementary perspective: With a view to *quality learning* in higher education settings, it is not only important *what* students learn (the frame of which is established by the curriculum), and to prepare them for the continuation of learning after graduation; but it is also important *why* and *how* students learn and to what effects. Quality teachers as required for excellent education at schools need quality learning, which is about active, motivated, reflective learning for understanding and for new insights. In literature on higher education teaching and learning published in recent years, a clear shift of focus from what the teacher does to what the student does is evident (as is the case, e.g., with Biggs & Tang, 2011).[69]

In the context of teacher education, it is also important to take into account the sociocultural aspects of learning (Säljö, 2010). Participants in a program or course of teacher education can be seen as a community of learners (e.g., Cooper, 2007), while during student teaching they are also introduced to a community of practice (e.g., Hou, 2015). Collaboration of student teachers can be regarded as preparation for social practices at

[69] As noted by Shuell (1986, p. 429),

> … if students are to learn desired outcomes in a reasonably effective manner, then the teacher's fundamental task is to get students to engage in learning activities that are likely to result in their achieving those outcomes, taking into account factors such as prior knowledge, the context in which the material is presented, and the realization that students' interpretation and understanding of new information depend on the availability of appropriate schemata. It is helpful to remember that what the student does is actually more important in determining what is learned than what the teacher does.

So the paramount importance of student-centered teaching and learning, based on student engagement and student activity, was realized by Thomas J. Shuell more than 30 years ago. It seems interesting to note that the importance of student engagement and student activity also forms one basis of the *Angebots-Nutzungs-Modell* ('Offer-and-Use-Model') referred to in Section 2.1.2, an effect model providing a framework for research on teaching and learning in schools, originally conceived by Helmut Fend, as laid out, e.g., by Seidel (2014) (who translates the term *Angebots-Nutzungs-Modell* as 'Utilization-of-Learning-Opportunities-Model', which, by the way, to the author of this dissertation is a more elegant translation and captures more adequately the contents of the model than the translation used so far.). At all levels of education, teacher activity may be in vain if students fail or refuse to decide, on the basis of previous experiences and their perceptions of the present situation, to take up a learning opportunity and utilize it actively.

school (Dobber, Akkerman, Verloop, & Vermunt, 2012), learning being conceptualized as collective meaning-making (Paakkari, Tynjälä, & Kannas, 2011). Two more particularities of learning for professional development and personal growth in teacher education are to be pointed out in the present context:

(1) The effects of individuals' beliefs (e.g., Tillema, 1994; Valcke, Sang, Rots, & Hermans, 2010; Weinstein, 1990) have to be taken in account. Teacher education students bring along pre-conceptions (Weinstein, 1989; Wubbels, 1992; also see Section 2.1.2 of this dissertation). Beliefs tend to guide perceptions of program and course contents and experiences as well as students' thoughts and actions, so it is desirable that participants in teacher education be given the opportunity to consciously explicate their beliefs – and that these beliefs be challenged, if from the teacher educator's/expert pedagogue's point of view they seem to be professionally inappropriate or in need of further clarification and refinement.

(2) Teaching as a profession is a deeply moral undertaking (Bullough Jr, 2011; Sanger & Osguthorpe, 2011; Sanger & Osguthorpe, 2013; Veugelers, 2010).[70] Responsibility for good teaching – which from this perspective can be seen as effective and efficient teaching, based on moral values – is conferred upon teachers, who have to be conscious of this responsibility and live up to it. With a view to morally responsible teacher actions, ample opportunity should be provided for teacher education students to examine and contest their personal and professional values and attitudes in comparison with educational values.

Given a purposeful plan for the portfolio to be constructed, a careful selection of contents to be covered, and a proper design of the portfolio tasks to be carried out by teacher education students,[71] the particular appeal of portfolio development in teacher

[70] As, of course, is any form of professional activity in the domains of the health sciences. This is one of the aspects where teaching as a profession can be compared to medicine and nursing.

[71] The importance of a clear sense of purpose(s) of portfolio construction as well as of adequate portfolio design and implementation is highlighted by numerous authors throughout the portolio literature.

education is that portfolio as an educational instrument appears to have the potential to address all issues relevant to professional development and personal growth in teacher education,[72] and to support quality learning (both with regard to self-regulated learning and to meaningful, deep learning for understanding) and reflection.[73]

In teacher education, as in other domains of higher education, there can be distinguished several broad areas of intended learning outcomes.[74] These are *quality learning* of issues in the curriculum, i.e., of program and course contents, *self-regulated learning skills* (with a view to the present as well as to the future, with regard to lifelong learning), as well as *generic graduate attributes*.[75] Judging from its favorable presentation in the literature, portfolio as an educational tool appears to have the potential to support intended learning outcomes in all of these domains. Learning of course contents as

[72] Owing to the fact that the purposes of portfolio construction in education and the ways in which portfolio construction can be implemented are virtually unlimited, as laid out in Section 2.1.1.

[73] The bases for these claims will be laid out in Chapter 3, where the systematic review of original research on portfolio is presented.

[74] Learning outcomes represent one of the key elements essential in constructive alignment, an influential approach to the design of higher education teaching and learning. For detailed information on the concepts of learning outcomes in higher education, see, e.g., Adam (2004); Allan (1996); Caspersen, Frølich, Karlsen, and Aamodt (2014); Caspersen, Smeby, and Aamodt (2017); Chan, Tsui, Chan, and Hong (2017); Drechsler Sharp, Komives, and Fincher (2011); Entwistle (2005); Entwistle and Smith (2002); Hussey and Smith (2003, 2008); Keshavarz (2011); Liu, Bridgeman, and Adler (2012); Melton (1996); Sweetman, Hovdhaugen, and Karlsen (2014); and Trigwell and Prosser (1991a). Learning outcomes are are by no means restricted to the cognitive domain, but may also include social and emotional, affective (e.g., Shephard, 2009; Vorhaus, 2010) as well as psychomotor elements. For more information on intended learning outcomes (ILOs), see Biggs and Tang (2011). It is to be noted that learning outcomes in higher education are not limited to the outcomes intended; thus, the outcomes of learning do not necessarily correspond to the objectives set for learning. For the purposes of this dissertation, learning outcomes are considered as changes and developments in learners' mental representations of knowledge, skills, and dispositions, guiding as models and structures in the mind an individual's thinking and action.

[75] In modern-day terminology, these graduate attributes might be considered to include *soft skills*, which are not bound to any discipline or profession. Almost half a century ago, Chickering (1969) outlined several major outcomes from university study which appear to be still applicable today, an appraisal confirmed by Hattie (2015).

well as the acquisition of self-regulated learning skills can be fostered and facilitated by means of reflection, while generic graduate attributes can be attained through reflection as well, as is the case, e.g., with critical reflection. Other generic graduate attributes can be attained by recurrent execution of particular assignments carefully created to that end, which, e.g., is the case with the acquisition of higher order thinking skills by means of cognitive tasks involving the thinking skills to be acquired, and with the acquisition of the capacity for teamwork by means of tasks designed to involve student group work and collaboration.

Learning as a human activity is a complex process, involving cognitive, emotional, and social elements (e.g., Illeris, 2002), and leading to complex results.[76] Individual, internal mental models – resulting from learning – are intricate, consisting of "… multiple, interdependent, and integrated representations of some system or set of phenomena" (Jonassen & Strobel, 2006, p. 4). The mental representations of learning (i.e., the products, or outcomes of learning) include elements of different types, such as "structural knowledge, procedural knowledge, reflective knowledge, metaphorical knowledge, executive knowledge, and a host of beliefs about the world" (Jonassen & Henning, 1996, as cited by Jonassen & Strobel, 2006, p. 4).[77, 78]

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[76] For mechanisms promoting the development of cognitive, social, and affective graduate attributes, see Kember, Hong, Yau, & Ho (2017).

[77] Jonassen and Strobel (2006) differentiate between individual mental models and collaborative group mental models, the latter being socially constructed by groups of individuals collaborating with a focus on the same meaningful task. While the differentiation the authors make gives rise to some questions, it is interesting to note the authors' concept of 'artifactual knowledge' as

> … knowledge or cognitive residue evidenced in the artifacts that learners produce … [W]hen learners produce artifacts, especially while modeling systems, there is extensive evidence of their thinking in the products. The models that result from model building are artifacts that are full of knowledge, knowledge that represents some portion of the learner's mental model. Artifacts can also serve as discourse markers … (Jonassen & Strobel, 2006, p. 7).

So, as a matter of course, the artefacts contained in portfolios, show learners' thinking and learning, as do the reflective entries in portfolios.

[78] For a more modern categorization of types of knowledge, see, e.g., Anderson and Krathwohl (2001). In their taxonomy for learning, teaching, and assessing (NB: the three domains essential to construc-

Research on learning in formal settings – e.g., at school, in higher education settings, and at the workplace – abounds, with a large number of theories and concepts presented in the literature. Thus, for the purposes of scientific research and teaching/learning practice, it is important to differentiate between facets of interest – such as the ones named above: self-regulated learning, information processing, and student approaches to learning – and to clearly state the theories and define the concepts involved in these theories.[79] In educational settings, including higher and teacher education, concepts such as 'conceptions of learning' (e.g., Duarte, 2007; Edmunds & Richardson, 2009), 'learning orientations' (e.g., Birenbaum & Rosenau, 2006; Jeffrey, 2009; Vermunt & Vermetten, 2004), 'learning orchestrations' (e.g., Hazel, Prosser, & Trigwell, 2002; Meyer, Parsons, & Dunne, 1990), 'learning patterns' (e.g., Donche & van Petegem, 2009; Endedijk & Vermunt, 2013), etc. have to be specified and clearly set apart from other, similar constructs in the domain of learning. Although student learning in high-

tive alignment), the authors revise the seminal taxonomy of educational objectives designed by Benjamin Bloom and colleagues in the 1950s (Bloom, Engelhart, Durst, Hill, & Krathwohl, 1956; for the complementary handbook, concerned with the affective domain, see Krathwohl, Bloom, & Masia 1956). Both handbools deal with the classification of educational goals. As regards the educational terms of 'goals' and 'objectives' in classroom teaching, while some use the former for overarching purposes of curriculum and reserve the latter for day-to-day instructional targets, in research and theory the two terms tend to be used interchangeably (Marzano, 2009), as will plausibly also be the case in educational practice. Robert J. Marzano, who considers teaching to be both an art and a science (Marzano, 2017), refers to the works by Bloom and colleagues and the subsequent revision by Anderson and Krathwohl when proposing another taxonomy of educational objectives (Marzano & Kendall, 2007).

79 With a view to the virtually babylonic confusion of technical terms in the scientific literature used in relation to human learning as a psychological construct, there is the need for precision and clarification. The use of a large range of different technical terms and/or the arbitrary use of technical terms poses a problem to communication – and to scientific research in particular. As was noted by Dr Johnson in the Preface to his great *Dictionary of the English Language*, "… when the name of things is unknown, or the notion unsettled and indefinite, and various in various minds, the words by which such notions are conveyed, or such things denoted, will be ambiguous and perplexed." (Johnson, 1755, cit. by Blackburn, 2016, preface).

er education has been the object of scientific research for many decades, there continue to be a large range of different definitions, concepts, and theories.[80]

In the following two sections, student approaches to learning (SAL) and levels of cognitive processing/learning activities will be will be looked at more closely. There are a number of reasons for this selection: A (desired) deep approach to learning is what higher education – including teacher education – is all about.[81] The investigation of student approaches to learning, based on phenomenography and phenomenographic research (e.g., Richardson, 1999; Svensson, 1997; Tight, 2016), conveys a holistic picture of student learning, looking at both *why* the student learns (motivational dimension) and *how* the student goes about learning (strategic dimension).[82] Reflection, which will be looked at in detail in Section 2.2.2., can be regarded *the* core element of educational portfolio construction, and the concept of student approaches to learning (SAL) can be closely related to the concept of reflective thinking (e.g., Leung & Kember, 2003). The concept of student approaches to learning has come to be well established in higher education research and practice, and there is a large body of literature that can be built upon. A close link has been established in research between students' conceptions of learning, their approaches to study, and their learning outcomes (Kember & Kwan,

[80] The observation that "… confusion has crept in with additional terms being used to describe overlapping concepts" is confirmed by Entwistle (1991, p. 201), who in an introduction to a special issue of *Higher Education* writes about the concepts of 'learning strategy', 'learning style', 'cognitive style', 'approaches to learning', 'study orientations', and 'study orchestrations'. As regards the differentiation of styles, approaches, and patterns in student learning, also see the editorial written by Evans and Vermunt (2013) in the *British Journal of Educational Psychology*.

[81] It is to be noted that while deep approaches to learning, related to quality learning, generally constitute a universal aim of education institutions around the world, a distinction can also be made between student approaches to learning that are appropriate to a specific, given context of learning (curriculum, task design, etc.) and those that are not. Deep learning approaches, if overdone, can even be detrimental to academic success, e.g., in cases where excessive elaboration keeps students from the acquisition of course content and the achievement of intended learning outcomes at the pace intended in instructional design, while in contexts of required rote learning, a surface approach to learning may suffice.

[82] An even more comprehensive basis for research on student learning would be the learning patterns perspective on student learning in higher education taken by Vermunt and Donche (2017).

2002), so approaches to learning are one key determinant of the quality of learning. Teacher learning involves relating theory to practice and learning from experience in student teaching, which can be seen as issues of deep learning and instances of higher-level cognitive processing. The aims of the course *Schulpraktische Studien 1 (SPS 1)*, based on teaching and learning in a portfolio-based learning environment, involve reflective quality learning in the form of deep learning and higher levels of task processing; thus, information on student approaches to learning and levels of cognitive task processing is selected for presentation in this dissertation.[83] In higher education settings, as in schools, there is learner diversity (Hattie, 2015),[84] and it is what the student does that determines the outcomes of learning (e.g., Biggs, 2014a; Biggs & Tang, 2011).[85] Thus, students' approaches to learning and their levels of cognitive task processing in the form of levels of learning activities will be looked at in the next two sections.

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[83] While numerous elements related to SRL can be found in the course *Schulpraktische Studien 1 (SPS 1)* and, thus, in the intended learning outcomes for the course, these elements of SRL are not the primary focus of interest here. In the context of the course *Schulpraktische Studien 1 (SPS 1)* as one topic of this dissertation, quality learning is regarded as involving a deep approach to learning, deep cognitive task processing, and a positive development of students' dispositions towards a disposition for deep learning.

[84] As noted by Hattie (2015, p. 79),

> [t]oday's university students are diverse, not necessarily self-regulated, having varying skills in learning strategies, and need to be deliberately taught. Ths begs for a robust discipline about the scholarship of teaching and learning at the university level to best identify what works.

[85] This idea, pivotal to constructive alignment in higher education as well as to constructivist approaches to education in general, can be traced back to the book *Basic principles of curriculum and instruction* by Ralph W. Tyler, reprinted a few years ago (Tyler & Hlebowitsh, 2013). Not only did Tyler write about the vital importance of student activity for student learning, he also made use of the concept of 'educational experiences' organized for the attainment of educational purposes. This idea of students' 'educational experiences' can be found in educational theory – in general theory as well as in theory on portfolio development – as representing the sum of students' sensations, perceptions, and reflections of and on the teaching/learning environment. Incidentially, 'ways of experiencing' are the core object of research in phenomenography (Säljö, 1997), the research methodology SAL research is based on (see Section 2.2.1.1). Phenomenography is about human perceptions of experiences.

2.2.1.1 Student approaches to learning (SAL)

Student approaches to learning (SAL) can be seen as representing a broad, holistic approach to the research and practice of student learning and instructional design.[86] The basis to studying student approaches to learning is phenomenography, a methodology influential in research on higher education (Ashworth & Lucas, 1998, 2000; Greasley & Ashworth, 2007).[87]

As noted by Evans and Vermunt (2013), there are three main issues in research on styles, approaches, and patterns in student learning:[88] dimensionality, measurement, and changeability.

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[86] In this dissertation, the term 'learning', relative to the process in general, is given preference over the more limited term 'studying', which can be regarded as being specific to higher education. Thus, it is student approaches to *learning* which are the key topic of this dissertation, which might as well be called student approaches to *studying*. A comprehensive analysis of the pertinent literature leads to the impression that the term 'approaches to learning' is used by most authors, both in theoretical/conceptual treatises as well as in original research of teaching and learning in higher education. Note is to be taken of the article by Entwistle (2012) in the *Encyclopedia of the Sciences of Learning*, where a distinction is made between the concept of 'approaches to learning' as referring to deep and surface approaches to learning and the concept of 'approaches to studying' as comprising an additional, strategic dimension. While the broad distinction between deep and surface approaches to learning is still commonly used in current research on student learning in higher education, a 'strategic' or 'achieving' approach appears to be no longer a focus of interest. The current version of the *Study Process Questionnaire*, the *Revised Two-Factor Study Process Questionnaire* (R-SPQ-2F; Biggs, Kember, & Leung, 2001), which forms one of the bases of the original research conducted in the context of this dissertation (see Chapters 4–6), retains the two fundamental dimensions of a 'deep' and a 'surface' approach, but no longer contains an 'achieving' approach.

[87] Tight (2016, p. 319) considers the application of phenomenography as "… arguably the only research design (so far) to have been developed substantially within higher education research by higher education researchers." For more information on the origins of phenomenography in higher education research, see this article as well as, e.g., Entwistle (1997).

[88] It is important to differentiate between these concepts – as well as between these concepts and many more terms and notions involved in the research and practice of student learning. It would not be possible within the scope of this dissertation to consider in detail *all* different potentially interesting conceptualizations of constructs related to student learning. For an overview of theories, models, and measures related to learning styles, see Cassidy (2004). An overview of research on students' ap-

Student approaches to learning are based both on the individual student (student characteristics) and on the context of teaching/learning, the latter being mediated by the student's perceptions of the context.[89] There is cultural specificity of approaches to learning/approaches to studying in higher education (e.g., Kember & Gow, 1990; Leung, Ginns, & Kember, 2008; Richardson, 1994).[90] With regard to dimensionality,

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proaches to learning is provided by Duff and McKinstry (2007). For more information on student learning styles in higher education and their differentiation from (and interrelationships with) student approaches to learning, see, e.g., Adler, Whiting, and Wynn-Williams (2008); Cano-Garcia and Justicia-Justicia (1994); Cuthbert (2005); Duff (2014); Murray-Harvey (1994); Newble and Entwistle (1986) Richardson (2011); Samarakoon, Fernando, and Rodrigo (2013); and Tsingos, Bosnic-Anticevich, and Smith (2015). While the concept of 'learning styles' – individual styles of learning, often mentioned together with 'cognitive styles' as individual styles of thinking (Rayner, 2001) – can be found in higher education literature up to the present (e.g., Evans, Cools, & Charlesworth, 2010), recent scholarly publications from different academic disciplines call into question the validity of the concept of student learning styles, considering it a 'myth' (e.g., Lethaby & Harries, 2015; Newton, 2015; Newton & Miah, 2017; Rohrer & Paschler, 2012). For the purposes of this dissertation, definitions offered by Entwistle and Peterson (2004b, p. 537) can be used as guidance for further considerations, with 'learning style' as "[a] preferred and relatively consistent way of learning, usually related to educational or workplace settings", and 'approach to studying' as "[a] context- and content-specific way of carrying out academic tasks". Here again, *approaches to studying* appear to be *approaches to learning* in academic contexts. The relation of the two terms and their historic background is outlined by Entwistle, McCune, and Tait (2013). In a recent publication by Evans and Kozhevnikova (2016), 'styles research' is used as an umbrella term to include cognitive styles, learning styles, and approaches to learning, as well as student and teacher beliefs and conceptions of learning and teaching, the latter influencing teachers' and students' teaching and learning, too. Student patterns of learning in higher education appear to be a major focus of research in recent years, constituting a comprehensive approach, integrating and encompassing elements from other conceptualizations of student learning (e.g., Gijbels, Donche, Richardson, & Vermunt, 2014; Vermunt & Donche, 2017).

[89] An individual student's perceptions of the teaching/learning context may be appropriate or not. The adaption of learning to the context perceived can thus be appropriate or not. For more information on study orchestration see, e.g., Meyer, J. H. F. (1991), and Meyer, J. H. F., Parsons, and Dunne (1990).

[90] With regard to the cultural specificity of approaches to learning, attention is often drawn to particular ways of learning of students in Asia, as opposed to students in the Western parts of the world (e.g., Kember, 2000). With regard to the systematic literature review in Chapter 3 of this dissertation, the assumption is made that findings from international portfolio research can be generalized under

there is the distinction of two broad categories of learning, deep learning and surface learning, and the related approaches adopted by the student, i.e., a deep approach and a surface approach to learning. A mixed approach to learning is possible, i.e., students' approaches to learning within a given context do not have to be *exclusively* deep or surface.[91, 92] Within the dimensions of deep and surface approaches to learning, there are assumed to be two sub-dimensions: motive and (corresponding) strategy.[93]

As regards the issue of measurement, the *Revised Two-Factor Study Process Questionnaire* (R-SPQ-2F; Biggs et al., 2001), either in its original version or in an adapted and/or translated version, is extensively made use of in original research on students' approaches to learning in various contexts of higher education all over the world – in domains as diverse as, e.g., an MBA program in China (Taher & Jin, 2011), Arts and Mathematics university education on the Fiji Islands in the South Pacific (Phan, 2007), medical education in the Netherlands (Dolmans, Wolfhagen, & Ginns, 2010), nursing education in Hong Kong (Tiwari et al., 2006), and university teacher training in Belgium (Gijbels, Coertjens, Vanthournout, Struyf, & van Petegem, 2009).[94]

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certain conditions, e.g., as long as there is reason to suppose that the cultural background of the participants is not too dissimilar, while the context of portfolio construction is comparable.

91 It should be kept in mind that both deep and surface learning approaches imply processes of learning taking – or having taken – place. There is also the possibility of non-learning on the part of the student (Hay, 2007), which in the consideration of rote learning vs. meaningful learning is pointed out by Meyer (2002), too.

92 This potential mixture of approaches on the part of the student is mirrored by the fact that students in the *Revised Two-Factor Study Process Questionnaire* (R-SPQ-2F) score on both dimensions, deep and surface.

93 While this theoretical/conceptual distinction between the (sub-)dimensions 'strategy' and 'motive' is plausible and commonly assumed, a clear distinction between the two was not found in the analysis of the translated/adapted version of the R-SPQ-2F as used in the disposition questionnaire developed for the original research in the context of this dissertation (for further information, see Subchapter 4.5; with a view to using the R-SPQ-2F questionnaire for the distinction of deep and surface learning without further differentiation of 'motive' and 'strategy' (sub-)scales, also see Justicia, Pichardo, Cano, Berbén, & De la Fuente, 2008).

94 Other inventories that have been used to measure students' approaches to learning and studying are the Lancaster Inventory/Approaches to Studying Inventory (ASI; e.g., Meyer & Parsons, 1989); the re-

With regard to the changeability[95] of approaches to learning, research findings in the literature suggest that it is difficult to change students' approaches to learning towards deeper approaches (e.g., Gijbels et al., 2009).[96] As will be laid out in the following paragraph, approaches to learning can be assumed to be not completely context-specific and variable, i.e., to be not completely determined by the singular situation – or to be more precise: by the individual learner's perception of a singular context in an educational setting. A complete, unconditional determination by the situation would entail as a result that leaners' approaches to learning were utterly variable – which they are not. As long as there is opportunity for deep learning – which it is important to provide on the basis of instructional design, in cases where deep learning is aimed at, i.e., included in the formulation of the intended learning outcomes (ILOs) –, some students

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vised version of the ASI (RASI; e.g., Entwistle & Tait, 1994; Duff, 2004a); and the Approaches and Study Skills Inventory for Students (ASSIST; e.g., Tait, Entwistle, & McCune, 1998; Entwistle, McCune & Tait, 2013), incorporating the RASI. For more information on these and other instruments named in the context of research of learning and studying, also see Entwistle and McCune (2004) as well as Ak (2008).

[95] In the literature, there can also be found the notion of 'malleability' with regard to higher education students' approaches to learning (e.g., Chamorro-Premuzic & Furnham, 2009; Duff, 2004a; Duff, 2004b). The question of the *extent* to which approaches to learning are malleable, i.e., dependent on experience and, thus, amenable to intervention, is not easy to answer. As is stated by Ballantine, Duff, and McCourt Larres (2008, p. 191) with regard to accounting and business students' approaches to learning

> ... relatively few studies address changes in accounting students' approaches to learning over time. The extent to which students' approaches to learning are malleable remains an interesting empirical question. If student approaches to learning are shown to be unstable over time, accounting educators may be capable of influencing students who adopt inappropriate approaches within a context that values a deep approach.

This idea can be transferred to other domains of higher education. It is to be noted that a deep approach is not presented as appropriate in any given situation, but in contexts that *value* a deep approach, i.e., in contexts where a deep approach is necessary for and/or conducive to learning. This corresponds to the idea that some students in their study orchestration choose an approach that is context-/task-appropriate, while others go for an approach which is context-/task-inappropriate.

[96] Unfortunately, it seems to be (much) easier to induce a surface approach to learning in students by means of careless course design, e.g., in cases where the workload in a course is much too high.

will show deep learning motives and strategies, while others will not, based on individual differences and preferences, including prior educational experiences.

So, are students' approaches to learning stable or variable? As is often the case, the truth is likely to be somewhere in between. While it is human nature to create dichotomies (Schwartz & Goldstone, 2016), such as trait/state, stable/variable, deep/surface, etc., students' approaches to learning are unlikely to be either totally invariable (i.e., completely independent of context) or totally variable (i.e., completely dependent of context). With a view to students' learning behavior, Richardson (2011) advocates what he calls a "rapprochement" (p. 288) of the learning styles and the approaches to learning research traditions, pointing out that students' conceptions of learning – which impact students' learning behavior, as do students' perceptions of context - remain stable, even over the course of an entire degree program; in addition, evidence from neuroscience suggests new person-bound determinants of student learning (Evans & Vermunt, 2013). On the other hand, recent cognitive styles research underlines the impact of context, as well as of person-bound variables, on style development (Moskvina & Kozhevnikov, 2011). With reference to Cools and Bellens (2012), Evans and Vermunt (2013, p. 185) point out that "[a]cross the field of student learning, there is evidence of both stability and variability in how individuals go about learning."

If students' learning behavior is assumed to be variable to some extent, educators can use this variability as a starting point to support students' learning and take positive influence by means of careful instructional design.[97] With a view to the various theories and concepts of student learning, there is ongoing research to unify different learning theories (e.g., Phan, 2008) and to arrive at an integrative approach to the research of student learning (SAP – styles, approaches, patterns; Evans & Vermunt, 2013).

Student approaches to learning are conceptualized as being made up of two elements: motive and strategy. While students choosing a deep approach to learning are typically intrinsically motivated, i.e., interested in their studies and aiming at understanding, students going for a surface approach to learning are characteristically motivated ex-

[97] For more information on instructional design, see, e.g., Merrill, Drake, Lacy, and Pratt (1966). Instructional design is about instruction that is effective, efficient, and engaging (Merrill, 2013).

trinsically, e.g., interested in their degree with a view to getting a job.[98] Differences in the strategies implemented are based on how students go about their studies and on the levels of cognitive processing students made use of. While students adopting a deep approach to learning reflect about and elaborate on what is to be learnt, students adopting a surface approach to learning resort to rote learning.[99] Regarding these individual differences in students' motives as well as in their learning strategies, in the following section levels of cognitive processing in learning will be looked at.

2.2.1.2 Levels of cognitive processing – taxonomies for learning, teaching, and assessing

While as early as 25 years ago the terms 'deep' and 'surface' had come to be commonly used to describe students' approaches to learning and studying (Kember, 1991), there was no definition of the terms that would have met with universal agreement.[100] With reference to Biggs (1987), Kember (1991, pp. 289–290) in his article on instructional design for meaningful learning notes that

> … Biggs (1987, p. 15) believes that there would be wide agreement that a student who adopts a deep approach

[98] With regard to the differentiation between intrinsic and extrinsic motivation, the extensive, well-known works by Richard M. Ryan and Edward L. Deci are referred to (e.g., Ryan & Deci, 2000), also see Levesque, Copeland, Pattie, and Deci (2010). In spite of existing criticism of these broad concepts (e.g., Reiss, 2012), the differentiation between intrinsic and extrinsic motivation appears suitable and fit to differentiate between 'academic' and 'non-academic' students – or rather: between 'academically oriented' and 'non-academically oriented' students –, the former being interested in and motivated by their studies, the latter studying with some kind of instrumental purpose of their studies in mind, e.g., the acquisition of a university degree in order to get a job a degree is required for.

[99] As noted above, the two approaches are not mutually exclusive, i.e., students' actual approaches to learning can contain elements of both typical approaches, deep and surface.

[100] Considering the construct of 'universal agreement' in research, it can safely be assumed that this lack of agreement continues to the present day – and will continue. Yet, the distinction between the notions of 'deep' and 'surface' approaches to learning meets with wide agreement in the higher education literature (despite criticism regarding the very broad distinction of two categories only, e.g., Beattie, Collins, & McInnes, 1997).

- is interested in the academic task and derives enjoyment in carrying it out;
- searches for the meaning inherent in the task (if a prose passage, the intention of the author);
- personalizes the task, making it meaningful to own experience and to the real world;
- integrates aspects or parts of task into a whole (for instance, relates evidence to a conclusion), sees relationships between this whole and previous knowledge and
- tries to theorize about the task, forms hypotheses.

A student who adopts a surface approach:

- sees the task as a demand to be met, a necessary imposition if some other goal is to be reached (a qualification for instance);
- sees the aspects or parts of the task as discrete and unrelated either to each other or to other tasks;
- is worried about the time the task is taking;
- avoids personal or other meanings the task may have; and
- relies on memorization, attempting to reproduce the surface aspects of the task (the words used, for example, or a diagram or mnemonic).[101]

Different taxonomies for learning, teaching, and assessing – as the three key activities included in instruction – have already been mentioned above. The taxonomy by Bloom et al. (1956) and its revision by Anderson and Krathwohl (2001) are two prominent ex-

[101] Illustrations of student thinking and acting in relation to the adoption of deep and surface approaches to learning abound. This list from one of the most renowned researchers in the field of student approaches to learning is considered as adequate to convey an idea of qualitative differences in students' approaches to learning. Other summary descriptions of thought and action related to deep and surface approaches to learning can be found in the pertinent literature of more recent date, e.g., Biggs and Tang (2011).

amples.[102] It can be assumed with regard to the levels of cognitive (task) processing that students who are more academically oriented (i.e., students with a (pre-) disposition for deep learning and deep processing) show higher level engagement in studying and learning than do students who are less academically oriented (i.e., students with a (pre-)disposition for surface learning and surface processing).[103] The more active the teaching method chosen and implemented, the higher the level of student activity that is likely to be elicited. In 'passive' teaching/learning environments (e.g., standard university lectures), while students with an 'academic' motivation show a relatively high level of engagement, using the learning experience (as conveyed by the sensual input) for application of and theorizing on new information, students with a 'non-academic' orientation only show a relatively low level of engagement, e.g., by merely taking notes of what is presented by the lecturer. When in instructional design

[102] Taking into account their prominence, these two taxonomies, relative to the cognitive domain and the design of cognitive tasks, are not presented in detail. An overview comparing the original and the revised taxonomy can be found in an article by Krathwohl (2002). In the original taxonomy, originating in the 1950s, the levels of cognitive complexity were named and sequenced as (1) Knowledge, (2) Comprehension, (3) Application, (4) Analysis, (5) Synthesis, and (6) Evaluation. In the revision of the taxonomy, there is a change in the higher levels of cognitive processes as well as a change from nouns to verbs, resulting in (1) Remembering, (2) Understanding, (3) Applying, (4) Analyzing, (5) Evaluating, and (6) Creating. The combination with four knowledge dimensions – factual knowledge, conceptual knowledge, procedural knowledge, and metacognitive knowledge – in the revision of Bloom's taxonomy undertaken by Anderson and Krathwohl (2001) leads to a two-dimensional matrix by means of which intended learning outcomes can be classified. Against the background of the emphasis on learning outcomes made in the Bologna process, the taxonomy offered by Bloom and colleagues has met with renewed interest. With a view to epistemology, some authors critically consider learning outcomes to represent a behaviorist approach to learning (e.g., Murtonen, Gruber, & Lehrinen, 2017), with learning outcomes not – or not adequately – depicting the complexity of the processes and products of learning.

[103] On students' (pre-)dispositions regarding their approaches to learning, see, e.g., Kember and Gow (1989). Considerations relative to the disposition to understand in 21st century university education are presented by Entwistle and McCune (2013) and McCune and Entwistle (2011). Considering the importance of reflective thinking in portfolio construction, it is to be noted at this point that with higher education students there are also dispositions for critical thinking (e.g., Colucciello, 1999; Zhang & Lambert, 2008), with higher dispositions for critical thinking harbored and put into practice by those students with higher dispositions for deep learning.

more active teaching methods are implemented (e.g., problem-based learning, portfolio construction, practicums), students with an 'academic' orientation show a still higher level of engagement than they might do in a more passive teaching/learning environment, but the increase is relatively small, while with students with a 'non-academic' orientation there is a relatively large increase in their levels of engagement, as they have to implement higher order learning activities in order to keep up and pass the course. In teaching/learning environments designed to be more active, not only is there expected to be a higher level of engagement by *all* students, regardless of their study orientation; there can also be expected to be less of a difference between the levels of engagement shown by 'academic' and 'non-academic' students. The level of engagement is determined on the basis of the level of the learning activities, i.e., the level of cognitive processing students implement.

Against the background of the Bologna process in European higher education (e.g., Curaj, Scott, Vlasceanu, & Wilson, 2012; Reinalda & Kulesza, 2006; Rezaev, 2010; Rich, 2010; Wächter, 2004), it can be plausibly assumed that the number of 'non-academic' students is on the increase, so it is all the more important to provide students with learning opportunities likely to elicit higher levels of engagement, as represented by higher levels of cognitive (task) processing.[104] The differences in levels of engagement as based on students' orientations and teaching method are illustrated in Figure 1:

[104] Observations of changes in the domain of higher education as well as in the university student population, due to the Bologna process, are well-known to higher education practitioners.

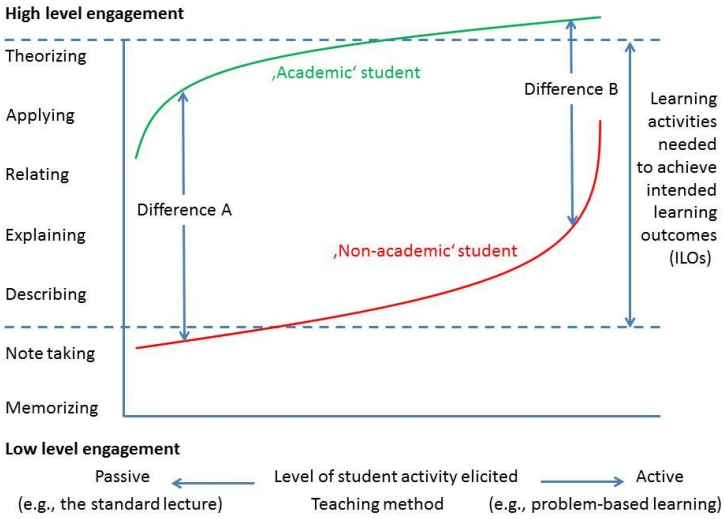

Figure 1. Student orientation, teaching method, and level of engagement (Biggs & Tang, 2011, p. 6).

Teacher educators as well as those teaching in higher education in general should encourage and support students who show signs of non-academic behavior to become more active, e.g., by means of the construction of a portfolio containing tasks and obligatory reflective entries that unconditionally *require* student activity in so far as there is no opportunity for simple surface learning or surface learning only. Reflection (i.e., reflective thinking) as the basis of reflective learning is at the top of the higher-order cognitive processes/higher-order learning activities classified by Biggs and Tang (2011) as being representative of deep learning. In Figure 2, verbs describing generic learning activities are ranked according to the level of cognitive processing they are taken to represent:

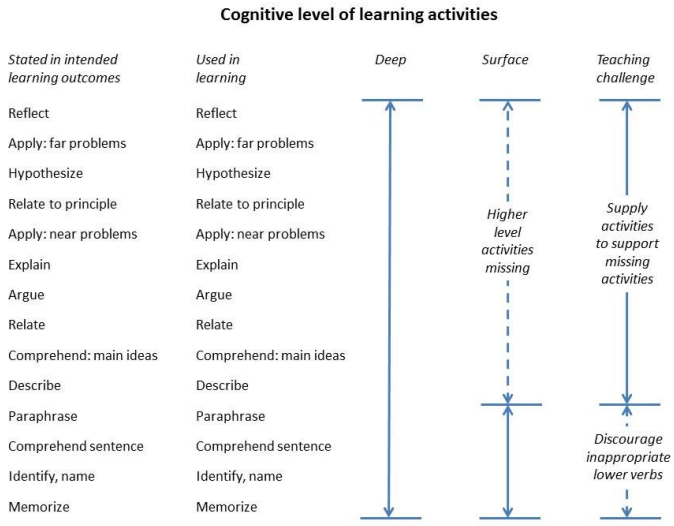

Figure 2. Desired and actual level of engagement, approaches to learning, and enhancing teaching (Biggs & Tang, 2011, p. 29).

Another taxonomy often used in the research and practice of higher education is the SOLO Taxonomy. The SOLO (Structure of the Observed Learning Outcome) Taxonomy is a means to describe levels of increasing complexity in students' learning. It was proposed 35 years ago by John Biggs and Kevin Collis (Biggs & Collis, 1982), allowing for a classification of observed learning outcomes. As is the case with the above consideration of cognitive levels of learning activities, the verb 'reflect' can be found at the top end of the order of verbs involved in student learning and sequenced on the basis of cognitive complexity; here, it is grouped with other verbs representing higher-order learning, namely, 'theorize', 'generalize', and 'hypothesize'.

In the SOLO Taxonomy, there are five categories for the classification of observed learning outcomes. In the first category ('prestructural'), no learning has taken place, the student having missed the point(s) learning was aimed at. The second category comprises 'unistructural' learning outcomes, where one element of knowledge has been learned, while in the following third category ('multistructural'), there are several elements of learning, which are not related to each other. It is only in the fourth category ('multistructural) that the elements of knowledge learned are linked to each other. In the fifth category ('extended abstract'), forming the upper end of the continuum,

learning is based on high(est)-order learning verbs, involving theorizing, hypothesizing, transfer and reflection, as shown in Figure 3:

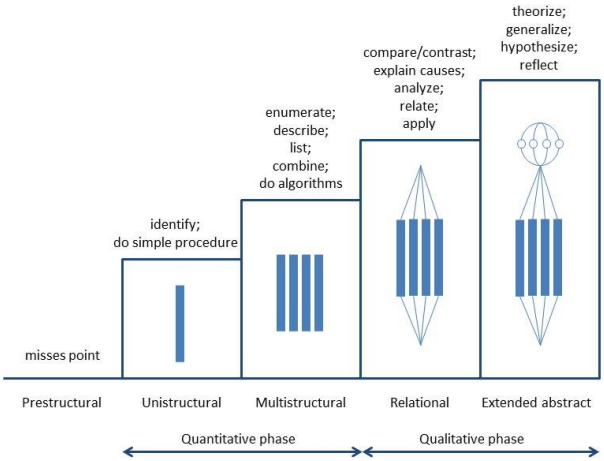

Figure 3. Hierarchy of verbs for the formation of Intended Learning Outcomes (Biggs & Tang, 2011, p. 91).

With a view to constructive alignment of learning processes – at any stage of education –, intended learning outcomes (ILOs), teaching/learning activities in task processing as well as assessment tasks have to be aligned, i.e., adjusted to one another. This interdependence is why in constructive alignment and instructional design there is the idea of an 'instructional system' (e.g., Biggs, 1996; Reiser, 2001b; Schott & Seel, 2015). The Presage-Process-Product (3P) model of learning, going back to the works by Michael J. Dunkin and Bruce J. Biddle on the study of teaching (Dunkin & Biddle, 1974) and forming one basis of the works by John Biggs, is a model representing a systems model of teaching and learning (Biggs, 1993).[105, 106] The basic structure of the 3P model of classroom learning is depicted in Figure 4:

[105] This can be seen as a cognitive systems approach (Biggs, 1993) depicting an instructional system. While the elements of 'process' and 'product' in teaching and learning are familiar to experts in education, the term 'presage' seems to be particular to the 3P model of learning. It is the antecedents of student learning that are meant by 'presage factors'. Yet, in contrast to the term 'antecedents', the term 'presage factors' expresses even more clearly the effect these factors are expected to take on

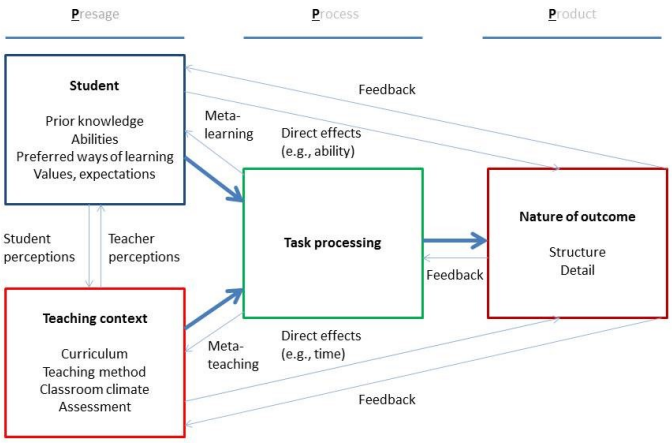

Figure 4. The 3P model of classroom learning (as represented by Biggs, 1993, p. 75).

In the alignment of intended learning outcomes (ILOs), teaching/learning activities, and assessment tasks, the decision of whether to design the teaching/learning activities as teacher-managed, peer-managed, or self-managed depends on the intended learning outcomes (ILOs) to be achieved by the learners. First, these intended learning outcomes (ILOs) are formulated, then, following this decision, the teaching/learning activities and the assessment tasks are designed, leading to an alignment of intended learning outcomes, teaching/learning activities, and assessment tasks as illustrated in Figure 5:

what follows. A note on the naming of the 3P model: There is variation in the literature ('3P model of teaching and learning', '3P model of learning', '3P model of classroom learning', etc.). Basically, the 3P model represents a model of teaching and learning that can be applied at all levels of the educational system, including higher education, a domain in which the 3P model is well-known and often used.

[106] While all elements of the instructional system represented are interrelated, the main directional flow in the 3P model of teaching and learning is from the left (presage) to the right (product), as noted, e.g., by Biggs (1993).

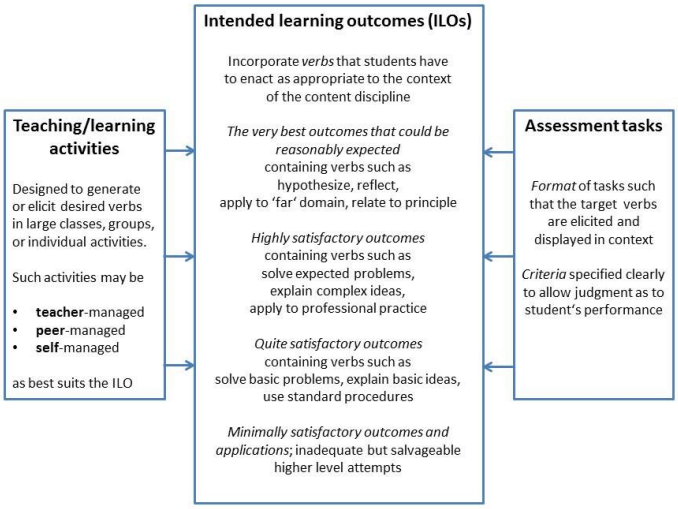

Figure 5. Aligning intended learning outcomes, teaching, and assessment tasks (Biggs & Tang, 2011, p. 105).

As can be seen from the illustration, activities in intended learning outcomes (ILOs) typically linked to reflective practicums in (pre-service) teacher education, such as 'reflect' and 'apply to professional practice' (as represented by the intended combination of theoretical knowledge acquired in the university classroom and practical experience at school), are located at high levels of intended learning outcomes (ILOs) and can be considered as very good results of the teaching/learning process.[107]

[107] There are some more aspects of this illustration that may be highlighted with a view to quality learning in education: Contrary to the impression sometimes conveyed, in the design of teaching/learning activities, peer-managed and/or self-managed teaching/learning activities are *not* inherently/unconditionally superior to teacher-managed teaching/learning activities. It is careful instructional design that is of vital importance for quality learning – ILOs and teaching/learning activities have to be carefully matched on the basis of the professional expertise of the teacher (in teacher education: the teacher educator). The verbs incorporated in the intended learning outcomes (ILOs), e.g., for a university course comprising a teaching practicum, – representing 'desired verbs' – are based on normative settings on the part of the teacher educator. Institutional educational processes are invariably based on normative settings. With a view to the formulation of intended learning outcomes (ILOs), these ILOs contain the verbs that students – in carrying out the learning activities designed – *have to* enact if they wish to achieve the outcomes set on the basis of the assessment tasks. Looking at portfolio construction as an example, the cognitive process of reflection as representing higher-order

Following this consideration of theories and concepts of student learning in (higher) education, in a next step the concept of reflection – emphasized in discussions of modern-day university education and desirable graduate attributes, inherent in reflective learning as representing quality learning in tertiary education, and vital to the process and product of portfolio construction – will be looked at.

2.2.2 Reflection: Learning by *thinking*

At first glance, the heading "Learning by *thinking*" might appear somewhat peculiar to the reader, as *all* cognitive processes related to learning require the learner to think *in some way*. Here, the intention of the heading is to express that learning by means of reflection is to take place in the form of *deliberate, non-superficial, conscious, critical thinking*,[108] with a view to a critical stance towards knowledge, the self, and the world (e.g., Wilson & Howitt, 2016), and the relation of these three elements.

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learning has to be carried out on the part of the student when constructing a portfolio, e.g., in writing reflective entries. With a view to the classification of intended learning outcomes (ILOs), it should be noted that, e.g., the use of standard procedures as an intended learning outcome (ILO) is not inherently 'inferior' to, e.g., the explanation of complex ideas. Rather, what is to be considered as highly satisfactory, acceptable, or non-satisfactory depends on what is intended to be achieved. In many cases, this may include the acquisition of basic knowledge or basic skills. In the above illustration, verbs are ordered on the basis that higher education *as a whole* aims at deep, complex and comprehensive quality learning.

[108] To educate student for autonomous, critical thinking was one of the key aims of the first university founded in the Middle Europe, i.e., of the renowned *Univerzita Karlova*, founded in Prague in 1348. With a view to the Bologna process and its (side) effects, the aim to educate students for autonomous, critical thinking as a general attribute of university graduates seems as important – in fact, in an age of postmodernism, pluralism, and ubiquitous (fake) information probably even more important – than ever. Eynon, Gambino, and Török (2014) in their article on e-porfolio initiatives in higher education note that higher education confronts a challenging new era, and that it is riven by two competing agendas: The 'completion agenda' is about speedy and efficient advancement through higher education and rapid graduation, while the 'quality agenda' focuses on learning, with depth and understanding and help for students in developing as complex thinkers as its priorities. In their article, the authors note that "… thoughtful e-portfolio practice can help build student success (as

Learning from and by means of reflection – i.e., reflective learning (e.g., Brockbank & McGill, 2007; Graham & Phelps, 2003; Griggs, Holden, Lawless, & Rae, 2017; Jordi, 2011; Kember, 2001; Peltier, Hay, & Drago, 2005; Ryan, M. E., 2015; Ryan & Ryan, 2013) – is an important way of learning in higher/adult education.[109] There exists a number of studies on reflective learning in portfolio construction (e.g., Bataineh et al., 2007; Chetcuti, 2007; Chetcuti et al., 2011), reflection being key in portfolio construction, as well as in learning from experience (Boyd & Fales, 1983).[110] Thus, it is not surprising that reflection and reflective learning in portfolio construction are frequently related to experiential learning from practicums in teacher education.

'Reflection' can be considered an umbrella term, covering attributes such as 'reflectivity' and 'reflexivity', processes such as 'reflective thinking' and 'reflective learning', and outcomes such as (the capacity and readiness for deliberate, conscious engagement in continuous) 'reflective practice'.[111, 112]

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measured in "hard outcomes" such as retention and graduation) while also advancing reflection, integration, and 'deep learning'" (Eynon et al., 2014, paragraph 1).

[109] Higher education *is* one particular type of adult education. Whether the two domains are mentioned in connection with each other or not, it is important to keep in mind that university students are adult learners whose ways of learning differ from that of younger people – in elementary as well as in secondary education –, e.g., with regard to the accumulated (life) experience university students dispose of and to ways of experiential learning. For more information, see, e.g., the seminal work by Knowles, Holton III, and Swanson (2015).

[110] As was pointed out by John Dewey, it is not experience, but the reflection on experience that humans learn from (Dewey, 1933). Thus, the slogan "learning by doing", often attributed to Dewey, is not correct in all cases – it might be to the point as long as non-complex tasks are to be dealt with, but with regard to complex professional tasks, non-routine work, and continuous professional development, it is learning from *reflection* on doing something, i.e., "learning by reflecting" that is required.

[111] Taking into account the variety of theories, concepts, definitions, and terms presented in the literature, it will not be possible to present in detail each and every approach to reflection in educational research and practice that has been encountered during the search of the pertinent literature on reflection in higher/adult professional education in general and in teacher education and portfolio construction in particular. There exist reviews related to various facets of the topic of reflection, providing overviews that can be referred to (e.g., Atkins & Murphy, 1993; Beauchamp, 2015; Dyment & O'Connell, 2010, 2011; Jayatilleke & Mackie, 2013; Koole et al., 2011; Liu, 2015; Marcos & Tillema,

As regards the concept of reflection, it has been claimed to be much used but rarely defined by educationists (Day, 1999),[113] and in teacher education the concept continues to be elusive (Clara, 2015; Jay & Johnson, 2002). In the wake of the reflective turn in teacher education, which started in the 1980s, triggered by the Donald Schön's (1983, 1987) influential works on the reflective practitioner in professional education and action (see Section 2.2.2.2), terms such as 'reflection', 'reflective teaching', and 'reflective practice' abound in the pertaining literature. As has been claimed by Boud and Walker (1998), the concept of reflection is valuable, but there has also been much abuse of the

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2006; Ng, Kinsella, Friesen, & Hodges, 2015). Again, a look at the literature conveys the impression that with a view to reflection in education – as with portfolio development and quality learning – teacher education and education in the health sciences (in particular medical education and nursing) are at the forefront of research and practice.

[112] For the purposes of this dissertation, 'reflexivity' is considered to be the capability of reflecting on the self and the individual's interaction with the world, while 'reflectivity' can be seen as reflection on the world. (For more interesting considerations concerning reflective practice terminology and its use, see, e.g., Finlay, 2008.) 'Reflective thinking' does not necessarily involve or result in 'reflective learning', thus, 'reflective learning' always involves 'reflective thinking', whereas vice versa this does not have to be the case. Encouraging and supporting reflective practice in the sense of professional practice based on and guided by reflection – with a view to reflective learning and continuous improvement – is an aim of higher professional education in various domains (e.g., Clarke, 2014; Clarke & Chambers, 1999; Fletcher, 1997). Pre-service teachers can – and from the point of view of teacher educators: should – be engaged in reflective practice as early as in their teaching practicums during higher education studies (e.g., Jones & Ryan, 2014; Lee & Loughran, 2000; McGarr & McCormack, 2015; Parsons & Stephenson, 2005; Seban, 2009; Stenberg, 2010), independent of theoretical and practical concerns (e.g., Collin, Karsenti, & Komis, 2013) and the fundamental question of whether reflective thinking and practice can be taught (e.g., Edwards & Thomas, 2010; Pennington, 2011; Russell, 2005). In the following, it is assumed that students can be encouraged to engage in reflective thinking and reflective practice. While it does not suffice to *teach* reflective practice, the capability to engage in reflective practice can be *trained* on the part of the students by means of active learning and (continuous) engagement in reflective thinking. Whether the reflection trained during initial teacher education at university will actually endure over the course of a later teaching career cannot be predicted. Yet, this should not hinder teacher educators to acquaint teacher education students with the potential of reflective practice for professional development and personal growth. And if not from the very beginning, the first stage of teacher professional education, at university: When else?

[113] Going back to the work of John Dewey, Rodgers (2002, p. 843) notes that there has been a loss of meaning of the term 'reflection', reflection having come to mean "everything to everybody".

notion. While Bengtsson (1995) aimed to answer the question of what was reflection in the teaching profession and in teacher education by way of an outline of the notion of reflection in then contemporary pedagogy and by means of describing and discussing basic characteristics of reflection – reflection as self-reflection, thinking, and self-understanding –, in the literature there continues up to the present the critique that reflection is not clearly defined (e.g., Collin et al., 2013), Clara (2015) expressing the need to continue to look for clarity in this ambiguous notion. In spite of its being an integral part of teacher education programs, reflection continues to be an elusive concept, which makes it difficult to define and teach (Jay & Johnson, 2002).

Many modern theories on reflection can be traced back to the works of John Dewey (Rodgers, 2002; Yost, Sentner, & Forlenza-Bailey, 2000), who by many authors is considered to be "the father of reflection in education" (Thorsen & DeVore, 2013, p. 90). In his seminal work *How we think: A restatement of the relation of reflective thinking to the educative process*, Dewey (1933) elaborates on the qualities of reflective thinking as well as on the attributes of a reflective person:[114] open-mindedness, whole-heartedness, and responsibility.[115] These attributes should be kept in mind when thinking of aca-

[114] As noted by Simpson (2006, p. 22), "[w]hile there are almost innumerable qualities, practices, and habits of a reflective person that Dewey interspersed through his writings, he synthesized many of these characteristics in *How We Think* …". There, Dewey (1933, p. 9) also formulates his oft-cited definition of reflective thinking as "active, persistent, and careful consideration of any belief or supposed form of knowledge in the lights of the grounds that support it". Dewey (1938, p. 28) presents as a principle the continuity of experience, an 'experiential continuum', in which each experience influences the following experiences, which is an important thought for educators and education. For more information on Dewey's ideas and his conception of reflective thinking, see, e.g., Rodgers (2002). What to a pedagogue is compelling in Dewey's ideas is the ideal of better quality human experiences in a human/humane educational setting (Dewey, 1938). In recent years, literature on student learning in higher education has shifted towards the observation of student *experience* of teaching and learning: It is the way students *experience* and *perceive* educational setting and the processes of teaching and learning, and what, on this basis, they decide (not) to do in the process of learning, that is of vital importance.

[115] It is to be noted that the attributes listed by Dewey (1933) are attributes that are desirable for teachers – as well as for professionals in general – in the execution of their profession. These attributes can

demic reflection as a systematic, deliberate process. Half a century later, Donald Schön promoted the ideas of 'reflection-in-action' and 'reflection-on-action' (Schön, 1983). While reflection-*in-action* is undertaken spontaneously *during an action*, reflection-*on-action* is embarked on only *after its completion*. More recently, Conway (2001) has drawn attention to the aspect of anticipatory reflection, with a view to balancing retrospective (i.e., memory) and prospective reflection (i.e., imagination) in teacher education. Reflection-*for-action* is engaged in with a view to guidance for further actions (Yost et al., 2000).[116] While Dewey (1933) considered reflective thinking in the rather narrow context of a problem to be solved, Korthagen et al. (2001) extends the concept of reflection, broadening the potential basis of reflection to be issues in general.[117]

At the turn to the 21st century, reflection had come to be considered the *"grand idée"* in teacher education (Webb, 1999, cit. by Jay & Johnson, 2002, p. 73), and today, it would be hard to find on a global scale a teacher education program that does not claim to be interested in the promotion of teacher reflection in one way or the other (LaBoskey, 2010). In teacher education literature, the idea of reflection appears to be ubiquitous, which stresses its significance both for the work of teachers and for teacher education programs (El-Dib, 2007). Today, reflective practice is a central theme in teacher education (Kaasila & Lauriala, 2012). Teaching being a complex endeavor, teachers need to continually review and reflect on their activities (Groom & Maunonen-Eskelinen, 2006), thus living up to the notion of the teacher as a 'reflective practitioner'. As noted by Etscheidt, Curran, and Sawyer (2012, p. 7), "[teacher] reflection has been promoted as a necessary tool for educators to sustain responsive instructional practices." The aim of professional reflection is to engage in deliberate, systematic, deep thought in order

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also be considered to be 'dispositions', i.e., tendencies, inclinations, or propensities to think and act in particular ways.

[116] Regarding the temporal aspects of reflection, there can be stated an extension of concepts, from 'reflection-in-action' and 'reflection-on-action' (as represented in the classical distinction by Schön, 1983, 1987) via 'reflection-for-action' (as a form of anticipatory reflection, see Conway, 2001) to 'reflection-with-action' (Ghaye, 2011). For an overview of concepts, see Ghaye (2011).

[117] Fred Korthagen has done a lot of research on reflection as well as on the relationship and the linking of theory and practice in teacher education (e.g., Korthagen, 1985, 1992, 1993, 2010, 2016; Korthagen & Kessels, 1999; Korthagen, Kessels, Koster, Lagerwerf, & Wubbels, 2001; Korthagen & Vasalos, 2005).

to gain enhanced understanding. Its significance in teacher education is well-recognized, although questions remain as to when to start reflection and how to prompt and foster it. Pre-service teachers being at the start of their teaching career, where professional foundations are laid, it seems reasonable to assume that reflection is of special importance when pre-service teachers begin to learn how to teach (Liston & Zeichner, 1990; Zeichner & Liston, 1987). Good teaching is about reason and justice of conduct, the exigence of reasonable, justified actions in teaching ruling out arbitrary assumptions and personal preferences while stressing the importance of research-based evidence and educational values.

Teacher education students are adult learners who bring along pre-existing knowledge, skills, and dispositions as well as beliefs, values and attitudes, and they learn in particular ways. As stated by Day (1999), at the core of adult learning there is reflection. Yet, issues of reflection are difficult for teachers (Prestridge, 2014) and teacher education students (e.g., Francis, 1997) alike. In spite of extensive personal and professional experience, few students have experience with academic reflection (Spalding, Wilson, & Mewborn, 2002). Yet, academic reflection is no matter of mere intuition, but requires specific pedagogic support (Ryan & Ryan, 2013). If reflection is emphasized in teacher education, it has to be fostered continually, research findings summed up in a paper by Moore and Ash (2002) suggesting that

> … despite an appreciation on the part of beginning teachers of the potential value of reflective practice, many new teachers choose not to reflect on their practice constructively and critically, preferring to fall back on pre-conceived understandings of how they and their pupils should conduct themselves in the classroom. ("Introduction …", para. 1)

Attention has to be paid to *both* students' abilities and their dispositions to reflect, which make up their individual reflective capabilities. As regards the ability to reflect, it has been questioned whether reflective thinking can be taught (Pennington, 2011). Research suggests that in teacher education, reflection can develop over the course of time (e.g., Oner & Adadan, 2011). With regard to the disposition for reflection, Copeland, Birmingham, de la Cruz, and Lewin (1993, p. 358) define reflectivity to be "…

a teacher's tendency to engage in a conscious process of identifying problematic issues in his/her practice and pursuing solutions that bring about valued effects for student learning". Stimulating this proclivity is a key aim of professional teacher education. With a view to the use of portfolio in teacher education, Groom and Maunonen-Eskelinen (2006, p. 292) state that

> [t]he emerging corpus of international literature on the use of the portfolio in teacher education, although detailing different perspectives and highlighting different aspects of its development, has a unity of emphasis in portraying its use as tool for promoting reflective practice.

Quality teacher education is not about learning and reflection of *any* type, but about *meaningful* – i.e., quality – learning for *understanding*, with the dual aim of professional development and personal growth, as well as about *thoughtful, productive* reflection to support this learning. Both activities are geared towards the enhancement of understanding and new insights. The close ties between – as well as the interplay of – learning and reflection are laid out by Moon (2001, 2004) and by Leung and Kember (2003), the former representing reflection as learning for understanding, the latter linking reflection and a deep approach to learning, which from several perspectives can be seen as corresponding to each other. The link between learning and reflection is also delineated by Higgins (2011), who refers to the supportive nature of reflection with regard to learning, too. It is highly desirable in higher professional education in general and in teacher education in particular that students should learn reflectively, choosing a deep approach to learning, and all decisions by faculty concerning the design of the learning environment should be taken accordingly. A comprehensive overview of issues related to learning and reflection in higher education and in professional development is provided by Moon (e.g., Moon, 2007, 2008a, 2008b, 2010), who also describes features of *academic* (i.e., deliberate, systematic, structured) reflection as opposed to *everyday* reflection (Moon, 2000), a distinction in line with the division Dewey (1933) makes between reflective thought and good thinking.

So, in what ways can reflective processes be represented? With regard to the range of issues comprised in the cognitive processes of reflection, an elementary distinction can

be made between the *breadth* and the *depth* of the contents of reflection. While breadth of reflection can be considered to refer to the contents of reflection and the variety of these topics – as depicted, e.g., by means of the onion model (Korthagen & Vasalos, 2005) –, depth of reflection can be considered as the quality of reflection, represented by frameworks or levels of reflection (see Section 2.2.2.1). Yet, breadth and depth of reflection cannot easily be distinguished from each other. What makes reflection broad and deep and how these two dimensions are related to each other remains unclear (Luttenberg & Bergen, 2008). In search of aspects common to major frameworks of reflection, it can be noted that the basic level at one end of the spectrum often represents instances of non-reflection (e.g., Kember, McKay, Sinclair, & Wong, 2008; Larrivee, 2008), while the top level at the other end commonly represents occurrences of reflection termed 'critical reflection' (e.g., Kember et al., 2008; Larrivee, 2008). Frameworks of reflection vary both in the characterization of the discrete levels and in the number of levels represented, ranging from few to many (for an overview, see, e.g., El-Dib, 2007).[118] It is important to note that there are different ideas related to the conceptualizations of 'critical reflection' (van Woerkom, 2008): While some authors use the term to denote academic, systematic, deliberate, non-superficial reflection, others consider the term of '*critical* reflection' to comprise ethical/moral aspects

[118] With a view to the variations regarding definitions of reflection, Larrivee (2008, p. 342), referring to an extensive review of the pertinent literature, notes that

> … the various definitions evolving over several decades most commonly depict three distinct levels of reflection … The three levels are: (1) an initial level focused on teaching functions, actions or skills, generally considering teaching episodes as isolated events; (2) a more advanced level considering the theory and rationale for current practice; (3) a higher order where teachers examine the ethical, social and political consequences of their teaching, grappling with the ultimate purposes of schooling.

A fourth level, representing non-reflection (pre-reflection), is added by Larrivee (2008) with reference to the extensive body of literature where reflective practitioners are contrasted with non-reflective teachers. So, in the literature on reflection, there is a phenomenon corresponding to non-learning: non-reflection.

related to teaching.[119] Reflection is often depicted as a cyclical process, in the form of reflective learning cycles (e.g., Gibbs, 1988; Kolb, 1984; Kolb & Kolb, 2012), which represent a temporal sequence of reflective steps/phases/processes linked to learning. It is important to note that such sequences in their prototypical, pure, and structured form can only be realized to their full extent during reflection-on-action and reflection-for-action. During reflection-in-action, there is not enough time for structured, sequenced steps of reflection, especially in the case of novices to teaching.

Williams and Grudnoff (2011) point out the recent emphasis of reflection for learning in professional teacher education programs, while Roebuck (2007) states that reflexive practice has the potential to enhance student learning. Reflective practice as 'conscientisation' (Estrela, 1999) means deliberate, thoughtful, academic, systematic reflection. With regard to reflective teaching, there are, e.g., Zeichner's critical, school-based perspective, and a more technocratic, positivistic approach of Cruickshank (Gore, 1987). It is not only effective (quality) teaching that is a key aim of reflective teaching, but there is also teacher emancipation (e.g., Day, 1999) as an outcome of reflective practice, as well as teacher empowerment (e.g., Short, 1994).[120] Teaching is a "highly subjective endeavor" (Green & Smyser, 1995, p. 44), and "[e]ven though the teaching portfolio is an encouraging improvement in evaluation, its function as the impetus to reflection must be recognized as the central purpose." (Green & Smyser, 1995, p. 44) Reflection is important for teacher education students to relate theory to practice (e.g., Korthagen et al., 2001), thus combining and elaborating on what is learnt in the university classroom and during workplace learning in the form of practicums at school. Reflection on the

[119] Also see Kember et al. (2000), where, with a view to the work of Jack Mezirow in particular, 'critical reflection' is taken to be 'premise reflection'.

[120] With a view to reflection – on the basis of the construction of professional portfolios – for 'becoming' in nurse professional education, see Maich, Brown, and Royle (2000, p. 309), where 'becoming' is considered to be a spiral, "encompassing alterations in beliefs and behaviours enabling personal and professional growth". Ghaye (2000, p. 7) brings up the possibility that "… maybe reflective practices may offer us a way of trying to make sense of the uncertainty in our workplaces and the courage to work competently and ethically at the edge of order and chaos", noting "… the inspiration and hope that reflective practices offer us to make our work and workplaces more knowable, manageable, just and satisfying" (Ghaye, 2000, p. 9).

basis of portfolio construction – with its openness of conceptualization and implementation – has the potential to support pre-service teachers in their individual learning for professional development and personal growth, both being "highly subjective endeavors", too. While there is much discussion of heterogeneity regarding pupils' learning at school, it should be taken into account that teacher education students are heterogeneous in their learning and reflection, too. With a view to the relationship and the integration of theory and practice, it was John Dewey, again, who, early on in the 20th century, elaborated on the theory/practice divide in education (Dewey, 1904). The relation of theory and practice in (teacher) education seems to be a perennial, yet unresolved problem. Reflection, if implemented properly, may possess the potential to support students in linking these two domains with a view to a realistic teacher education (e.g., Korthagen et al., 2001).

2.2.2.1 Frameworks for reflection: Definitions and conceptualizations

As noted by Bell, Kelton, McDonagh, Mladenovic, and Morrison (2011, p. 799) with exemplary reference to the pertinent literature, "[r]eflection, reflective thinking, reflective learning and critical reflection are not clearly defined, consensus about the terminology is lacking and the numerous definitions are problematic". Rogers (2001, p. 38) notes that in addition to this terminological confusion – repeatedly stated in the domain of reflection – "… there is a lack of clarity in the definition of reflection, its antecedent conditions, its processes and its identified outcomes". With a view to the divergent uses of the term of 'critical reflection' in particular, which is commonly taken in reflection frameworks to represent the highest level of reflection, Leijen, Valtna, Leijen, and Pedaste (2012, p. 205) state that

> [o]ne particularly flexible term is critical reflection. … [T]he concept of critical reflection implies the acceptance of a particular ideology, assumptions and epistemology. However, as Hatton and Smith (1995, 35) point out, 'some take it to mean no more than constructive self-criticism of one's actions with a view of improvement'. The loose usage of terms creates tangled meanings and confusion around the concept of reflection

> in education. Therefore, instead of mixing the two perspectives, it is useful to consider them separately; both epistemologies in their own right.

So, it can be agreed that there is no common agreement in the literature on reflection.

In order to state a definition of 'reflection' which is not too particular and encompasses many of the meanings of the term that can be found in the literature on education, reflection can be broadly defined as "a set of connected mental activities carried out … in order to structure or restructure an experience, a problem or existing knowledge or insights" (Zwart, Wubbels, Bergen, & Bolhuis, 2007, p. 169).[121] This definition does not limit reflection to any particular aim or domain, but encompasses the – productive – construction or reconstruction – i.e., the generation or re-arrangement – of experiences (with human experience not being limited to the cognitive domain, comprising emotional issues as well),[122] problems, knowledge, and insights.[123] The aim of reflection is teacher learning for teacher change, through reflection on the self, the world, and the interaction of the two in the form of professional practice.[124, 125] Boud, Keogh, and Walker (1994a, p. 19) note that "reflection in the context of learning is a generic term for those intellectual and affective abilities in which individuals engage to explore their

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[121] For more information on conceptualizations of reflection in professional education, see, e.g., LaBoskey (1993, 2010); Lyons (2010b); and Nguyen, Fernandez, Karsenti, and Charlin (2014). Zwart, Wubbels, Bergen, and Bolhuis (2007) note that while enactment leads to action, reflection leads to a change in cognition – a difference which may be considered in terms of external (visible) and internal (invisible) processes.

[122] The inclusion of reflection on the emotional aspects of students' experiences, which is of vital importance in a holistic approach to teacher education, can be seen in the reflective cycle presented by Gibbs (1988).

[123] Meaningful learning for insight and understanding is one of the issues where deep learning and reflection clearly overlap. The close connections between approaches to learning, levels of cognitive processing, and levels of reflective thinking will be laid out in the following.

[124] For more information on teacher change and teacher professional growth, based on teacher reflection, see, e.g., the well-known and oft-cited Interconnected Model of Teacher Professional Growth (Clarke & Hollingsworth, 2002).

[125] In relation to change, also see theories and concepts of transformative learning in higher education and adult learning (e.g., Cranton, 2010; Cranton & Roy, 2003).

experiences in order to lead to new understandings and appreciations."[126] They, too, link reflection to learning,[127] and name the cognitive together with the affective domain. Reflection is not an end in itself, but geared at turning experience into learning, in the form of new understandings and appreciations.

In the literature, there exist several frameworks – i.e., models – of reflection. Based on the contents of reflection, differences with regard to the breadth and the depth of reflection can be identified and analyzed. While the breadth of reflection refers to the amount or scope of the content covered – e.g., various aspects of the teaching profession (e.g., Luttenberg & Bergen, 2008), internal and external issues (e.g., Korthagen et al., 2001), consideration of both the past and the future (e.g., Conway, 2001) –, depth of reflection, as represented in numerous frameworks/models of reflection and laid out in the following paragraphs, refers to whether this content is viewed from a higher or lower level (e.g., Beauchamp & Thomas, 2009; Luttenberg & Bergen, 2008). In order to be productive, reflection has to be broad and deep, and breadth of content is related to depth of reflection (Luttenberg & Bergen, 2008).[128]

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[126] Here, as is the case throughout the literature on learning and reflection, portfolio-based and otherwise, the links between deep learning (meaningful learning for *understanding*) and reflection (for new *insights* and appreciations) are evident. Boud, Keogh, and Walker (1994b) in their seminal book on reflection for learning on the basis of experience also note that reflection in their understanding is a complex process, pursued with intent, involving both cognition and feelings, which are interlinked and interactive.

[127] As does, e.g., van Woerkom (2008), who relates critical reflection to higher-level learning.

[128] This relation of breadth of content and depth of reflection is also illustrated in the so-called 'onion model' (Korthagen, 2004; Korthagen & Vasalos, 2005), where potential contents of teacher reflection – behavior, competencies, beliefs, (professional) identity, and mission, in addition to the environment which is outside the individual who reflects and with which he/she interacts – are seen as representing different levels of reflection, different levels of potential teacher change. The innermost (deepest) two levels, (professional) identity and mission, represent the core of an individual's personality, so reflection extending to these two levels, which, unlike an individual's interaction with the environment, are not directly observable, but must be elicited, e.g., by means of classroom discussion and portfolio writing, is termed 'core reflection' by Korthagen and Vasalos (2005). In their article, the authors draw attention to the importance of teachers' emotions in professional teaching, which they expressly name as a topic for reflection within the phases of the ALACT model. The ALACT model

There was a plethora of literature on reflective teaching one and a half decades ago (Fendler, 2003), and, with the success the approach has encountered in professional education and professional practice, we have come to the situation that, as Winchester and Winchester (2014, p. 114) put it, "[t]he number of journal articles on reflection or reflective practice is phenomenal." With reference to the pertinent literature they note: "Being a reflective practitioner is considered a pinnacle of teaching practice".

As regards models representing levels of reflection, two approaches are chosen for a more detailed presentation in this section: the early, oft-cited approach by Hatton and Smith (1995), with a specific view to the definition and operationalization of reflection in teacher education, and the approach presented by Kember et al. (2000) in relation to the measurement of levels of reflective thinking, which is of a more general nature and well-known to higher education researchers.[129]

(e.g., Korthagen and Kessels, 1999; Korthagen et al., 2001), describing a structured process of reflection comprising subsequent phases of (1) Action, (2) Looking back on the action, (3) Awareness of essential aspects, (4) Creating alternative methods of action, and (5) Trial (with phase (5) Trial as a new phase of (1) Action and the point of re-entry into the reflective cycle), represents one of the cyclical models of reflection that can be found in the literature (for another example, see, e.g., Gibbs, 1988). As can be seen from the onion model, beliefs held by the person who reflects are not at the deepest level of reflection and change, but neither are they at the very surface. In their contribution to the *Handbook of Reflection and Reflective Inquiry* (Lyons, 2010a), Korthagen and Vasalos (2010) in the context of 'deepening reflection' relate reflection to deep learning, while Lyons (2010c, p. 25) in the context of foundational issues regarding reflective inquiry writes about "a deepening of conscious life". In the Anglophone educational literature, the term of 'deep reflection' can be found (e.g., Moon, 2000). Independent of issues of dimensionality and direction that have to be taken into account (high/low, deep/surface), the link between (levels of) reflection and (levels of and approaches to) learning is obvious. The relationship between approaches to learning and reflection is also elucidated by David Kember and colleagues, e.g., in Leung and Kember (2003).

[129] For other conceptualizations of reflection and reflective thinking, varying in numbers and types of levels of reflection, see, e.g., Jay and Johnson (2002) (descriptive – comparative – critical); Kember et al. (2008) (habitual action/non-reflection – understanding – reflection – critical reflection); Sparks-Langer, Simmons, Pasch, Colton, and Starko (1990) (no descriptive language – simple, layperson description – events labeled with appropriate terms – explanation with tradition or personal preference given as the rationale – explanation with principle or theory given as the rationale – explanation with principle/theory and consideration of context factors – explanation with consideration of ethical,

One of the early frameworks for reflection, often referred to and cited in the literature, is the framework proposed by Neville Hatton and David Smith in their seminal article *Reflection in teacher education: Towards definition and implementation* (Hatton & Smith, 1995). The four levels proposed are (1) 'descriptive writing', which is no form of reflection, and three different kinds of reflection, termed as (2) 'descriptive reflection', (3) 'dialogic reflection', and (4) 'critical reflection'.[130] On the first level, the level of 'descriptive writing', the student does not reflect at all, "… but merely reports events of literature". On the second level, 'descriptive reflection', the student attempts "… to provide reasons based often on personal judgement or on students' reading of literature." On the third level, 'dialogic reflection', the student enters a form of discourse with his/her self, exploring possible reasons. On the fourth level, 'critical reflection', the student gives reasons for decisions or events, taking into account "… the broader historical, social, and/or political contexts" (Hatton & Smith, 1995, pp. 40–41). In their analysis of essays written by student teachers in two cohorts, Hatton and Smith (1995) found that while most reports contained some kind of reflection, only few instances of critical reflection were evident. The observation that the critical reflection of the broader context of teaching (historical, social, and political) is not often evident in teacher education students' reflective writing can be found throughout the literature.

The framework for assessing the levels of reflection/reflective thinking as proposed by David Kember and colleagues (e.g., Kember et al., 2000; Kember et al., 2008) is based to a large extent on the works by David Boud, Rosemary Keogh, and David Walker (Boud et al., 1994b) and by Jack Mezirow (Mezirow, 1991).[131] The four categories proposed, are (1) habitual action/non-reflection, (2) understanding, (3) reflection, and (4) critical reflection. This conceptualization of levels of reflective thinking can be used both to measure students' levels of reflective thinking by means of a questionnaire de-

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moral, political issues); van Manen (1977) (technical rationality – practical reflection – critical reflection); and Ward and McCotter (2004) (routine – technical – dialogical – transformative). Early overviews of research on teachers' reflective thinking are provided by Sparks-Langer and Colton (1991) and by Bengtsson (1995).

[130] As can be seen, the range of reflective levels is limited by 'non-reflection' as the lowest and 'critical reflection' as the highest level of reflection.

[131] A review of Mezirow's theory can be found in Lundgren and Poell (2016).

veloped to that end (Kember et al., 2000) and to code and assess the levels of reflection in students' written work (Kember et al., 2008). As laid out by Kember et al. (2008), 'habitual action' occurs when in professional practice "… a procedure is followed without significant thought about it" and "… when a student responds to an academic task by providing an answer without attempting to reach and understanding of the concept of theory that underpins the topic", thus giving a response consistent with, yet not equivalent to, a surface approach to learning (Kember et al., 2008, p. 373). 'Understanding' is a category which represents a student's attempts to reach an understanding of a concept or topic by means of an active search for meaning. This form of meaningful learning, learning for understanding, involves a deep approach to learning on the part of the student (Kember et al., 2008). The category of 'reflection' can be distinguished from the category of 'understanding' on the basis of the personal meaning involved in the consideration of an issue.

> Theory is applied to practical applications. As a concept becomes related to other knowledge and experience personal meaning becomes attached to the concept. … Concepts will be interpreted in relationship to personal experiences. Situations encountered in practice will be considered and successfully discussed in relationship to what has been taught. There will be personal insights that go beyond book theory. (Kember et al., 2008, pp. 373–374)[132]

The category of 'critical reflection' involves a transformation of perspective.

> Many of our actions are governed by a set of beliefs and values that have been almost unconsciously assimilated from our experiences and environment. To undergo a change in perspective requires us to recognize and change these presumptions. To undergo critical reflection it is necessary to conduct a critical review of presuppositions from conscious and unconscious prior learning and their consequences. (Kember et al., 2008, p. 374)

[132] These personal insights, going far beyond book theory, may well be considered instances of the 'wisdom of practice'.

While here the concept of 'critical reflection' is different from that proposed by Hatton and Smith (1995), the authors, too, note that it is unlikely for critical reflection to occur frequently. Presuppositions such as conventional wisdom and ingrained assumptions are hard to change, "… in part because they become so deeply embedded that we become unaware that they are assumptions or even that they exist" (Kember et al., 2008, p. 374). These four categories of reflection are also embodied in the scales of the reflective thinking questionnaire (Kember et al., 2000), which can be shown to relate in a structured way to the scales measuring student to learning in the *Revised Two-Factor Study Process Questionnaire* developed by Biggs et al. (2001) (Leung & Kember, 2003; Kember et al., 2008).[133]

In higher education settings, higher levels of reflection, as represented in students' written work, are often not achieved (e.g., Dyment & O'Connell, 2011). The question has been posed whether reflective thinking and reflective practice can be taught (e.g., Edwards & Thomas, 2010; Pennington, 2011; Russell, 2005). Ryan (2013), who considers teaching reflection in higher education a 'pedagogical balancing act', argues that it is possible – and desirable – to teach higher education students how to reflect in deep and transformative ways. The position that reflective learning can be taught and has its place in higher education is also taken by other authors (e.g., by Brockbank & McGill, 2007). Reflection is key to experience-based learning in higher education, and scaffolding of student reflection is important (Coulson & Harvey, 2013). While quality learning is about meaningful learning for understanding, quality reflection is about productive reflective thinking.

[133] More than a decade ago, Phan (2007) noted that there were not many studies taking into account the totality of student approaches to learning and reflective thinking. With a view to links between student approaches to learning, levels of cognitive processing and reflective thinking, and reflection in learning, see, e.g., Bourner (2003); Fullana, Pallisera, Colomer, Fernández Peña, and Pérez-Burriel (2014); Kori, Pedaste, Leijen, and Mäeots (2014); Peltier, Hay, and Drago (2005); and Phan (2009a, 2009b).

2.2.2.2 Reflective practice and the 'reflective practitioner' – the reflective turn in teaching and teacher education

As noted above, there is worldwide interest in the promotion of teacher reflection by means of teacher education programs (LaBoskey, 2010). Teacher professional learning – both with pre-service and with in-service teachers – is a complex process (van Driel, 2014), which is just one of many reasons why it would be impossible to simply pass on, i.e., transfer, expert knowledge from effective, experienced, successful teachers to teacher education students.[134]

Teaching practice is considered to be one of the most important components of pre-service teacher education (Ziv, Silberstein, & Tamir, 1994). While reflection is thought to be an inherent part of teacher practice, numerous issues of teacher confidence and skills in reflective action have to be taken into account (Prestridge, 2014). Thus, it would seem advisable to lay the foundations of reflective teaching, reflective learning, and, thus, reflective practice from the very beginning, i.e., in initial, pre-service teacher education.[135] The term 'reflective turn' in professional education, denoting a shift in the

[134] There is no objection to experienced, effective teachers discussing their wisdom of practice with aspiring pre-service and practicing in-service teachers. Yet, every single teacher has to master the process of becoming and being a teacher himself/herself, ideally with constant support from others, e.g., in professional learning communities, the foundations of which can – and should – be laid in initial, pre-service teacher education (as in the case described, e.g., by Rigelman & Ruben, 2012). For more information on teacher professional learning communities, see, e.g., Anwaruddin, 2015; Popp and Goldman, 2016; Prenger, Poortman, and Handelzalts, 2017; and Prenger, Poortman, and Handelzalts, 2018. For a review of research on the impact of professional learning communities on teaching practice and student learning, see Vescio, Ross, and Adams (2008). For more information on research on the impact of teacher professional development on teachers' instruction (and thus, pupils' learning), the works by Laura M. Desimone (e.g., Desimone, 2009; Desimone, Porter, Garet, Yoon, & Birman, 2002) can be referred to. At this point, it is to be emphasized once more that teachers are the single most important in-school factor influencing pupils' learning. Thus, teacher professional development is a key to improving schools (Desimone, 2011).

[135] For more information on reflective practice, see, e.g., Behizadeh, Thomas, and Behm Cross (2017); Bell and Mladenovic (2013); Belvis, Pineda, Armengol, and Moreno (2013); Benade (2015, 2016); Blair and Deacon (2015); Bleach (2014); and Bold and Chambers (2009). In the literature, reflective practice and reflective learning have been called "the road to professionalism" (Branch Jr., 2010). Regarding

contents of curricula as well as a change in the approaches to higher education, can be found in the work by Donald Schön (e.g., Schön, 1991; Schön, 1992).[136]

Craig (2018) writes about knowing, doing, and being in relation to experience in teaching and teacher education. These three domains – teacher knowledge, teaching practice, and teacher identity – can be considered to be vital elements of reflection in both pre-service and in-service teacher education. While there can be found discussion in the literature of whether reflection can be carried out successfully at an early stage of pre-service teacher education, there is evidence of growth of reflection in pre-service teachers (e.g., Alger, 2006). In professional teaching, which can be considered science, craft, and artistry,[137] reflective practice is about deliberate, unceasing inquiry with a view to quality standards and continuous (self-)improvement. Reflective and reflexive learning in higher education are ways to lifelong learning (e.g., Ryan, M., 2015).

In Chapter 3, there will now follow a review of original research on portfolio.

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the notion of the 'reflective practitioner', see, e.g., Adler (1991); Attard (2008); Korthagen and Wubbels (1995); and Ostorga (2006).

[136] As noted by Bengtsson (1995), the work by Donald A. Schön was an important inspiration as regards the notion of reflection. Bengtsson (1995) draws attention to the fact that the book *The Reflective Practitioner* (Schön, 1983) did not focus on the teaching profession directly, whereas in the following works (Schön, 1987; Schön, 1991), pedagogy is considered. Kwo (2010, p. 314) qualifies these books as "… a seminal discussion of theory and practice for professionals". Other theoretical works asserted by Bengtsson (1995) to have been of great importance to the interest then developing in the notion of reflection are the article *Linking Ways of Knowing with Ways of Being Practical* (van Manen, 1995) and John Dewey's seminal book *How We Think* (Dewey, 1933).

[137] Science in adeptly basing pedagogical practice on scientific theory; craft in skillfully planning and executing instruction; and artistry in successfully mastering novel complex situations in teaching.

3 Original research on portfolio construction: A systematic review of the available literature

"The greatest part of a writer's time is spent in reading, in order to write; a man will turn over half a library to make one book."

Samuel Johnson, in *The Life of Samuel Johnson, LL. D.* (Boswell, 1791)

3.1 Research questions guiding the literature review

IN PRE-SERVICE TEACHER EDUCATION, objectives related to learning and reflection for professional development and personal growth are often followed by means of the implementation of a portfolio designed in one specific, concrete way. As has already been mentioned, substantive, empirical quality research on portfolio and its potential in education continues to be scarce; a paucity of research that has been alluded to repeatedly throughout the history of the instrument (e.g., Borko et al., 1997; Herman & Winters, 1994; Imhof & Picard, 2009; Ogan-Bekiroglu, 2014).[138] Yet, it is of crucial importance for researchers and practitioners alike to know the current state of knowledge on portfolio in order to advance teacher education research and practice,[139] while policy-makers and higher education faculty need a basis to take decisions on the curricula for teacher education, the structure of programs, and the design of learning environments.[140] To the best of the author's knowledge, there exists no systematic literature review of recent date addressing specifically the topic of portfolio construction for deep learning in pre-service teacher education, which is why in this chapter of the dissertation the best available literature is analyzed and presented in order to provide

[138] Some authors claim that a large number of studies have been conducted on various aspects of portfolio (as does, e.g., Koçoğlu, 2008). The dissonance of statements in the literature regarding the availability, scope, and quality of research on portfolio is one more reason to embark on an investigation of the actual state of research.

[139] As illustrated by Grossman and McDonald (2008) with a view to the United States, research on teacher education has developed in isolation from research on teaching, and in comparison is still quite young.

[140] The latter being based on up-to-date principles of instructional design and constructive alignment.

answers to key questions on the use of portfolio in pre-service teacher education that have to be considered as being still open. The five main research questions guiding this literature review are as follows:

Aiming at a broad overview regarding the range of concrete implementations of the abstract concept of portfolio, the first research question is posed as follows:

RQ 1: What are the *key purposes* of portfolio construction in pre-service teacher education, as reported in the studies reviewed?

It will be interesting to see *what purposes* portfolio is actually used for, and *in what ways* this is done.

The second question, focusing on the effects of portfolio as an educational tool, thus being fundamental to the judgment of its effectiveness in university teacher education, is:

RQ 2: What aspects of portfolio construction have been *the focuses of the research identified* and what are *the effects of portfolio construction on pre-service teachers' learning and reflection*, with regard to task processing as well as in relation to (intended) learning outcomes?[141]

Research on portfolio being geared at different aspects of portfolio-based education, in particular at various aspects of student learning and reflection, it is desirable to compile existent relevant literature in order to construct 'the big picture' instead of simply looking at fragmented research findings on isolated aspects of portfolio construction only.

[141] Both in the literature review (this chapter) and in the original research conducted (Chapter 4) the focus is laid exclusively on issues of *effectiveness*, i.e., on the impact of portfolio construction on student learning and reflection. Questions of *efficiency* (e.g., whether there are other educational tools, such as learning journals, that might be used to achieve the same intended learning outcomes with the same or a higher level of efficiency) are not dealt with. Questions regarding efficiency may be examined by further research as soon as the research base relative to the effectiveness of portfolio construction as such has been further extended and consolidated.

Delandshere and Arens (2003) as well as Zeichner and Wray (2001) point out that the details of portfolio development, such as the purposes and the context of portfolio use, must be taken into account when researching the effects of the instrument. Thus, with a view to this scientifically sensible demand, a third research question is formulated, taking note of the differentiation of learners and of learning environments:

RQ 3: What is *the influence of contextual factors* of portfolio development in pre-service teacher education? Specifically:

RQ 3.1: What *student factors* are considered to influence pre-service teachers' learning and reflection in portfolio construction?

RQ 3.2: What aspects regarding *the learning environment* may take effect on pre-service teachers' portfolio-based learning and reflection; what factors are regarded as facilitators, what factors are seen as impediments?

Each implementation of portfolio in an educational setting is unique in the sense that students, student groups, faculty, curricula, learning environments, etc. differ. Yet, there can be assumed to be universal general effects, e.g., of student pre-dispositions and of task design.

Keeping in mind that portfolio development in teacher education can only be realized to its full potential and that maximum success is only to be expected if there is buy-in on the parts of both the students and the teacher educators, based on positive perceptions and a perfectly – or at least predominantly – positive portfolio experience, the fourth research question is:

RQ 4: What are *the perceptions of portfolio construction* in pre-service teacher education *held by pre-service teachers*?[142]

[142] As was laid out in Chapter 2, students' perceptions of the context of learning influence their approaches to learning. In the literature, the whole of a learner's perceptions of portfolio construction and the portfolio-based learning environment is often labeled the 'portfolio experience' (e.g., Borko, Michalec, Timmons, & Siddle, 1997; Brown, 2001; Fiedler, Mullen, & Finnegan, 2009; Miller & Morgaine, 2009; Parker, Ndoye, & Ritzhaupt, 2012; Stansberry & Kymes, 2007; Wade & Yarbrough, 1996).

As it is claimed in the literature that portfolio development lacks theoretical foundation, the concluding research question that will be dealt with – by way of parenthesis, in complementing the review of empirical evidence on portfolio development – is:

RQ 5: What *theoretical foundations, concepts, and key pedagogies* underlying portfolio use in pre-service teacher education are referred to in the studies identified and reviewed?

"An important weakness in the existing portfolio literature is that it is largely unconnected to broader theoretical frameworks" (Fiedler et al., 2009, p. 101). The lack of theoretical foundation stated by Fiedler et al. (2009) is confirmed by the impression gained when searching the literature; however, there do exist articles and papers focusing on the theoretical foundations of portfolio construction and/or taking them explicitly into account (e.g., Dysthe, 2002; Dysthe & Engelsen, 2004; Tisani, 2008). It will be of interest to see what theoretical and conceptual foundations researchers base their idea of portfolio development on. In view of the fact that in international teacher education both paper-based and electronic portfolios are implemented and that there is research on both, research related to both forms of portfolio will be examined.

Not only is there an apparent lack of existing research, but there are also contradictory statements as to the amount of research available (e.g., Bataineh et al., 2007, as opposed to Imhof & Picard, 2009). Based on this apparent dearth of empirical research, contradictory statements included in different reviews of the literature, and varying observations regarding the quality of the available and cited literature, a proper, up-to-date systematic review of the literature seems warranted. To the best of the author's knowledge, no systematic review on portfolio development addressing the above research questions has been published in recent years. There exists a literature review on portfolio published by Butler (2006), which is often cited; yet, independent of the fact that there can be assumed to have been new research findings in recent years, Butler's review contains no statements as to the methodology followed and no comments on the quality of the research collated and analyzed.

The 3P model of learning (Biggs, 1989, 1993; Biggs et al., 2001) is to serve as the basis of an methodical examination of four out of the five research questions formulated above.

The 3P model can be considered to be a universal representation of student learning in particular contexts and is often referred to with regard to constructive alignment of academic teaching and learning in higher education contexts (e.g., Biggs, 1989, 1993, 1996, 1999; Biggs & Tang, 2011; Walsh, 2007; Wang, Su, Cheung, Wong, & Kwong, 2013). Student characteristics (student factors; e.g., prior knowledge and preferred ways of learning) as well as attributes of the learning environment (such as departmental context, teaching methods, and classroom climate) constitute *presage* factors, influencing – directly as well as through students' perceptions – the *process* (task processing, learning-focused activities) and, thus, the *product(s)* of learning (learning outcomes; intended learning (ILOs), achieved fully or to a certain extent, as well as *all* outcomes resulting from task processing, planned for or not), the whole of interlinked elements representing an instructional system.[143, 144, 145]

On the basis of the review of the literature, substantiated answers to the five research questions will be attempted. This review intending to follow a systematic approach, it seems important to first provide an overview of its method, including the decisions leading to the corpus of literature used as a basis to answer the research questions put. In the following section, the processes of the search for literature and the subsequent selection as well as the following processes of analysis, structuring, evaluation, data extraction, and synthesis of the evidence will be outlined.

[143] In the literature, student factors are also termed 'personological factors' (e.g., Biggs, 1978; Watkins & Hattie, 1981).

[144] There can be assumed to exist different cultures and demands in different university departments. Further information on the influence of university departments and university teachers on student learning is provided by, e.g., Entwistle and Tait (1990); Ramsden (1979); and Ramsden and Entwistle (1981). Students' approaches to learning and their perceptions of the teaching-learning environment in different disciplines are investigated, e.g., by Entwistle and Tait (1995) and by Parpala, Lindblom-Ylänne, Komulainen, Litmanen, and Hirsto (2010).

[145] Learning being an open-ended, complex, continuous process, it would be virtually impossible to foresee *all* outcomes of learning, institutional (e.g., at university and at school) and otherwise.

3.2 Methodological considerations regarding the literature review

It is one of the key aims of this dissertation to provide a systematic review synthesizing the best available literature identified by means of a systematic, transparent procedure. Thus, the procedure for this literature review was determined in a review protocol and carried out in a structured way, based on the principles, policies, and guidelines published by scholars and professional groups on the subject of systematic reviews (e.g., Gough, Oliver, & Thomas, 2012; Gough, Oliver, & Thomas, 2013; Littell, Corcoran, & Pillai, 2008; McMillan & Schumacher, 2014; PRISMA - Transparent Reporting of Systematic Reviews and Meta-Analyses, 2009a; Torgerson, 2003). As pointed out by Bearman et al. (2012), it is the emphasis on transparent, structured, and comprehensive approaches to searching the literature and the requirement for a formal synthesis of research findings that distinguish systematic review methodology from narrative reviews. Referring to the higher education sector, Bearman et al. (2012) note that there seems to be relatively little use of systematic review methodology and that thoughtful use of this methodology might be of benefit.[146] In the following parts of this section, the distinct successive stages of the approach chosen for this literature review and the procedures established for the identification, selection, analysis, organization, evaluation, and synthesis of original research will be laid out in order to provide a comprehensive, transparent account of the procedures followed.

3.2.1 Literature search and selection

The literature search for a systematic review (Petticrew & Roberts, 2006; The Campbell Collaboration, 2015) by means of a sequence of queries in several scholarly internet databases was conducted at the beginning of the first stage of the reviewing process. The databases (1) Academic Search Premier, (2) Teacher Reference Center, (3) PsycARTICLES, (4) PSYNDEX, (5) PsycINFO, (6) ERIC, and (7) Web of Science were searched, the last three records listing most of the international educational research available (Depaepe, Verschaffel, & Kelchtermans, 2013). All searches were conducted at the end

[146] A look at higher education research of more recent date leads to the impression that the number of systematic literature reviews is growing.

of May/at the beginning of June 2014.[147] Due to differences in the database query forms, it was not possible to run searches with perfectly identical parameters; yet, the key parameters were kept constant as far as possible (for details of the parameters set, see the notes in Appendix A.2, p. 440).

[147] A comprehensive pool of literature pertaining to various aspects of portfolio construction in teacher education had been collated and analyzed for many years prior to this database search to be used in a documented, *systematic* literature review to present the current state of original research on portfolio. Taking into account that at the stage of the completion of this dissertation a period of three years had passed since the systematic search described here, additional searches for up-to-date literature – i.e., original research on portfolio meeting the criteria for inclusion – were performed in April/May 2017, and the pool of studies for the systematic literature review was complemented. Further searches were run for original research published in the years 1993-1994, in order to round off a comprehensive, thorough search for portfolio research published during 25 years. Complementary information on these searches can be found in Appendix A.8 (p. 535). While the analysis of the main corpus of studies was executed in great detail, the articles identified in the course of the complementary search for literature were scanned and considered in total, the findings reported being drawn on primarily to corroborate findings of the preceding review of the literature as well as to check for possible new directions and insights in up-to-date research and practice related to portfolio as an educational tool. The additional references identified generally confirm the observation that there are various approaches to portfolio design and portfolio implementation in pre-service teacher education, to which new forms of portfolio (e.g., Facebook® portfolios, as described by Kabilan, 2016) are added. The general stance towards portfolio as an educational tool, both on the part of researchers as well as of practitioners, appears to continue to be positive. (In a German publication, Koch-Priewe (2013) in her summary of portfolio research then existing notes that research findings on portfolio in teacher education, both in German-speaking countries as well as on an international scale, were mixed. The comprehensive review of portfolio literature conducted for this dissertation gives the impression that the extensive range of international research findings collated can well be considered as primarily positive, with findings of a positive impact prevailing. Yet, as is stated by Hascher and Sonntagbauer (2013), much more research is needed on the effectiveness of portfolio in teacher education as well as on the conditions for success. The authors call for more reliable and generalizable research findings, noting that in the empirical research then existing there was not enough information on the contents and the design of the portfolios researched, the studies also having a 'local bias'. Taking into account the multitude of portfolio practices that can be observed in higher and teacher education, it seems questionable whether – and if so: in what ways – such generalizability of research findings might be achieved with regard to research on an educational tool as flexible and variable as portfolio. From the publication in question it can also be seen that paper-based portfolios continue to be in use in teacher education.)

The seven databases named were searched for articles in peer-reviewed journals that had been published between the years of 1994 and 2014, i.e., within a time span of 20 years up to the time of the review. The limitation to scholarly, peer-reviewed journals as sources of literature was made with regard to quality issues, the assumption being that a peer-reviewing process established by the editors of a scientific publication can generally be assumed to ensure that minimum quality criteria are met. The time span of two decades was chosen in order to gain a comprehensive overview of what had been researched and published in the last 20 years. In some databases, entries could only be retrieved for a time span shorter than 20 years; in that case, the maximum time span available was chosen. In order to take into account terminological variability, three separate Boolean searches were run in each database, combining the search term of 'portfolio' with the search terms of (1) 'teacher education', (2) 'teacher training', and (3) 'teacher preparation' respectively, mirroring the terminological variety in teacher education research, practice, and literature. The parameter "Apply related words" was set, if offered in the query form. Terms such as 'pre-service teachers', 'student teachers', 'trainee teachers', etc. were deliberately avoided, since these are used very variably in the literature so that a comprehensive result of a search on the basis of their use could not be assured to a satisfactory extent. Learning and reflection, the focuses of this review, were also not entered as search terms, so as to ensure that *all* articles related to portfolio construction in teacher education would be retrieved. With regard to the location of the search terms, no particular fields (title, abstract, or keywords) were specified; however, full text searches were not included if that parameter was available, to make sure that the search would remain focused, and the number of results manageable. That way a gross total of 1,015 results were retrieved from the seven databases.

Due to a limitation of resources, an extension of the literature search beyond the use of internet databases, by means of searches for grey literature or hand searches in the reference lists of the literature identified, was deliberately refrained from. This seems justifiable with a view to the fact that the internet databases selected for the literature search can be assumed to comprise relevant high-quality literature in education, and in face of the claim that searches in reference lists are inefficient and unsystematic

(Chapman, Morgan, & Gartlehner, 2010). The search for literature having been completed, the stage of literature selection followed.

During literature selection as the second stage of the reviewing process, the lists of results obtained during the search for original research on portfolio development in pre-service teacher education were carefully processed and saved for subsequent analysis and permanent documentation. The number of results found in each database can be found in Appendix A.2 (p. 440), together with an overview of the parameters that were set within each database. As noted above, the search led to a total number of 1,015 results from all databases. Screening these results by means of an analysis of the results lists, it was determined which articles would be clearly or potentially relevant to the aims and the research questions of this literature review – and which would not. Duplicates were removed. Articles that seemed to be of interest were analyzed more closely to determine whether their contents might warrant an inclusion in this literature review. In the end, 119 studies were taken into account when writing this literature review in order to gain a broad overview of existing research on portfolio in pre-service teacher education and to pinpoint possible gaps in research findings. These 119 studies, selected from the total of results identified, are marked in the reference list of this dissertation by means of an asterisk. A graphic overview of the process of literature search and selection is provided in the form of a flow chart in Appendix A.2 (p. 442).

3.2.2 Analysis, organization, evaluation, data extraction, and synthesis of the evidence

The third stage of the literature review started with a thorough analysis of the 119 studies that were considered to be clearly or at least potentially relevant. In an iterative process, these studies were read and re-read several times in order to make sure that their contents would be registered properly, that the quality of the studies could be evaluated, and that potential links (thematic and otherwise) to other studies in this pool would be discovered. First, the studies were organized by assigning them to different categories that were built inductively during the reviewing process, such as 'portfolio to improve learning', 'portfolio to foster reflective thinking', etc., according to the primary focus of research of and the main purpose of portfolio development re-

ported in each study.[148] Then, the quality of the studies in the clusters was assessed on the basis of the principles for scientific research in education (Shavelson & Towne, 2002). A data extraction form was designed in which data could be entered (see Appendix A.3, p. 443). In order to be considered for in-depth analysis and presentation, studies had to be of relevance with regard to the research questions (portfolio for learning and reflection in pre-service teacher education), they had to represent an empirical study (original research), and with regard to quality assessment they had to meet or exceed a minimum quality threshold.[149]

In the following subchapter, high-quality articles dealing with portfolio for learning and reflection in pre-service teacher education will be presented and analyzed in detail against the background of the research questions formulated. Other articles from the field of teacher education may be referred to in the discussion if they deal with aspects of (portfolio-based) learning and reflection, to challenge or corroborate, as the case may be, the findings summarized in the following. Additional findings from research on higher education learning and reflection in general and from research on learning and reflection in educational programs and courses for particular professions (e.g., medicine, nursing) that in comparison with teaching can be considered to address similar issues (e.g., human action and interaction; dealing with uncertainty; issues of ethics and responsibility) and to be of similar complexity during professional education and later professional practice may be mentioned as well in the discussion of original research findings where appropriate.[150]

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[148] A tabular overview regarding the focus(es) of research identified is provided in Appendix A.4 (p. 445). As there may be more than one focus of research in a given study and as the focuses of research are sometimes stated rather broadly, a study may be listed in relation to more than one topic.

[149] For considerations of the weight of evidence based on quality and relevance, also see Gough (2007).

[150] While there exist many original research findings from a variety of domains making use of portfolio-based professional education, judging from the number of scholarly texts on this topic that have been identified during the composition of this dissertation, it is the fields of medical and nursing education that, along with teacher education, appear to be most advanced both in portfolio practice and in the research thereof. Of course, Portfolio as an educational tool is not exclusive to teacher, medical, and nursing education. There is ample evidence of portfolio being widely used in higher education on an international scale, in domains and disciplines as diverse as accounting (e.g., Samkin &

Francis, 2008) and engineering (e.g., Heinrich, Bhattacharya, & Rayudu, 2007; Kilgore, Sattler, & Turns, 2013). With regard to the two academic disciplines named, it is to be noted that there also exists extensive research articles and scholarly treatises on student approaches to learning. In accounting, these would be publications, e.g., by Angus Duff (Duff, 2014; Duff & McKinstry, 2007; Duff & Mladenovic, 2015); in engineering, articles by Case and Marshall (2004); Ellis, Goodyear, Calvo, and Prosser (2008); and Pettersson, Svedin, Scheja, and Bälter (2017). Independent of the fact that on the basis of the 3P model student approaches to learning can be assumed to potentially differ between academic disciplines (with different contexts of student learning and varying perceptions of the academic task on the part of the students, see Duff & McKinstry, 2007; differences between discipline have been shown by, e.g., Andreou, Vlachos, & Andreou, 2006; Entwistle & Tait, 1995; and Nelson Laird, Shoup, Kuh, & Schwarz, 2008) and departments (e.g., Ramsden & Entwistle, 1981), these publications illustrate that both portfolio construction and the support of student learning by means of portfolio continue to be topics of interest in both higher education research and practice.

3.3 Findings of the literature review: An overview and a synthesis of original research

3.3.1 Purposes of portfolio construction (Literature Review Research Question 1)

Based on the topic of this review and the corresponding pre-selection of search results for analysis and evaluation, there is a focus on articles dealing with portfolio construction for pre-service teachers' learning. As has been stated above, implementations of portfolio aimed at multiple purposes at the same time are possible and used in practice. Thus, in addition to objectives exclusively geared at professional development and personal growth, portfolios emphasizing student learning and reflection may well address, to varying extent, issues of assessment, in the form of assessment *for* learning (formative assessment, e.g., Bloxham & Carver, 2013; Brown, 2004; Sambell, McDowell, & Montgomery, 2013; Taras, 2002, 2005) as well as in terms of assessment *of* learning (summative assessment; e.g., Buzzetto-More, 2010; Smith & Tillema, 2007; Taras, 2005, 2009). Therefore, it seems warranted to take a closer look at the manifold purposes of portfolio development as reported in the range of studies found during the search for literature, and to lay out the aims that are typically followed by means of portfolio as a tool in the design of educational environments. Combined with the exploration of portfolio purposes, the contexts of portfolio development in pre-service teacher education will be examined on the assumption that the context influences both portfolio purposes and possibilities.

Of the studies identified, the majority deals with a key purpose of portfolio in teacher professional preparation in higher education: the encouragement of quality learning. Quality learning (e.g., Biggs, 2001; Biggs & Tang, 2011; Jones, 2010b), i.e., *meaningful learning for understanding*, is intended to stimulate students' professional and personal development as future teachers. Portfolio is used for students' professional development (e.g., Koçoğlu, 2008; Scherz, Bialer, & Eylon, 2008; Senne & Rikard, 2004; Willis & Davies, 2002; Winsor, Butt, & Reeves, 1999; Wray, 2007) and to support students in learning to teach (e.g., Avraamidou & Zembal-Saul, 2006; Bataineh et al., 2007; Chetcuti, 2007; Klenowski, 2000; Pecheone et al., 2005; Pelliccione & Raison, 2009; Yoo, 2009). It can be used in the preparation of students for the future design of learning environments, including issues of performance assessment and technology use

(Bartlett, 2002). E-portfolios are often used with the express purpose of technology competence acquisition on the part of the students (e.g., Milman, 2005; Spendlove & Hopper, 2006; Trent & Shroff, 2013). With regard to the competencies and dispositions deemed important in teaching, portfolios can be used to encourage pre-service teachers' inquiry (e.g., Shepherd & Hannafin, 2011; Yoo, 2009), to support the formation of students' personal theories (Jones, 2010a) and student teachers' identities (e.g., Hallman, 2007; Haniford, 2010; Trent & Shroff, 2013), to serve as repertoires of practice (Berrill & Addison, 2010), and to foster teacher autonomy (Cakir & Balcikanli, 2012). They can also be used to change students' conceptions of teaching (Green & Smyser, 1995).

Portfolios are used to foster learning (e.g., Blau, Mor, & Neuthal, 2013; Chang, 2001; Çimer, 2011; Hartmann & Calandra, 2007; Loughran & Corrigan, 1995; Mansvelder-Longayroux, Beijaard, Verloop et al., 2007; Stansberry & Kymes, 2007; Wickersham & Chambers, 2006; Yoo, 2009), to encourage learner engagement (e.g., Barrett, 2007; Shepherd & Hannafin, 2009), to promote learner collaboration (e.g., Tang & Lam, 2014; Wang, 2009), and to support independent, autonomous learning (e.g., Chau & Cheng, 2010; Meeus, Petegem, & Meijer, 2008a; Meeus, Petegem, & Meijer, 2008b). Reflection in teacher education being considered as a form and a means of learning, there are the closely related purposes of portfolio as a tool to encourage reflective learning (e.g., Bataineh et al., 2007; Chetcuti et al., 2011), reflective thinking (e.g., Ayan & Seferoğlu, 2011; Mansvelder-Longayroux, Beijaard, & Verloop, 2007; McKinney, 1998; Milman, 2005; Oakley et al., 2014; Oner & Adadan, 2011; Thomas & Liu, 2012; Wade & Yarbrough, 1996), and reflective practice (e.g., Borko et al., 1997; Chuang, 2010; Groom & Maunonen-Eskelinen, 2006; Orland-Barak, 2005).

As has been noted above, portfolio can be implemented as a particular way of designing the learning environment, portfolios being used for assessment (e.g., Denney et al., 2012; Dutt, Tallerico, & Kayler, 1997; Dutt-Doner & Gilman, 1998; Wickersham & Chambers, 2006; Zou, 2003), the integration of different features of the learning environment (McKinney, 1998), and the integration of discrete elements in the curriculum (Lurdes Gonçalves & Andrade, 2007). The integration of different features of the learning environment as well as of discrete elements in the curriculum serves the key

purpose of constructing a context that is conducive to professional development and personal growth based on holistic, comprehensive learning and reflection comprising the cognitive, affective, and social dimensions of learning (Illeris, 2002; Illeris, 2003; Illeris, 2004).[151]

Portfolio is typically made use of in practicum settings (as is the case with, e.g., Borko et al., 1997; Kaasila & Lauriala, 2012, Oner & Adadan, 2011), which can be assumed to be due to several benefits attributed to portfolio construction in (pre-service teacher) education – namely, its potential to encourage the formation of links between theory and practice (e.g., Borko et al., 1997), its potential to support comprehensive learning (e.g., Bataineh et al., 2007), and its potential to foster and document iterative learning over longer periods of time (e.g., Lin, 2008). As has been noted above, portfolio as a bridge between educational theory in the university classroom and hands-on field experience during practical phases at school is used on an international scale to combine school-based and university classroom learning. The context is indicative of its purpose(s). In the studies selected for detailed presentation in this literature review, the key purpose of portfolio development is student learning and reflection.

Following this overview of purposes of portfolio use in teacher education, the second research question, which represents the mainstay of this literature review, will now be addressed: The effects of portfolio construction on students', i.e., pre-service teachers', learning and reflection.

3.3.2 Effects of portfolio construction on pre-service teachers' learning and reflection (Literature Review Research Question 2)

From a pedagogical point of view, portfolio should only be used if there is sufficient reason to assume, on the basis of the available evidence, that the instrument is conducive to preservice teachers' learning and reflection, i.e., that its implementation on the part of those teaching and its construction on the part of those learning is worthwhile:

[151] These comprehensive, integrative, holistic approaches to learning and reflection can be considered to represent manifestations of (opportunities for) deep learning.

Taking into account the considerable additional amount of work related to portfolio development, both for students and for teacher educators, it seems important to look at the effectiveness as well as the efficiency of this educational tool.[152] Learning and reflection being the focuses of this literature review, there will now follow a detailed presentation of original research on portfolio construction in relation to these two processes that has been published in peer-reviewed journals and is considered by the author of this dissertation to represent quality research.

In the context of university pre-service teacher education for social sciences and English as a foreign language, Bataineh et al. (2007) in their study on Jordanian pre-service teachers' perceptions of *the portfolio as a reflective learning tool* report that during individual interviews the 50 students participating in their research reported a wide range of benefits in several categories, some of which are related to general aspects of learning and reflection. Students perceived keeping a portfolio to be beneficial to the development of various categories, such as students' knowledge (e.g., about educational matters, of portfolio structure and organization, of self-assessment), skills (e.g., reflective, critical, and analytical thinking skills), attitudes (e.g., towards keeping a portfolio, self-assessments, and independent learning), personal traits and values (e.g., self-confidence), motivation to learn (e.g., keeping a well-constructed portfolio), positive interpersonal relationships (e.g., relationships with peers), and portfolio being an information source of the students' own (e.g., portfolio as a source of knowledge always available).

With a view to university teacher education in the United States, Beck et al. (2005) compare pre-service and beginning in-service teachers' self-assessments of *the effects of formative and summative portfolios on professional development.* Drawing on three samples of pre-service teachers comprising a total of 188 participants and on one sample of beginning in-service teachers consisting of 19 participants, the authors had the participants construct four different kinds of portfolio. The portfolio A sample (62 pre-service teachers) created a hybrid form of portfolio (primarily geared towards teacher

[152] With a view to the impact, i.e., potential benefits, of portfolio construction. As noted, issues regarding efficiency of portfolio implementation will be set aside in this context of this dissertation.

development, with some summative elements), the portfolio B sample (67 pre-service teachers) created a summative accountability portfolio, while the portfolio C sample (59 pre-service teachers) and the portfolio D sample (19 in-service teachers) both created a formative portfolio essentially based on the model of reflective inquiry proposed by Schön (1983), with distinctive modifications in each of the two forms. Thus, all portfolios were based on different curricula, and hypotheses on professional outcomes were formulated based on the variations in instructional design. Findings show that while teachers' rating of each of the four portfolios was favorable, portfolios A, C, and D – the formative portfolios – each received a significantly higher rating than did the purely summative portfolio B. For four out of five factors concerning professional outcomes (comprising "overall teacher development, including reflective skill" and "the benefit of teacher peer collaboration"), the means of the three formative portfolios were significantly higher than those of the summative accountability portfolio.

Working in United States university teacher education, too, Borko et al. (1997) in a school-based professional seminar, taken by students concurrently with student teaching, conducted a qualitative study to examine *student teaching portfolios as a tool for promoting reflective practice.* A short introduction on the then present situation as well as on theoretical and empirical support for portfolios is followed by a description of portfolio as implemented at the University of Colorado, Denver. The authors sought to answer the question what factors in the process of portfolio construction would be seen by students as facilitators, and what factors would be seen as hindrances. To this end, participants' experiences and perceptions of the portfolio project were examined by means of action research. Data were collected by means of written reflections by all 21 students in the fall 1994 cohort and semi-structured interviews with eight students. Both the written reflections and the interviews were about students experiences of constructing the portfolio. The authors note that in two cases, the portfolio experiences differed dramatically. As regards the analyses of the reflective writings and the interviews, responses could be assigned to five general categories: benefits of the portfolio project; costs; factors facilitating portfolio construction; factors hindering portfolio construction; and suggested refinements. Both in the written reflections and during the interviews, participants commented most frequently on the benefits of the portfo-

lio experience, each participant identifying multiple benefits. Costs of the portfolio experience were commented on much less frequently, and concerns were voiced by a much smaller number of participants. The benefit of participation in the portfolio experience that was cited most frequently was opportunity for reflection. Portfolio was seen as a tool for reflection (on students' individual strengths and weaknesses, their teaching, and their educational philosophies), enabling participants to form connections between theory and practice relative to teaching.

With a view to fostering teacher autonomy, Cakir and Balcikanli (2012) in a study conducted in university pre-service language teacher education in Turkey examined *preservice teachers' and teacher trainers' views of the European Portfolio for Student Teachers of Languages (EPOSTL).* This particular form of portfolio was implemented as a reflection tool for self-assessment of competences and monitoring of progress as well as for the documentation of teaching experiences. 25 student teachers and four teacher trainers were interviewed. Findings imply that portfolio development was beneficial for reflection, awareness, and self-assessment, all of which are considered by the authors as elements of teacher autonomy.

In relation to the Professional Development Portfolio (PDP) compiled by pre-service teachers in the Faculty of Education of the University of Malta, Chetcuti et al. (2011) conducted an exploratory study to find out *whether the reflective learning skills acquired in preservice teacher education are retained in the first year of teaching.* After presenting a short overview of reflective practice and types of reflection, the authors lay out the context of portfolio development at the University of Malta, and with a short reference to previous local studies and the positive aspects found in relation to the PDP wonder whether the reflective learning skills and the 'academic' view of reflection would be retained in the first year of teaching. They also wanted to know whether first-year teachers use reflective learning processes when seeking to continue their professional growth as teachers. Open-ended, semi-structured interviews were conducted with 15 first-year teachers, both from the fields of secondary and primary teaching. 14 participants indicated that the skill of reflection was one of the most important skills they acquired while preparing their PDP during preservice teacher education. All participants agreed that they continued to reflect in the first year of teaching. However,

they made a distinction between 'formal' and 'informal' reflection. Only four of the 15 teachers interviewed continued to compile their PDP on the basis of 'formal', 'academic' reflection. The other eleven participants all reported that the reflective skills acquired in the course of the PDP process were retained in the first year of teaching; yet, the reflection they engaged in as first-year teachers was regarded as 'informal', and they did not continue compiling a 'formal' PDP. It seemed that the teachers participating in the study simply used their PDP developed during their initial teacher education as a point of reference. Nine teachers used their PDP as a way of comparing the type of teacher they were in their pre-service teacher education to the type of teacher they were in the process of becoming in their first year of teaching. The authors conclude that the reflective process engaged in during pre-service teacher education seems to become 'a habit of mind' (Chetcuti et al., 2011, p. 69), which is retained in the first year of teaching. Though it is noted that this reflection was in most cases 'informal' only, being limited both with regard to contents and to its level, the development of the PDP seems to have created a reflective stance.

In Canada, Chitpin and Simon (2009) examined *pre-service teachers' perceptions of purpose, process, and impact of professional portfolios* in a teaching and learning context where portfolio was to promote reflection. In the context of a reflective practice seminar in primary/junior division at the University of Ottawa, data were collected through interviews, informal classroom conversations, and reflections over a period of eight months. 15 out of 19 pre-service teachers enrolled in one seminar section participated in the study on a voluntary basis. Findings showed that the construction of the professional portfolio with reflection as the key element was perceived as changing habitual practice in the form of questioning what was previously taken for granted. Pre-service teachers stated that portfolio construction challenged them with cyclical reflection on taken-for-granted assumptions while providing them with the articulation of growth and a variety of perspectives.

In a qualitative study from Turkey related to university pre-service teacher education in the field of biology, Çimer (2011) investigated *student teachers' views of portfolios as a learning tool.* Claiming that there was not enough qualitative empirical research on student learning and the portfolio process, the author intended to provide qualitative

evidence of the effects of portfolio implementation on learning. A class of 35 fourth-year student teachers studying biology for secondary schools participated in the study, based on their being enrolled in a course on assessment and evaluation. The portfolio assignment was combined with weekly tests, and self-reflective journal reports in the portfolios as well as a final self-reflection task were used for data collection. The summary reflection papers were written at the end of the portfolio process, summing up what had been learned from self-assessment journal entries as well as from the entire portfolio assessment experience. Data analysis led to five broad categories regarding students' perceptions of the portfolio process and its effects on their learning. In general, students' views about the portfolio process improved over the course of portfolio development. Students noted that the self-reflection requirements, especially the reflection prompts, contained in the portfolio induced them to study regularly, with study habits becoming more regular. Self-awareness in the form of noticing strengths and weaknesses in learning was supported by feedback from the weekly tests and the writing of weekly reflective journal entries. Students also pointed out positive effects of portfolio related to increased retention and higher-order thinking.[153] Çimer (2011) relates this improvement in learning to the reflective elements of the portfolio. Reflection on experience turned learning into a more conscious process and led to increased self-assessment. Students' feelings about portfolio improved over the course of portfolio development, and in the final reflective reports all of the students expressed positive feelings.

Delandshere and Arens (2003) in a context of portfolio development for initial licensure in the United States examined *the quality of the evidence represented in pre-service teachers' portfolios and the inferences drawn from them.* Portfolio implementation in three different elementary teacher education programs was compared on the basis of several data collection strategies. The authors state that the portfolios "… lack[ed] explanations or conceptual structure and represent teaching as an eclectic set of discrete and generic skills, beliefs, and activities" (Delandshere & Arens, 2003, p. 62). The statements relative to the students' philosophies of education were shallow and in most cases inconsistent with the other elements in the portfolio. It is to be noted here

[153] Again, note the relation to deep approaches to learning, comprising higher-order learning activities.

that this study represents one of the few unfavorable studies of portfolio identified and examined.

Considering initial teacher education in Norway, Hauge (2006) conducted a study focusing on *professional learning in a teacher education program* at the University of Oslo. Acknowledging the positive role that is generally attributed to portfolios for reflection in teaching and learning, the author states that there is a need to reconsider this in more detail, taking into account specific knowledge domains, portfolio purposes, conditions, and contexts of use, as well as to clarify the different aims and functions of portfolios in teacher education when exploring their benefits and outcomes. Data collection comprised open-ended interviews with five student teachers, who were invited to be interviewed twice about their values, preferences, and experiences with Information and Communications Technology (ICT) and portfolio during the program, and an electronic survey study by means of a questionnaire administered to all students at the end of the program. 55 students out of 76 responded to the questionnaire, which was to elicit the students' perceptions and experiences of teaching, learning, and assessment in the program. With regard to student characteristics, it is to be noted that some participants in the teacher education program disposed of previous teaching experience, i.e., that those participants were no pre-service teachers in a narrow sense of the word. In the interviews, all students said that the teacher education program had helped them and their understanding of what learning is about,[154] and that their learning experiences were very different from earlier ones. They stressed that the study processes had been richer and deeper-going than ever before.[155] With regard to the portfolio writing process, there was general agreement among the interviewees as to its being productive to a certain extent for their learning and professional understanding. With

[154] Such an effect would mean a change in the students' conceptions of learning, which in turn may take effect on students' approaches to learning (e.g., Entwistle & Peterson, 2004a; Richardson, 2011; Zhu, Valcke, & Schellens, 2008). Students' conceptions of learning and possible changes in these conceptions depend on a variety of factors, including the academic environment of the tertiary institute (McLean, 2001). There are numerous studies showing correlations of students' deeper approaches to learning and higher quality learning outcomes (Trigwell, Prosser, & Waterhouse, 1999).

[155] Note the relation to deep approaches to learning, which are also demonstrated in the reflection on subject matter, as stated by the participants in this study.

regard to the survey, the majority of students agreed that portfolio work had been helpful in concretizing theory in the study program, that the writing of portfolio assignments had helped them to reflect on the subject matter in the study program, and that the portfolio work had contributed a lot to contacts and collaboration with fellow students. Students' background variables, such as ICT experience and study motivation, were revealed to have had an influence on these perceptions.

In a two-part study focusing on German pre-service teachers' and teacher educators' views of portfolio, Imhof and Picard (2009) in the first part of their study investigated 118 *pre-service teachers' acceptance of portfolio and the effects of portfolio on pre-service teachers' professional development*. 26 prospective teachers in a traditional teacher education program without portfolio were used as a control group. Students were administered a questionnaire comprising questions regarding their acceptance of the portfolio (portfolio components and structure), their ratings of its importance and usefulness, as well as the way in which the pre-service teachers actually worked with their portfolios. With regard to professional competences and attitudes, existing scales were made use of. The participants' perceptions of the portfolio will be dealt with in Section 3.3.4. As regards dimensions of professional development, no significant positive impact of portfolio was found. In the second part of the study, 15 teacher educators from different types of school (primary, secondary) and with different subject backgrounds were asked to assess the portfolio method by means of a questionnaire. 14 out of the 15 teacher educators agreed that there was potential in the portfolio. They also noted that in their opinion the interaction of peers driven by the portfolio process resulted "… in a more elaborate style of reflecting on … professional development and in a more productive and independent group process among the pre-service teachers …" (Imhof & Picard, 2009, p. 153).

Focusing on *variation in the breadth and depth of reflective processes in different contexts*, Kaasila and Lauriala (2012) examined the context of Finnish pre-service teacher education with portfolio as a frame and a vehicle for reflection. Research data consist of 53 pre-service teachers' mathematics portfolios, three of which were analyzed more closely, representing different reflection profiles. The breadth and depth of the pre-service teachers' reflection processes varied greatly, depending on the context and the

student's proclivity for reflection, with pre-service teachers' former experiences as learners of mathematics having great impact on their reflection when teaching mathematics for the first time. Through acquaintance with research articles, pre-service teachers' reflection both broadened and deepened, while consideration of biographical context supported learners' understanding and reflection of other contexts.

Kabilan and Khan (2012) conducted a qualitative study in Malaysia, to examine *prospective teachers' practices with e-portfolios in their learning* and to find out whether these practices lead to teaching competencies. The study also aimed at the identification of *the benefits and challenges of using an e-portfolio as a tool for learning and self-assessment*. Following an extensive introduction and a review of the pertinent literature, the authors provide a short outline of e-portfolios in the research setting. 55 pre-service TESOL (Teaching English to Speakers of Other Languages) teachers participated in the study. These were randomly divided into nine groups of about six members each to work in online communities of practice. Weekly journals as well as discussion journals from the portfolios and a survey questionnaire were used to collect data. The survey questionnaire, containing open-ended questions, was handed out twice, at the beginning and at the end of the semester. The data in the journals and in the questionnaire were analyzed and coded. Findings indicate that participants appreciated e-portfolios, and that e-portfolios functioned as a monitoring tool, helping to recognize learning and to identify strengths and weaknesses. Teacher competencies emerging from e-portfolio practices were "(1) developing understanding of an effective teacher's role; (2) developing teaching approaches/activities; (3) improving linguistic abilities; (4) comprehending content knowledge; (5) gaining ICT skills, and (6) the realization of the need to change mindsets" (Kabilan & Khan, 2012, p. 1007).

In a one-year case study conducted by Lin (2008), t*he effectiveness and the value of e-portfolios from the perspectives of pre-service teachers* were examined. Following a short introduction on portfolio and electronic portfolio, e-portfolio is presented from three perspectives: as a learning strategy, as a reflective tool, and as a technology tool. The research took place within the context of an elementary teacher education program in the United States. 38 undergraduate elementary pre-service teacher candidates were introduced to the concept of e-portfolio. In order to measure students' perspec-

tives regarding the e-portfolio, an 18-item questionnaire was administered at the end of the course and selected interviews were conducted. As regards positive views on the e-portfolios expressed in the survey, a large majority of the students (87 %) thought that the process of reflecting on their work over time and seeing their experiences in the final e-portfolio help them revisit, i.e., review and rediscover, that learning experiences in more specific and complex ways. A considerable majority of the students (73 %) also stated that the reflection helped them self-assess their learning acquisition. Further positive views agreed to by a majority of the students were a development of a sense of purpose and focus, the development of synthesis skills by means of reviewing the artefacts time and again to decide how to compile them in a meaningful way, and learning from communications and interactions. Positive experiences related to technology that a majority of respondents agreed to were related to gains in confidence as well as reviewing existing and learning new technology skills. With regard to challenges of the e-portfolio process, almost half of the respondents (45 %) agreed that they felt challenged and overwhelmed by technology issues.

Focusing on reflection (learning activities) in portfolio compilation and on the contents of portfolio, Mansvelder-Longayroux, Beijaard, and Verloop (2007) investigated *student teachers' learning and reflection* in a one-year university teacher education program in the Netherlands, in the course of which two portfolios were produced. For the study, 39 learning portfolios were analyzed. The authors found that students tended to concentrate on their teaching practice and how to improve it, discussing individual experiences important to them and the connections of these experiences over a period of time. Yet, the student teachers made use the portfolio to a lesser extent in order to advance their understanding of situations and developments that had occurred.

Mansvelder-Longayroux, Beijaard, Verloop et al. (2007) examined *the functions of the learning portfolio in the learning process of student teachers*. Providing a general introduction on portfolios in teaching and teacher education as well as an overview of pertaining studies, the researchers derive the key question of their research, which is what student teachers understand by working on a learning portfolio. This question was then divided into two separate questions related to (1) what functions student teachers attribute to the learning portfolio with regard to the learning process and to (2) the

relation of these functions. With a view to the process function of the learning portfolio, an extensive summary regarding this process function, reflection, self-regulation of learning, and construction of practical knowledge is given. The study was conducted at Leiden University in the Netherlands. The student teachers participating in the study were being trained to teach in secondary education in language or science subjects. They produced two learning portfolios during their one-year postgraduate teacher training course, one in each semester. All 25 student teachers were willing to participate in the research. However, four of the 25 student teachers had not completed the course when the research project ended, so they were not included in the study. Data were collected by means of open-ended retrospective interviews and portfolio evaluation reports, which were a compulsory element of the first and second portfolios. A total of 21 interviews and 39 portfolio evaluation reports were collected and analyzed. Process-oriented thinking activities involved in portfolio production were recollection, structuring, evaluation, analysis, and reflection. Functions of the learning portfolio were 'meeting the requirements', 'showing others or yourself', 'recollecting and structuring experiences', 'evaluating development', 'understanding experiences', 'understanding yourself as a teacher', and 'understanding the learning process'. These functions could be divided into product-oriented functions ('meeting the requirements' and 'showing others or yourself'), process-oriented functions aimed at action and improving action ('recollecting and structuring experiences', 'evaluating development'), and process-oriented functions geared towards the understanding of processes that underlie teaching practice and learning to teach ('understanding experiences', 'understanding the learning process', 'understanding yourself as a teacher').

With a view to university teacher education in the United States, Milman (2005) investigated *students' experiences in and reasons for creating digital teaching portfolios*. Based primarily on interviews with students (seven out of nine students in an elective course participating in an interview at the end of the course) and participant observation (the researcher being the course instructor), Milman (2005) asserts that digital teaching portfolio creation as a constructivist process promoted student reflection through an examination of beliefs, philosophies, etc., and through collaboration. She

also states that the creation of digital teaching portfolios fostered students' confidence in professional and technology skills.

Looking at teacher education in Turkey, Ok and Erdogan (2010) examined *how portfolio and portfolio assessment were perceived by pre-service teachers studying at university*. Data were collected through semi-structured individual interviews with 23 prospective teachers from different teaching programs related to different types of school (elementary/secondary) and different subjects (e.g., science, mathematics, language). The authors found that students considered portfolio development to contribute to various aspects of professional, personal, and social development, portfolio construction facilitating both understanding and reflection.

Oner and Adadan (2011) investigated *web-based portfolios as tools for the development of reflective skills in pre-service teacher education*. 19 pre-service teachers studying at a Turkish research university participated in the research. Data were collected by means of an analysis of the contents of participants' web-based portfolios, constructed as a response to two reflection tasks set, and by means of a questionnaire administered to the participants, asking them to evaluate their web-based portfolio experience. While pre-service teachers demonstrated different levels of reflective skills during the semester, there was found a statistically significant increase in the number of high-level reflective indicators in the second reflection task carried out as compared to the first.

Senne and Rikard (2002) conducted *a comparative analysis of two models of physical education teacher education (PETE)* in the United States, investigating *interns' perceptions of the programs*. No significant development was shown by quantitative data, yet, qualitative data implies that students from one university were positive in their overall responses, while students from the other university felt positive about their personal growth.

Trent and Shroff (2013) conducted *an examination of teacher identity construction during e-portfolio development* throughout an eight-week teaching practicum at a teacher education institution in Hong Kong. Making use of in-depth interviews with six pre-service teachers (three interviews with each participant; one interview shortly before the practicum, one halfway through the practicum, and one as soon as possible after

completion of the practicum), the authors investigated how participants' identity construction was shaped by electronic portfolio construction. The questions asked were dependent on the time at which the interviews were conducted: In the first interview, participants were asked about their expectations regarding the upcoming use of the e-portfolio (benefit anticipated, potential difficulties expected, and possible ways of resolving these challenges); in the second interview, participants were asked to describe their initial experiences with the e-portfolio and their actual use of the instrument; and in the third interview, participants were asked to reflect on their experiences of using the e-portfolio (perceived benefits and limitations, influence of portfolio use on their teaching and learning experiences, pre-service teachers' intentions to further develop their e-portfolios after completion of the teaching practicum). The findings of the study suggest that participants believed e-portfolio construction to have changed their personal and professional identity development, contributing in a positive way to the construction of their teacher identities. The e-portfolio was "… a form of reification of the type of 'modern' teachers [the participants] wanted to become, … a tool for sharing, discussing, and reflecting upon artefacts of teaching …, and … a forum for student teachers to document and reflect upon development in their professional and personal identities" (Trent & Shroff, 2013, p. 18).

Investigating *portfolios as a tool for reflective thinking in teacher education*, Wade and Yarbrough (1996) made use of different methods of data collection to examine 212 pre-service teachers' efforts aimed at reflective thinking in the process of portfolio construction. The portfolios were constructed based on students' experiences in a community service-learning program, which was part of an elementary teacher education program at a university in the United States. The authors report that the portfolio experience was different for individual students, portfolio working differentially as a help in reflection. The majority of students agreed that portfolio helped them with reflection and, thus, with learning; yet, portfolio success was not universal.

Having looked at the effects of portfolio development on pre-service teachers' learning and reflection reported in the literature, the next sections will provide information on the influence of contextual factors on the process and, thus, on the product of portfolio development.

3.3.3 The influence of contextual factors (Literature Review Research Question 3)

In this section, the influence of contextual factors on portfolio development will be looked at, both with regard to student characteristics (student factors) and to the learning environment (teaching context), based on the 3P model of learning (Biggs, 1989, 1993; Biggs et al., 2001). As can be seen from various reports and studies on portfolio development, students build and use their portfolios differently. This can be plausibly assumed to be influenced by the personal characteristics of individual learners (student factors) as well as by the design of the portfolio-based learning environment and students' perceptions thereof (for students' overall perceptions and students' appreciation of portfolio development, see Section 3.4). So, is portfolio potentially beneficial *to each student* in a class, or is it particular students only who profit? Is the extent of benefits individual students draw from portfolio construction comparable? Are there specific student characteristics that are assumed to potentially take effect on students' behavior in portfolio construction, and, if so, what are these factors? As is shown in the literature, the design of the learning environment takes effect on students' portfolio processes and, thus, their learning outcomes (products), both through the learning opportunities offered by and students' perceptions of the task set. A compilation of aspects described in the literature will provide an idea of what is to be taken into account, and how to design an environment for portfolio development that on a theoretical basis should prove conducive to students' learning and reflection.

3.3.3.1 Student factors (Literature Review Research Question 3.1)

Based on the selection of studies described in Section 3.2, no study was found focusing explicitly on the influence of specific student characteristics (student factors, student input) on task processing and learning outcomes in portfolio development. While most studies give no particular attention to potential differential effects of specific characteristics of individual students and solely investigate the effects of portfolio development on a group of students as a whole (e.g., Bataineh et al., 2007; Chitpin & Simon, 2009), other studies take student differences into consideration (e.g., Beck et al., 2005; Hauge, 2006). In all of the sources identified, this consideration remains rather cir-

cumstantial, the focus being laid on the effects of portfolio development on students in general.

Although the investigation of variations in student factors does not seem to be the primary focus in any of the studies selected for this review, the influence of student characteristics on portfolio development is looked at parenthetically in some studies. Examining the effects of variation in portfolio curricula, Beck et al. (2005) stated that they had found no published studies on gender differences in portfolios, so they were also interested in potential gender differences in pre-service and beginning teachers' self-assessment of the benefits related to portfolio construction. The results showed no significant differences between male and female teachers concerning the effects of the different electronic portfolios on professional development. The authors conclude that electronic portfolios may provide a useful technique to enhance professional development, for both male and female teachers.

With a view to portfolios and ICT as means of professional learning, Hauge (2006) noted that individual conceptions of technology, learning, and teaching led to variations in the impact of the integrated technology activities. He also observed an influence of initial technological competence on learning and experiences. Imhof and Picard (2009) stated that the effects of portfolio seem to vary on the basis of student characteristics, such as learning orientation. When looking at pre-service teachers' reflections when teaching for the first time, Kaasila and Lauriala (2012) noted the extent of the impact the students' former experiences seemed to have. Kabilan and Khan (2012) remarked that portfolios did not work for all students: Some of the learners remained passive and negative. According to Lin (2008), possible influences on the process function of portfolio can be seen in student teachers' learning orientations and students' experiences in e-portfolio production.[156]

While the influence of contextual factors is only a marginal element of the study conducted by Mansvelder-Longayroux, Beijaard, Verloop et al. (2007), reference is made to

[156] These differential effects of portfolio construction, along with the observation by Wade and Yarbrough (1996) that in their study portfolio success was not universal, should be kept in mind when considering the effectiveness of portfolio as an educational tool.

the literature, where student characteristics relevant to portfolio development are noted to be experience with portfolio and student teachers' learning orientations. When looking at ownership and task value as important variables, it can be assumed that these perceptions differ between students based on their personal needs and preferences. Wade and Yarbrough (1996) draw attention to the influence of students' prior experience with portfolios and of students' beliefs as well as to the importance of students' personal investments.

Following this brief look at the question of what specific student characteristics may take effect on portfolio development, the focus of the next section will be specific features of the learning environment that so far seem to have been researched in more detail.

3.3.3.2 Features of the learning environment (Literature Review Research Question 3.2)

In the 3P model of learning (Biggs, 1989, 1993; Biggs et al., 2001), the features of the learning environment are assumed to take effect on the process and, thus, on the product of learning.

In their study of the effects of formative and summative electronic portfolios on professional development, Beck et al. (2005) compared the effects of four different portfolio curricula on pre-service and beginning teachers' self-assessment of their professional development. Each of the four portfolios employed was rated favorably; yet, the findings of the study show that the portfolios which were either of a wholly formative nature or at least predominantly geared towards formative teacher development – as was a hybrid portfolio, containing some summative assessment elements –were all rated significantly higher with regard to their overall contribution to professional development than was the purely summative accountability portfolio. There were significant differences in professional outcomes, such as overall teacher development, including reflective skills, and perceived benefits of teacher peer collaboration. A significant difference was found with regard to the curricula the four different portfolio types were based on. The curricula represented by the three portfolios based on a

formative approach were rated significantly higher with regard to their contribution to professional development than was the portfolio with a purely summative orientation.

Borko et al. (1997) in their study laid a focus on the impact of the learning environment, differentiating between facilitators and hindrances to portfolio development. A major facilitator to portfolio construction was support and guidance from the university program. Hindrances, on the other hand, were portfolio guidelines that were perceived to be too restrictive, timing and time constraints, restrictions during student teaching, and past experiences during the program of study.

Cakir and Balcikanli (2012) refer to both, student characteristics and the design of the learning environment, when noting that most students found the use of the European Portfolio for Student Teachers of Languages (EPOSTL) challenging due to a lack of self-assessment skills and the perceived workload.[157] Çimer (2011) states that with an overall view, it was the reflection prompts in self-reflection related to portfolio development that served as the cues to elicit reflection. Delandshere and Arens (2003) write that there was a general misunderstanding of evidence, explanation, and reflection on the part of the students, which was considered a problem. They highlight that the context "… in which the artifacts are produced also contributes to shaping the representation of teaching and learning reflected in the portfolio" (Delandshere & Arens, 2003, p. 65).

Comparing pre-service teachers' reflective processes in different contexts, Kaasila and Lauriala (2012) note that the participants' considerations of their own biographical contexts were helpful to their understanding and their reflections of other contexts, as was the acquaintance with research articles, which led to deepened and seemingly

[157] When introducing portfolio and working with portfolio, great care must be taken to ensure that there are a thorough introduction, appropriate guidance, and sufficient support. It is to be made sure that students dispose of the skills required for portfolio construction, i.e., that they already possess these skills (which, in most cases, can be assumed to be unlikely), or that they are given the opportunity to acquire and/or extend them, as the case may be. Successful portfolio development including tasks related to student self-assessment calls for students to dispose of the skills that are required for task completion. The perceived extent of the workload involved in course and program completion takes effect on the approaches to learning and reflection students choose.

broadened reflection. Noting that in their study portfolio did not work for all students, Kabilan and Khan (2012) identify challenges related to the learning environment, including time constraints, workload, and ethical issues. Lin (2008) draws attention to the importance of ownership for students to make use of the process function of portfolios and explicitly points out instruction and supervision as possible influences on the portfolio process function. The importance of supervision and guidance is also pointed out by Mansvelder-Longayroux, Beijaard, and Verloop (2007), who also consider the findings of their study as corroborating earlier findings that "… deep processing in learning is more likely to occur if the matter on hand demands personal involvement" (Desforges, 1995, p. 393). The importance of instruction and supervision is further emphasized by Mansvelder-Longayroux, Beijaard, Verloop et al. (2007), who also mention ownership and task value as important variables related to context and student perceptions.[158]

Ok and Erdogan (2010) list time issues, document availability, scope and contents of portfolio (clarity of direction and guidelines) as well as the continuity of feedback as contextual factors relevant to portfolio development. Oner and Adadan (2011) point out that with web-based portfolios there are several additional benefits of portfolio development, among these to the portfolio anywhere and anytime. The authors also report a perceived increase in the quality of students' work due to the public nature of the portfolios (feedback received over the web as well as students' consciousness of publicity). Senne and Rikard (2002) note the importance of time management issues and student introduction relative to the portfolio process, while Trent and Shroff (2013) refer to a context of community building and maintenance by means of the construction of electronic teaching portfolios. Wade and Yarbrough (1996) emphasize the initial introduction (presentation and explanation) of portfolio development as important to avoid initial struggle and frustration on the part of the learners, and they also note the importance of guided support.

[158] The importance of guidance and support in portfolio-based teaching and learning is also pointed out by Borko et al. (1997). Obviously, proper, adequate instruction, supervision, support, and guidance can be considered key elements in the instructional design of a portfolio-based learning environment.

As has been noted, students' approaches to learning and reflection in task processing are not only dependent on student factors and the (objective) learning environment, but also on students' (subjective) perceptions thereof. Thus, a closer look will now be taken at pre-service teachers' perceptions of portfolio construction.

3.3.4 Pre-service teachers' perceptions of portfolio construction (Literature Review Research Question 4)

The fourth research question focuses on pre-service teachers' perceptions of portfolio development. Students' perceptions of the learning environment are assumed to influence students' approaches to learning (e.g., Biggs, 1993; Entwistle, 1991; Entwistle, McCune, & Hounsell, 2002; Segers, Gijbels, & Thurlings, 2008), interacting with more stable individual differences, such as learning dispositions. Thus, it is important to design and implement portfolio development in teacher education in ways that are didactically conducive to learning while at the same time leading to positive perceptions on the part of the pre-service teachers that support learning and reflection on a motivational and strategic basis.

There is a large range of studies examining students' perceptions of portfolio. The design of the learning environment takes effect on students' uptake and use of portfolio for learning and reflection via students' perceptions of portfolio construction, the latter comprising a set of particular tasks within a course or program of study. Student buy-in is a vital prerequisite to effective portfolio development. In the portfolio literature, students' perceptions of portfolio construction have been investigated by a large number of researchers. In the literature reporting this research, the focus has been laid on different aspects, such as the comparison of the views of different student groups (e.g., Bartlett & Sherry, 2006); students' views of portfolio as an alternative method of assessment (e.g., Birgin, 2011; Deveci et al., 2006; Dutt-Doner & Gilman, 1998); students' perceptions of e-portfolio in particular (e.g., Bolliger & Shepherd, 2010; Wilson et al., 2003; Wright, Stallworth, & Ray, 2002; Yao et al., 2009); students' appreciation of portfolios (e.g., Chitpin & Simon, 2009); the perceived effects of portfolio on student teachers' learning (e.g., Çimer, 2011; Lin, 2008); the perceived effects of portfolio on student

teachers' professional development (e.g., Koçoğlu, 2008); pre-service teachers' views on using portfolio in teacher education (e.g., Imhof & Picard, 2009; Zidon, 1996); students' perceptions of the process and the product of portfolio development (e.g., Meyer & Tusin, 1999); students' evaluation of their portfolio working process (e.g., Niikko, 2002); and prospective teachers' perceptions of different aspects of portfolio (e.g., Ok & Erdogan, 2010).

Bataineh et al. (2007) relate pre-service teachers' perceptions of the benefits of portfolio as a reflective learning tool as being very positive. "Keeping a well-constructed portfolio" (Bataineh et al., 2007, p. 442) is reported as having a positive influence on the motivation to learn. With Beck et al. (2005), participants ratings of all four types of portfolio developed were favorable, with the three formative portfolios being rated significantly higher with regard to their overall contributions to professional development. Borko et al. (1997) state that participants commented most frequently about the benefits of the portfolio experience, each participant identifying multiple benefits, such as opportunity for reflection (the benefit cited most), the opportunity for connections between theory and practice, and the portfolio as a step towards a professional portfolio (portfolio for licensure and employment). Comments about costs of the portfolio experience were made, but were much less frequent than the remarks on benefits and voiced by a much smaller number of participants only. The main cost was seen to be the demand for time and energy in portfolio construction, competing with student teaching, requiring students to balance the portfolio project and the student teaching experience. The factors enabling and facilitating portfolio development were considered to be in three broad categories: "support and guidance from the university program, sharing ideas with peers, and support from the cooperating teacher" (Borko et al., 1997, p. 352). Hindrances to portfolio development were more idiosyncratic and situation-specific, such as characteristics of the portfolio assignment, specific features of the student teaching placement, issues related to timing and time constraints, and past student experiences in the program of study.

Cakir and Balcikanli (2012) note that the student teachers

> … seem[ed] to have positive views regarding the use of the European Portfolio for Student Teachers of Languages (EPOSTL) in their pre-service teacher education. … Most participants were highly positive about the effectiveness of the EPOSTL in the pre-service teacher education context (Cakir & Balcikanli, 2012, p. 9).

Chitpin and Simon (2009) describe a general shift in attitude during portfolio construction: While initially skeptical, all participants came to identify benefits related to the construction of professional portfolios. Pre-service teachers generally appreciated self-assessment and continuous reflection as elements of the portfolio construction process. Çimer (2011) reported a general tendency of student teachers' views about the portfolio process to become more positive over time, involvement improving feelings. All overall student reflections at the end of the process were positive, with positive cognitive outcomes being accompanied by positive affective outcomes. Delandshere and Arens (2003) point out that students thought "… one of the most beneficial aspects of the process is to think critically about their own teaching" (Delandshere & Arens, 2003, p. 61). Hauge (2006) stated that the majority of students saw portfolios as "… helpful means in concretising theory in the study program, in reflecting on subject matter and contributing to contact and collaboration with fellow students" (Hauge, 2006, p. 29).

Imhof and Picard (2009) in their study conducted in Germany realized that the general evaluation of the portfolios was rather mixed, with students' views both with regard to the perceived importance as well as to the usefulness of portfolio being heterogeneous. A mixed view of portfolio development was also stated by Kabilan and Khan (2012), who noted that pre-service teachers were generally appreciative of electronic portfolios, while a few students remained passive and negative about the e-portfolio project.[159]

[159] This observation shows once more that students' perceptions of and approaches to portfolio-based teaching and learning vary. Not all students take up the opportunities for learning and reflection provided in the form of portfolio construction.

A positive perception conveyed by Lin (2008) was that students reported portfolio as enhancing their marketability. However, negative perceptions on the part of the students include online e-portfolio construction being considered as having little effect on their development, and frustration due to technology used in portfolio development. Milman (2005) reports that students viewed the creation of a teaching portfolio as valuable. They considered the technology skills acquired in the process as useful, both personally and professionally. In the study by Ok and Erdogan (2010), focusing explicitly on pre-service teachers' perceptions of different aspects of portfolio, there is a variety of portfolio definitions. Students perceived portfolio both as a learning and as an assessment tool. Judging from the influence of portfolio reported, students' attitudes *seem* to have been rather positive, although this is not mentioned explicitly. Oner and Adadan (2011) note that participants perceived the web-based platform used for portfolio development as a medium that provided easy access, thus making it possible to create better portfolio artefacts. Almost all students expressed positive reactions towards using the web-based platform implemented, which was the open source software Mahara from New Zealand (now used internationally as one of the major web-based solutions for online portfolio development in higher education).[160] Senne and Rikard (2002) in their comparative analysis of two portfolio models report that with students at one university, most comments on the portfolio process were positive – reflective elements being mentioned most often as a beneficial component of the portfolio –, while at the other university the findings relative to students' perceptions were much more mixed. Trent and Shroff (2013) highlight the positive evaluation of the e-portfolio used in their study as a means of teacher identity construction, which is of particular importance in the phase of pre-service teacher education. Wade and Yarbrough (1996) note that more than half of the students in their study agreed that portfolio creation was a valuable experience, that they enjoyed creating the portfolio, and that portfolio helped them in their reflections.

[160] Mahara (www.mahara.org) is also the e-portfolio software of choice implemented in the course *Schulpraktische Studien 1 (SPS 1)*, i.e., in the context of the portfolio research and practice reported in this dissertation.

Prior to the discussion of the findings of this literature review and its conclusion, a short outline of theoretical foundations of portfolio development in pre-service teacher education as reported in the literature will now be given.

3.3.5 A brief note on theoretical foundations of portfolio construction (Literature Review Research Question 5)

Portfolio as an instrument can be assumed to have its origins primarily in educational practice (Häcker, 2011; Häcker, 2017), and there can be found repeated claims in the literature that the theoretical bases underlying portfolio use in education were rather limited. A look at the studies reviewed shows that the majority of texts – albeit not all of them – contain at least *some* references to theoretical foundations, concepts, and key pedagogies underlying portfolio development in teacher education. In addition to general educational theories of learning and reflection (e.g., learning orientations, approaches to learning, levels of reflection), specific educational theories regarding the context of learning and reflection can be assumed to be relevant to portfolio construction in pre-service teacher education, including practicums (e.g., theories on collaborative learning, experiential learning, and transformative learning as well as theories on workplace learning).

Prior to the analysis of the theoretical and conceptual foundations presented in the articles selected for this literature review, a conference paper presented by Dysthe (2002) will be taken into account, as it deals specifically with the theoretical background of portfolios as tools for learning and assessment in teacher education. Dysthe (2002) draws attention to the fact that there exist a great variety of portfolio models in international education, their common elements being a selection of student work done over time and reflection as an important aspect of learning. Taking into account the number and the nature of the stages in portfolio composition, Dysthe (2002) differentiates between simple and complex portfolio models. With reference to the literature then existing, she notes that most portfolio projects in teacher education share a constructivist perspective on knowledge and learning (McLaughlin & Vogt, 1996) as well as an emphasis on reflection, very often with reference to Donald Schön's concept

of the 'reflective practitioner' (Schön, 1983; 1987). She also points out that the aspects of portfolio as a tool for learning and portfolio as a tool for assessment are closely related, the combination posing a particular challenge. Choosing sociocultural theory as the basis for portfolio work, Dysthe (2002) states that knowledge and learning are considered to be situated, social, distributed, mediated, dependent on language, and dependent on participation in communities of practice. Activity theory is referred to in connection with computer-supported collaborative learning, which together with various forms of problem-oriented learning as well as with process writing is seen as a basic learning principle guiding the whole of the continuous portfolio learning process.[161]

With a view to the theoretical and conceptual background of the studies reviewed, there can be found the whole spectrum from a quasi-absence of a systematic account of theoretical foundations (e.g., Bataineh et al., 2007; Çimer, 2011) to a comprehensive, in-depth exposition of the germane background (e.g., Mansvelder-Longayroux, Beijaard, & Verloop, 2007; Mansvelder-Longayroux, Beijaard, Verloop et al., 2007). So, what are the theoretical foundations, concepts, and key pedagogies of portfolio development that are referred to in the studies reviewed in detail?

While there is no explicit theoretical background section in the study by Beck et al. (2005), Schön's (1983) model of reflective inquiry is referred to with regard to the design of two of the four different portfolio types used in the study. Borko et al. (1997) mention reflection and reflective practice in the introductory sections of their study. They claim that theoretical support for portfolios as reflective tools was strong, while empirical support for proponents' claims was sparse. Cakir and Balcikanli (2012) refer to teacher autonomy (comprising reflection, awareness, and self-assessment) as a key concept in their study on portfolio development. However, there is no presentation of portfolio in relation to teacher autonomy. Chetcuti et al. (2011) throughout their article refer to literature related to reflection, reflective practice, and portfolio, but there is no reference to basic theories. Chitpin and Simon (2009) present an outline of a literature

[161] For more information on activity theory, see Daniels, Edwards, Engeström, Gallagher, and Ludvigsen (2013); Engeström (2010); Engeström (2015); and Engeström, Miettinen, and Punamäki (1999).

review on portfolio use and reflective practice. Delandshere and Arens (2003) offer a 'conceptual framework' section, containing information on teacher education and portfolio assessment. Hauge (2006) provides a section on the 'analytical framework' used in his study, in which the (conceptual) background is outlined. However, no reference to specific educational theories is made. Imhof and Picard (2009) in the introduction to their study mention constructivist theories, self-regulated learning, and reflection in relation to portfolio. Kaasila and Lauriala (2012) include a 'theoretical framework' section dealing with reflectivity, reflective processes, and reflection as a phase in learning as well as with literature on the depth and breadth of reflection, with the work of Jay and Johnson (2002) on a typology of reflective practice for teacher education and van Manen's (1977) basic theoretical considerations on reflection being mentioned explicitly. Kabilan and Khan (2012) present the concept of e-portfolios while referring to communities of practice (Wenger, 1998; Wenger, McDermott, & Snyder, 2002) as well as to sociocultural theoretical considerations by Dewey (1916) and Vygotsky (1978). Lin (2008) presents e-portfolios both as tools for alternative assessment and as a strategy for learning (related to a deep approach to learning, engagement, motivation, student-centeredness, interaction, reflection goal-setting, responsibility, and self-confidence). Mansvelder-Longayroux, Beijaard, and Verloop (2007) explain theory on learning activities and see reflection as a principle of teacher education. Approaches to and models of reflection are laid out, reflection being operationalized in terms of learning activities. Mansvelder-Longayroux, Beijaard, Verloop et al. (2007) refer to constructivism, learning as a process (process function of the portfolio), reflection in the process of learning during portfolio compilation, self-regulation of learning and construction of practical knowledge, reflection on experiences, understanding of underlying processes, and deep processing. Milman (2005) considers the creation of digital portfolios to be a constructivist process. She refers to reflective thinking and reflective practice and links constructivist theory to the works of Jean Piaget and Lev Vygotsky. Constructivism is also referred to by Ok and Erdogan (2010), who also expound on traditional vs. performance-based assessment, summative vs. formative assessment, and alternative assessment. Oner and Adadan (2011) illustrate reflection in teacher education and in teaching portfolios, reflective thinking, reflective practice, and reflective skills, reflection strategies, and electronic/web-based portfolios.

Senne and Rikard (2002) refer to teacher professional development, cognitive developmental theory, and reflection and reflective approaches, while Trent and Shroff (2013) consider teacher identity, teacher identity formation, discourse, and agency. Wade and Yarbrough (1996) introduce their study with an illustration of the concepts of reflection and portfolio, in which they refer to the process of reflection and the construct of portfolio, in general and in teacher education.[162]

Following the presentation of original research findings relevant in answering the five research questions guiding this literature review, the next sub-chapter will provide a discussion of the literature reviewed.

3.4 Discussion of the literature reviewed

A look at the practice of portfolio construction – which today is virtually ubiquitous and common to teacher education programs around the world – and, more specifically, at the effects of portfolio construction on students' learning and reflection in pre-service teacher preparation and beyond, brings to the mind the oft-cited seminal article published by Zeichner and Wray (2001): On a national basis, the authors compiled what was then known of the teaching portfolio in US teacher education programs and what, in their opinion, still needed to be known. In pursuit of a similar project, but on a global scale, taking into account the selection of international, up-to-date literature on portfolio in education, in particular in pre-service teacher education, identified and looked at, in this sub-chapter of the dissertation there will now be presented a preliminary summary and appraisal of the evidence-based knowledge that forms the basis of this review, i.e., a comprehensive discussion of what is known on the basis of selected substantial original research findings identified within the extensive portfolio literature available. General observations related to (1) the search for and selection of literature, (2) the range of original research and the availability of substantial research findings, (3) methodological features of the studies identified and analyzed, as well as to (4) the particular, concrete portfolio-based learning environments reported in the literature

[162] In addition to the information given in this section of the literature review, there is an overview by Koch-Priewe (2013) regarding the theoretical foundations of portfolio in teacher education.

will be followed by a summary of what is known in relation to the five research questions framed in Subchapter 3.1 of this dissertation. On the basis of this appraisal, an up-to-date consideration of what (still) needs to be known as well as of what seems desirable to be done when implementing and researching portfolio in pre-service teacher education – i.e., suggestions for further research combined with general reflections regarding the design of portfolio-based learning environments – will follow in Subchapter 3.5, rounding off this chapter and, thus, the systematic review of the literature.

(1) Literature search and selection – the identification of pertinent original research

As was noted in Section 3.2.1 on the search for and selection of literature, it is not in all cases easy to identify original research related to portfolio-based learning and reflection in pre-service teacher education. This is due to several issues: First of all, there exist studies investigating portfolio-based learning in pre-service teacher education in which portfolio is not mentioned in the title (e.g., Chamoso et al., 2012; Shepherd & Hannafin, 2009). While these studies may focus on very specific aspects of teaching and learning within a portfolio-based learning environment or a limited range of aspects within a portfolio context only, they can be assumed to make potentially valuable contributions to the body of research on portfolio development, and, thus, to the understanding of the processes and products of portfolio development – especially in the current situation, in which still more research on portfolio is needed. If in a study research questions are related directly to the effects of portfolio development (as is the case with Shepherd & Hannafin, 2009), it is essential that 'portfolio' as a keyword be used in the article title, so as to clearly point out portfolio as the instrument used in the learning environment researched. Second, there are studies geared primarily at non-portfolio-specific aspects of teaching and learning in which use is made of portfolio (e.g., Kaasila & Lauriala, 2012), and these studies have to be considered, too, when the acquisition of a comprehensive, global overview of portfolio as an educational tool is intended. Third, in the Anglophone parts of the world as well as in scientific articles published in English, there exist several synonymous terms for pre-service teachers,

such as 'student teachers' (e.g., Borko et al., 1997; Cakir & Balcikanli, 2012; Chamoso & Cáceres, 2009; Chuang, 2010; Çimer, 2011; Koçoğlu, 2008; Mansvelder-Longayroux, Beijaard, & Verloop, 2007 ; Mansvelder-Longayroux, Beijaard, Verloop et al., 2007; Sevim, 2012) – which, like 'pre-service teachers', is used quite often –, 'initial teacher trainees' (e.g., Spendlove & Hopper, 2006), 'prospective teachers' (e.g., Deveci et al., 2006; Ok & Erdogan, 2010; Thomas & Liu, 2012), 'teacher candidates' (e.g., Ntuli, Keengwe, & Kyei-Blankson, 2009), etc., which, with regard to article titles, abstracts, keywords, and full texts, have to be considered in conducting searches in electronic databases. Fourth, there are article titles which seem to express the focus of research inadequately, which ranges from titles formulated in a rather overall style (e.g., Klenowski, 2000; Willis & Davies, 2002; Woodward & Nanlohy, 2004a), thus providing no or only little indication as to the guiding research questions, to titles which only represent parts of the research (e.g., Imhof & Picard, 2009). Thus, if a particular aspect of portfolio development in pre-service teacher education is to be researched – as is the case here, with a view to the effects of portfolio construction on pre-service teachers' learning and reflection –, it has to be checked first of all whether the study on hand deals with the particular aspects that are of interest. Fifth, considering constructive alignment of learning and assessment, backwash effects of assessment, students' perception-based adaption to particular learning environments and assessment modes, and assessment *for* learning related to portfolio development, studies on portfolio *assessment* may offer a lot of important research findings, too, and cannot be excluded right at the outset when looking at portfolio *for learning and reflection*. One instance of a study relative to portfolio assessment that offers such findings would be Hung (2012). There are further observations with regard to article titles, such as no indication of the domain of higher education (e.g., Stansberry & Kymes, 2007), no mention of teacher education (e.g. Wickersham & Chambers, 2006), or no specification of the phase of teacher education researched (e.g., Strudler & Wetzel, 2008). While in some cases this can easily be remedied by simply looking at the journal title (as is the case, e.g., with Stone, 1998), in other cases this is not possible (as can be seen, e.g., with Wickersham & Chambers, 2006). These observations show that a simple search of electronic databases would have been neither sufficient nor adequate. The abstracts and the keywords of articles, and in many cases the full texts as well, had to be checked in order to obtain a com-

prehensive, valid overview of the existent range of original research. At this point, it is to be noted that the terminological elusiveness surrounding the concept of portfolio may pose an issue, as it may potentially result in both: educational tools possessing the basic features of portfolio while *not being labeled* as such, and didactic instruments *being termed* 'portfolios' despite their not complying with the notion of portfolio. While it seems virtually impossible to come up with practicable ways of literature search to resolve the former problem, the latter challenge can be fixed during the phase of literature selection, with a view to ensuring that only empirical studies investigating the construction of some implementation of portfolio, as generally defined and as defined for the purposes of the research on hand, are considered.

(2) The range of original research and the availability of substantive research findings – a few notes

Looking at the countries of origin of the studies reviewed, it can be stated that portfolio in teacher education – in particular in pre-service teacher education – and research on the effects of portfolio construction have come to be international phenomena. Professional education literature on portfolio, as well as the research identified, started in the 1990s, gained momentum in the 2000s, and keeps evolving, the focus of research being laid on various aspects. In face of technological progress and the widespread introduction of electronic portfolios around the turn of the millennium, research on electronic portfolios has been on the increase in recent years, with research on paper-based portfolios continuing concurrently. Depending on the intended learning outcomes (ILOs; Biggs & Tang, 2011) to be achieved and the technical equipment available, paper-based portfolios continue to be implemented in pre-service teacher education. Thus, electronic portfolios can be considered as chronological, technology-based *successors* – but by no means *replacements* – of traditional paper-based portfolios.

In the literature, contradictory statements as to the availability of empirical research findings can be found. At the dawn of portfolio development, Herman and Winters (1994) in the title of their article pointed out that portfolio research was a slim collection then. Only four years later, Wolf and Dietz (1998) were able to conduct a basic

literature review for their article on the purposes and possibilities of teaching portfolios, stating that most of the professional literature on portfolio then available had focused on portfolio use in pre-service teacher education. More recently, within the past decade, while some authors claim that there was "… a plethora of international research on the uses, effectiveness, and viability of keeping a portfolio …" (Bataineh et al., 2007, p. 436), others maintain that "… [a]lthough great expectations have been placed on the portfolio, research on the efficiency of the instrument has been few and far between" (Imhof & Picard, 2009, p. 150).[163]

Research articles having been published at a given point in time, and the range of original research on portfolio growing over the years, some of the contradictory statements in the literature may simply reflect the course of time. Independent of this fact, observable in all scientific disciplines, it has to be noted that in the introductory sections of many of the articles reviewed there are only very few studies cited. A more extensive presentation and summary of available research, both to corroborate authors' claims that previous research were or were not readily available and to give the reader a detailed impression of what is already known on a given topic at the time an article is written, would be desirable. A comprehensive presentation of available research identified by the authors would also make evident gaps in the existing literature, indicating the need for further research, and thus, by illustration of the importance of and the need for further examination of specific issues, provide a rationale for the respective study on hand.

It is to be noted once more that this literature review was composed on the basis of the observation that *not one* single substantive *systematic* literature review on the effects of portfolio construction in pre-service teacher education published as such had been identified. There does exist a review of the literature on both portfolios and electronic portfolios published by Butler (2006) a decade ago, but in this paper, often cited by other authors, neither the search for nor the selection of literature are set out in detail,

[163] While on the basis of the systematic literature review undertaken in the context of this dissertation this statement made by Imhof and Picard (2009) can be considered to be correct, the question of whether the statement was not rather intended to refer to the 'effectiveness' of portfolio – effectiveness and efficiency being two related, but by no means congruent concepts – might be reflected on.

and there is no critique to be found regarding the quality of the texts included. So, this oft-cited text cannot be considered to be a *systematic* review. There exist reviews of the effects of portfolio construction for different purposes at different stages of professionals' careers in domains comparable to, but not identical with, teaching, such as medicine and nursing (e.g., Buckley et al., 2009; Carraccio & Englander, 2004; Driessen, van Tartwijk, van der Vleuten, & Wass, 2007; McCready, 2007; McMullan et al., 2003; Tochel et al., 2009), some of which prominently comprising in their titles the express statement of being systematic (e.g., Buckley et al., 2009; Driessen, van Tartwijk et al., 2007).[164] There exists a review published in the last decade which focuses on the reliability of portfolio as a measurement and assessment method (Oskay, Schallies, & Morgil, 2008). However, this article neither claims to follow a systematic approach to reviewing, nor was it published in a scientific journal of international acclaim.[165]

The apparent absence of a dependable systematic review of the literature on the effects of portfolio construction in teacher education in general and in pre-service teacher education in particular, published in a renowned scientific journal, may in part account for the fact that the number and the range of empirical studies cited in the introductory paragraphs of the studies reviewed in many cases seem to be partial, and to some extent arbitrary. The findings of the present literature review reveal that there actually exists available original research which is up-to-date and at the same time of high or at least appropriate quality with regard to the principles of scientific educational research (Shavelson & Towne, 2002). In addition to a plethora of anecdotal reports by portfolio proponents, all aspects of learning and reflection in a portfolio-based learning environment as represented by an instructional system comprising the elements of the 3P model – student factors, the learning environment, students' perceptions of the portfolio experience, the process of portfolio development as well as the

[164] For a systematic review of the use of teaching portfolios for educators in further and higher education, see McColgan and Blackwood (2009).

[165] In the recent past, further reviews relative to portfolio construction have been published, e.g., Beckers, Dolmans, and van Merriënboer (2016). Yet, to the best of the author's knowledge, there is no systematic review on portfolio construction focusing on student approaches to learning and student reflection in university pre-service teacher education in particular.

product (learning outcomes) – have been topics of original research.[166] Yet, the range of available research differs: While there are numerous studies on the process and the product of portfolio development as well as on the effects of different features of the learning environment, there is only a limited range of studies on the influence of student factors on portfolio learning and reflection. This limited range of research should be kept in mind when taking into account the findings of several studies that portfolio development benefits most, or at least many, but not all students (e.g., Wade & Yarbrough, 1996). As concerns the question of to what extent *substantive* research findings are available, the extensive range of portfolio literature available online and/or in print includes a large number of original research studies, which, after careful collation of a corpus of empirical studies and the exclusion of thematically irrelevant and/or methodologically substandard texts, allows the compilation of substantive research findings, gained by means of quality studies, and, thus, the collation of research findings for the deduction of informed inferences as to the influence of portfolio construction on pre-service teachers' learning and reflection.

As regards possible differential effects of the form of portfolio, both traditional, paper-based and more recent, electronic portfolio formats have been researched. However, studies deliberately comparing the effects of the two forms of portfolio are scarce.[167]

(3) Features of the studies reviewed – methodological considerations and general notes on quality

The implementation of a thorough, i.e., comprehensive and systematic, search in order to collate and appraise the existing body of pertinent literature, the application of the set of pre-determined inclusion/exclusion criteria (see Section 3.2.1 and Appendices A.1–A.2, p. 436), and the presentation of selected quality research being completed and

[166] For examples, the reader is referred once more to the tabular overview in Appendix A (p. 436), providing comprehensive information on the studies reviewed.

[167] Examples of studies identified comparing the construction of paper-based and electronic portfolios are Driessen, Muijtjens, van Tartwijk, and van der Vleuten (2007) as well as van Wesel and Prop (2009).

commented upon, there will now follow a summative discussion of the practical approaches which were made use of in the studies identified and reviewed. These reflections will basically draw on the methodological considerations contained in the principles for scientific research in education published by Shavelson and Towne (2002).

There are six fundamental principles for scientific research in education postulated by Shavelson and Towne (2002):[168] (1) Pose significant questions that can be investigated empirically. (2) Link research to relevant theory. (3) Use methods that permit direct investigation of the question. (4) Provide a coherent and explicit chain of reasoning. (5) Replicate and generalize across studies. (6) Disclose research to encourage professional scrutiny and critique.

Scientific principle 1: Pose significant questions that can be investigated empirically

As noted above, in many instances the title of an article reporting a study does not depict precisely what the research is about. It has to be noted that several authors neglect the provision of specific research questions that are to be investigated as the focus of a given article. Given the large spectrum of open questions on portfolio construction in pre-service teacher education, most of the research questions stated in the studies reviewed can be considered as significant, as they contribute to an evolving body of findings relative to the research on portfolio construction. While it has been stated that there does exist a wide range of empirical research on portfolio construction, by no means could it be claimed that the field were over-researched as regards substantive empirical studies. So, every study, if properly designed and conducted, has the potential to make a contribution to what is known on portfolio construction and, thus, to help closing the gaps in existing research.

Scientific principle 2: Link research to relevant theory [NB: and preexisting empirical research]

When looking at the introductory sections of the studies reviewed – which are supposed to comprise an introduction and a presentation of the theoretical/conceptual

[168] In this summary overview, the principles stated by Shavelson and Towne (2002) are quoted verbatim.

backgrounds, including a thorough review of pertinent prior research findings available at the time of authoring –, it can be seen that, while the introduction is usually clear, the theoretical/conceptual backgrounds presented show considerable variation in quality, ranging from quasi-non-existence of background information to the presentation of a comprehensive overview.[169] As for a review of the literature and a summary of prior empirical research findings constituting the basis of a study, in the articles analyzed, these elements vary in length, too. In addition, it does not always become clear whether a citation refers to an empirical study (i.e., original research, following established criteria for scientific research) or to another type of literature (e.g., a project report, a position paper, or theoretical considerations). Moreover, in many cases where empirical studies are cited (and readily identifiable as such), there seems to be hardly any critique regarding the quality and the significance of the studies and their specific contribution to the topic under investigation. In most cases, the unique contexts of studies that are referred to are neither given in detail nor does this uniqueness seem to have been taken into intensive consideration, which makes a comparison and a summary of findings difficult. Keeping in mind that contextual factors in portfolio implementation differ to a potentially unlimited extent, care must be taken in considering the extent to which relevant research findings in the field of portfolio construction can be transferred and generalized. Although the studies reviewed for this article were published in peer-reviewed journals, in many cases there were quality issues such as the aforementioned lack of explicit research questions, absent or inadequate theoretical and/or conceptual clarification, or questionable, viz. arbitrary, or uncritical reference to existing prior research.[170]

[169] See Appendix A (p. 436) for more information on the contents of this part of the articles.

[170] While there can be plausibly assumed to be similarities between the processes involved in portfolio construction *in different disciplines and domains of higher education*, such as teacher, medical, and nursing education, a concurrent analysis of processes of portfolio construction *at different levels of the educational system*, e.g., in secondary school and in higher education settings, would seem to be of limited informative value, due to, e.g., the age of learners and their prior experience. Yet, the basic processes of portfolio construction, e.g., the focal role of reflection, are the same.

Scientific principle 3: Use methods that permit direct investigation of the question

All aspects of portfolio construction – student factors, the learning environment, students' perceptions, the process of learning and reflection (task processing) as well as its product (learning outcomes) – have been researched in the last twenty-five years of portfolio development in higher education. Regarding the 3P model of learning (Biggs, 1989, 1993; Biggs et al., 2001), which is used in this literature review to structure and organize the research on portfolio development,[171] it becomes clear from the literature reviewed that in many cases there is to be noted a lack of distinction between the process (task processing) and the product (learning outcomes) of portfolio construction. When pre-service teachers' self-reports of portfolio development are given, there is often a mixture of aspects related to the process as well as to the product of portfolio development. As can be seen from the tables in Appendices A.5 and A.7 (p. 455, p. 473), the approach of the large majority of studies identified and presented in detail in Section 3.3.2 of this dissertation is exclusively or predominantly qualitative in nature, qualitative studies outnumbering the studies making use of a purely or predominantly quantitative approach. This domination of qualitative approaches can be explained with a view to learning, reflection, and instruction being highly complex, deeply human social processes, as well as with a view to the researchers' intention to gain in-depth data.[172, 173] When a qualitative approach is chosen, many researchers go for inter-

[171] It is also used for the design of the original research conducted in the context of this dissertation (see Chapter 4).

[172] A qualitative approach to research can extensively capture and consider contextual factors in natural settings. Yao, Aldrich, Foster, and Pecina (2009) in their study on pre-service teachers' perceptions of an electronic portfolio as a tool for reflection and teacher certification (NB: again a combination of purposes of learning – the development of students' reflective skills – and assessment in the form of teacher certification) summarize Creswell's (1998) recommendation that a qualitative approach be used in the case of topics yet to be explored, variables yet to be identified, and theories yet to be developed. On the basis of a qualitative approach, researchers can take into account all possible factors taking effect on portfolio-based learning and assessment, not being confined to a set of predetermined variables. Qualitative approaches to research are typically used in exploratory as well as in case studies.

[173] With regard to the original research conducted for the purposes of this dissertation, the decision was taken to go for a quantitative approach to research. Numerous semi-structured interviews were con-

views (e.g., Bataineh et al., 2007; Cakir & Balcikanli, 2012; Chetcuti et al., 2011; Ok & Erdogan, 2010; Trent & Shroff, 2013), which enable researchers to ask interviewees for detailed information and to dig deeper by means of specific questions whenever this is considered necessary or productive. Other studies opt for a qualitative analysis of portfolio contents, either as the sole method of investigation or in combination with other methods of data collection (e.g., Borko et al., 1997; Çimer, 2011; Kaasila & Lauriala, 2012; Kabilan & Khan, 2012; Mansvelder-Longayroux, Beijaard, & Verloop, 2007; Oner & Adadan, 2011). In all cases, inferences are drawn regarding the process and the product of portfolio construction. In many instances, the number of people taking part in a study was rather small (e.g., Milman, 2005; Trent & Shroff, 2013), and the way participants were selected is not always clearly laid out. In some studies, it is explicitly stated that a mixed-methods approach is followed (e.g., Oner & Adadan, 2016).

Scientific principle 4: Provide a coherent and explicit chain of reasoning

Regarding the chain of reasoning, it has already been noted that in many cases there is no clear distinction of process (task processing) and product (learning outcomes), which makes both the approach and the findings reported in a study somewhat unsystematic. In cases where e-portfolios are used, there sometimes seems to be exaggerated enthusiasm about technology. Both paper-based and electronic portfolios are based on

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ducted with students participating in the course *Schulpraktische Studien 1 (SPS 1)*, these interviews being used to ensure that students had benefited from learning and reflection on the basis of portfolio, to elicit students' views of portfolio, and to identify factors supporting as well as factors hindering students' learning and reflection on the basis of the concrete instance of portfolio implemented in the course. The decision for a quantitative approach to the evaluation and the investigation of portfolio-based learning in the course *Schulpraktische Studien 1 (SPS 1)* was taken in order to examine specific variables (student approaches to learning, cognitive task processing, levels of reflective thinking, etc.) on the basis of a theoretical and conceptual background existing prior to the research undertaken, and to provide research based on a survey comprising the whole cohort of students constructing a portfolio, as opposed to qualitative studies with only very few students participating (as is the case, e.g., with Yao et al. (2009), with eight pre-service teacher participating in semi-structured interviews). It is to be pointed out that both qualitative and quantitative approaches to research are valuable approaches in their own right, the choice of approach depending on the purpose(s) of research followed. They can be combined in the form of mixed-methods studies.

the same pedagogy, and the affordances of the new technologies should be thoroughly examined and not lauded uncritically. While e-portfolios – if designed, implemented, and used carefully and properly – do have a number of *practical* advantages as compared to their paper-based predecessors (such as easy accessibility and simple storage), their *educational* affordances enhancing the learning potential of portfolio seem to be much less clear, with some studies reporting difficulties in portfolio construction related specifically to the use of technology (e.g., Pecheone et al., 2005).[174, 175] In some studies, there seems to have been some form of researcher bias, such as in cases where the questions asked in interviews appear to be – somewhat or downright – suggestive, while in still other studies the inferences drawn from a limited set of data and limited findings seem to be somewhat wide-ranging. For researchers to be able to provide a coherent and explicit chain of reasoning, each step of a study must be based on a comprehensive, integrative consideration of the theoretical/conceptual background as well as of prior empirical research findings available; a careful, planned collection and analysis of data; and a cautious, unbiased making of inferences, which may prove useful in extending – and where necessary and appropriate: modifying – existing theory.

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[174] No matter whether such problems are inherent to the technology used or brought about by users' unfamiliarity with e-portfolio technology – they are prone to lead to frustration. For one more example of frustration due to technology issues during portfolio construction, see Lin (2008).

[175] It will not have escaped readers' attention that the author of this dissertation advises against the precipitate introduction of e-portfolios just because they are the digital form of portfolio. As is noted by Pecheone, Pigg, Chung, and Souviney (2005, p. 174),

> [w]ith the implementation of any technology, it is critical to identify the problems or issues that the introduction of the new technology can and cannot solve. If the technology is perceived as unable to address a problem, or the technology introduces more problems than it solves, the technology or its implementation must be reassessed.

An inherent, systematic superiority of e-portfolios over paper-based portfolios as regards the educational processes and outcomes of learning and reflection and against the background of the ways students actually appear to use e-portfolios remains yet to be proven.

Scientific principle 5: Replicate and generalize across studies

While there are a large number of original research articles on portfolio in pre-service teacher education, in the large majority of these articles the authors appear to follow a particular approach.[176] While taking into account, to varying extent, preexisting research findings, they investigate one particular, concrete, local portfolio implementation – an approach which makes generalization difficult.[177] Among the studies identified and analyzed, there was not one single study explicitly designed and described as a replication study.[178]

Scientific principle 6: Disclose research to encourage professional scrutiny and critique

This principle can be seen as respected if researchers publish their original research in peer-reviewed scientific journals, as is the case for the studies included in this literature review. As regards the scales employed in quantitative studies based on questionnaires, in many cases the key scales used (items, wording, etc.) are not published. The provision of these scales is an obvious desideratum. It should also be kept in mind that as many details of the context of portfolio construction as possible should be provided, as this context is the basis of the research conducted, and comprehensive knowledge of the context – including the portfolio contents planned and the tasks to be carried out – is crucial to the appropriate interpretation of the findings of *any* empirical study that is looked at.

[176] As they practically have to, taking into account the unique contexts of portfolio construction.

[177] These studies can be considered evaluation studies. In order to gain general insights on portfolio in (pre-service teacher) education, an approach can be taken where a large number of studies investigating (possibly) similar forms of portfolio are collated, and consistent observations are derived.

[178] While there were instances of duplicates and overlaps in authors reporting their research, no replication studies as such were undertaken.

(4) Features of the studies reviewed – designs of the portfolio-based learning environments

Portfolio development having come to be a global phenomenon in pre-service teacher education, there is considerable variation in context and in the ways portfolio is implemented – both between institutions of higher education in the same (e.g., Delandshere & Arens, 2003; Senne & Rikard, 2002) as well as between higher education institutions in different countries (e.g., Groom & Maunonen-Eskelinen, 2006).

There are numerous instances of portfolio being used in the context of teaching practicums or internships, i.e., of student teaching practice and practical/clinical[179] experience (e.g., Cakir & Balcikanli, 2012; Chitpin & Simon, 2009; Lin, 2008; Oner & Adadan, 2011; Senne & Rikard, 2002; Trent & Shroff, 2013), while instances of portfolio being used in solely theoretical courses (e.g., Çimer, 2011) are scarce. Portfolio use in the context of teaching practice is not astonishing, as portfolio is considered a tool to bridge the gap between theory in the university classroom and teaching practice at school (e.g., Korthagen et al., 2001).[180] Portfolio will be of particular interest in contexts of practical elements of programs and courses of study – if the assumption that portfolio has the potential to bridge the gap between theory and practice (e.g., Brown, 2001) can be confirmed.

In the studies reviewed, portfolio was used for different subjects of study, ranging from the arts (comprising subjects such as languages, e.g., Ayan & Seferoğlu, 2011; Cakir & Balcikanli, 2012; Kabilan & Khan, 2012; Mansvelder-Longayroux, Beijaard, & Verloop, 2007) via the social (e.g., Bataineh et al., 2007) and the exact sciences (e.g., Mansvelder-Longayroux, Beijaard, Verloop et al., 2007) to subjects of study with a psychomotor component such as physical education (e.g., Senne & Rikard, 2002). Depend-

[179] As has been noted, while 'clinical experience' is quite common a term in literature in English, to German readers it has a predominantly medical connotation. Thus, the terms 'practical experience', 'practicum experience', or 'field experience' will be given preference in this dissertation. From a semantic point of view, this also allows us to stay within the theory/practice framework.

[180] For more information on the relation of theory and practice in teacher education, see, e.g., Lunenberg and Korthagen (2009) and Korthagen (2010).

ing on whether portfolio was implemented in one particular course, in several courses, or throughout a whole program of study, duration of portfolio development varied, ranging from a few weeks (e.g., Breault, 2004) to several semesters or complete programs of study.[181]

The large majority of studies reviewed do *not* convey a precise, detailed picture of the contents and the tasks contained in the portfolio, which is to be considered a key shortcoming of most studies reviewed – there is no or insufficient information on the context of portfolio construction, both with regard to portfolio contents and the tasks to be executed by students in composing and collecting artefacts and in writing reflective entries. While in some studies there is an outline of portfolio contents (e.g., Imhof & Picard, 2009) from which a range of cognitive and/or affective processes typically involved in the production of these contents and, thus, potentially induced by the particular portfolio implementation can be inferred,[182] most studies only convey a very vague, if any, idea of the concrete portfolio conceptualization reported on. This omission of indispensable information on the design of the portfolio-based learning environment in question constitutes a severe problem: If there is no or only little information on the contents and the tasks pre-service teachers process in the construction of their portfolios, *any* form of work could be labeled portfolio construction; there is conveyed no idea as to the processes involved and the products created; the effects of portfolio development cannot plausibly be attributed to the portfolio-based learning environment as a whole or to particular elements thereof; and neither a transfer of the findings to similar learning environments nor a generalization of the findings are possible.[183]

[181] Tabular overviews containing detailed information on the context and the duration of portfolio construction reported in the studies analyzed are provided in Appendix A (p. 436).

[182] In other studies, excerpts from the portfolio guidelines are included.

[183] Here, again, it should be kept in mind that a wide-ranging generalization of research findings related to portfolio construction may turn out to be difficult anyway. For research findings to be transferred from one situation of teaching and learning to other educational situations, the contextual variables have to be comparable.

(5) Answers to the five key research questions, based on the original research identified and analyzed

As regards the first research question on the purposes of portfolio development in pre-service teacher education, the findings of this literature review show that while in some studies identified the purpose of portfolio development is stated explicitly (e.g., Ayan & Seferoğlu, 2011; Borko et al., 1997; Cakir & Balcikanli, 2012; Mansvelder-Longayroux, Beijaard, & Verloop, 2007; Oner & Adadan, 2011), with others it is necessary to infer these purposes from the context of portfolio construction described and the study reported.[184] Given the importance of portfolio purpose(s) as *the* initial guiding decision determining the type of portfolio to be implemented, its intended range of contents, and the tasks designed and set, the purposes of portfolio should be stated explicitly, exactly, and comprehensively in *all* studies and reports related to research on and practice of portfolio use in pre-service teacher education. As laid out in Section 3.3.1, the purposes of portfolio constructed reported in the literature are varied, covering the areas of learning, assessment, and employment. In many teacher education programs and courses, portfolio development serves more than one purpose (e.g., Milman, 2005; Yao et al., 2009), especially a combination of learning and assessment (e.g., Ok & Erdogan, 2010). While concerns have been voiced regarding the compatibility of portfolio purposes aimed concurrently at both student learning and assessment of students, there seems to be general agreement that these purposes can be reconciled, if potential tensions that might arise from the differences between learning and assessment are duly taken into account. Keeping in mind constructive alignment (e.g., Biggs, 2012, 2014a; Larkin & Richardson, 2013; Trigwell & Prosser, 2014; Wang et al., 2013) and assessment *for* learning (e.g., Birenbaum, 2011; Bloxham & Carver, 2013; Brown, 2004; Sambell et al., 2013; Taras, 2002), there can be expected to be a washback effect of e-portfolio assessment (Hung, 2012) and an influence of portfolio assessment on learning (Zou, 2003), so that in examining the effects of portfolio on pre-service

[184] Even if the purpose of portfolio construction is stated explicitly in the title and/or in the abstract of a study, it is necessary to carefully read the study in detail. Portfolio purposes such as 'professional learning', 'reflection', etc. are broad and unspecified, and may comprise more than one particular aim.

teachers' learning and reflection, in contexts where learning and assessment are aimed at simultaneously, it seems worthwhile to take into account findings from studies on portfolio for assessment, too.

Referring to the findings of their study, comprising the implication that portfolio were better suited for formative purposes, Beck et al. (2005) recommend that portfolio be not used for summative purposes. Taking into account the large number of reports on portfolio research and practice, this recommendation appears to be too categorical: It is possible to make use of portfolio for assessment as well as for learning and assessment at the same time. The recommendation made by Beck et al. (2005) can be agreed to as regards *high-stakes assessment*, where assessment is intended to be highly valid, reliable, and objective with regard to pre-determined learning goals and pre-determined criteria. While several issues have to be taken into account with regard to summative assessment, in the case of formative assessment (i.e., assessment *for* learning), it seems practicable to implement portfolio without major restrictions, portfolio being the basis for formative learning and reflection, capable of comprising feedback for students from teacher educators, cooperating teachers, and peers, as well as students' self-assessment. Portfolio should not be used for summative purposes (i.e., assessment *of* learning) in a way that hampers formative purposes related to portfolio development. In the following, it is assumed that portfolio is apt for formative as well as for summative purposes, and that these can be linked and followed at the same time. Portfolio for assessment and for employment may influence pre-service teachers' portfolio construction, so it is all the more important to provide a thorough introduction to portfolio development, making clear the intended learning outcomes, including their benefits to students, and showing students portfolio-related connections between learning, reflection, assessment, and employment.

Fundamental issues to which an evidence-based answer is sought in the context of the second literature review research question are: What are the effects of portfolio construction on pre-service teachers' learning and reflection? Is portfolio an effective means to reach generic intended learning outcomes (i.e., general graduate attributes) and/or specific intended learning outcomes (e.g., within a program, within a course) in

pre-service teacher education?[185] If so, what instances of these intended learning outcomes and illustrations of these effects are there (within the broad context of formative and summative purposes)? In what ways does portfolio construction influence pre-service teachers' learning and reflection, i.e., what cognitive, affective, motivational, and social processes can be observed in a portfolio-based learning environment?

Evidence of the effects of portfolio construction on pre-service teachers' learning and reflection, topic of the second research question, is drawn from the broad array of the 77 studies listed in Appendix A.7 (p. 473), with a particular view to the studies presented in detail in Section 3.3.2. At the same time, the larger body of empirical studies identified and read in the course of the extensive reviewing process spanning several years is kept in mind. As noted by Imhof and Picard (2009), despite the proliferation of portfolio – in the case of Imhof and Picard (2009) with a view in Germany, but, as has been laid out above, generally, in countries all around the world –, little attention has been given to the question of how the effects of portfolio methods can be determined. It is obvious that the majority of articles reviewed relies on participants' self-reports of the influence of the portfolio experience as a whole. While this is pragmatic and legitimate practice, considering the importance of students' views and the assumption that adult students in higher education are generally willing and able to give an appropriately exact and, thus, valid report, there remains a risk of students' self-reports being biased or inaccurate. Beck et al. (2005) state that an improvement in reflective skills is frequently cited as a major benefit of portfolio development. The findings of this litera-

[185] In addition, if the theory- and practice-based assumption that portfolio can be implemented to *effectively* reach intended learning outcomes can be supported on an empirical basis, it would be interesting to examine whether portfolio could also be shown to be *efficient* in reaching these outcomes, as compared to educational instruments such as learning journals (e.g., Zeichner, 1987) or other tools and techniques supposed to support reflection (for an overview, see Korthagen, 1992). This consideration of efficiency would be particularly interesting against the background of repeated claims by both students and faculty, reported in the literature, that portfolio is very time-consuming. Yet, a comparison of different educational tools implemented to foster reflective learning would lead too far in the context of this dissertation – and no such research related to portfolio was identified during the process of literature search for this review. Thus, the following observations will focus exclusively on issues of portfolio *effectiveness*.

ture review generally support this observation, with most of the studies reporting positive effects of portfolio on pre-service teachers' learning and reflection. Yet, in the studies reviewed, it was also noted that the quality of the portfolios (only) developed (e.g., Bataineh et al., 2007) and that the levels of reflection attained by individual pre-service teachers differed. This implies that the effects of portfolio construction on professional development and personal growth, and benefits thus gained, may differ between individual learners. In a number of studies, a distinction is made between students who clearly benefited from the portfolio experience and those who did not or did so to a lesser extent only (e.g., Imhof & Picard, 2009). All in all, it can be stated that in the large majority of the studies reviewed, positive effects of portfolio construction on a broad array of facets related to student learning and reflection are reported, while studies reporting critical findings are considerably less frequent.

Contextual factors – as addressed by the third research question in this literature review – take effect on pre-service teachers learning and reflection. The demand for explicitness and accuracy in research seems particularly warranted with regard to the modalities of any given portfolio implementation: If the context of portfolio construction – including the program of study, the course, the curriculum, the contents of the portfolio, the tasks set and processed by the students, etc. – is not presented in sufficient detail, it is virtually impossible to fully understand and evaluate the research and practice of portfolio construction that is reported on. Variability of portfolio effects due to different types of programs (e.g., elementary vs. secondary, single subject vs. multiple subjects) is to be considered and cannot be ruled out (Delandshere & Arens, 2003). The influence of context was examined by several authors, with a view to higher and teacher education institutions within and between countries (e.g., Dysthe & Engelsen, 2011; Fiedler et al., 2009; Groom & Maunonen-Eskelinen, 2006; Senne & Rikard, 2002) as well as with a particular view to the examination and evaluation of different e-portfolio implementations (e.g., Johnson-Leslie, 2008; Strudler & Wetzel, 2005). The demand for a clear description of context was made by Zeichner and Wray (2001) more than one and a half decades ago; yet, the quality of descriptions both of portfolio purposes and portfolio context (including portfolio type, contents, and tasks) continues to vary, most of the studies reviewed providing little or no detail on the spe-

cifics of the portfolio design and implementation researched. With regard to the type of portfolio used, it should be kept in mind whether the portfolio conceptualized and implemented was to serve formative or summative purposes, or both (e.g. Beck et al., 2005; Chetcuti et al., 2006). There exist studies that do not examine the effects of portfolio development as a whole, but the influence of particular features of a portfolio implementation, such as weblogs in e-portfolios (e.g., Chuang, 2010; Tang & Lam, 2014) and response groups when working with portfolio (Hoel & Haugaløkken, 2004).

When looking at research on the contextual factors of portfolio development as well as at reports on portfolio practice (including evaluation studies), there is the impression that contextual factors relative to the design and the features of the learning environment have so far been given considerably more attention than contextual factors related to the students.

The demand for explicitness and accuracy also applies to the provision of information on the characteristics of the pre-service teachers participating in a study, i.e., on student factors influencing portfolio learning and reflection. For example, in a study of the effects of goal orientation on the reflective ability of electronic portfolio users from other disciplines in higher education, Cheng and Chau (2013) found that students with dual goal orientations (mastery *and* performance-approach goals)[186] appeared to show a higher level of persistence and reflection than those students with single goal orientations only (mastery *or* performance goals). The authors come to the conclusion that e-portfolios are a valuable tool in fostering students' reflective competence by means of emphasis on both process (mastery-oriented) and product (performance-oriented). Further aspects of student factors are addressed in the research reviewed (e.g., gender, as considered by Beck et al. (2005); yet, there seems to exist a limited range of studies

[186] For a detailed presentation of mastery learning (mastery goals, learning goals) as a concept, see, e.g., Ames (1992); Elliott and Dweck (1988); Guskey (2010); and Slavin (1987). Goal orientation of higher education students is investigated, e.g., by Geitz, Brinke, and Kirschner (2016a, 2016b) and by Hsieh, Sullivan, and Guerra (2007).

only dealing on the basis of a quantitative research approach with the differential effects of student factors.[187]

With regard to the fourth research question, in many instances of portfolio construction students' perceptions of the portfolio experience tend to be altogether or predominantly positive (e.g., Bataineh et al., 2007; Beck et al., 2005; Borko et al., 1997; Cakir & Balcikanli, 2012; Hauge, 2006), as do those of teacher educators (e.g., Imhof & Picard, 2009).[188] Based on the studies analyzed for this review, it can be stated that pre-service teachers' perceptions of portfolio are in most cases reported as predominantly positive. When asked about their experiences of portfolio development, pre-service teachers identify a wide range of benefits and report a positive experience of as well as a positive attitude towards portfolio development (e.g., Bataineh et al., 2007). Beck et al. (2005) in their comparison of formative and summative electronic portfolios report that pre-service and beginning in-service teachers' ratings of all portfolios examined were favorable, the ratings of those portfolios that were wholly or predominantly formative being significantly higher with regard to perceived overall contribution to professional development.

The fifth research question formulated for this literature review focuses on the theoretical foundations, concepts, and key pedagogies underlying portfolio development in pre-service teacher education. Here, it is to be stated that the scope and the detail, and thus the quality, of the theoretical and conceptual backgrounds given in the studies reviewed varies widely. Most often, it is the paradigm of constructivism and various aspects related to pre-service teacher learning and reflection that are laid out as theo-

[187] In fact, Beck et al. (2005) explicitly note that at the time no published studies were found on differences related to gender and portfolio.

[188] It is interesting to see that in the literature there are reported shifts in students' attitudes towards portfolio and a positive development of student teachers' views of the tool (e.g., Chitpin & Simon, 2009; Çimer, 2011): The author of this dissertation remembers several noteworthy cases of students who were initially very critical of portfolio construction in the course *Schulpraktische Studien 1 (SPS 1)*, but then completely changed their attitude when during the portfolio experience they perceived the benefits of this method of learning and reflection for their professional development and their personal growth. These remarkable shifts in attitude were addressed and plausibly explained in the respective students' portfolios as well as during interviews and conversations with students.

retical and conceptual bases in the introductory parts of the original research reviewed.

Summing up on the theoretical and conceptual bases of portfolio construction, it can be stated that the approach is based on constructive principles of teaching and learning,[189] and that, if designed and implemented properly, it is in accordance with current pedagogical approaches to teaching and learning – in general as well as in higher education in particular –, such as constructive alignment (including assessment *for* learning); the combination of theory and practice (of vital importance in professional education); meaningful, deep learning for understanding; productive reflection; and the development of a stance as a reflective practitioner and a lifelong learner. Once again, it is to be pointed out that neither the implementation of portfolio construction nor the introduction of reflection into teacher education programs and courses is a sufficient condition to make pre-service teachers 'better', i.e., more effective, more professional teachers. What is essential to effective portfolio development is that students (as well as teacher educators and co-operating teachers at schools) take up the opportunities provided by a portfolio-based learning environment, that they *decide to engage actively in learning and reflection*, and that they use the opportunities provided to the fullest potential possible, engaging in meaningful, deep learning for understanding as well as in productive reflection.

Following the discussion of the evidence presented in the original research reviewed, preliminary conclusions will now be drawn as to the current state of research.

[189] Portfolio is in remarkable accordance with constructivist principles of learning and instruction, as is the concept of student approaches to learning.

3.5 Portfolio construction in pre-service teacher education – what we know and what we need to know: A preliminary, literature-based summary

Closing this chapter, a concluding, yet preliminary, summary of the overall findings of this literature review will be given, and on the basis of the discussion in the previous section, conclusions will be drawn as to the scope, the quality, and, thus, the substance of the available evidence. Finally, on the basis of gaps in and limitations of the research that has been reviewed, suggestions for further empirical research on portfolio in pre-service teacher education will be made.

With a view to quality teaching at schools as the paramount, ultimate aim of teacher professional education, starting with pre-service teacher education, there is a large range of notions related to concepts such as teacher professionalism, teacher competence, and teacher effectiveness. As can be deduced from the works by Donald Schön (e.g., Schön, 1983, 1987), a model of technical rationality is not sufficient for teaching. Yet, technical problem-solving on the basis of scientific knowledge is to be seen in the broad framework of reflective inquiry and reflective practice. Reflection was joined to action by Schön (1983) in an extension of Dewey's (1933) work. Teaching and teacher education have to be research-based, but that is not enough: The mere application of context-independent, static knowledge would neither be possible in all situations nor would it be sufficient. Thus, with a view to quality in teaching, Carr (1989) presents arguments for a reflective teaching profession. Taking a holistic stance towards teacher education, learning to teach, and professional, responsible teaching at school as truly human endeavors, teacher identity, knowledge, skills, dispositions, and habits of inquiry have to be consciously and deliberately developed in pre-service teachers. As noted by Kilgore et al. (2013, p. 807) with a view to experiential learning by means of professional portfolio development in engineering, "… the role of education is to develop habits of inquiry in students". A reflective approach in teacher education,[190] leading to reflective practice, potentially contributes to teacher autonomy, teacher emancipa-

[190] It is evident that both is important: A reflective approach *in* as well as *to* teacher education. It is crucial in the design of concrete learning environments and the provision of productive learning opportunities to continuously reflect on how to best implement reflection with students.

tion, teacher competence, and intelligent practice, freeing (future) teachers from merely following 'conventional' teaching practice.

Portfolio appears to have the potential to support various processes of student learning and reflection in pre-service teacher education. Yet, there is not only the fact that there is no such thing as *the* portfolio (Mansvelder-Longayroux, Beijaard, Verloop et al., 2007) that has to be taken into account when implementing and researching portfolio construction in teacher education. Considering the continuing difficulty and variation regarding the definition of portfolio (e.g., Challis, 2005; Greenhalgh & Koehler, 2015) – which is due to the 'chameleon' aspect (Dysthe & Engelsen, 2011) of portfolio as an educational tool – it seems all the more justified to demand that details of any portfolio implementation reported on in research and practice be given in order to enable the reader to appraise the context of portfolio development as well as the cognitive, affective, motivational, and social processes involved in portfolio construction. Central to the definitions of portfolio in education is the collection of artefacts, with much of the portfolio literature focusing on the potential of portfolio to inspire and guide reflection (Greenhalgh & Koehler, 2015). As was noted by Dysthe (2002, paragraph 3), "… defining the portfolio in education is no easy task." The variety of definitions and, thus, the 'chameleon' aspect of portfolio (Dysthe & Engelsen, 2011, Dysthe, 2002) is mirrored in the variety of approaches to the concept, all of them attempting to explain the prerequisites, the processes, and the products of portfolio learning and assessment in (higher) education. Without a clear presentation of the learning environment and the portfolio implemented, it is neither possible to fully understand and evaluate an approach and its study, nor can it be replicated.

The large majority of studies identified, analyzed, and considered in this literature review were published within the past two decades, which indicates the continuing relevance of the topic.[191] Portfolio practice is common to teacher education programs all

[191] The continuing, high relevance of portfolio construction in teacher education was highlighted once more as well as confirmed in topical presentations, discussions, and conversations during the *11. Bundeskongress der Zentren für Lehrerbildung und Schools of Education* (11. National Congress of the Centers of Teacher Education and the Schools of Education in Germany, 8–9 March 2018, University of Flensburg).

around the world, with research articles published on an international scale. Regarding the question posed by Woodward and Nanlohy (2004b) – "Digital portfolios: fact or fashion?" –, it can be noted that portfolios, both paper-based and electronic, are well established in higher and teacher education and in all probability are here to stay. There is a growing body of portfolio literature, a considerable part of which is anecdotal or evaluative in nature. A large number of the studies identified are primarily qualitative in nature, and there are quality issues with regard to many studies; however, despite all of these limitations, the body of evidence is growing. According to Greenhalgh and Koehler (2015), the basic formative/summative distinction in the field of portfolio is that summative portfolios focus on the evaluation of past performance while formative portfolio help teachers to prepare for their future. Despite the tensions between their summative and formative uses, portfolios can play both roles (Greenhalgh & Koehler, 2015). Portfolios based on formative assessment appear to be more conducive to professional development than portfolios with a purely summative orientation (Beck et al., 2005). Hybrid forms of portfolio, serving learning and assessment at the same time, are possible.[192]

Portfolio is implemented in all fields and at all stages of teacher education: with future elementary teachers (e.g., Chitpin & Simon, 2009; Lin, 2008; Wade & Yarbrough, 1996) as well as with prospective secondary teachers (e.g., Mansvelder-Longayroux, Beijaard, Verloop et al., 2007) or with both (e.g., Chetcuti et al., 2011; Ok & Erdogan, 2010);[193] with pre-service as well as with in-service teachers (Beck et al., 2005). The study conducted by Chetcuti et al. (2011) implies that portfolio as a tool for reflective learning is considered to be potentially useful to teachers not only during university pre-service teacher education, but also beyond, in their first year of teaching. Portfolios are implemented with teacher education students of all subjects: language (e.g., Bataineh et

[192] The portfolio designed for and implemented in the course *Schulpraktische Studien 1 (SPS 1)* is an example of a hybrid form – it serves the purpose of learning and reflection in the first place and is also used for the purpose of assessment. The formal assessment taking place after students hand in their portfolios is deliberately limited to a very basic summative assessment (pass vs. fail).

[193] For the sake of completeness, it can be noted that portfolios are constructed by teacher educators as well (e.g., Klecka, Donovan, & Fisher, 2007; Klecka, Donovan, Venditti, & Short, 2008; Wright, Knight, & Pomerleau, 1999).

al., 2007; Cakir & Balcikanli, 2012; Kabilan & Khan, 2012; Mansvelder-Longayroux, Beijaard, & Verloop, 2007; Mansvelder-Longayroux, Beijaard, Verloop et al., 2007); social sciences (e.g., Bataineh et al., 2007); mathematics (e.g., Chetcuti et al., 2011; Kaasila & Lauriala, 2012); science (e.g., Chetcuti et al., 2011; Mansvelder-Longayroux, Beijaard, & Verloop, 2007; Mansvelder-Longayroux, Beijaard, Verloop et al., 2007); chemistry (e.g., Oner & Adadan, 2011); biology (e.g., Çimer, 2011); and physical education (e.g., Senne & Rikard, 2002). Portfolio is used in the education of pre-service teachers for general as well as for special education.[194]

In research, the theoretical and conceptual background, the concepts, and the key pedagogies underlying portfolio construction in general and any specific implementation in particular must be given in detail. With a view to the theoretical and conceptual background of a study, the principles guiding scientific research in education (Shavelson & Towne, 2002) demand that existing pertinent research findings be referred to. However, as has been pointed out above, a considerable number of the studies analyzed for this review have no specific section dealing explicitly with the theoretical background of portfolio implementation. Studies cited in the introductory parts of many studies are of older date, and the reader cannot help the impression that in some cases the studies cited are somewhat a 'convenience sample'. It becomes clear from the studies reviewed that there is no such thing as *the* portfolio, but a large variety of portfolio implementations, differing in key aspects, such as purpose, type, form, contents, and tasks. Portfolio enables learners to take up the learning opportunities provided by the learning environment, and differences in learners as well as in specific contexts will for their part result in variation, both with regard to students' participation in the process of portfolio development and with regard to the learning outcomes resulting from the portfolio process. There is a large range of international research implying that portfolio has the potential to foster pre-service teachers' learning and reflection, if it is implemented properly with students actively engaging in the portfolio experience. Yet,

[194] For examples of portfolio in pre-service special education preparation, see, e.g., Conderman (2003); Kenney and LaMontagne (1999); Kossar (2003); and Rice and Drame (2017).

all studies focus on particular aspects of given portfolio implementations,[195] while no replication studies were found. Taking into account the (quasi) unique nature of the portfolio implementations investigated, it might be said that all studies reviewed are some kind of 'evaluation study' of one particular portfolio implementation. As noted in Chapter 1, the processes related to learning and reflections are complex, the latter in particular continuing to be only vaguely defined and understood. Therefore, it is all the more important to define and state clearly what kinds of processes of learning and reflection are to be stimulated and researched in the context of any given portfolio implementation, both with a view to task processing and (intended) learning outcomes.

Portfolio use can be compared between higher education disciplines and domains and seems to be most advanced in teacher education and the health sciences (Butler, 2006; Chitpin & Simon, 2009). As can be confirmed based on the findings of this systematic literature review, there is a large range of literature dealing with the uses of educational portfolios; yet, even on an international scale, original research on portfolio construction in pre-service teacher education that meets basic standards of scientific research in education seems to be scarce, a lack of evidence that has been repeatedly pointed out by several authors ever since the introduction of portfolio into teacher education. The findings of this review confirm the state of research recently indicated by Imhof and Picard (2009), i.e., that research on the efficacy of the instrument has been scarce, despite the great expectations placed on it. The continuing scarcity of substantial research on portfolio in pre-service teacher education leads to the conclusion that much remains to be done in research on this topic.

Tosh, Light, Fleming, and Haywood (2005) emphasize the importance of student buy-in. In the literature reviewed, student teachers' views of portfolio are reported as being predominantly positive, and the same holds true for teacher educators' views (e.g., Cakir & Balcikanli, 2012; Granberg, 2010; Imhof & Picard, 2009).

[195] With the exception of studies investigating portfolio implementations in comparison (e.g., Fiedler et al., 2009), it is one specific, concrete context that is looked at. In comparative studies, the portfolio implementations reported on are contextually bound, too.

Given the complexity and variability of approaches to portfolio construction, it seems strongly advisable to clearly express the focus and the purpose of a study in the title, presenting in the abstract a concise summary of the research undertaken. Moreover, the context of portfolio development should be described as accurately as possible, and research questions focused on a limited range of portfolio aspects and/or portfolio elements to be researched thoroughly should be formulated. As there is no such thing as *the* portfolio, variations in elements of portfolio construction have to be considered and examined. With regard to the context of a study, it is also important to note whether the participants disposed of relevant prior knowledge of portfolio development and over what period of time the portfolio was constructed. Portfolio development being an activity taking some time, it can be assumed that the impact of portfolio activities varies with the length of the period of portfolio construction. While in a large number of studies portfolio is reported to have been compiled over a period of one semester (e.g., Bataineh et al., 2007; Cakir & Balcikanli, 2012; Çimer, 2011; Mansvelder-Longayroux, Beijaard, & Verloop, 2007; Oner & Adadan, 2011), typically in relation to practice-oriented elements included in the program of study, such as student teaching (e.g., Borko et al., 1997), there are teacher education programs in which the duration of portfolio development is shorter (e.g., Kaasila & Lauriala, 2012; Trent & Shroff, 2013) or longer (e.g., Chetcuti et al., 2011; Chitpin & Simon, 2009) than one semester. With regard to the focus of portfolio development, while in many cases portfolio is related specifically to one course, portfolio development may also comprise several courses up to the whole program of study. With regard to learning and reflection, it seems plausible that with a view to developmental processes, the duration of portfolio development takes effect on the processes and the products of portfolio development.

Portfolio, if designed and implemented properly, has the potential to foster both student learning and student reflection. It is an educational tool that can be made use of in order to provide students with a learning environment in which pedagogically desirable (i.e., intended) learning outcomes are likely to occur if students are willing and able to take up and actively engage in the learning opportunities offered. To ensure student buy-in, a thorough introduction to this way of learning and reflection is of crucial importance (e.g., Tosh et al., 2005): Students must be able to see the benefits of

portfolio construction. If portfolio is poorly designed, introduced, and/or implemented, students (as well as faculty) will tend to see this approach as just additional workload. As regards academic, systematic reflection, there is discussion in the literature whether reflection can be taught (e.g., Pennington, 2011). While it is unlikely that reflective capability can be fostered in students by way of mere teaching,[196] reflective thinking certainly can – and should – be *modelled* by the teacher educator and *trained* in class, as early as in pre-service teacher education. The beneficial effects of portfolio on student learning and reflection may relate to student knowledge (e.g., of subject matter; of the environment; of the student's self; of the interaction of the self with the environment; of factual, conceptual, procedural, and metacognitive knowledge as conceptualized, e.g., by Krathwohl, 2002); skills (e.g., skills relative to teaching; skills in self-regulated learning; skills in academic reflection for continuous (self-)improvement and lifelong learning); and dispositions (including habits, attitudes, values, and beliefs). Depending on its design, portfolio as an instrument for the education of pre-service (and in-service) teachers can address *all* aspects of teachers' professional development and personal growth in contexts of individual and cooperative learning.[197] In the form of holistic learning (cognitive, emotional, and social),[198] it can address a multitude of facets related to teacher professionalism and teacher identity.[199] Portfolio appears to be an instrument for pre-service teachers' programs of studies, apt for the processing of practice-based experiences, in the context of particular courses as well as throughout the whole of a program.

Despite the variance in portfolio conceptualizations, purposes, implementations, and contexts, 'portfolio' is a tool empowering learners to systematically plan, carry out, and

[196] Etymologically, the verb *teach* can be traced back to Middle English *techen* (to show, to instruct), from Old English *tǣcan* (Merriam-Webster, 2018c). The Old English verb *tǣcan* is related also related to the German Verb *zeigen*. It is not enough to present to students information about reflection: In order to develop reflective capacity, students have to experience and train the mental processes involved in reflective thinking.

[197] Cooperative learning takes place in a community of learners, which, depending on the context, may also be a community of practice (e.g., Hou, 2015).

[198] For more information on the dimensions of learning, see, e.g., Illeris (2002).

[199] For an overview of issues related to teacher identity, see Beauchamp and Thomas (2009).

evaluate their academic learning. It is not restricted to any particular domain of higher education or to any subject matter within a domain. It can – and in the author's opinion: should[200] – be used with a holistic view to combining *all* elements of an individual learner's education: learning and experiences made *before* higher education (for pre-service teachers with a particular view to the experiences made during their years at school); learning and experiences *during* higher education for professional development and personal growth (with a view to combining theory and practice, guided and self-directed learning, individual and collective learning, and contents of a course or several courses within a program of study); and learning and experiences *beyond* higher education, gathered in the course of professional practice and lifelong learning. Portfolio is unique in the sense that at the same time it represents a way of learning and reflection; the basis of the cognitive, emotional, motivational, and social processes involved; and the documentation of learning and reflection that is ongoing or has occurred. On the basis of this documentation, growing over time, continuous, essentially endless learning and reflection in an iterative way can take place.

For the purposes of teacher education and teacher education research, portfolio as an educational tool can be conceptualized as a collection of contents, negotiated to varying extent by the teacher and the learner, and tasks to be processed on the basis of these materials with a view to the intended learning outcomes to be formally attained and the outcomes of learning and reflection desired by the learner. Based on this general concept of the instrument, when taking into account the huge, inevitable variance in portfolio designs, it is barely surprising that there continues to be no general agreement on how to define portfolio. It is also evident that there cannot be a comprehensive set of *detailed* guidelines on how to best implement portfolio; yet, on the basis of existing portfolio research and teacher educators' practical experience, there can be provided a range of *basic* guidelines on what to consider in general when developing portfolio with learners – in the case on hand with pre-service teachers in professional teacher education. Finally, the assumption seems justified that there cannot be generalizable research findings on the effects of portfolio construction in any given area of education as long as portfolio is to be considered a framework containing contents and

[200] Normative deliberations are at the core of many pedagogic decisions.

tasks varying to an enormous extent. Both the contents, i.e., the resources providing the material basis and the opportunities for learning and reflection, as well as the ways these contents are processed, i.e., the cognitive, emotional, motivational, and social processes involved in individual and collective portfolio construction, in fulfilment of tasks set and/or in pursuit of individual aims followed by the learner, are highly specific to any given portfolio implementation. There is no such thing as *the* portfolio in education, which makes it difficult to implement ready-made concepts fully productively, or to claim general effects of portfolio development. The key to success seems to be the design, implementation, and evaluation of specific portfolio-based learning environments for particular purposes in local contexts of teaching and learning, focusing on these concrete approaches and their effects. These portfolio designs have to fulfil the general requirements set for teaching/learning environments to qualify as being portfolio-based (collection of artefacts and tasks to be performed; reflection as an indispensable element of portfolio development), and they should be based on the general recommendations for productive portfolio development available in the literature. Taking into account the variation in student factors (including cultural background), context (institution, program, course), students' perceptions, task processing, and intended learning outcomes, if portfolio development is to be realized to the fullest extent possible, it seems inevitable to design tailor-made portfolio experiences for learners – based on the specific learning outcomes set for a course or a program of study, and with a view to additional general benefits for learners, such as the attainment of university graduate attributes. These designs for portfolio-based learning can then be implemented and researched.

In conclusion, the findings of this literature review show that over the past decades there has been conducted a substantial amount of research on portfolio in pre-service teacher education. While it soon became obvious that there is a huge collection of literature based on anecdotal reports,[201] these reports – such as mere descriptions of portfolio projects (e.g., Darling, 2001) or summaries of "lessons learned" (e.g., Wilhelm

[201] In the history of portfolio, this observation was noted early on, e.g., by Wade and Yarbrough (1996) and by Zeichner and Wray (2001). With a view to the continued existence of this limitation relative to the literature on electronic portfolios, see Carney (2006).

et al., 2006), which in their own right may certainly have great value as guidelines for portfolio design and portfolio practice – exist alongside a growing body of original research that comes up to the principles of scientific empirical research in education. If the literature is searched systematically, there can be identified numerous empirical studies on portfolio construction in pre-service teacher education that have been conducted in the course of three decades of portfolio use, especially in more recent years. So far, these studies are mainly qualitative in nature, and many of them reveal major shortcomings with regard to research methodology when evaluated on the basis of the principles for scientific research in education set out by Shavelson and Towne (2002). However, in addition to theoretical support for portfolio development derived from general theories of learning and reflection, the findings of these studies justify the assumption that portfolio as a tool in teacher education, if designed and implemented properly based on what is known so far, has the potential to foster pre-service teachers' learning and reflection with a view to powerful learning experiences in effective teacher education. The holistic approach to cognitive, emotional, and social learning and reflection in pre-service teacher education made possible by the techniques and processes subsumed under the technical term of 'portfolio' can be considered exceptional and worthy of further consideration in pedagogical practice and educational research.

As can easily be confirmed by means of a quick look at pertinent resources on the Internet, the notion of portfolio has been taken up by teacher educators around the world, and it continues to be of interest. The findings of the original research studies identified during this literature review justify the assumption that portfolio has the potential to support pre-service teachers' learning and reflection in ways desired by teacher educators, many of whom set high hopes in this technique. With a view to the high variability of portfolio implementations by teacher educators and portfolio use by pre-service teachers, as well as to the large range of factors influencing the processes and products of portfolio development, the generalization of empirical research findings involving any given implementation seems difficult. Thus, it seems advisable to introduce portfolio in pre-service teacher education on the basis of what is known so far, to design a portfolio-based learning environment on the basis of the purposes followed and the context given, to put this design into practice, thus providing pre-

service teachers with a potentially powerful portfolio experience, and to systematically research and evaluate the effects of portfolio construction on pre-service teachers' learning and reflection in this specific context.

With regard to the professional education of teachers – including portfolio as a tool for meaningful, reflective learning –, lessons may be learnt and transferred from education and training for other professions (Yinger, 2010), such as medical and nursing education. Here, it is important to determine to what extent the prerequisites, processes, and products of learning and reflection in professional preparation are comparable to those in (pre-service) teacher education.

So, what overall appraisal of the state of portfolio research and what suggestions for further research can be derived from the systematic literature review carried out?

Overall appraisal of the state of portfolio research

- Parallel with an evolving body of empirical research findings, authors' statements as to the scope of available research have changed over the past decades. Still, based on the categorical way in which these statements are put, some of them are downright contradictory (e.g., Bataineh et al., 2007 vs. Imhof & Picard, 2009). It seems plausible to attribute such contradictions to the facts that hitherto there has been published no comprehensive systematic review of the relevant literature, and that with regard to the background sections of many an article the search for previous research, if any, has been done in a way that appears to be rather arbitrary. Based on the findings of this review, it is concluded that there is quite some research on portfolio, both in its paper-based and its electronic forms, and that there exist studies of good quality.[202]

- The scope and the quality of the research identified seem adequate to warrant the assumption that, in accordance with the view held by many teacher educators, portfolio construction has the potential to support pre-service teachers'

[202] As for details, see the tabular overviews in Appendix A (p. 443).

professional development and their personal growth, covering essential processes such as learning, reflection, and identity formation. Both the literature and the widespread use of portfolio in teacher education practice give the impression that portfolio is fashionable indeed; but on no account is there such a thing as *the* portfolio, and by no means is portfolio an educational tool the thoughtless implementation of which would lead to certain student learning and reflection. Portfolio construction must be carefully implemented – on the political and institutional levels by setting an adequate frame; on the part of faculty by implementing portfolio properly; and on the part of the students by actively, deliberately, and consciously taking up the opportunities offered by portfolio-based learning and reflection.

- With regard to electronic portfolios following their paper-based predecessors, caution is warranted: Here again, contradictory statements as to the scope of available prior research can be found. While there do exist aspects of digital portfolio construction that – in comparison with paper-based, traditional portfolio construction – plausibly constitute an advantage (such as ease of access, ease of storage, etc.), in some cases the positions of e-portfolio proponents seem to be overly enthusiastic. The enthusiasm obvious in e-portfolio literature and practice does not always seem to be supported by rigorous research findings. Paper-based and electronic portfolios being grounded on the same pedagogies, the crucial question is what additional affordances – and, thus, what extra benefits – e-portfolio technology brings to portfolio-based pre-service teacher education. In education, the use of digital devices does not constitute an end in itself.[203] While it is clearly advantageous to prepare pre-service teachers with a

[203] With the exception of lessons geared at the acquisition of digital technology literacy, it may be added. From a pedagogical point of view, digital devices are to be considered *tools*, the use of which is intended to support learners in the attainment of teaching/learning objectives set by the curriculum. They should be used if it is known or assumed that intended learning outcomes can be achieved to a greater extent, more easily, and/or in a pedagogically more desirable way by means of digital technologies (as opposed to more traditional ways of teaching and learning). They should not be used uncritically just because they are available. Digital technology does not teach in itself, and all consequences of decisions in its favor – or against its use – have to be considered in instructional design.

wide range of knowledge, skills, and dispositions conducive to teaching and learning – including the technique of portfolio construction and the competencies required for the future use of digital technology with pupils at school, in e-portfolio construction as well as in other fields of teaching –, it must be kept in mind that pre-service teachers may encounter problems in digital portfolio construction and/or may not feel comfortable with the use of digital technology (e.g., Lin, 2008; Pecheone et al., 2005). In both cases, student perceptions may be influenced in negative ways, which in turn may entail negative effects on the processes and the products of portfolio-based reflective learning.

Suggestions for further research

A large number of qualitative studies have been conducted, inferences regarding the benefits of portfolio often being based on the reports of a small sample of participants or content analyses of a small number of portfolios. More large-scale, quantitative studies (i.e., surveys) of the effects of portfolio on the learning and reflection of *all* students in a group constructing a portfolio seem desirable, e.g., in the form of pre-/post-test designs.

Taking into account that some researchers come to the conclusion that portfolio benefits all students, but to varying extent, while others conclude that portfolio is advantageous for most, but not for all students, it would be interesting and important to examine what students profit most from this way of learning and reflection, and why some the students constructing a portfolio profit, while others do not. Such an undertaking would be in line with the observation that the differential effects of student factors in portfolio construction have not been extensively researched so far.

It would also be interesting to examine the effectiveness of portfolio based on research comparing use (experimental group) vs. non-use (control group) of the instrument. Yet, bearing in mind that portfolio research in teacher education does not take place under laboratory conditions, but in real-life settings with pre-service student teachers, it is to be considered an ethical issue whether the students in a control group could be

deprived of portfolio as an educational tool as opposed to the students in an experimental group. Regarding issues of efficiency, considering the large range of tools that can be implemented in teacher education to support student learning and reflective thinking, it would be difficult to determine what specific instruments to compare portfolio with, e.g., with reflective journals or with written assignments geared at objectives similar to those followed by means of portfolio construction.

Studies could be conducted investigating particular aspects of portfolio construction, e.g., modifications in portfolio task design and/or in the teaching/learning context. Considering the advantages that electronic portfolios (e-portfolios) are claimed to have over their paper-based counterparts, more comparative research on these two forms of portfolio would be desirable.

Investigating the influence of web-based portfolio development on learning to teach (e.g., Avraamidou & Zembal-Saul, 2006) and the use of electronic portfolios to promote reflective thinking in pre-service teacher education (e.g., Ayan & Seferoğlu, 2011), the authors took to a qualitative case study design, which enabled them to gather in-depth data. Such an approach can be considered suitable given (1) the distinctiveness and complexity of any specific portfolio implementation and (2) the diversity of approaches and discoveries in existing portfolio research. Though, it would be possible to not only research by means of small-scale case studies the support provided by portfolio, but to conduct research with larger groups of students, in order to obtain a broad picture of variables, relationships, and effects in portfolio construction (considering that portfolio has been found to benefit students to varying extent). There should also be undertaken further comparisons of electronic vs. paper-based portfolio implementation, i.e., the division of a cohort of students into two groups, in order to compare the effects of variation in the form of portfolio, while other variables – including the portfolio contents required and the tasks set for processing – are kept as identical as possible.

Breault (2004) notes that the typical use of reflection in the early field experiences he reports on most closely resembled the utilitarian definition given by Cruickshank (1987), which emphasizes prospective teachers' ability to determine whether learners achieved the goals set for a lesson. By no means is this basic level of reflection (see Sec-

tion 2.2.2.1 on levels of reflection) inferior to other levels, as might be supposed on the basis of parts of the pertinent literature. Systematic, academic reflection and reflective practice can be taught in appropriate ways (e.g., Russell, 2005), and the lower levels of reflection between the basic level of non-reflection and the highest level of critical reflection are the starting point for this training of reflection. In addition, while critical reflection in the sense of reflection on ethical matters is an important aspect of professional teaching, it does not make basic considerations as to whether (and to what extent) learners achieved the goals set obsolete or less important. It would be a classic logical error to suppose that because attaining and practicing reflection on the level of critical reflection is good, important, and desirable, practicing – situationally adapted – reflection on the lower levels would be less important.

In the context of the study reported by Breault (2004), prospective teachers' attitudes towards portfolio appeared to be even more important than what was demonstrated in the portfolio regarding the long-term meaningfulness of the portfolio requirement set. This relevance of students' attitudes towards meaningful learning and reflection mirrors the relevance of students' perceptions of the learning environment for their approaches to studying.

While transparency and clarity can be assumed to be irrefutable requirements for successful portfolio construction in any case, it can be inferred from the study by Breault (2004) and other pertinent literature on challenging issues in portfolio development that it is wise for teacher educators to consciously and carefully design portfolio-based learning environments with a view to avoiding confusion and tensions from the very beginning of the process.

Summing up reflections by Antonek, McCormick, and Donato (1997), Wolf (1991), and Zubizarreta (1994), Breault (2004, p. 850) points out that "[w]hen done well, portfolio development is contextually situated, requires critical reflection on one's actions, is mediated by the input of a mentor and serves as a transition from thinking like a student to thinking like a teacher."[204] This transition may be taken to represent instances

[204] Breault (2004) notes several desirable qualities and attributes of portfolio development that are given *when portfolio development is done well*. This specification is taken as one more reminder that portfo-

of transformative learning (on transformative learning see e.g., Cranton, 2010; Gunnlaugson, 2005; Howie & Bagnall, 2013; Illeris, 2004, 2014; Liu, 2015). Breault (2004, p. 850) continues to state that "[i]f we accept those assumptions, then it would seem as though the instrument is as much a process as a product and as much a learning activity as a final attainment." This combination of process and product may well be the cause for the large number of texts in the literature – theoretical as well as empirical – that do not clearly differentiate between the process and the product of portfolio development. In studies reporting students' perceptions of portfolio, this mingling of process and product often is evident, too. It can be considered a difficult task indeed for researchers to design studies in which the process (i.e., task processing) can be clearly differentiated from the product (i.e., the portfolio and its effects on students). Finally, with reference to Long and Stansbury (1994) as well as to Barton and Collins (1993), Breault (2004, p. 850) states that "[t]here is no reason that a portfolio cannot serve multiple purposes", yet, "… the first and most significant act of portfolio preparation is to decide exactly what those purposes will be."

Based on the studies analyzed for this review, it can be stated that pre-service teachers' perceptions of portfolio are in most cases reported as predominantly positive. When asked about their experience of portfolio construction, pre-service teachers identify a wide range of benefits and report a positive experience of as well as a positive attitude towards portfolio development (e.g., Bataineh et al., 2007). Beck et al. (2005) in their comparison of formative and summative electronic portfolios report that pre-service and beginning in-service teachers' ratings of all portfolios examined were favorable, the ratings of those portfolios that were wholly or predominantly formative being significantly higher regarding perceived overall contribution to professional development.

In research as well as in practice, differences continue to exist in the conceptualizations of portfolio, learning, reflection, and other concepts essential to portfolio construction in education. Due to the variance in portfolio purposes, contexts, and implementations, and to limitations in existing research, substantial, generalizable

lio construction is likely to potentially benefit students to the fullest extent possible only if portfolio is conceptualized and designed carefully and introduced and implemented properly.

research findings on portfolio continue to be scarce. Available empirical research on portfolio construction in pre-service teacher education focuses on a broad array of facets related to student learning and reflection. The large majority of the studies reviewed reports the effects of portfolio construction as being predominantly positive, portfolio being considered a tool conducive to learning and reflection. Pre-service teachers' perceptions of their portfolio-based experiences are stated to be generally positive, as are the views of other stakeholders and many authors' attitudes towards portfolio.

Taking into account the theoretical and conceptual background of portfolio construction and the original research on the topic identified and analyzed, the following thesis statement is formulated:

Portfolio construction in university teacher education has the potential to support pre-service teachers' quality learning and pre-service teachers' reflective thinking.

High-quality learning as intended for the course *Schulpraktische Studien 1 (SPS 1)* and as represented in this thesis is conceptualized in the summary opening the book by Kirby and Lawson (2012) as learning that is "… extensive, well integrated, and deep and supports the use of knowledge in new situations that require adaption of what has been learned previously." Portfolio construction is considered a comprehensive, overall task, comprising all teaching/learning activities (TLAs) in the portfolio-based context, supporting students' high-quality learning and their reflective thinking.[205] As has been pointed out, portfolio being carefully designed, introduced, and implemented properly is essential if its potential is to be realized by teacher educators and pre-service teacher education students.

[205] This conceptualization of portfolio construction as one global task can also be seen with Avraamidou and Zembal-Saul (2006, p. 178), who in their study write about the (web-based) 'portfolio task'. Such a global, holistic understanding of portfolio construction as one 'portfolio task' is also evident with Fiedler, Mullen, and Finnegan (2009). The construction of a portfolio is also depicted as one task by Woodward and Nanlohy (2004a, 2004b).

Based on the literature reviewed, it is further assumed that

portfolio is likely to benefit pre-service teacher education students to differing degrees, depending on students' individual characteristics, such as their disposition towards learning and reflective thinking, and that

as long as portfolio contents and task design are identical, there is assumed to be no difference between the effects of paper-based and e-portfolios on students' learning and reflection.

Paper-based as well as e-portfolios are assumed to be ways of portfolio construction in their own rights.

The core thesis, stating that portfolio construction in university teacher education has the potential to support pre-service teachers' quality learning and pre-service teachers' reflective thinking, and the assumptions regarding the effects of students' dispositions and of the form of the portfolios constructed (paper-based vs. e-portfolios) will now be put to the test in the context of one concrete portfolio-based learning environment, designed for a practice-based course at a university in Germany where pre-service teachers for vocational schools for commerce/business are educated.

4 The study: An empirical investigation of portfolio construction

"Sed demonstratio longe optima est experientia ..."[206]

Francis Bacon, *Novum Organum I, LXX* (1620)

FOLLOWING THE PRESENTATION OF THE THEORETICAL AND CONCEPTUAL BACKGROUND of educational portfolio construction (Chapter 2) and the comprehensive synthesis of original research findings collated by means of the systematic literature review undertaken (Chapter 3), this chapter comprises a detailed account of the empirical investigation of portfolio-based teaching and learning embarked on in one specific, concrete context of university pre-service teacher education in Germany. To start with, the framework underlying the study will be presented in Section 4.1: The 3P model of teaching and learning, key to the works by John Biggs (e.g., Biggs, 1989; Biggs, 1993; Biggs & Tang, 2011) and often cited in the literature on higher education, will be the basis structuring the investigation. This well-established model will be explained and made use of in an adapted form, based on both the constructs that are of particular interest for this dissertation and the insights gained in the literature review. Next, in Section 4.2, the context, the design, and the actual implementation of the portfolio-based learning environment will be illustrated: An outline of teacher education in Germany, a short portrayal of the program of study in Economics and Business Education, a description of the course *Schulpraktische Studien 1 (SPS 1)* in which portfolio construction took place, and details of the learning environment created for portfolio construction in the context of this course will be provided, so as to make available a full depiction – and thus to enable readers to gain a comprehensive idea – of the teaching/learning context that has been investigated.[207] The research questions guiding this investigation will be set out in Section 4.3, while Section 4.4 comprises the key hypotheses formulated on

[206] The quote in Latin translates as "But the best demonstration by far is experience ...".

[207] At this point, reference is made once more to Zeichner and Wray (2001) and their demand that the context and details of portfolio construction be specified – otherwise, studies reporting on the educational effects of portfolio construction cannot be properly categorized and evaluated by the reader.

the basis of educational theory, the knowledge gained from the literature review, conversations with portfolio experts – as well as with students –, and the experience of portfolio-based teacher preparation practice gained by the author of this dissertation through extensive work in pre-service teacher education over the course of more than a decade. Methodological considerations regarding the study design, the participants, and the development of the instruments will be set forth in Section 4.5. The presentation of the findings, their discussion, and the conclusions drawn on the basis of the original research conducted – in conjunction with the insights gained from the literature review and the practice of portfolio construction in university pre-service teacher education – will form subsequent chapters of their own, rounding off this dissertation.

4.1 An adaption of the 3P model for constructivist teaching and learning

The model which is made use of in this study can be found in the works of John Biggs, who as a renowned expert on student learning and as a prolific writer is often cited in higher education literature.[208] The 3P (Presage-Process-Product) model (e.g., Biggs, 1989; Biggs, 1993; Biggs et al., 2001) is a key framework in student learning theory, predominantly in, but not limited to, the context of higher education. It provides "… a powerful means of understanding relations between students' perceptions of the teaching and learning environment, learning strategies, and learning outcomes" (Ginns, Martin, & Papworth, 2014, p. 485).

The starting point in this model of constructivist teaching and learning are the *presage factors*, which comprise aspects relative to the learners – i.e., student factors, such as prior knowledge, abilities, preferred approaches to learning, values, and expectations (Biggs, 1993; Biggs et al., 2001) – as well as features of the learning environment, i.e., the context in which teaching and learning take place – shaped by the (instructional) design of aspects such as the curriculum, teaching method(s), classroom climate, as-

[208] Relating to the 2017 Queen's Birthday Honours, on 8 September 2017, Professor John Burville Biggs was invested as a Member of the Order of Australia (AM), "[f]or significant service to tertiary education, particularly in the fields of curriculum development and assessment". For more information on John Biggs and his work, see www.johnbiggs.com.au.

sessment, etc. (Biggs, 1993; Biggs et al., 2001). With regard to student factors, students' preferred approaches to learning can be seen as (pre-)dispositions, as a propensity to think, feel, and act in a particular way where learning is concerned. This general inclination may differ from the learning strategies that are actually chosen in the process of learning in a given teaching context/learning environment.[209] With regard to constructive alignment (e.g., Biggs, 1996; Larkin & Richardson, 2013; Trigwell & Prosser, 2014; Wang et al., 2013) and the design of instructional systems (instructional systems design (ISD), e.g., Banathy, 1987; Lebow, 1993[210]; Sadler, 1989), it is important to note that it is not only the design of any particular learning environment that takes effect on students' task processing (process of learning) and students' learning outcomes (product of learning), but it is students' perceptions of the learning environment that also influence task processing and learning outcomes. While in this study it is assumed that at any given point of time students have a pre-existing disposition regarding learning and reflective thinking, students' perceptions of any specific, concrete learning environment they experience are another key factor taking effect on students' approaches to learning in task processing and, thus, following this path, on the outcomes of learning.

The *process of learning*, i.e., the actual phase of task processing, comprises all activities in relation to task processing. This is where the processes of learning and reflective thinking come into effect. During task processing, students adopt an approach to learning that they realize, going deep or remaining at the surface, based on the presence (or absence) of their intention to understand. With regard to cognitive processing of material, the cognitive activities involved in students' learning can be associated either with a higher or with a lower level of a taxonomy of learning (deep pro-

[209] Aspects of congruence of the large number of concepts related to learning – learning styles, learning strategies, approaches to learning, etc. – were considered in detail in Chapter 2, which provides the theoretical and conceptual background to this dissertation and the original research conducted. For more information on concepts of learning styles and available evidence, also see Pashler, McDaniel, Rohrer, and Bjork (2008).

[210] Lebow (1993) draws attention to constructivist values for instructional systems design and to the inclusion of both the cognitive and the affective domain into the process of learning. The importance of the affective domain is also pointed out with regard to reflection for learning (e.g., Gibbs, 1988).

cessing/surface processing).[211] In reflective thinking, students' reflective thoughts may differ with regard to both breadth (i.e., the range of topics reflected upon, related to the self, the environment, and the interaction of these two elements) and depth (i.e., the level of reflection, between the lowest level of non-reflection and the highest level of critical reflection).

The *product of learning* is represented by students' learning outcomes, which may be described in quantitative, qualitative, institutional, and affective terms (Biggs, 1989; Biggs & Telfer, 1981).[212] The ideal is that student participation in a given course leads students to individual results that meet or even exceed the objectives specified by faculty for the relevant program of study, for the course in question, and/or with regard to generic attributes desired in university graduates.[213] This product of learning, which comprises additions to and/or modifications of the knowledge, skills, and dispositions

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[211] For taxonomies of learning, in particular the SOLO taxonomy (Biggs & Collis, 1982; Biggs, Collis, & Edward, 2014; Boulton-Lewis, 1994, 1995; Braband & Dahl, 2009; Chan et al., 2002), see Chapter 2.

[212] It is in the article referred to that John Biggs points out the importance of deep, transformative learning in higher education:

> Knowing facts and how to carry out operations may well be part of the means for understanding and interpreting the world, but the quantitative conception [of tertiary teaching, MS] stops at the facts and skills. A quantitative change in knowledge does not in itself change understanding. Rote learning scientific formulae may be one of the things that scientists do, but it is not the way scientists think. … The goal of tertiary education – indeed, of education at any level – should be to change students' interpretations of the world. It is a futile exercise, for example, requiring teacher education students to pass an examination in educational psychology if, at the end, they are not beginning to see their own students in a different light, to see a little more clearly the relationship between what and how their students are learning, and their own teaching; if, in short, their conception of their role as teacher is unchanged by their course in psychology. (Biggs, 1989, p. 10)

It is to be noted that surface learning in the form of rote learning is not always misplaced (Biggs, 1993), and in many cases it is necessary. Yet, it is impossible for educational processes in total to remain limited to surface learning.

[213] For a discussion of generic graduate attributes see, e.g., Barrie (2006, 2007); Bridgstock (2009); as well as Hager and Holland (2007). Everyone graduating from an institution of higher education is expected to have acquired certain qualities as well as a certain mindset.

of the individual student, results in a modification of student characteristics with regard to the factors presaging future processes and products of learning.

While Biggs et al. (2001) state that in the 3P model of teaching and learning, its elements forming a system, there are various bidirectional relations between the different elements, the following representation of the framework, adapted as a basis for this study on learning and reflection in a portfolio-based learning environment, depicts the key relations between the presage factors (student factors; teaching context/learning environment), the process of learning and reflection (task processing), and the product of learning and reflection (learning outcomes). It also includes a representation of students' perceptions of the learning environment (linking the presage factors) and a backward link from the learning outcomes to the student factors, illustrating that any change in students' knowledge, skills, and dispositions as a product of learning brings about a change in student characteristics as a presage factor for subsequent learning and reflection following this change. In this adaption of the 3P model, intended as a basis for structuring the portfolio-based instructional system leading to students' portfolio-based experiences, the starting point is with the presage factors, linked by students' perceptions. These presage factors, which exist at the beginning of the course, take effect on students' processes of learning and reflection in the course, i.e., within this given, concrete teaching context/learning environment. The way of learning and reflection in task processing then results in the product of learning, i.e., the outcomes of learning, at the end of the course. This product of learning forms the basis of new cycles of learning and reflection in subsequent educational processes. The product of learning defined as changes in students' knowledge, skills, and dispositions and the new mental representations of these constructs represents the (new) student-related presage factors relevant for subsequent learning processes.[214] Portfolio as an educa-

[214] In Figure 6, following on the next page, in the box representing the learning outcomes, the learning outcomes listed are marked to be the intended learning outcomes commonly pursued by means of reflective learning in a portfolio-based learning environment. Intended learning outcomes of portfolio-based reflective learning are an increase in students' dispositions for deep learning (and a decrease in students' dispositions for surface learning), elaboration of the contents of learning, a disposition for reflection, and reflected learning (reflection regarding both the contents as well as the

tional tool is the basis of the teaching context/learning environment designed for the course. The (objective) opportunities as well as the challenges of this method influence students' learning and reflection, as do students' (subjective) perceptions of the portfolio-based learning environment, gained through the portfolio experience.

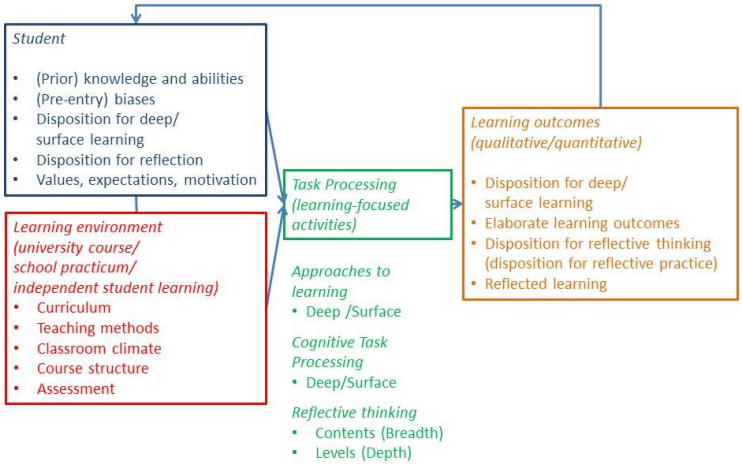

Figure 6. A model of reflective learning in a portfolio-based context. Adapted from John Biggs' 3 P model of teaching and learning (Biggs, 1989, 1993; Biggs et al., 2001; Biggs & Tang, 2011).

With regard to student factors, it seems important to differentiate between students' attitudes and dispositions. While among the general meanings of the term 'attitude' there can be found the meanings of "a mental position with regard to a fact or state", and "a feeling or emotion toward a fact or state" (Merriam-Webster, 2017a), the term 'disposition' can be used to denote a "prevailing tendency, mood, or inclination", a "temperamental makeup", and "the tendency of something to act in a certain manner under given circumstances" (Merriam-Webster, 2017b). In comparison to an attitude, a disposition can be considered the broader concept, as there is an element of the overall qualities of a person as well as an element of habit. So, the disposition of a person can be seen as their usual mood or attitude, as a "complex set of attitudes and inclinations

process of learning). The learning outcomes actually achieved by the individual student may exceed, meet, or fall short of the intended learning outcomes (ILOs) specified, e.g., for a course.

that guide behavior" (Merriam-Webster, 2017b), as a 'habit of mind'. There can be assumed to exist with students, to varying degrees, a disposition to understand (McCune & Entwistle, 2011) as well as a disposition for critical thinking (Facione, 2000; Facione, Sánchez, Facione, & Gainen, 1995; Giancarlo & Facione, 2001),[215] both taking effect on the ways in which students process tasks and on the resulting learning outcomes students arrive at accordingly. The dispositions to understand for oneself and to think critically can be seen as characteristics of students with an academic inclination as opposed to students with a non-academic inclination, both being depicted by Biggs and Tang (2011).

With regard to critical thinking, it was John Dewey (1933) who advocated education fostering students' critical thinking. His ideas got hold in higher education, too, and by the mid-1990, there was hardly any college or university in North America not stating the development of critical thinking as a key outcome of its core curriculum (Facione et al., 1995). While institutions of higher education have traditionally been places of learning and critical thinking, the Bologna process in the European higher education setting seems not to have benefited university teaching and learning in each and every respect: Based on ECTS[216] credit points and employability, in the author's personal experience of university teaching and learning as well as in the experience of numerous colleagues, students comment on 'the system' inducing them to follow surface approaches to learning in the face of summative assessments and workload of considerable extent. The university can be seen as the macro-environment, the department and the program of study as the meso-environment, and a course as the micro-environment, all of them taking effect on students' approaches to learning and – over time – on students' dispositions regarding learning and reflection. Students come to university with a (pre-)disposition to learn and think critically – or not to do so – which is influenced by their experiences over the course of their program of study. In the literature, it is discussed to what extent ways of thinking, feeling, and acting with regard to learning and reflection are malleable, and if so: how they can be influenced

[215] These two dispositions can be considered as dispositions for deep learning (meaningful learning, learning for understanding) and for (critical) reflection.

[216] European Credit Transfer System

by teaching in ways that are considered positive and desirable (e.g., Pennington, 2011; Russell, 2005).

For the purposes of this dissertation, on the basis of the assumptions that students' experiences and perceptions influence their approaches to learning (including reflection) and that humans keep adapting to their environment, it is assumed that students' dispositions *do* change – albeit not in the very short run – and, thus, that they are malleable and can be changed. In this sense, dispositions are located on a continuum between learning styles (considered to be constant) and ongoing approaches to learning at a specific point in time (considered to be completely flexible). It is further assumed that students may alter their approaches to learning over time if – and only if – they experience deep learning and reflection as beneficial to their professional development and/or their personal growth. The question of malleability of students' dispositions is considered a question of the kind of student experience and perceptions – and the magnitude of this impact – as well as a question of time: Students consciously experiencing and positively perceiving the benefits of quality learning and reflection are assumed to be more likely to change in their dispositions towards learning and reflection; students having concentrated experiences and perceptions of this kind over a longer period of time are assumed to be more likely to change in their dispositions than those who only have them once or twice or at longer intervals only. It is assumed that positive experiences and perceptions of quality learning and reflection in one course over one semester may lead students to change their approaches to learning and reflection in subsequent courses in their program of study and beyond, and that these changes may eventually lead to a lifelong change in students' dispositions.

The principal use of the 3P model described in the works by John Biggs is to structure the presage, process, and product variables that can be found in any course taught at university: Students come to a course, bringing along what they have experienced and learned up to the start of the course. These prior cognitive and emotional structures of the individual student in the form of pre-existing knowledge, skills, and dispositions may represent an advantage in the process of learning and in achieving the learning outcomes intended; yet, they may also constitute a challenge. For example, when students bring to the course appropriate prior knowledge of teaching and learning that

can be elaborated on, this clearly constitutes an advantage, as does a disposition for thorough, meaningful learning (i.e., for deep learning) and productive reflective thinking that the student may have gained at school and/or during previous semesters at university. On the other hand, inappropriate prior beliefs about teaching and learning that are firmly held to and not reflected on, e.g., unfounded personal beliefs as to the efficacy of different ways of teaching, obviously represent a challenge, as does a disposition for mere rote learning with the aim of simply passing the course in order to achieve graduation in the end (i.e., surface learning).

Based on the pertinent literature as well as on hundreds of conversations with students on the topic of learning at university,[217] the author assumes that the issue of deep and surface learning not only applies to specific courses. There is evident *a general disposition* – shown and voiced by students – to tend towards one of these two approaches of learning, either towards deep learning or towards surface learning. In 2007, the program of study in Economic and Business Education was changed from a continuous 10-semester program, leading to a university diploma, to two consecutive programs of study: a 6-semester bachelor's program and a subsequent 4-semester master's program, the latter being based on the bachelor's program, but also open to students having graduated in related bachelor's programs.[218] Ever since this change, due to the Bologna process in European higher education,[219] students state that they feel as if they were at school rather than at university, and they frequently comment on their feelings – opportunities to freely choose subjects or courses were reduced, the workload increased, as did requirements for practicums. As a reaction to these changes, and due to changes in the student population, many students give the impression that they are

[217] These conversations were held in class as well as between classes (during office hours; before and after classes), and in the form of student interviews and feedback conversations on portfolio.

[218] Such as Business Administration or Economics. Depending on the individual case, students may have to make up for courses and related credit points, e.g., for courses in pedagogy and the school practicum. Students from related programs entering the bachelor's/master's programs in Economic and Business Education are termed *Quereinsteiger/-innen*.

[219] For details on the new structures and the developments in European higher education, see, e.g., Curaj et al. (2012); Curaj, Matei, Pricopie, Salmi, and Scott (2015); Reinalda and Kulesza (2006); Rezaev (2010); Rich (2010); and Wächter (2004).

less interested in the contents, but merely see a university degree as a way to find a well-paid employment later on.[220] This corresponds to the observation stated by Biggs and Tang (2011) that there are different types of students (i.e., 'academic' students vs. 'non-academic' students). Fostering deep learning and reflection in such a climate of higher education is all the more important.

With regard to students' dispositions, the focus of this study will be on the *overall* dispositions for deep and surface learning, to capture elements that are not wholly dependent on the specific context of teaching and learning. The program of study can be regarded an aggregation of courses that influence students' *general* dispositions towards learning and reflection. There is a general element inherent in a disposition, making behavior not completely context-dependent: A disposition is a *tendency* (propensity, inclination) to act in a particular way.

4.2 Context, design, and implementation of the portfolio-based learning environment

4.2.1 The context: Teacher education for commercial vocational schools

In the Federal Republic of Germany, it is the *Bundesländer*[221] that are responsible for education at all levels, i.e., at primary and secondary schools as well as at institutions of higher education. This decentralization of political power and administrative accountability means that there is considerable variation in the organization of education and of teacher education in the 16 *Bundesländer*[222] governing the education and

[220] Present-day students study in an age of uncertainty (Barnett, 2007). From an economic point of view, and with regard to life planning, a focus on a degree (merely) for employment is understandable. However, it is not desirable for higher education institutions to operate in such a climate and not to try to change dispositions and attitudes incompatible with the idea of higher education based on *Bildung*. In German, the term for higher education is Hochschul*bildung*, not Hochschul*ausbildung* (geared merely at employability).

[221] In short: the *Länder*, the federal states of Germany.

[222] Below, the situation in the federal state of Baden-Württemberg will be described as the situation in one particular federal state of Germany, i.e., in one *Land*.

training of pre-service and in-service teachers for state schools.[223] At present, teacher education in Germany is characterized by (1) the accountability of the federal states; (2) its two-phase structure, with different institutional contexts; (3) the localization of (pre-service) teacher education in the form of particular programs of study at universities;[224] (4) the differentiation of various programs of study;[225] and (5) the combination of several areas of study within the various programs (The German Council of Science and Humanities [*Wissenschaftsrat*], 2001).

German pre-service teacher education is made up of two phases. There is no experience with a one-phase model of teacher education,[226] common around the globe and

[223] With a view to the joint coordination and development of education in Germany, the Standing Conference of the Ministers of Education and Cultural Affairs *(Ständige Konferenz der Kultusminister der Länder in der Bundesrepublik Deutschland)* has been established as a consortium of ministers responsible for education and schooling; institutes of higher education and research; and cultural affairs (for more information, see https://www.kmk.org/kmk/information-in-english.html).

[224] With the exception of the *Land* of Baden-Württemberg, where the first phase of pre-service teacher education is localized both at universities with a full range of academic domains *(Universitäten)*, such as the University of Mannheim, and at specialized universities of education *(Pädagogische Hochschulen)*. Prospective teachers of music and the fine arts are educated at universities of music and performing arts and at universities of arts and design, respectively. For details of pre-service teacher education in the *Land* of Baden-Württemberg, see, e.g., Cramer, Horn, and Schweitzer (2015). A detailed presentation of the educational system in Germany as a whole is provided by the European Commission by means of the Eurydice network (Eurydice, 2016).

[225] Depending on the level and the type of school. There are programs of study aimed at prospective teachers for primary education *(Primarstufe)* as well as programs of study for secondary levels I and II *(Sekundarstufe I und II)*; programs of study for prospective teachers for general education schools *(allgemeinbildende Schulen)* differ from those for prospective teachers for vocational education schools *(berufliche Schulen)*. There is a total of six different types of teaching license, see Standing Conference of the Ministers of Education and Cultural Affairs of the Länder in the Federal Republic of Germany [*Kultusministerkonferenz*] (2009, 2017). The *Kultusministerkonferenz* develops and coordinates the educational systems in the *Länder*.

[226] Apart from the situation in the former German Democratic Republic (GDR), where there was a one-phase model of teacher education, and a model project at the University of Oldenburg in the 1970s, as noted by Cramer (2012).

found in most neighboring countries.[227] What is common to measures of pre-service teacher education in Germany is the fact that students who wish to enter a professional teaching career in secondary education need to study two subjects to gain a qualification for teaching at a state school.[228] Overall, German teacher education can be considered as being composed of *three* distinct phases: (1) Pre-service teacher education at institutions of higher education as the first phase, focusing on the theoretical foundations of teaching and learning, ending with the first state exam (*Erstes Staatsexamen*) or a master's degree in a program of study that is regarded to be equivalent, entitling graduates to apply for admission to (2) a subsequent stage of 18 months' practice-oriented pre-service teacher education at a State Seminary for Didactics and Teacher Education and a school as the second phase, leading to the second state exam (*Zweites Staatsexamen*), which is teacher licensure, and (3) in-service teacher education for ongoing professional development and lifelong learning as the third phase.

In the *Land* of Baden-Württemberg, there are three state universities educating pre-service teachers for teaching at commercial vocational schools: the University of Mannheim, the University of Hohenheim, and the University of Konstanz.[229] This

[227] In his keynote speech held on the 23 March 2017 at the opening of the *10. Bundeskongress der Zentren für Lehrerbildung* (10. National Congress of the Centers for Teacher Education in Germany) at the Ruhr-Universität Bochum, the renowned educational researcher Ewald Terhart noted that the German model of a two-phase teacher education was unique.

[228] In the case of teacher education for vocational schools, there is not necessarily a one-to-one correspondence of the subjects studied and the subjects that may be taught. The broad domains of economics and business, which are core components of the program of study described below, correspond to a variety of subjects at school. In addition, students choosing history *or* social studies as their elective subject will be entitled to teach a combination of both subjects at school. Such subtleties can be neglected in the present context. In general, teachers at state schools must be qualified to teach more than one subject.

[229] A comprehensive overview of the school system in the *Land* of Baden-Württemberg can be found in Ministerium für Kultus, Jugend und Sport Baden-Württemberg (2013). In general, vocational schools in Baden-Württemberg are grouped according to three types: (1) vocational schools for trade and industry, (2) vocational schools for commerce/business, and (3) vocational schools for home economics, nursing, social pedagogy, and agriculture (Ministerium für Kultus, Jugend und Sport Baden-Württemberg, 2014). University graduates having studied Economic and Business Education at the

study of portfolio construction in university-based teacher education was conducted at the University of Mannheim, one of the leading research institutions in Germany, which is renowned for its distinction in research and higher education teaching, in particular in the fields of economic and social sciences.[230] The programs of study Bachelor of Science (B.Sc.) *Wirtschaftspädagogik* (with a standard period of study comprising six semesters) and Master of Science (M.Sc.) *Wirtschaftspädagogik* (with a standard period of study covering four semesters) are offered by the Area Economic and Business Education.[231] The Business School of the University of Mannheim, of which the Area Economic and Business Education is a division, is the first German institution to be awarded the 'triple crown' by the Association to Advance Collegiate Schools of Business (AACSB), the Association of MBAs (AMBA), and EFMD (EQUIS), the three leading unions of educational institutions for business worldwide.[232]

4.2.2 Portfolio design: Purposes, contents, and tasks set for reflective learning

Portfolio as the basis of the learning environment as designed for one particular course – the course *Schulpraktische Studien 1 (SPS 1)*[233] within the bachelor's program of study

University of Mannheim usually teach at a vocational school for commerce/business after completion of the second phase of teacher education. Yet, some of them may teach at a vocational school of another type. This is another subtlety that is neglected in the following. With a view to teaching in secondary education at state schools, the programs of studies in Economic and Business Education are geared at vocational schools for commerce/business.

[230] For more information, see http://www.uni-mannheim.de/1/english/university/profile/.

[231] While the successful completion of the master's program of study entitles graduates to apply for admission to the second phase of teacher education (*Referendariat*), they can also choose to take up a professional activity in another field, e.g., in human resources management. The master's degree in Economic and Business Education is designed by the Area Economic and Business Education to be a versatile university degree, which is also recognized by the Ministry of Education, Youth, and Sports Baden-Württemberg. This means that the master's degree prepares the ground for the second phase of teacher education and subsequent professional teaching, while in their professional choice graduates are by no means restricted to teaching at school.

[232] For more information, see https://www.bwl.uni-mannheim.de/en/school/.

[233] In the following, the course may be referred to by means of the customary abbreviation *SPS 1*. An apt English circumscription of the course title *Schulpraktische Studien 1 (SPS 1)*, capturing its meaning in

in Economic and Business Education – was introduced more than a decade ago. The portfolio/course design has been constantly refined and re-designed ever since, based on the course of events in the respective semesters, the author's perceptions and experiences of the teaching/learning environment – including students' participation, learning, and reflection – and, above all, based on extensive dialogue with students and on student feedback. In the first years of portfolio construction, interviews and conversations with students were conducted by the author of this dissertation to learn about students' perceptions of portfolio construction – benefits, challenges, issues related to portfolio authoring – and to give students summative feedback on their learning and their achievements as shown during the course and documented in their portfolios.[234] In addition, notes were taken by the author in the form of a teaching/research journal, in which key observations related to the course as well as insights gained, either in

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the broad sense intended in German, would be *Study-related School Internship* 1, the number referring to the fact that this internship is the first of a total of three internships during the bachelor's and master's programs of study leading to the master's degree that entitles students to enroll for the second phase of teacher education (*Vorbereitungsdienst, Referendariat*) with a duration of another 18 months (a short outline of teacher education in Germany has been given in Section 4.2.1). There is one school internship in the bachelor's program of study (SPS 1: 2 weeks at school), and there are two school internships in the master's program (SPS 2 and 3: 4 weeks each). It is important to note that the first, two-week, full-time school internship to be completed by the students is closely related to their studies at university, i.e., great importance is laid on the connection of theory and practice that continues to pose a challenge to teacher education. In university-based teacher education in Germany, where courses at university are complemented by practical field work and student experience at a public school, lecturers often get the impression that students seem to think of everything that is said and done in the university classroom as 'theory', while, correspondingly, everything that is said and done on-site in the practicum setting, at school, is regarded as 'practice'. These rather odd, semantic concepts of (scientific, abstract) 'theory' and (materialized, tangible) 'practice', tied to the places of experience and education, might be rectified best by clarifying for students the technical terms and explicitly bringing up the subject of the theory/practice divide – and possible solutions to related challenges – at an early stage of the teacher education program. In the course *Schulpraktische Studien 1 (SPS 1)*, this clarification is undertaken at the very beginning of the course, when the learning goals and the contents of the course are presented to the students participating.

[234] Formative feedback on students' learning was provided during class, by the author and by fellow students, during discussions as well as during group work, e.g., when portfolio artefacts and products prepared for class were reviewed.

class or by means of reflection afterwards, were documented. Both sources of deepened understanding of the teaching/learning process were continuously made use of to systematically and continually improve the portfolio-based teaching/learning environment.

During the fall/winter semester of the academic year 2013–2014, classes took place at weekly intervals, leading to a total of 12 meetings in class (see Appendix B.2, p. 537) over the course of the lecture period from September to December. Each meeting lasted for 90 minutes, providing students with the opportunity for active learning and reflection, conversation, collaboration, and both student and teacher feedback with the lecturer and all group members present. In order to stimulate and support active student participation, the course was offered in the form of an interactive seminar, with a typical group size of about 25 students. The group size, which is reasonably small for higher education courses, making it possible for students and the lecturer to get to know each other by name, and the personal learning environment, as opposed to large-scale university lectures, are often emphasized by students commenting on the benefits of the course.

The contents as well as the design of the course *Schulpraktische Studien 1 (SPS 1)* have evolved over the course of more than a decade. A brief outline is presented in this section, while the schedule of the course, including an overview of the topics covered, a detailed overview of the (prescribed) contents of the portfolio, and notes on the tasks set and the materials used in the course are provided in Appendix B (p. 536). In the first meeting, students are welcomed to the course and have the opportunity to introduce themselves to the group and to the lecturer. They are then provided with all relevant pieces of information on the course, in particular on the aims of school practicums in general and the learning goals set for the course *Schulpraktische Studien 1 (SPS 1)* in particular. They are then given the task to write an essay on their personal motivation in choosing this program of study and the professional career they aim at, i.e., professional teaching at a state school or working in a field outside school related to

economic and business education.[235] In addition, students are provided with basic literature on portfolio as an educational tool in general and on portfolio construction in higher education in particular. They are asked to read the texts, based on guiding questions, and note any questions they might have on portfolio, which as an instrument for teaching and learning is new to most participants.[236]

In the following meetings, there are phases in which students are given information by the lecturer, and phases during which students have the opportunity to work together in small groups, exchange ideas, and give each other feedback on products that will later be part of their portfolios (e.g., the essay on the individual motivation, the mind map depicting the professional tasks of teachers, the presentations given on the attributes of good teaching). They are encouraged to continue this exchange and their collaboration outside the classroom and during the internship at school. Independent of the various opportunities for student conversation and collaboration outside the classroom, this institutionalized opportunity for exchange and collaboration in the presence of the lecturer, who can provide knowledge and support students if support is wished or needed, forms one key component of the learning environment. There is the need to provide students with a proper, reliable setting at regular intervals where they can elaborate on their learning and reflection, work together, and exchange and discuss their experiences.[237]

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[235] One of the major benefits of the bachelor's and master's programs of study in economic and business education is their versatility: Students are given the opportunity to acquire a large range of knowledge, multiple skills, and university graduate dispositions that they can put to professional use in the field of school teaching as well as in fields related to economics, business, and education, such as company in-house training and human resource management. Students also benefit in the sense of personal growth.

[236] Students are well acquainted with the concept of portfolio in economics and business. The conceptual knowledge they dispose of can be made use of in various ways by means of analogies (e.g., portfolio as a frame for the inclusion of items of varying nature, portfolio for diversification, portfolio to collect items of value).

[237] In class, when provided with the opportunity for face-to-face communication with their peers and with the lecturer, most students show a remarkably high motivation, especially when working in small groups. Despite this obvious motivation, it could not be ensured that students would manage

As was pointed out by Lee Shulman in 1994, a teaching portfolio is "… the structured documentary history of a (carefully selected) set of coached or mentored accomplishments substantiated by samples of student work and fully realized only through reflective writing, deliberation, and serious conversation" (cit. by Lyons, 1998a, p. 3).[238] This exchange of perceptions, experiences, views, and ideas is indeed important to learning and reflection, and portfolio is supposed to be a suitable tool to support this process. Yet, self-reflection, in varying conceptualizations both as reflection *about* oneself and *by* oneself, without required exchange with other learners, is made use of in many teacher education programs. Based on the review of the literature, it seems reasonable to see individual student reflection and collective reflection in a group of learners as complementary processes, the combination of which is assumed to be educationally desirable. Self-reflection can be considered to be reflection in its own right, which under ideal conditions is complemented by collective reflection in a community of practice: To exchange views, to compare different standpoints, to test beliefs and assump-

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to regularly meet up in small groups outside the classroom, if they were asked to do so. In addition, students cannot be expected to arrange on their part for the meetings and the exchange that are the basis for discourse and discussion, i.e., for collaborative learning and reflection in a community of learners. So, students' presence in the seminar is valuable: It is an opportunity for face-to-face communication and for collaborative meaning making, which are deeply human processes. In the seminar, students enter into personal interaction with others, in the form of discourse and discussion. Collective reflection, based on student interaction, is the complement to individual reflection.

[238] According to McIntyre and McIntyre (2010),

> [w]hile this definition continues to serve as a standard in the research and literature on portfolios, the implementation of this definition is varied. This variation was most apparent in the latter half of the 1990s, when most of the literature described key elements of portfolios. In agreement with Shulman's definition, most teacher education portfolios included artifacts from the teacher candidate's experiences and were accompanied by reflections; however, this is where the similarities ended. The process for developing the portfolio varied greatly among institutions … (McIntyre & McIntyre, 2010, p. 123).

The large range of variation noted by the authors with regard to portfolio implementations continues to exist. There is noteworthy congruence in the elements of this definition when compared to the other portfolio definition often to be found in the literature, the oft-cited definition by Paulson et al. (1991). It is also to be noted that reflection is a highly individual as well as a social process, the *full* realization of which requires serious conversation in addition to reflective writing and deliberation.

tions, to work in teams, etc. is regarded as beneficial to students, broadening their horizons. With a view to the literature, both on the theoretical bases of portfolio construction and on original research conducted, there is no reason to assume that collective reflection is inherently superior to individual reflection. In the history of mankind, great philosophies have been devised by individual philosophers, while in collaborative reflection there may be challenges, e.g., of individuals dominating the discussion. Nevertheless, ample student exchange within a community of learners, aimed at collective reflection as the complement to individual reflection, is considered important and highly desirable.[239]

There are two more arguments that can be brought forward in favor of an emphasis on the training of *individual* reflection: Essentially, reflection is an individual cognitive and affective process, and in many cases it may comprise private, intimate thoughts and feelings that are not readily shared. So, many an issue will rather be reflected on in private. Moreover, in professional practice, for the reflective practitioner there is not always the opportunity of exchange within a community of practice. When reflecting in a group of learners, there will be modelling of reflective processes on the part of peers, which may support the progress of all students in the group towards the acquisition of effective professional and personal practices of reflective thinking. In collaborative reflection, students can undertake their first steps in deliberate, systematic, academic reflection as intended for a future reflective practice of professional teaching.

Regarding teacher education in Germany, as in other countries, there is the issue of the theory/practice divide, a problem which is further aggravated by the double division of teacher education with not only the division between learning in the university classroom and during study-related school internships, but with the two-phase model of teacher education as the predominant structure in German teacher education leading to an additional division between the first phase of teacher education, taking place at university and focused primarily on theory, and the second phase of teacher education,

[239] Parallel to their progress in teacher education and future teaching practice, teachers will also become members of a community of practice. For communities of practice, see, e.g., Cuddapah & Clayton (2011) and Wenger (2008).

taking place concurrently at school and at the seminary and oriented primarily towards the practice of teaching.[240] There is the need to constructively combine what is learned by students *in all places* and *in all phases* of teacher education, both at university, in the university classroom, and at school, at the workplace.[241]

There are many references in the literature dealing with techniques to stimulate reflection (e.g., Korthagen, 1992). Reflective learning in the portfolio-based learning environment provided by the course *Schulpraktische Studien 1 (SPS 1)* is intended to be stimulated both by the design of tasks that involve elements of reflection *and* by specific reflective entries based on reflection prompts that are required to accompany several elements in students' portfolios. Reflection prompts were offered in order to provide students with a scaffold for their reflective thinking, guiding their attention towards issues worthy of productive reflection and the systematic academic reflection thereof.[242] Students were free to extend these reflective entries and/or to enclose additional reflective entries of their own if they wished to do so. In order to acquaint students with cyclic models of systematic reflection, examples (e.g., Gibbs, 1988; Kolb, 1984; Korthagen & Vasalos, 2005) were presented and discussed in class. One key element of

[240] As has been noted, an outline of German teacher education is provided in Section 4.2.1. The second phase of teacher education takes place at school as well as at a State Seminary for Didactics and Teacher Education (*Staatliches Seminar für Didaktik und Lehrerbildung*).

[241] Regarding the relationship of student teaching experiences and later teacher effectiveness, in a study recently conducted by Goldhaber, Krieg, and Theobald (2017) it is pointed out that teacher effectiveness is higher when there is a similarity between the pupil demographics of the school teachers did their student teaching at and the pupil demographics of the school they teach at later on. Such correspondence is given with regard to student teaching in the course *Schulpraktische Studien 1 (SPS 1)*, as the choice of schools is limited to commercial vocational schools.

[242] Again, students were encouraged to reflect on a large range of issues, including the topics of the course; their experiences during class, during the school practicum, and otherwise during the course; if relevant; as well as on their learning and reflection. The focus of reflection was on reflection for *understanding*, i.e., on reflection for deep learning and processing, not on reflection for self-regulated learning. Yet, while the intention was for reflection to focus on issues of understanding, reflection for self-regulated learning was not ignored. The 5-minute reflection (*5-Minuten-Reflexion*) carried out at the end of the weekly meetings would be an example of reflection being directed at self-regulated learning, too.

the portfolio task – planning, implementation, and reflective analysis/evaluation of two lessons (or parts thereof) to be taught at school – was based on the ALACT model developed by Fred A. J. Korthagen (e.g., Korthagen, 1985; Korthagen et al., 2001; Korthagen & Vasalos, 2005, 2010).[243, 244]

4.3 Research questions guiding the empirical investigation

As was the case with the systematic review of the literature presented in Chapter 3, research questions were formulated for the empirical study undertaken in order to guide and focus the investigation of portfolio construction in the given context of pre-service teacher education at the University of Mannheim.

It is assumed that students (i.e., pre-service teachers) come to the course *Schulpraktische Studien 1 (SPS 1)* with an existing (pre-)disposition[245] for deep learning, i.e., for meaningful learning with the aim of understanding the issues studied, as well as with a disposition for surface learning which only focuses on rote learning with the aim of

[243] This well-known model of reflection is referred to by numerous authors, e.g., Driessen, van Tartwijk, and Dornan (2008). With respect to portfolio construction for reflection and self-reflection in university teacher education in the field of economic and business education in particular, the ALACT model is cited by Slepcevic-Zach, Riebenbauer, Fernandez, and Stock (2015).

[244] Mansvelder-Longayroux, Beijaard, and Verloop (2007) draw attention to the fact that the ALACT model is an example of what Wright (1992, p. 65) called "a variation on a theme by Kurt Lewin (1948)" – a sequence of steps involving (1) action and experience, (2) reflection on experiences (including learning, feelings, etc.) with a view to gaining understanding in perspective, (3) conceptualizing new insights to shape "a more adequate conception of the matter in question, a better theory of it" (Wright, 1992, p. 65), and (4) trial of the revised theory and search for new feedback. Mansvelder-Longayroux, Beijaard, and Verloop (2007) also note that there are limitations of such models in educational practice.

[245] As is noted by Merriam-Webster (2017b), the terms 'pre-disposition' and 'disposition' can be regarded as synonyms when 'disposition' is meant to refer to a 'tendency' or an 'inclination' – as is the case here –, as a tendency or an inclination to think or act in a particular way always exists before the activity itself, i.e., as the term 'disposition' in these cases always refers to the future, which makes the prefix 'pre-' redundant.

passing given exams.[246] The research questions to be investigated in the empirical study on portfolio construction in pre-service teacher education, as represented by one

[246] In Chapter 2, it was explained that approaches to learning are not mutually exclusive: They depend both on the student as the learner and the learning environment as the context of learning experienced via the student's perceptions. In the literature there can be found discussions of *the extent* to which students' approaches to learning are influenced by the context of learning. Against the background of the author's extensive personal experience gained in thousands of conversations and extensive portfolio-based feedback talks with students over a period of more than one decade, and the situation at university after the process in European higher education, it is assumed that there actually can be observed the two different types of learners that correspond to Biggs' and Tang's (2009) 'academic' and 'non-academic' student types. Students bring along to the seminar *Schulpraktische Studien 1 (SPS 1)* a disposition for deep and surface learning that has been shaped during many years of learning at school and two years of previous learning at university. In conversations and feedback talks of widely varying contents, students affirm that in the bachelor/master model of higher education, as implemented in Germany, they are induced to go for a surface approach to learning, which they may then generalize. In addition, many students' motivation seems to shift towards the perks and privileges of being a teacher at a state school they assume (mostly: being a civil servant with safe, considerable wages and frequent holidays, being able to be with the family in the afternoons), and the number of students who name studying as a priority motivation or reading as their hobby decreases – providing additional ground for the assumption that students are not in the first place interested in the acquisition of elaborate knowledge, but in passing their exams in order to achieve what they are planning for – a career as a teacher at a state school. Regarding the combination of appropriate knowledge, skills, and dispositions as a basis for professional, effective teaching, the author as well as many practitioners concerned with school internships for pre-service teachers experience a notable reluctance of students to work on the theoretical bases of teaching, their beliefs, and issues of teacher identity. They give the impression that they would be completely satisfied if they were given the opportunity to acquire the basic skills deemed necessary for teaching students at school. In addition, students often seem reluctant to reflect – which seems to be not so much about concerns of privacy, but students' statements that they "reflect anyway", without any particular prompts and guidance in doing so, and an initial lack of awareness that everyday reflection is different from systematic, academic reflection. These observations provide reason to assume that while there continue to exist a large number of students interested in their studies, i.e., students with a disposition for deep learning, there seems to have come, against the background of the context of the Bologna reform of higher education as well as of other political decisions opening university to ever larger number of students, a considerable proportion of students who simply consider their programs of study as something that has to be dealt with and ticked off in order to reach the desired career in

particular portfolio design in one particular course, i.e., the course *Schulpraktische Studien 1 (SPS 1)*, were framed as follows:

Considering plausible – against the background of student individuality – that portfolio construction, i.e., reflective learning in a portfolio-based learning environment, is perceived differently by students and, thus, does not benefit all students to the same extent, it is of interest to investigate the approaches to learning and the levels of cognitive task processing found in different sub-groups of students.

If students' dispositions for deep and surface learning are assumed to depend on students' prior educational experiences, including students' experiences in the university context/in the context of a program of study as a whole, and if these dispositions are assumed to be malleable, it is of interest to investigate the effects of portfolio construction on students dispositions, i.e., to investigate the impact of a portfolio experience on students' dispositions as represented by changes in these dispositions.

In view of the ongoing enthusiasm regarding e-portfolios in particular, it is of interest to investigate whether there can be found differences in students' learning and reflection with an e-portfolio as opposed to a traditional, paper-based portfolio. E-portfolio is of more recent date and, thus, considered a more modern educational instrument.[247]

4.4 Research hypotheses

The thesis statement formulated

- against the background of relevant educational theory (Chapter 2) as well as

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teaching or other professional fields. The latter students shall be assumed to have a disposition for surface learning.

[247] In education, instruments have to be effective in the first place. They are to support students in the attainment of the intended learning outcomes (ILOs), and, thus, to serve teachers in instructional design for effective teaching. Then follow issues of efficiency as well as of practicability. In pedagogical planning, the mere modernity of a tool, i.e., its date of origin, is not a consideration in itself. The effectiveness, the efficiency, and the practicability of an instrument have to be examined empirically. They are to be determined on the basis of evidence.

- on the basis of the findings of the systematic review of original research relative to portfolio construction in pre-service teacher education (Chapter 3)[248]

is that portfolio construction has the potential to support students' learning and reflection, promoting both their dispositions for learning and reflection as well as their actual approaches to learning and reflection and their levels of cognitive processing and reflective thinking in task processing.

The hypotheses to be tested in the context of this dissertation are derived from the fundamental thesis put forward in Section 3.5:

Portfolio construction in university teacher education has the potential to support pre-service teachers' quality learning and pre-service teachers' reflective thinking.

Portfolio is likely to benefit pre-service teacher education students to differing degrees, depending on students' individual characteristics, such as their disposition towards learning and reflective thinking.

As long as portfolio contents and task design are identical, there is assumed to be no difference between the effects of paper-based and e-portfolios on students' learning and reflection.

From this thesis there can be derived hypotheses related to students' learning as well as to students' reflective thinking in a portfolio-based learning environment. In addition, again with reference to the findings of the literature review, hypotheses can be formulated with regard to the connection of these two cognitive processes and the factors influencing them.[249, 250]

[248] The various positive effects attributed to portfolio construction in pre-service teacher education mentioned by portfolio experts in thematic conversations (e.g., at teacher education conferences) and experienced firsthand by the author over the course of more than a decade of portfolio-based teaching and learning are in accordance with the positive effects reported in the pertinent literature.

[249] In teacher education research and practice, there seems to be growing interest in the emotional and motivational aspects of teaching and teacher education. In the context of this dissertation, the focus of the study is laid on the cognitive aspect of teacher education. Independent of this focus, it is im-

Main Hypothesis 1 (H_1): Students' dispositions – Students' approaches to learning

H_1: Pre-service teachers having an overall disposition tending towards deep learning adopt a deeper learning approach in task processing than do pre-service teachers having an overall disposition tending towards surface learning.

This main hypothesis can be divided into three sub-hypotheses:

Pre-service teachers having an overall disposition tending towards deep learning …

Sub-Hypothesis $H_{1.1}$: … adopt more of a deep approach to learning in task processing …

Sub-Hypothesis $H_{1.2}$: … adopt less of a surface approach to learning in task processing …

Sub-Hypothesis $H_{1.3}$: … adopt an overall learning approach tending more towards deep learning in task processing …

… than do pre-service teachers having an overall disposition tending towards surface learning.

Main Hypothesis 2 (H_2): Students' dispositions – Levels of cognitive processing

H_2: Pre-service teachers having an overall disposition tending towards deep learning attain a higher level of cognitive processing in portfolio construction than is the case

portant to keep in mind the emotional and motivational elements of learning and reflective thinking, too.

[250] With a view to the broad scope of this dissertation project, the presentation of the study conducted will focus on the hypotheses formulated with a view to (1) students' dispositions towards learning, (2) their approaches to learning and their levels of cognitive processing, and (3) the effects of paper-based and e-portfolios. These hypotheses will be presented and tested. The hypotheses formulated with a view to reflective thinking, as well as an investigation of the relations between students' learning and reflective thinking, are intended to form the basis of further research.

with pre-service teachers having an overall disposition tending towards surface learning.

Again, the main hypothesis can be divided into three sub-hypotheses:

Pre-service teachers having an overall disposition tending towards deep learning …

Sub-Hypothesis $H_{2.1}$: … attain a higher score of deep cognitive processing in portfolio construction …

Sub-Hypothesis $H_{2.2}$: … attain a lower score of surface cognitive processing in portfolio construction …

Sub-Hypothesis $H_{2.3}$: … attain an overall score of cognitive processing in portfolio construction tending more towards deep cognitive processing …

… than is the case with pre-service teachers having an overall disposition tending towards surface learning.

Main Hypothesis 3 (H_3): Development of students' learning dispositions

H_3: Learning within a portfolio-based learning environment enhances (i.e., increases) pre-service teachers' dispositions for deep learning.

Main Hypothesis 4 (H_4): Impact of the form of the portfolio on student learning
Electronic portfolios (e-portfolios) vs. traditional, paper-based portfolios[251]

[251] In all hypotheses regarding the comparison of the effects of e-portfolios and paper-based portfolios, it is assumed that there are *no* differences of impact of the two forms. To postulate *that there are no differences* in variables between two groups is not the common way of hypothesis testing. However, as the assumption is that there are no differences, the hypotheses are intentionally formulated this way, with special attention being given to this aspect.

H_4: Given the same instructional design of classes for both groups (e-portfolio vs. traditional, paper-based portfolio) and identical tasks set for portfolio construction,[252] there is *no* difference …

Sub-Hypothesis $H_{4.1}$: … in the effects of e-portfolios as opposed to the effects of traditional, paper-based portfolios on pre-service teachers' actual/realized approaches to learning in task processing.

Sub-Hypothesis $H_{4.2}$: … in the effects of e-portfolios as opposed to the effects of traditional, paper-based portfolios on pre-service teachers' levels of cognitive processing in portfolio construction.

Sub-Hypothesis $H_{4.3}$: … in the effects of e-portfolios as opposed to the effects of traditional, paper-based portfolios on the development of pre-service teachers' dispositions for deep learning.

Prior to statistical testing of the hypotheses formulated, methodological considerations relative to the study – regarding its design, the participants, and the selection and the development of the instruments used – will be laid out.

4.5 Methodological considerations regarding the study

4.5.1 Study design

The study was designed as a quantitative study, consisting of a series of surveys involving the whole cohort of students participating in the course *Schulpraktische Studien 1 (SPS 1)*, designed and taught by the author. The main study was conceived, planned, and organized for the fall/winter semester of the academic year 2013–2014, with a preparatory pilot study being run in the course in the preceding fall/winter semester of the academic year 2012–2013. The selection of items for the various sections of the

[252] All hypotheses regarding the comparison of the effects of e-portfolios and paper-based portfolios are formulated on a *ceteris paribus* basis – it is the *form* of the portfolio only that is varied deliberately.

questionnaires administered to the students was based on scientific work by renowned authors in the fields of student approaches to learning, reflective learning, and academic reflection, in particular on the works by John Biggs, David Kember, and their colleagues. The initial translation of the items from English into German and subsequent refinements thereof were made by the author. The contents and the meaning of the original items (in English) were discussed with numerous experts in the field of education, as were the contents and the meaning of the items translated into German (with slight adaptions). In addition, the perception, interpretation, and understanding of the items formulated in German were discussed with teacher education students to check in a dialogic process their understanding of the items, and fine facets of meaning were considered and taken into account, leading to a process of iterative adaptions where appropriate.

In the preliminary pilot study, the questionnaires administered were handed out to the whole cohort of students taking part in the course *Schulpraktische Studien 1 (SPS 1)* in the fall/winter semester of the academic year 2012–2013. This made possible a test of the instruments, to examine students' perceptions and understanding of the contents and the meanings of the items. The questionnaires underlying the instruments used originating abroad, the possibility of differences in cultures (cultural differences in general as well as in the domain of education) had to be assumed.[253]

The course of the main study (academic year 2013–2014) was as follows:

The pre-test, in the second week of the course *Schulpraktische Studien 1 (SPS 1)*, focused on students' dispositions, so the questionnaire used was termed the 'disposition questionnaire'. The disposition questionnaire contained questions regarding personal information and scales to measure students' dispositions for deep and surface learning, along with scales to measure students' dispositions regarding levels of reflective think-

[253] There are a number of differences: Differences in cultures, differences in languages, differences in the fields in which the questionnaire is administered. With regard to the R-SPQ-2F as an inventory of learning, it can be stated that the English version as well as translated and adapted versions have been used in different contexts of higher education. Independent of this variety of applications, it is always important to validate instruments/scales that have been adapted for use in new contexts.

ing, scales to measure pre-service teachers' technology acceptance, and scales to measure students' motivated strategies for learning. In addition, students were asked whether they planned to take up professional teaching and whether this was the career of their choice. Relating the disposition questionnaire to the 3P model, the scales were used to measure the student factors that were considered important in the investigation of portfolio construction for student learning and reflective thinking.

The post-test 1, which took place in the last week of the course *Schulpraktische Studien 1 (SPS 1)*, at the end of the lecture period, again focused on students' dispositions for deep and surface learning and the different levels by means of which reflective thinking was operationalized; thus, the scales related to students' dispositions were handed out a second time. In addition, in order to examine students' perceptions of the learning environment, scales to measure students' perceptions of basic need fulfilment (autonomy, competence, relatedness, and belonging) were administered to the students in a separate questionnaire called the 'perceptions of the learning environment questionnaire'. With a view to students thinking of the appropriate context when filling in the respective questionnaires, the disposition questionnaire was administered at the beginning of class, with students coming from other courses, and the perceptions questionnaire was handed out at the end of class, when students had once more experienced the portfolio-based learning environment to be investigated.

The post-test 2a questionnaire was administered to the cohort of students that had participated in the course *Schulpraktische Studien 1 (SPS 1)* in the second week of the following lecture period. As the focus of this questionnaire was on students' task processing within the context of the portfolio-based learning environment and in portfolio construction, it was called the 'task processing questionnaire'. The first section of the task processing questionnaire contained scales on students' actual/realized approaches to learning with regard to the learning environment provided by the course *Schulpraktische Studien 1 (SPS 1)* as a whole. The following sections of the task processing questionnaire contained scales to measure students' levels of cognitive task processing and students' levels of reflective thinking as realized, both expressly with regard to the process of portfolio construction.

The post-test 2b questionnaire, which was administered in the third week of the following lecture period to the students having participated in the course *Schulpraktische Studien 1 (SPS 1)*, focused on students' dispositions for the third time in a row. Again, scales from the disposition questionnaire were used to measure students' dispositions for deep and surface learning and students' dispositions regarding the different levels of reflective thinking.

The differentiation between the program of study as a whole, the portfolio-based learning environment of the course *Schulpraktische Studien 1 (SPS 1)*, and the learning activities in portfolio construction in particular was made in order to capture the differences between students' approaches to learning in general, students' approaches to learning in the course SPS 1, and students' cognitive activities (deep/surface processing) during the process of portfolio construction.

Why was a survey chosen as the method for the study? As had been shown by the extensive analysis of existing original research, in a large number of studies authors had implemented a qualitative research design, in many cases limited to small numbers of participants. A qualitative research design should be opted for if detailed, in-depth information is desired. Quantitative studies in the form of surveys, on the other hand, make possible observations that include a whole cohort of students, the formulation of hypotheses, and statistical testing of these hypotheses. Against the background of substantial theoretical support for the assumptions underlying portfolio construction, and based on findings of prior original research considered apt and sufficient to justify the creation of hypotheses, hypotheses were formulated, and questionnaires were used for this study.[254]

[254] It should also be kept in mind that – in addition to theoretical support of educational portfolio construction and original research on portfolio stating positive effects of portfolio construction – there is a plethora of positive reports by portfolio practitioners, including teacher educators implementing portfolio in programs in courses. From a scientific point of view, such anecdotal reports and articles on 'lessons learnt' certainly cannot be regarded as substantive evidence of the effectiveness of portfolio as an educational tool and the multitude of benefits that are attributed to it. However, it seems legitimate to keep these positive reports in mind *while* there is sufficient theoretical and empirical support for the formulation of hypotheses, which – in the author's view – can be assumed to be the

Throughout the process of portfolio construction, student reflection was elicited, guided, supported, and enhanced by means of task design: Opportunities for deep approaches to learning as well as occasions for reflective thinking, supported by reflection prompts, were provided. Portfolio can be seen as the basis for reflective student learning, constituting its frame, at the same time supporting and documenting students' learning and reflection. The learning and reflective thinking documented in material, tangible shape (texts, mind maps, illustrations, etc.) form a lasting record, which can serve as the basis for later learning and documentation thereof – and, thus, for an iterative process aimed at continuous professional development and personal growth.

In the seminar, there were portfolio tasks set for the preparation of classes (i.e., homework, e.g., the preparation of a reflective essay); portfolio tasks set during class (e.g., in the form of group work or discussions with peers); portfolio tasks set for the time of the school practicum (e.g., for the analysis and the design of lessons); as well as portfolio tasks set for individual, additional student work (extra materials). In task design, cognitive *and* affective processing of student experiences gained in and between classes as well as during the school internship and afterwards were expressly taken into consideration. Portfolio was the thread running through the whole of the course (seminar, school internship, independent student work), linking the different elements of the course and students' experiences. Portfolio was the integration of experiences and task processing at different times, in different locations, in different contexts. It was designed to support deep (quality) learning and systematic, sustained, academic reflection.

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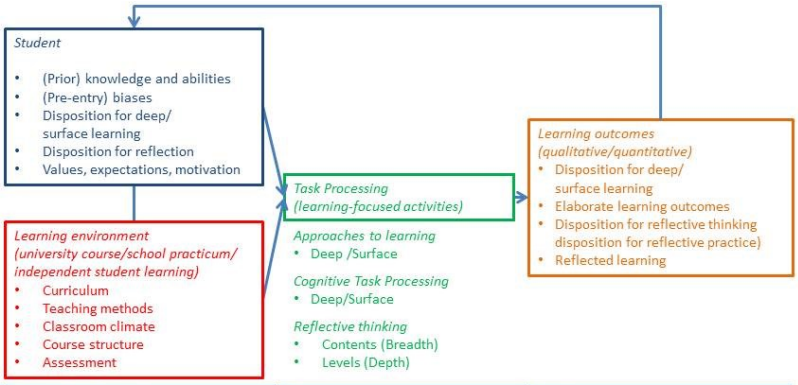
case. The numerous reports by portfolio practitioners, the large majority of them positive, can be regarded as a manifestation of action research on the part of (teacher) educators. The author's experience of portfolio construction is positive, too, which is in accordance with most of the literature. Yet, the effectiveness and the actual effects of one concrete implementation of a portfolio-based learning environment – the learning environment provided by the course *Schulpraktische Studien 1 (SPS 1)*: seminar, school internship, and independent student work – on students' reflective learning are to be researched in the study for this dissertation by means of a rigorous subjugation to scientific methodology. The author/researcher being clearly conscious of a possible bias posed by his positive experience is an advantage: He will be all the more careful to reliably keep to rigorous scientific procedures.

All student groups in the fall/winter semester of the academic year 2013–2014 were included in the study. There were six groups of students with about 25-30 students in each group; so, all groups were of comparable size. Three of the six groups constructed e-portfolios by means of the e-portfolio system Mahara, while the other three groups constructed portfolios in their traditional, paper-based form.[255] Thus, 88 (50.6 %) of the 174 students in the cohort were required to construct an e-portfolio, while 86 (49.4 %) of them constructed traditional, paper-based portfolios.[256] It was the students who, when enrolling for the course, gave preferences which group they would like to participate in. When enrolling, students were not informed about the difference regarding portfolio form (e-portfolio in groups 1, 3, and 5; paper-based-portfolio in groups 2, 4, and 6), with groups being distributed throughout the week. Thus, a quasi-experimental method was employed for the study in a natural setting, with a pre-test/post-test parallel group design.

[255] The open-source software Mahara (available via the internet on the site www.mahara.org) can be considered one of the leading applications for educational portfolio construction. Providing a fully featured framework for online e-portfolio construction, Mahara can be adapted both by the teacher educator and by the students. While portfolios constructed by means of Mahara are termed e-portfolios, it is important to note that these e-portfolios are web-based. Thus, students are offered technological features in portfolio construction that did not exist at the advent of e-portfolios about two decades ago. It has been noted that nowadays, paper-based portfolios are constructed with the aid of digital devices (e.g., computers with word processing software), too. It is *web-based e-portfolio construction* that comes to mind when e-portfolio is addressed these days. In Appendix B (p. 536), further information on the portfolio-based learning environment in the course *Schulpraktische Studien 1 (SPS 1)* – regarding the purposes of portfolio construction (teaching/learning objectives), the curriculum, portfolio contents, and the tasks set for processing – will be provided. It was the *form* of portfolio (paper-based vs. electronic) only that was varied deliberately between the groups. Great care was taken to keep everything else identical and, thus, comparable to the greatest possible extent.

[256] These numbers refer to the main study in the fall/winter semester of the academic year 2013–2014 (HWS 2013/2014). HWS = fall/winter semester *(Herbst-/Wintersemester)*; FSS = spring/summer semester *(Frühjahrs-/Sommersemester)*.



	Presage (predictors)	Process	Product
Variable(s)	• Students' dispositions (pre) • Students' perceptions of learning environment	• Approaches to learning • Cognitive task processing • Levels of reflective thinking	• Students' dispositions (post)
Tests	• Pre-test (beginning of seminar) • Post-test 1 (after university seminar)	• Post-test 2a (after university seminar, school practicum, and independent student work	• Post-test 1 (after university seminar) • Post-test 2b (after university seminar, school practicum, and independent student work)
Time	• t_0 (second week of semester) • t_1 (last week of semester)	• t_2 (second week of *following* semester)	• t_1 (last week of semester), t_2 (third week of *following* semester)
Instrument(s)	• Disposition questionnaire • Perceptions (...) questionnaire	• Task processing questionnaire	• Disposition questionnaire

Figure 7. The design of the study (1): Model and data collection.

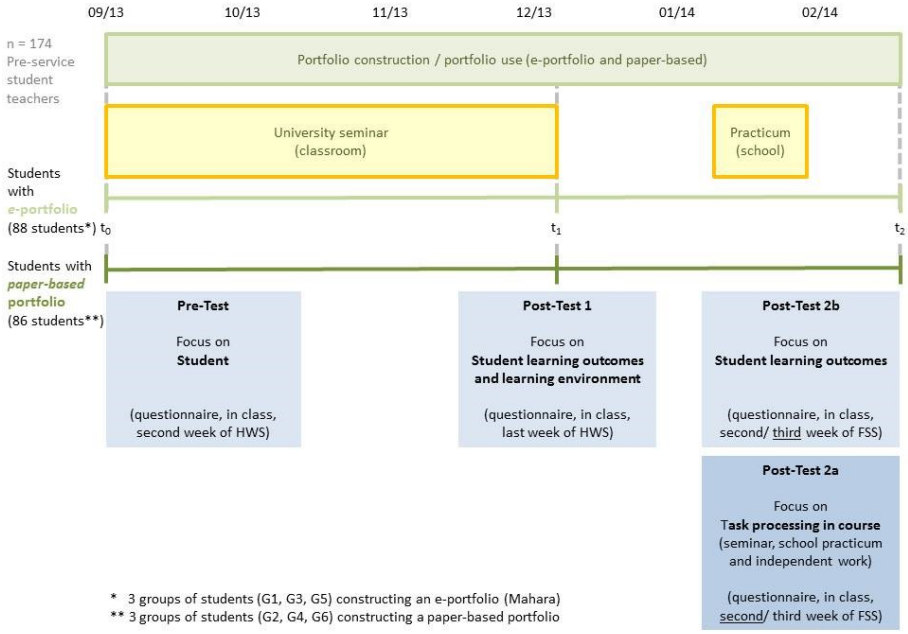


Figure 8. The design of the study (2): Overview of the surveys.

4.5.2 Participants

Participants in the study were the students in the cohorts taking part in the course *Schulpraktische Studien 1 (SPS 1)* in the fall/winter semester of the academic year 2012–2013 (preliminary pilot study) and in the fall/winter semester of the academic year 2013–2014 (main study). In the fall/winter semester of the academic year 2012–2013, a total of 153 students were registered for the course – 77 students in groups 1, 3, and 5 (e-portfolio); and 76 students in groups 2, 4, and 6 (paper-based portfolio) –, while in the following fall/winter semester of the academic year 2013–2014, a total of 174 students were registered – 88 students in the groups constructing an e-portfolio (groups 1, 3, and 5); and 86 students in the groups constructing a paper-based portfolio (groups 2, 4, and 6).[257, 258] All participants were students of Economic and Business Education, the large majority of them being in the fifth semester of the bachelor's program of study in Economic and Business Education, for which obligatory attendance of the seminar is scheduled.

4.5.3 Development and use of the instruments

4.5.3.1 Selection of the scales for the instruments

After determining student approaches to learning, levels of cognitive processing, and levels of reflective thinking to be at the center of this study, the scales to be used had

[257] These numbers are given on the basis of lists of students made at the beginning of the respective lecture period. There were cases of students not filling in all questionnaires due to absence in class, and cases of students not completing the course. In the end, there was a total of n = 150 cases listed in the SPSS data sheet resulting from data collection in the fall/winter semester of the academic year 2012–2013 (this data being used for the development/adaption of the disposition questionnaire, see Section 4.5.3.2). In the context of the main study in the fall/winter semester of the academic year 2013–2014, 'incomplete cases' – representing participating students who had missed filling in one or more of the questionnaires handed out, or had omitted one or more responses relevant to the calculations presented in the following – were excluded from the master data sheet created in SPSS, which resulted in a total of n = 81 'complete cases'.

[258] In the cohorts of students participating in the preliminary pilot study and in the main study, the two groups of students receiving a differential treatment regarding portfolio form can be regarded as being of roughly the same size.

to be chosen. In the international literature on student learning and reflection, there exist several scales to measure the constructs named. Special attention was given to the questionnaires developed in teams with John Biggs and David Kember, two authorities in the field of student learning and reflection. For this study, scales from the following instruments published in the literature on student learning, reflective thinking, and technology acceptance by pre-service teacher education students were used, either in total or in part, as they were deemed an appropriate base to capture the constructs of interest:

- The Revised Two-Factor Study Process Questionnaire (Biggs et al., 2001),
- the Reflective Thinking Questionnaire (Kember et al., 2000),
- the Technology Acceptance Measure for Pre-Service Teachers (Teo, 2010), and
- the Motivated Strategies for Learning Questionnaire (as presented by Duncan & McKeachie, 2005).

In order to capture students' perceptions of the seminar *SPS 1* – based on the concept of basic psychological needs –, scales from a questionnaire addressing basic student needs (Doménech Betoret & Gómez-Artiga, 2011) were translated and adapted for use in a separate questionnaire, with a view to running possible additional analyses regarding students' perceptions of the learning environment.

4.5.3.2 Preparatory pilot study and adaption of the disposition questionnaire

In order to assess students' dispositions before, during, and after portfolio construction, a questionnaire was developed, which was to be administered to students three times, (1) at the beginning of the seminar *Schulpraktische Studien 1 (SPS 1)* – i.e., before portfolio construction –, (2) at the end of the seminar – i.e., during the process of portfolio construction –, as well as (3) after completion of the portfolios as required for the course – i.e., after portfolio construction.[259] Key characteristics to be assessed by means

[259] This means completion of portfolio construction for reflective learning and institutional assessment in the context of the course *Schulpraktische Studien 1 (SPS 1)*. As the portfolios remain with the students with regard to ownership, documentation, and the option of further developing the portfolios

of this self-report questionnaire were students' dispositions for deep and surface learning – relative to their typical way of studying within the program of study – as well as their dispositions for reflective thinking with regard to their university studies. Thus, the questionnaire was termed the 'disposition questionnaire'.

As a starting point for scale construction, scales were collected from a number of instruments published in the pertinent literature on higher education students' learning and reflective thinking. The scales to measure students' deep and surface learning were taken from the Revised Two-Factor Study Process Questionnaire (R-SPQ-2F) as published by Biggs et al. (2001), the scales to measure the levels of reflective thinking were taken from a questionnaire constructed by Kember et al. (2000). The scales to measure students' technology acceptance were extracted from a report on the development, validation, and analysis of the Technology Acceptance Measure for Pre-Service Teachers (TAMPST) conducted by Teo (2010). The scales relative to various aspects of student motivation and learning were selected from the Motivated Strategies for Learning Questionnaire (MSLQ) as presented by Duncan and McKeachie (2005). The two items related to students' career choice were formulated by the author with a view to the purposes of this study, as were the introductory questions on student variables.[260]

Use of existing instruments was made for several reasons. The instruments available for measuring students' approaches to learning and the levels of their reflective thinking were considered to fit the purposes of the study. They had been constructed by

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at any time, this completion may only be temporary, if students decide to continue working on their portfolios on an autonomous basis and/or if portfolio construction is resumed within an institutional context at a later stage of teacher education, e.g., at a later time during university studies, in the second phase of teacher education, and/or in continuous professional development (CPD). Continuous connectivity with a view to lifelong learning is assumed to be one of the major benefits of portfolios (e.g., Barrett & Garrett, 2009; Cambridge, 2008, 2010; Heinrich, Bhattacharya, & Rayudu, 2007) and should be taken into account at any stage of portfolio design and implementation.

[260] The items addressing students' career choice and the questions on student variables (e.g., age, gender, previous experience with portfolio) can be used in descriptive statistical analyses to portray the students participating in the study. In addition, they can be used in the investigation of potential differential effects of student factors, which may be undertaken in additional research continuing this dissertation project.

distinguished authors who can be regarded as highly competent in their fields of expertise, in this case approaches to learning and reflective thinking. The instruments available had also been submitted to processes of validation, which meant that they could be assumed to measure what their authors claim the instruments measure. It had to be taken into account that in the course *Schulpraktische Studien 1 (SPS 1)* students have a particular cultural background, and that this particular course takes place within a specific department at a given university, which is influenced by the culture of the academic discipline. Yet, in prior research, inventories of student approaches to learning have been studied extensively – in various countries, academic disciplines, and departments –, so there was reason to assume that after careful translation and possible adaption the scales would be appropriate for use in the present context.

The items in the disposition questionnaire were translated from English to German by the author. The translation was made in the form of an iterative process, subsequent modifications of item translations being discussed extensively with faculty until all experts agreed that the contents of the original items were adequately mirrored in their German translation. At the same time, the translation of the items was discussed with a small sample of pre-service teachers from another program of study in order to examine their understanding of the German version of the items and to make sure that minor modifications could be made on this basis, too, if such adaptions seemed to be necessary with a view to students' understanding of the items as compared to the underlying constructs. In these ways, it was intended to ensure face validity of the German translation of the items.

It must be taken into account that the disposition questionnaire as used in this study is intended to measure students *overall dispositions* for learning and reflective thinking, as compared to specific approaches to learning and reflection related to one particular course. This important aspect was provided for in the disposition questionnaire in two ways: The information and the instructions preceding the items were formulated in a way that students could see that the items referred to the program of study as a whole and to their usual way of studying. In addition, adaptions were made in the wording of the items in order to explicate as clearly as possible that they refer to students' dispositions, e.g., students' *typical* ways of acting, their *general* views, and their *usual* percep-

tions and emotions. With a view to the items from the R-SPQ-2F, Biggs et al. (2001) note that both adequate introductory texts and adaptions to the wording of the items are supportive in making clear to students what basis is to be referred to (e.g., program of study, course). In this context, it is assumed that students over the course of the four semesters preceding the course *Schulpraktische Studien 1 (SPS 1)* have developed an individual disposition concerning learning and reflective thinking, shaped by their experiences within and their perceptions of their program of study (requirements, faculty culture, etc.).[261] These dispositions are assumed to be rather stable, yet malleable by means of student experiences in a learning environment that fosters deep learning and higher levels of reflective thinking.

Taking into account the translations made of the original English version of the items, the adaption of the wording of the items, and possible differences between the teaching/learning environments in which the original questionnaires had been validated and the teaching/learning environment in which the adapted scales were to be administered, the disposition questionnaire constructed for this study was administered to the whole cohort of students taking part in the course *Schulpraktische Studien 1 (SPS 1)* in the fall/winter semester 2012–2013 in order to validate it in a pilot study before its intended use the main study in the following academic year.[262] The questionnaire was administered to students in all parallel groups at the beginning of class in the second week of the lecture period. Students were informed about the purposes of the survey

[261] For a detailed discussion of the various concepts in the domain of student learning – e.g., learning styles, approaches to learning, etc. –, see Chapter 2. For the purpose of this study, based on the comprehensive review of literature on student learning, it is assumed that students' dispositions towards learning are to some extent malleable by means of students' experiences during the course of their studies, and that students' approaches to learning in a particular course are to some extent influenced by their pre-dispositions concerning learning.

[262] In the fall/winter semester of the academic year 2012–2013, there was a total of 153 students registered for the course *Schulpraktische Studien 1 (SPS 1)*. Yet, while all students readily agreed to participate in the study and thus to fill in the questionnaire, presence of all students in class – including class in the second week of the lecture period – was rare. Thus, the number of questionnaires filled in and the number of cases eventually available in data analysis are lower than the total number of students registered.

and asked to note on the first page of the questionnaire their individual participant code in order to make possible a subsequent matching of successive questionnaires. It took students about 10-15 minutes time to complete the questionnaire, which was then returned to the author.

The front page of the disposition questionnaire is practical in nature: It comprises a short cover note – addressing the student and asking for student participation – as well as a field in which the participant code is to be entered. Thus, in addition to verbal information and directions given in class after the questionnaire has been handed out, students receive written information on the objectives of the survey and printed directions on how to properly fill in their responses to the questions and the items comprised in the questionnaire. They are once again asked for their support in the form of participation in the survey, while being assured that strict confidentiality will be observed with regard to the data and that the data will be used for purposes of scientific research and possible course improvement only. Students are also requested to fill in individual participant codes in order to make possible a matching of the questionnaires as typical of pre-post-designs.[263]

In Section A of the questionnaire, students are asked for individual information. They are asked about their age; their gender; whether they have completed vocational training prior to studying at university ("*abgeschlossene berufliche Ausbildung"*); whether they have completed a course of studies in tertiary education prior to the seminar, now changing to Economic and Business Education (which would qualify them as *Quereinsteiger/-innen*, as opposed to the students who have run through the bachelor's program of study in Economic and Business Education from its start); and, finally, whether they have constructed a portfolio before, at school or during their program of study. The information on possible prior vocational training and/or possible prior education in the tertiary sector is collected based on the assumption that students having successfully completed prior vocational training and/or a prior program of study dispose

[263] The disposition questionnaire as used in the main study in the fall/winter semester of the academic year 2013–2014 is contained in Appendix D (p. 570), where the cover note including instructions on the participant code to be filled in by the student can be found.

of a larger range of professional and personal experience than those students having taken up the program of study in Economic and Business Education right after having obtained their university entrance qualification. Thus, they might potentially have a higher capacity for reflection than those students who do not dispose of this additional experience. The information on whether students have constructed a portfolio prior to the course *Schulpraktische Studien 1 (SPS 1)* is deemed important on the basis of the assumption that those students who have had the opportunity of practicing and experiencing portfolio construction prior to the course might profit more, being more able on the basis of existing portfolio-related knowledge and skills to construct a proper portfolio on the basis of deep learning and reflective thinking.[264] In this study, these data are asked for only once, as they are connected to students' codes.[265]

Section B contains the scales to measure students' dispositions for deep and surface learning in the context of their program of study. In the heading of this section, it is expressed clearly that agreement to the items is to be based on students' ways of studying with regard *to the program of study as a whole*. In case agreement to an item should depend on the subjects being studied, students are asked to think of the subjects most important to them. This additional instruction is intended to give students orientation in case an answer should be dependent on this distinction.[266] In Section B, a 5-point rating scale was used to document students' agreement to the items. With reference to the original scales used in the R-SPQ-2F (Biggs et al., 2001), the poles of the scale are labeled "is never/only rarely the case" (1) and "is always/almost always the case" (5). The five-point gradation used in the R-SPQ-2F was kept. An extension of the scale to comprise seven points was not deemed as beneficial. On the contrary: Students might

[264] If students have engaged in prior portfolio construction, it is to be assumed that they bring along to the course *SPS 1* views of portfolio that have been influenced in a particular way.

[265] The first administration of the disposition questionnaire was of vital importance for the inclusion of students into the study. In the end, students were excluded from the study in all cases where data on student learning, including students' initial disposition for deep and surface learning, was missing.

[266] Numerous conversations with students over more than a decade of university teaching as well as inquiries with students regarding the topics of this study have led the author to think that students usually see their program of study as an entity and/or that they are well able to perform this abstraction if asked to do so.

well have problems to classify their learning on a seven-point scale. The use of a forced choice scale, comprising an even number of response options (e.g., four or six response options) was rejected: It was assumed that the use of an even number of response options without a middle option would distort the results, as with the items used it is well possible that with participants the response option in the middle is the option that represents their situation/their view most accurately.[267, 268] The two main scales included in Section B of the disposition questionnaire are "Disposition for Deep Learning" (deep disposition, DD) and "Disposition for Surface Learning" (surface disposition, SD).

Section C addresses students' dispositions for reflective thinking. Again, in addition to the spoken instructions preparing students for questionnaire completion, students are made aware in writing of the fact that the items refer to *their program of study as a whole*. In Section C, a 5-point rating scale is used, the grades being labeled "definitely disagree" (1), "mainly disagree" (2), "undecided" (3), "mainly agree" (4), and "definitely agree" (5). In the instructions, students are asked to choose response option 3 ("undecided") only if they consider no other response possible. The four scales comprised in Section C of the questionnaire are "Habitual Action" (HA), "Understanding" (U), "Reflection" (R) and "Critical Reflection" (CR). The source of the original scales is the Reflective Thinking Questionnaire (Kember et al., 2000).

In Section D, students are asked to report on their technology acceptance by rating several items on their (usual) way of working with computers. A 5-point rating scale is used, the grades being labeled "definitely disagree" (1), "mainly disagree" (2), "undecided" (3), "mainly agree" (4), and "definitely agree" (5). The three scales comprised in Section D of the questionnaire are "Perceived Usefulness" (PU), "Attitude towards

[267] When asking students about the extent to which they agree to a given statement, it may be advisable to choose a forced choice scale in cases where students' *attitudes* are investigated, in order to elicit a response expressing at least a tendency in approval or rejection – which constitute a binary option (unless the person asked has no opinion at all on a given topic). In Section B, items refer not to attitudes in the sense of approval or rejection, but to students' usual ways of studying. Here, a middle option is well possible. It is an accurate depiction of students' dispositions that is aimed at.

[268] Basically, this line of reasoning applies to the items in Sections C and D as well.

Computer Use" (ATCU), and "Perceived Ease of Use" (PEU). The fourth scale contained in the original instrument – the Technology Acceptance Measure for Pre-Service Teachers (TAMPS, Teo, 2010) – was not adopted for the disposition questionnaire: The scale "Facilitating Conditions" (DC) was considered as inappropriate for most advanced university students with regard to typical uses of computers in the context of their studies, so it was assumed that the items might be considered as rather odd by students.[269]

Section E addresses aspects of students' motivation. Several scales of the Motivated Strategies for Learning (MSLQ, as reported by Duncan & McKeachie, 2005) questionnaire were translated and adapted for use in this study. In the initial version of the disposition questionnaire constructed for the pilot test, the scales "Intrinsic Goal Orientation", "Extrinsic Goal Orientation", "Task Value", "Control of Learning Beliefs", and "Self-Efficacy for Learning and Performance" were included. A 7-point rating scale ranging from "definitely disagree" (1) to "definitely agree" (7) at the poles of the scales is used.

Finally, in Section F, students are asked about their attitude towards becoming a teacher. Bearing in mind that successful completion of the successive bachelor's and master's programs of study in Economic and Business Education entitles students to apply for admission to the second phase of teacher education while at the same time opening them a broad range of career choices other than teaching, students are asked two crucial questions: Whether they are planning to become a teacher and whether this is their preferred choice of career. These two questions are by no means identical: While a student may plan to take up professional teaching for particular reasons, he/she does not necessarily have to consider this his/her first choice of career. In this section, a forced choice format of four response options was chosen, response options being "do not agree at all" (1), "rather disagree" (2), "rather agree" (3), "fully agree" (4). It was assumed that all students would have a trend regarding their choice of career so

[269] All items from the "Facilitating Conditions" (FC) scale in the original instrument start with "When I need help to use computers, …". It is assumed that students – advanced in their university studies and familiar with the Internet, social networks, office applications, etc. – know how to use computers in the context of their studies.

that a middle option ("undecided") would be neither necessary nor desirable for the purposes of this study.

For data collection and all subsequent statistical analyses in the pilot study, the IBM SPSS Statistics software package (Version 21) was made use of. The empirical data collected was compiled in a spreadsheet and prepared for statistical analysis. Following the definition of names and labels for variables as well as the attribution of variable types, variable roles, and levels of measurement, the empirical data was entered. Missing values were marked as such. Following the completion of data input, the spreadsheet created was controlled to rule out input errors. Variable sets were defined in order to arrange data more clearly for visual examination and subsequent statistical analysis.

The decision was taken to subject the empirical data collected in the pilot test to factor analysis in order to validate the disposition questionnaire containing the items selected, translated, and adapted from the original instruments.[270] For the purposes of this study, Principal Component Analysis (PCA) was chosen in the light of the translation and the adaptions made to the scales and the items.[271]

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[270] There are different types of factor analysis. There is Exploratory Factor Analysis (EFA), a complex, multi-step process (Osborne and Costello, 2009); a technique in multivariate analysis (e.g., Field, 2013; Mertler and Vannatta Reinhart, 2016; Tabachnick and Fidell, 2013), commonly used in psychology and in the social sciences (e.g., Fabrigar, Wegener, MacCallum, and Strahan, 1999; Osborne and Costello, 2009), which allows researchers to attribute manifest variables to a smaller number of latent variables (factors) in order to reduce dimensions and explore the variables (factors) underlying the variables contained in the scales of questionnaires. In general, EFA is applied in early stages of research, when little is known about the number and nature of possible factors, as opposed to Confirmatory Factor Analysis (CFA), which is applied if a stable theoretical basis exists. Both EFA and CFA can be traced to the same foundation (e.g., Thompson, 2004); for a comparison of EFA and CFA, also see Hurley et al. (1997). Factor analysis has come to be a standard method of statistical analysis in educational and social research. Independent of the widespread use of EFA and its popularity in research, criticism of its application continues (see, e.g., Fabrigar et al., 1999; Ford, McCallum, & Tait, 1986; Osborne & Costello, 2009).

[271] It is pointed out in the literature that scales and items previously validated have to be validated again after translation into another language. The process of translation of instruments and scales can be

A PCA of the scales and items contained in sections B to E of the disposition questionnaire was run in order to validate the adapted scales against the background of the underlying theories and conceptual frameworks as laid out in the context of the construction and validation of the original instruments.[272] In the SPSS datasheet, the cases of 150 participants had been entered and prepared for analysis. All analyses run with a view to the validation of the adapted scales were followed by an analysis of reliability. The process and the results thus obtained will be presented in this order.

lengthy and time-consuming. In this study, translations were made by the author with the help of faculty; all of those involved are native speakers of German, having both a good command of the English language and technical knowledge of the scientific background of the scales and items. Complete semantic correspondence was not intended to be achieved, as this study does not involve a cross-cultural component (e.g., the comparison of scores on a scale in multiple languages administered to students from different cultures), nor would complete semantic correspondence have been possible against the background of the intended adaptions to the items.

[272] In SPSS, factor analysis can be used both in an exploratory way (when the number of factors is not specified) as well as in a confirmatory way (when the number of factors is specified). In the context of this study, the decision was taken to run a Principal Component Analysis (PCA) of the data. From a technical point of view, PCA is not a true method of factor analysis; yet, it is set as the default method of extraction in many popular statistical software packages, and while some theorists in the field of statistics are quite ciritcal of its use, others see virtually no difference between factor analysis and PCA, or prefer the latter (Osborne & Costello, 2009; in the article, several examples of the two positions are quoted). In IBM SPSS Statistics, PCA is subsumed under the heading of Factor Analysis, and it is pre-selected as the default method. The background to Principal Component Analysis is presented by Abdi and Williams (2010); recent developments are summarized by Jolliffe and Cadima (2016).

Principal Component Analysis (PCA) of Section B of the disposition questionnaire: Disposition for deep learning and surface learning[273]

Construct validity of the instrument to measure students' dispositions related to deep learning and surface learning (Section B of the disposition questionnaire, comprising the variables B001 to B020) was examined by means of Principal Component Analysis (PCA). Both Bartlett's Test of Sphericity (Chi-Square (190) = 721.406, $p < .001$) and the Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO = .727) indicate that the sample correlation matrix is appropriate for factor analysis. In addition, the MSA values of all variables B001 to B020 on the main diagonal of the anti-image correlation matrix exceed an MSA value of .60, the majority exceeding an MSA value of .70. Thus, adequacy of the empirical data for factor analysis was assumed and a Principal Component Analysis (PCA) with Varimax rotation was run.[274] While based on the Kaiser criterion there were 6 factors with Eigenvalues > 1.0, on the basis of the Scree Plot and theoretical considerations a two-factor solution was chosen, which after rotation accounted for 32.720 % of variance. The six-factor solution was not chosen; neither did the variables load clearly on the factors extracted, nor was there seen any adequate interpretation of six factors. A four-factor solution representing the sub-scales of the R-SPQ-2F (deep motive, deep strategy, surface motive, surface strategy) could not be reproduced by means of factor analysis, as variables did not load clearly on the factors when the number of factors to be extracted was set to 4.[275] Thus, the decision was taken to go for a two-factor solution representing the key constructs/scales underlying the original English version of the R-SPQ-2F: deep learning and surface learning.[276] In this

[273] Detailed statistical data from the Principal Component Analysis and the reliability analysis of section B of the disposition questionnaire is provided in Appendix C (p. 543).

[274] Rotation (Varimax with Kaiser Normalization) was carried out in order to improve the interpretation of the resulting factors. Rotation converged in 10 iterations.

[275] Also see Justicia et al. (2008), who with regard to the structure underlying the R-SPQ-2F suggest a simple first-order two-factor solution (deep and surface learning, each measured by 10 items).

[276] It is the distinction between deep and surface learning, both in students' dispositions as well as in the learning they realize, that is the focus of interest of this study. While there is agreement in the literature, that approaches to learning are made up of a motivational and a strategic component, this subdivision is of minor importance for the purposes of this study.

two-factor solution, obtained by setting the number of factors to be extracted to 2, Factor 1 represents "Student disposition for surface learning", Factor 2 represents "Student disposition for deep learning".[277] All 20 variables showed a clear loading on one of the two components (factors): 15 of the 20 positive factor loadings on one of the two factors – each of them exceeding a minimum loading of .30 – were accompanied by a negative loading on the other factor, 5 by a very low positive loading (< .10) on the other factor.

Considering that participants were to fill in the disposition questionnaire at three different points in time over the course of the main study, the decision was taken to reduce the total number of variables in Section B of the disposition questionnaire. To this end, factor loadings were examined, and only the variables showing a considerable factor loading equaling or exceeding .50 were retained, while the variables showing a factor loading below that threshold set were removed from the scales. This resulted in a shortened version of the instrument with a total number of 12 (out of 20) items, in which the equality of the numbers of items dealing with deep learning and surface learning respectively was maintained, with 6 items on deep learning and 6 items on surface learning.[278] This reduction of the items by 40 % was made both with a view to increased validity and to test efficiency. The 12 items retained can be seen from Table 1:[279]

[277] Again, PCA and Varimax rotation (with Kaiser Normalization) were chosen, this time with a number of 2 factors set to be extracted. Rotation converged in 3 iterations.

[278] As pointed out above, the distinction between the motivational and the strategic components of these two dimensions could not be reproduced by means of the factor analysis run. While it was deemed important to maintain an equal number of items related to deep learning and surface learning respectively, the number of items initially considered to be related to motivational aspects of learning and of those items initially assumed to address strategic aspects of learning is not equal in the shortened version of the instrument.

[279] The complete table, containing all 20 items and their loadings, can be found in Appendix C.1 (p. 543).

Table 1. Items and loadings: Student dispositions for deep and surface learning

Rotated Component Matrix[a]

	Component	
	1	2
B001 - Gefühl tiefer persönlicher Befriedigung beim Lernen (Deep Motive)	-.072	.539
B006 - Eigene, weitere Beschäftigung mit neuen Themen (Deep Strategy)	-.034	.711
B008 - Auswendiglernen auch von nicht Verstandenem (Surface Strategy)	.695	-.024
B009 - Wissenschaftliche Themen fesselnd/ spannend (Deep Motive)	-.170	.593
B011 - Ansicht, dass Bestehen auch ohne Verstehen (Surface Motive)	.625	.074
B012 - Beschränkung des Lernens auf das Geforderte (Surface Strategy)	.696	-.070
B013 - Intensive Arbeit im Studium aufgrund von Interesse (Deep Motive)	-.112	.661
B014 - Weitergehendes, eigenes Lernen zu besprochenen Themen (Deep Strategy)	.011	.660
B016 - Lehrende sollten nur prüfungsrelevante Kenntnisse erwarten (Surface Strategy)	.518	-.051
B017 - Vorbereiten von Fragen für Lehrveranstaltungen (Deep Motive)	-.053	.536
B019 - Kein Sinn in Erlernen nicht prüfungsrelevanter Inhalte (Surface Motive)	.620	-.145
B020 - Ansicht, Bestehen der Prüfung durch Auswendiglernen (Surface Strategy)	.675	.049

a Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization. Rotation converged in 3 iterations.

Items B001, B006, B008, B009, B011, B012, B013, B014, B016, B017, B019, and B020 were retained, while items B002, B003, B004, B005, B007, B010, B015, and B018 were dropped in the course of the PCA and removed from the questionnaire. After removal of these six items, an additional PCA with Varimax rotation was run on the reduced set of variables.[280] In this analysis, after rotation the two factors extracted explained a total of

[280] In this analysis, both Bartlett's Test of Sphericity (Chi-Square (66) = 394.685, p < 001) and the Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO = .736) indicated that the reduced set of variables were appropriate for factor analysis. In addition, the MSA values of all variables contained in the

variance of 44.199 %.[281] The initial Eigenvalue of Factor 1 was 3.102, the initial Eigenvalue of Factor 2 was 2.201. While the Eigenvalues of the following two factors also exceeded 1.0, they did so only marginally.[282] In addition, as opposed to the first to factors, they only accounted for less than 10 % of variance each. A two-factor solution could be supported by the Scree plot. It is to be noted that in this analysis as well as in the initial analysis of Section B the Eigenvalues of Factors 1 and 2 were consistently higher than the Eigenvalues of the following factors, which is taken as an indication that the basic constructs of deep learning and surface learning are represented by Factors 1 and 2. After rotation, the total variance in the selection of variables explained by Factors 1 and 2 was nearly equal (Factor 1: 22.458 %, Factor 2: 21.714 %), as was the case in the factor analysis run initially on the total of variables (Factor 1: 16.452 %, Factor 2: 16.268 %).

Reliability Analysis of Section B of the disposition questionnaire: Disposition for deep learning and surface learning

Cronbach's Alpha based on the 10 items initially making up the "Disposition for Deep Learning" scale was calculated as .731. Examination of the item-total statistics showed that a marginal increase of Cronbach's Alpha could be effected by means of the deletion of item B010, raising the value to .732. Cronbach's Alpha based on the 10 items initially making up the "Disposition for Surface Learning" scale was calculated as .764. Item-total statistics showed that a marginal increase of Cronbach's Alpha could be effected by means of the deletion of item B004, resulting in a Cronbach's Alpha value of .767. Both item B010 and item B004 were among the items removed after factor analysis. After removal of the 8 items listed above, Cronbach's Alpha for the "Disposition for Deep Learning" scale was .722, for the "Disposition for Surface Learning" scale its value was .748. The examination of item-total statistics showed that with the "Disposition for

reduced set clearly exceeded the threshold value of .50 across the main diagonal of the anti-image correlation matrix. So, here again, it was assumed that the data was appropriate for factor analysis.

[281] This is considered as acceptable, taking into account that educational research is a social science.

[282] As is claimed in the literature, the Kaiser criterion looking for Eigenvalues > 1.0 is not strict enough, resulting in a possible overextraction of factors. Thus, the inclusion of factors with an Eigenvalue only marginally exceeding 1.0 should be considered carefully.

Deep Learning" scale, no increase of Cronbach's Alpha could be effected by means of the deletion of an item, while with the "Disposition for Surface Learning" scale, the deletion of item B016 would have led to a marginal increase of the value to .753, an increase considered too insignificant to take into consideration deletion of item B016 after factor analysis. The Cronbach's Alpha values of the initial as well as of the shortened scales exceeded the threshold of .70 and were thus considered to be acceptable based on common convention.

Principal Component Analysis (PCA) of Section C of the disposition questionnaire: Disposition for levels of reflective thinking

The structure of the instrument to measure students' dispositions relative to levels of reflective thinking (Section C of the disposition questionnaire, comprising the variables C001 to C016) was examined by means of PCA. Both Bartlett's Test of Sphericity (Chi-Square (120) = 608.063, $p < .001$) and the Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO = .713) indicate that the sample correlation matrix was appropriate for factor analysis. The MSA values of all variables C001 to C016 on the main diagonal of the anti-image correlation matrix exceed the minimum value of .5 required by this criterion, with the exception of variable C005, where the MSA value of .475 was near the threshold of .5. Thus, adequacy of the empirical data for factor analysis was assumed and a Principal Component Analysis (PCA) with Varimax rotation including all 16 variables was run.[283] With a view to the Kaiser criterion, there were 5 factors with Eigenvalues > 1.0. Yet, based on the Scree Plot, an Eigenvalue of Factor 5 that was only marginally above 1.0, and theoretical considerations assuming four dimensions (Habitual Action, Understanding, Reflection, and Critical Reflection), a four-factor solution was chosen, which after rotation accounted for 54.849 % of variance. In a four-factor solution, computed by setting the number of factors to be extracted to 4, Factor 1 represents "Understanding", Factor 2 represents "Reflection", Factor 3 represents "Critical

[283] Rotation (Varimax with Kaiser Normalization) was carried out in order to improve the interpretation of the resulting factors. Rotation converged in 6 iterations.

Reflection", and Factor 4 represents "Habitual Action".[284] All 16 variables showed a clear loading on one of the four factors, while there were no significant cross-loadings that would have called into question the distinction of the dimensions or the interpretation of the factors. Thus, this could be considered a simple structure. All positive loadings on one of the four factors exceeded the value of .4, most of them being considerably higher. Taking into account this clear four-component (four-factor) solution as well as the limited number of items, the decision was taken to retain all 16 items in the instrument.

Reliability Analysis of Section C of the disposition questionnaire: Disposition for levels of reflective thinking

Cronbach's Alpha values for the four scales in Section C of the disposition questionnaire were calculated as follows: .565 for "Habitual Action", .730 for "Understanding", and .737 for both "Reflection" and "Critical Reflection". While the latter three values, all of them exceeding .70, were considered to be acceptable based on common convention, Cronbach's Alpha for the "Habitual Action" scale was < .60 (yet still > .50), which makes it rather low in the views of most authors. Keeping in mind that "habitual action" is quite a broad concept to be measured and operationalized, that there are only four items to the scale, and that in the publication on the development and testing of the original instrument the authors consider Cronbach's Alpha values between .60 and .70 to reach "acceptable levels" (Kember et al., 2000, p. 387), a value of .565 of the "Habitual Action" scale is accepted for the purposes of this study. As regards the translation and adaption of the items, the Cronbach's Alpha values of "habitual action" and "understanding" calculated by Kember et al. (2000) for the original scales were higher than were the values achieved in the pilot study. On the other hand, the Cronbach's Alpha values calculated for the translated scales measuring "reflection" and "critical reflection" were higher in the pilot study than were the values for the original scales.

[284] Again, PCA and Varimax rotation with Kaiser Normalization were chosen. Here, rotation converged in 6 iterations.

Principal Component Analysis (PCA) of Section D of the disposition questionnaire: Pre-Service Teachers' Technology Acceptance

The structure of the instrument to measure pre-service teachers' (i.e., students') technology acceptance (Section D of the disposition questionnaire, comprising the variables D001 to D011) was tested by means of PCA. Both Bartlett's Test of Sphericity (Chi-Square (55) = 869.012, $p < .001$) and the Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO = .841) indicated that the sample correlation matrix was appropriate for factor analysis. The MSA values of all variables D001 to D011 on the main diagonal of the anti-image correlation matrix exceeded .7. Thus, adequacy of the empirical data for factor analysis was assumed and a Principal Component Analysis (PCA) with Varimax rotation including all 11 variables was run.[285] Based on the Kaiser criterion, there were 3 components (factors) with Eigenvalues > 1.0. This three-component (three-factor) solution was assumed; it was supported both by the Scree Plot and by knowledge of the structure of the original instrument, from which the three dimensions of "Perceived Usefulness", "Attitude towards Computer Use", and "Perceived Ease of Use" were taken. The three-factor solution after rotation accounted for 72.049 % of variance. In this three-factor solution based on the initial extraction of factors, Factor 1 represents "Perceived Usefulness", Factor 2 represents "Attitude towards computer use", and Factor 3 represents "Perceived Ease of Use". All 11 variables showed a clear, high loading on one of the three factors, while there were considered to be no cross-loadings that would have called into question the distinction of the dimensions or the interpretation of the factors. Taking into account this clear three-factor solution as well as the limited number of items, the decision was taken to retain all 11 items in the instrument to measure pre-service teachers' technology acceptance.

[285] Rotation (Varimax with Kaiser Normalization) was carried out in order to improve the interpretation of the resulting factors. Rotation converged in 4 iterations.

Reliability Analysis of Section D of the disposition questionnaire: Pre-Service Teachers Technology Acceptance

Cronbach's Alpha was calculated as .816 for the four items in the "Perceived Usefulness" scale, as .842 for the three items in the "Perceived Ease of Use" scale, and as .850 for the four items in the "Attitude towards Computer Use" scale. All values can be regarded as good against the background of common convention, especially when taking into account the small number of items each of them contains. This may be due to narrow constructs being measured, as opposed to broad constructs such as dimensions of student learning and reflection.

Principal Component Analysis (PCA) of Section E of the disposition questionnaire: Motivated Strategies for Learning

The structure of the instrument to measure students' motivated strategies for learning (Section E of the disposition questionnaire, comprising the variables E001 to E026) was tested by means of PCA. Both Bartlett's Test of Sphericity (Chi-Square (325) = 2166.815, $p < .001$) and the Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO = .869) indicated that the empirical data contained in the sample correlation matrix was appropriate for factor analysis. In addition, all MSA values of all variables E001 to E026 on the main diagonal of the anti-image correlation matrix exceeded .6. Thus, adequacy of the empirical data for factor analysis was assumed and a Principal Component Analysis (PCA) with Varimax rotation including all 26 variables was run.[286] PCA indicated that there were 5 factors with Eigenvalues > 1.0. While this number of factors corresponds to the number of scales included Section E (intrinsic goal orientation; extrinsic goal orientation; control of learning beliefs; task value; and self-efficacy for learning and performance), the factor loadings in the rotated component matrix were not clear. On this basis, it was decided to limit the items to be included in this section of the questionnaire to the items from the scales "task value" and "self-efficacy for learning and

[286] Rotation (Varimax with Kaiser Normalization) was carried out in order to improve the interpretation of the resulting factors. Rotation converged in 4 iterations.

performance", as these two dimensions were assumed to be related to students' approaches to learning, and thus could be examined as moderator variables in this study. PCA with Varimax rotation of these scales only led to the extraction of three factors with an Eigenvalue > 1.0, explaining a total of 71.275 % of variance. Extraction of a number of 3 factors was confirmed by the Scree plot. In this three-factor solution, Factor 1 represents "Task Value", with clear and high loadings of the all "task value" variables on this factor. Factor 2 comprises elements related to performance, achievement, and assessment, while Factor 3 is related to learning, especially to understanding content. Variables related to "Self-efficacy for Learning and Performance" mostly show high loadings on Factors 2 or 3, except for variables E 005, E016, and E024, which show significant cross-loadings across the three factors. While it would have been possible to take into account the use of those items related to "Self-efficacy for Learning and Performance" which showed loadings on Factors 2 (achievement/performance) and 3 (learning/understanding), this was decided against in order to reduce the number of items and keep the scales short. Moreover, item E003, clearly related to "Task Value" but showing the smallest loading of all "Task Value" items, was dropped in order to achieve an equal number of items for both dimensions. The resulting instrument covers the dimensions "Task Value" and "Self-Efficacy for Learning and Performance", both assumed to be moderator variables in learning. In the questionnaire, each dimension is represented by 5 items.

Reliability analysis of Section E of the disposition questionnaire: Motivated Strategies for Learning

The two scales resulting from the selection of items as described had Cronbach's Alpha values of .945 ("Task Value") and .799 ("Self-Efficacy for Learning and Performance"). Examination of the item-total-statistics showed that deletion of items from either scale would have led to a lower Cronbach's Alpha value respectively.

The main study was conducted in the fall/winter semester of the academic year 2013–2014. The questionnaires used for the surveys were administered to the whole cohort of students. The points in time at which the questionnaires were handed out can be seen from Figure 8 (p. 212). In addition to the disposition questionnaire, two more questionnaires were administered: the Student Perceptions Questionnaire and the Task Processing Questionnaire.

The Perceptions of the Learning Environment Questionnaire

The Perceptions of the Learning Environment Questionnaire was to capture students' perceptions of the portfolio-based learning environment in the course *Schulpraktische Studien 1 (SPS 1)*. It is based on the concept of basic psychological needs and their satisfaction and comprises four scales (autonomy, competence, relatedness, and belonging) as published by Doménech Betoret and Gómez-Artiga (2011).[287] In view of the focus of this dissertation, the research questions formulated in Section 4.3, and the scope of the dissertation project as a whole, further consideration of the Student Perceptions Questionnaire will be deferred at this point. Keeping in mind that the Self-Determination Theory (SDT) and the theory of basic needs satisfaction (e.g., Ryan & Deci, 2000) are well-established in the fields of education and psychology and that portfolio as an educational tool has the potential to address and cater to these needs (student autonomy in the form of portfolio ownership, student competence in the form of empowerment, student relatedness in the form of social, collaborative learning, etc.), the Student Perceptions Questionnaire may be further examined and developed for future research on the basis of additional data analyses.[288]

[287] The basic psychological needs stated in relation with the Self-Determination Theory (SDT) are autonomy, competence, and relatedness (Ryan & Deci, 2000). The fourth scale – belonging – was added by Doménech Betoret and Gómez-Artiga (2011).

[288] Several scales for the measurement of Basic Psychological Needs Satisfaction are published on the website www.selfdeterminationtheory.org, which deals with this approach to human motivation and personality. The scales by Doménech Betoret and Gómez-Artiga (2011) were selected as they were

The Task Processing Questionnaire

In order to assess students' *realized* approaches to learning, their *realized* levels of cognitive task processing, and their *realized* levels of reflective thinking within the portfolio-based context of the course *Schulpraktische Studien 1 (SPS 1)*, the Task Processing Questionnaire was designed.

The Task Processing Questionnaire is made up of three sections (see Appendix D, p. 570). In Section A, all 20 items from the Revised Two-Factor Study Process Questionnaire (R-SPQ-2F; Biggs et al., 2001) are used, translated into German and formulated with a view to the context of the course *Schulpraktische Studien 1 (SPS 1)*. All items are formulated in a way that students' attention and their statements are focused on their approaches to learning in the course as a whole.[289] Biggs et al. (2001) explicitly state the option of adjusting the items of the R-SPQ-2F so as to focus and refer to one course in particular. While in the disposition questionnaire the number of items in the deep learning and the surface learning scales was reduced to 6 items respectively, all 20 items of the R-SPQ-2F were used in the task processing questionnaire. As in the PCA of the translated 20 items from the R-SPQ-2F all items loaded as expected on the two factors of deep and surface learning, all 20 items could be used, the intention being to depict students' approaches to learning in a maximum of facets. There was no need for extensive considerations of test efficiency, as a number of 20 items is still highly manageable, and, unlike the disposition questionnaire, the task processing questionnaire was administered only once. In Section A of the questionnaire, a 5-point rating scale is used.

Section B of the Task Processing Questionnaire contains 16 items put into words specifically to cover typical tasks in portfolio-based learning and reflection as designed for and implemented in the course *Schulpraktische Studien 1 (SPS 1)*. The decision was tak-

considered to best depict elements of the learning environment as designed for and implemented in the course *Schulpraktische Studien 1 (SPS 1)*.

[289] The whole of the course *Schulpraktische Studien 1 (SPS 1)* consisted of classes during the lecture period, the two-week practicum at a vocational school for commerce/business, and independent student activity, both individual and in groups, during portfolio construction.

en to refrain from a search for existing scales, as such scales, if they existed, might have approximated cognitive processes as involved in portfolio-based learning and reflection in the course *Schulpraktische Studien 1 (SPS 1)*, but would certainly not have captured the facets of portfolio construction deemed important in the design and the implementation of this particular course. Designed to depict a clear dichotomous distinction, i.e., higher-order vs. lower-order cognitive processing, 8 of the 16 items represent high-level cognitive processing, while the other eight items depict low-level cognitive processing of course contents and tasks. Students' attention was focused on their cognitive processing of the tasks set for and executed in portfolio construction. The 16 items are to be answered based on a 5-point rating scale.[290]

Section C contains 16 items referring to students' levels of reflective thinking in portfolio construction in particular. These items are based on the items in the Reflective Thinking Questionnaire (Kember et al., 2000). Again, a 5-point rating scale is used.

Following the description of the development and the use of the instruments for the study, the results of the study will now be presented.

[290] Regarding the evaluation of the levels of cognitive processing in portfolio construction, verbs representing higher-order and lower-order cognitive processing – as listed and ranked in taxonomies and tables on levels of cognitive processing in learning – were used to formulate these 16 items. Considering the high face validity of the items formulated and their specificity regarding the activities related to portfolio construction in the course *Schulpraktische Studien 1 (SPS 1)*, the decision was taken to include in the analysis and presentation of data the data collected based on this section of the Task Processing Questionnaire, without the items having undergone prior testing in an additional pilot study.

5 Results

"It is a capital mistake to theorize before one has data.
Insensibly one begins to twist facts to suit theories, instead of theories to suit facts."[291]

Arthur Conan Doyle, *A Scandal in Bohemia* (1891)

FOLLOWING THE EXPLANATION OF THE STUDY AND ITS CONTEXT, this chapter of the dissertation covers selected results of the study conducted.[292] In subchapters 5.1 and 5.2, key results of the investigation of students' approaches to learning and students' levels of cognitive processing in portfolio-based task processing will be presented. Following further the research questions and the hypotheses formulated, changes in students' dispositions towards learning will be looked at in subchapter 5.3. In subchapter 5.4, attention will be given to the comparison of the group of students constructing (traditional) paper-based portfolios and the group of students constructing (more recent) electronic portfolios, a comparison of portfolio *forms* implemented in higher education in general and in pre-service teacher education in particular that appears to warrant further research, as has been noted based on the review of the literature in Chapter 3.

As set out in Section 4.4, it was hypothesized that portfolio construction would take effect on students' learning, in particular that in a portfolio-based learning environment,

[291] As usual, Sherlock Holmes is right. The famous consulting detective's observation is in clear support of an empirical approach to theory construction.

[292] As laid out above, for the purposes of this dissertation, the presentation and discussion of findings will focus on an investigation of students' dispositions and approaches, both with regard to *learning*, as well as on an examination of students' levels of *cognitive task processing*. In addition, the effects of *portfolio form* (paper-based vs. electronic) will be studied. Further research, focusing on students' levels of reflective thinking, as well as additional analyses which can be run on the basis of the extensive set of data collected – e.g., analyses regarding differential effects of student factors, analyses of the relationships of approaches to learning and levels of reflective thinking –, may form the basis of additional publications.

- pre-service teachers having a higher disposition for deep learning adopt a deeper approach to learning in task processing (Main Hypothesis 1)[293] and that
- pre-service teachers having a higher disposition for deep learning attain higher levels of cognitive processing in portfolio construction (Main Hypothesis 2), that
- learning within a portfolio-based learning environment (i.e., portfolio construction) enhances pre-service teachers' dispositions for deep learning (Main Hypothesis 3), while
- there is *no* difference in the effects of e-portfolio construction as opposed to the effects of paper-based portfolio construction on pre-service teachers' learning (Main Hypothesis 4).

All calculations and analyses presented in this chapter are based on the cases of the students showing in the questionnaires administered no missing values relative to the calculations presented. While all students taking part in the course *Schulpraktische Studien 1 (SPS 1)* participated in the study, not all students were present in class every time a questionnaire was administered. In addition, some students failed to fill in all data, or the data filled in was not clear. It was decided not to substitute missing values on the basis of one of the statistical methods available to this end, but to exclude cases with missing values from the analyses affected by these missing values. In consequence, with regard to students' learning dispositions, their approaches to learning in the portfolio-based learning environment, and their levels of cognitive task processing in portfolio construction, the cases of N = 81 students were available for analysis. 45 of

[293] In data collection and analysis, all students taking part in the course *Schulpraktische Studien 1 (SPS 1)* and thus constructing a portfolio are considered to make up one large group of learners that can be divided into subgroups based on student factors (e.g., students' (pre-)dispositions towards learning). For the comparison of paper-based and electronic portfolio construction, two subgroups are created based on the form of portfolio constructed. *Ex ante*, there is assumed to be *no* difference between the effects of paper-based portfolios and e-portfolios, as expressed in Main Hypothesis 4, under the conditions that both forms are a variant of the educational tool 'portfolio' and that the contents required and the tasks set are the same.

these students (55.6 %) had constructed an e-portfolio, while 36 of them (44.4 %) had constructed a traditional, paper-based portfolio.[294]

With regard to descriptive statistics related to student factors – fundamental to learning and instruction and thus contained in the 3P model of teaching and learning – the following was found:[295]

As for the participants' age, the range was from 21 years (youngest participants; largest age group: 22 students, 27.2 %) to 44 years (oldest participant; one student, 1.2 %), all but one participants being in their twenties, the large majority of the participants in their early twenties. The participants' mean age was 22.89 years, the students in the fifth semester of their program of study still being quite young. Regarding gender, almost three quarters of the participants were female (female: 60 students, 74.1 %; male: 21 students, 25.9 %). More than two thirds of the participants (56 students, 69.1 %) had not completed a program of professional training previously, while the others (25 students, 30.9 %) had done so. 7 students (8.6 % of the participants) were lateral entrants to the program of study in Economics and Business Education, whereas 74 (91.4 %) of the participants were not. The large majority of participants reported that they had no previous experience in portfolio construction (78 students, 96.3 %), only 3 students (3.7 %) having dealt with educational portfolios before.[296]

With a view to motivational aspects involved in portfolio construction as a basis for the participants' (first, obligatory) school practicum, students were asked whether they were planning to become a teacher, i.e., whether (at the time of the survey) they intended to take up a teaching career. While 52 (64.2 %) of participants agreed that they were planning to become a teacher (categories 'totally agree' and 'rather agree'), 29 students (35.8 %) did not (categories 'totally disagree' and 'rather disagree').[297] Teach-

[294] The absolute differences in group sizes is 9, the ratio of group sizes is 1.25. Considering this rather small difference, in the following the groups are treated as being of equal size.

[295] For descriptive statistics regarding participants (student factors), also see Appendix C.2 (p. 551).

[296] This large majority of students dealing with portfolio for the first time in their educational careers is in line with reports in the literature that portfolio is an educational approach most students are not familiar with (e.g., Bataineh et al., 2007; Çimer, 2011).

[297] These proportions are similar to observations made in previous years.

ing was considered as the desired profession by 46 students (56.8 %), while by 35 (43.2 %) it was not thought to be so.[298, 299]

5.1 Students' learning dispositions and students' realized approaches to learning in the portfolio-based learning environment

In order to represent students' dispositions with regard to deep and surface learning, scores from the disposition questionnaire were used, while students' actual/realized deep and surface approaches to learning in the portfolio-based learning environment were represented by the relevant scores from the task processing questionnaire.

Students' dispositions relative to deep and surface learning were measured by means of the scales constructed for this study (see the description in Section 4.5.3). With both scales – disposition for deep learning, disposition for surface learning – containing six items and the scale of each item ranging from 1 to 5, the minimum value of (6*1 =) 6.0 was taken to indicate a very low disposition for the respective way of learning, while the maximum value of (6*5 =) 30.0 was taken to imply a very high disposition for the respective manner of learning. In order to calculate an *overall* disposition for (meaningful, academic) quality learning, a quotient was calculated, dividing the score for a 'deep disposition' by the score for a 'surface disposition', which resulted in a score for an *overall* disposition for quality learning, ranging from (6/30 =) .2 with students with a minimum disposition for deep learning and a maximum disposition for surface learning to (30/6 =) 5.0 with students where the converse is the case, i.e., with students with

[298] Again, the numbers of students who rather or totally disagreed were summed up, as were the numbers of students who rather or totally agreed. It is to be noted that the contents of this question and the contents of the previous question are not identical: Students planning to become a teacher do not necessarily consider teaching as their desired profession, as can be seen from the shift in numbers in answers to the two questions. Individual motivations to become a teacher are manifold, ranging from the desire to teach students in order to support their development and growth to motivations legitimate workwise, but poor from a pedagogical point of view, such as a high salary and/or extensive school holidays.

[299] Further information on as well as graphical representations of statistical data regarding student factors can be found in Appendix C.2 (p. 551).

a maximum disposition for deep learning and a minimum disposition for surface learning.

In order to make a division between students with an *overall* disposition geared more towards meaningful learning for understanding (i.e., towards desirable, academic quality learning) as opposed to uncritical, indiscriminate rote learning and students where the converse is the case, two groups of students were constructed:

- Students with an overall disposition score ranging from 1.0 to 5.0 (i.e., students with a deep learning disposition score equaling or exceeding the corresponding disposition for surface learning score) were assigned to group 1, while
- students with an overall disposition score ranging from .2 to a value less than 1.0 (i.e., students with a deep learning disposition score inferior to the associated disposition for surface learning score) were assigned to group 2.[300, 301]

These two groups – (more) 'academically oriented' students with an *overall* tendency towards deep learning (students in group 1) as opposed to (more) 'non-academically oriented' students with an *overall* tendency towards surface learning (students in group 2) – were compared.[302]

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[300] With reference to Biggs and Tang (2011), these two groups can be seen as distinguishing the (more) "academic learners", comprised in group 1, from the (more) "non-academic" learners, contained in group 2. Again, it is to be noted that dispositions for (quality) learning in the sense of this dissertation are considered to be general, quite stable propensities for thinking and acting in certain typical ways with regard to learning and reflective thinking. Yet, these inclinations are considered to be malleable in the direction of academically desirable (i.e., quality) learning on the basis of students' positive perceptions and experiences of deep learning. In order to make the division between the two groups by means of IBM SPSS Statistics 24, the variable (quotient) representing the relation of a student's deep and surface dispositions was recoded on a binary basis.

[301] Students with an overall disposition score close to the value of 1.0 only narrowly qualify as members of the group they are assigned to. Yet, the decision was taken to set a clear threshold value in dividing the cohort of students into the two groups.

[302] With regard to forming (sub-)groups of learners based on student learning, a categorization of students based on learning patterns (e.g., by means of forming four groups, based on the values of the variables (deep/surface) being high and/or low) would have been possible. Considering the research

Students' overall dispositions for quality learning

With regard to students' dispositions towards learning, 41 students (50.6 %) showed an overall disposition for quality learning (≥ 1.0), while 40 students (49.4 %) showed an overall disposition below the threshold level of 1.0.[303] Thus, the number of students whose overall disposition tended towards deep learning (the scores for their disposition for deep learning being at least equal to their scores for their disposition for surface learning) was about the same as the number of students whose overall disposition (as represented by the division of the two scores measuring their dispositions for deep and surface learning) tended towards surface learning.

Main Hypothesis 1 (H_1): Students' dispositions – Students' approaches to learning

As described above, students' overall dispositions for learning were used to divide students into two groups on the basis of their dispositions. Students with a disposition tending towards deep learning were assigned to group 1 (n_1 = 41), while students with a disposition tending towards surface learning were included in group 2 (n_2 = 40). On the basis of these two groups formed, independent samples t-tests were run.[304]

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questions and the research hypotheses formulated, a dichotomous categorization of learners, resulting in two groups of learners, was considered expedient as regards the purposes of the study conducted.

[303] In the case at hand, the categorization of students based on their overall disposition for learning leads to a bisection of the total number of participants considered as cases in the calculations and analyses in Chapter 5. With n_1 = 41 and n_2 = 40, these two groups of students are treated as being of equal size.

[304] With a view to running an independent samples t-test (in short: an independent t-test), several assumptions have to be met by the data. (1) The dependent variable is measured (at least) at the interval level. (2) There is an independent variable on the basis of which are formed the two (categorical, independent) groups that are to be compared. (3) Normal distribution within the populations. (4) Homogeneity of variance (homoscedasticity) within the populations. (5) There is independence of observations, within as well as between groups. For details on the assumptions underlying the independent t-test see, e.g., Bortz (2005); Field (2013); Rasch, Friese, Hofmann, and Naumann (2014); and Universität Zürich (2016c). In the following analyses, the assumptions are made that (1) the depend-

The range of scores for students' actual approaches to learning realized in task processing in the portfolio-based learning environment, both deep and surface, was from (10*1 =) 10 (minimum) to (10*5 =) 50 (maximum) respectively.

H_1: Pre-service teachers having an overall disposition tending towards deep learning …

Sub-Hypothesis $H_{1.1}$: … adopt more of a deep approach to learning in task processing …

Sub-Hypothesis $H_{1.2}$: … adopt less of a surface approach to learning in task processing …

Sub-Hypothesis $H_{1.3}$: … adopt an overall learning approach tending more towards deep learning in task processing …

… than do pre-service teachers having an overall disposition tending towards surface learning.

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ent variable can be considered to be on an interval level as regards students' scores for deep and surface learning as well as their scores for deep and cognitive processing; (2) there are two categorical, independent groups of students formed; (3) the number of students in each of the two groups exceeds the threshold level of 30 participants, which as a rule of thumb is commonly cited in statistical literature with regard to a threshold sample size above which a possible deviation from the assumption of normal distribution can be neglected, the t-test being considered to be quite robust against possible deviations from one or more of its assumptions; (4) homogeneity of variances is tested (and, if necessary, corrected) by IBM SPSS Statistics 24; while (5) the independence of observations within and across groups can be assumed. As is noted in the literature, deviations from one or more assumptions of the t-test are not uncommon in practical, real-life research. What is important is to be aware of the theoretical assumptions underlying the t-test, and to judge the extent to which they are met by the available data when running a t-test.

Sub-Hypothesis $H_{1.1}$	Pre-service teachers having an overall disposition tending towards deep learning adopt more of a deep approach to learning in task processing than do pre-service teachers having an overall disposition tending towards surface learning.
Statistical procedure	Independent samples t-test (parametric procedure)
Variables involved	DA_Post2a (absolute score of actual/realized deep approach to learning in task processing), ranging from 10 (Minimum) to 50 (Maximum) DDSD_Pre_binary (grouping variable, taking the values 1.00 (overall disposition tending towards deep learning) or 2.00 (overall disposition tending towards surface learning), based on students' (pre-)dispositions for deep and surface learning)

The group statistics regarding students' realized deep approaches to learning in groups 1 and 2 are given in Table 2:

Table 2. Realized Deep Approach to Learning (Post-Test 2a) – Group Statistics

Group Statistics

	Grouping variable DDSD_Pre_binary	*N*	*Mean*	*Std. Deviation*	*Std. Error Mean*
Realized Deep Approach to Learning (Post-Test 2a)	1.00	41	28.93	6.290	.982
	2.00	40	25.13	6.866	1.086

As can be seen from the table, the mean score of actual/realized deep approaches to learning is higher in the group comprising the students with an overall disposition for

deep learning (M_1 = 28.93) than in the group of students with an overall disposition tending towards surface learning (M_2 = 25.13). The independent samples t-test statistics is shown in Table 3:

Table 3. Realized Deep Approach to Learning in Task Processing (Post-Test 2a) – Independent Samples t-Test

Independent Samples Test

			Realized Deep Approach to Learning in Task Processing (Post-Test 2a)	
			Equal variances assumed	Equal variances not assumed
Levene's Test for Equality of Variances	F		.176	
	Sig.		.676	
t-test for Equality of Means	t		2.600	2.597
	df		79	78.018
	Sig. (2-tailed)		.011	.011
	Mean Difference		3.802	3.802
	Std. Error Difference		1.462	1.464
	95 % Confidence Interval of the Difference	Lower	.891	.887
		Upper	6.713	6.717

As can be seen from a comparison of the mean scores of actual/realized deep approaches to learning in task processing, there is a Mean Difference of 3.802. Based on Levene's Test for Equality of Variances, equal variances could be assumed.[305] Based on the independent samples t-test run, this study found that there was a significant ($p < .05$) difference in the mean scores regarding actual deep approaches to learning realized in task processing by students with a more academic overall disposition for learning ($M_1 = 28.93$, $SD_1 = 6.290$) as compared to actual deep learning approaches in task processing realized by students with a more non-academic overall disposition for learning ($M_2 = 25.13$, $SD_2 = 6.866$), $t(79) = 2.600$, $p = .011$.[306] The effect size[307] (Cohen's d) was calculated as $d = .58$, representing a medium effect.[308]

[305] IBM SPSS Statistics calculates two versions of the independent samples t-test, one version representing the results of Student's t-test (to be used if equal variances can be assumed on the basis of Levene's Test for Equality of Variances), the other representing the results of Welch's t-test (unequal variances t-test; for a discussion of Welch's approach, see Welch, 1947, 1951). In the literature on statistics, some authors advocate the use of Welch's t-test in all cases, regardless of the result of Levene's Test for Equality of Variances. In the case on hand, equality of variances can be assumed *and* the two groups to be compared are of equal size (41 and 40 students, respectively). There is considerable evidence in statistical literature that a deviation from one or more assumptions underlying the t-test does not preclude its use.

[306] Based on conventional levels of significance, $p \leq .05$ is regarded as representing a statistically significant result (e.g., Craparo, 2007). Substantiated by theory, Main Hypothesis 1 is directional, and thus, one-tailed testing is appropriate, which results in $p = .011 / 2 = .0055$. Based on theory, Main Hypothesis 2 is directional as well, allowing one-tailed testing, too. As regards Main Hypothesis 3, two-tailed testing, which is stricter, will be applied. For two-tailed testing with regard to Main Hypothesis 4, where the *nonexistence* of a difference is presumed, also see Cho & Abe (2013).

[307] While the result of the t-test shows that the difference in group means is statistically significant, it provides no answer as to the magnitude, i.e., the size of the effect. There are various methods for calculating effect sizes, and thus, numerous indices, Cohen's d and Pearson's r being among the most prominent. Cohen's d is to be preferred if there is a considerable difference in the size of the two groups that are compared (Universität Zürich, 2016c); as an element of the d family of effect size indices it is used with regard to group differences, while Pearson's r, belonging to the r family, is used in the analysis of associations. In statistical analyses, Cohen's conventions are used to interpret effect size. As is the case with any convention, they should be used with caution, as pointed out by Cohen himself (Cohen, 1988). With regard to effect size, Pearson's $r = .10$ implies a weak effect, $r = .30$ implies a moderate effect, and $r = .50$ implies a strong effect (Universität Zürich, 2016c), while for Co-

With regard to Sub-Hypothesis $H_{1.1}$, there is a significant difference in group means, so the null hypothesis can be rejected. The effect size can be classified as intermediate.

Sub-Hypothesis $H_{1.2}$	Pre-service teachers having an overall disposition tending towards deep learning adopt less of a surface approach to learning in task processing than do pre-service teachers having an overall disposition tending towards surface learning.
Statistical procedure	Independent samples t-test (parametric procedure)
Variables involved	SA_Post2a (absolute score of actual/realized surface approach to learning in task processing), ranging from 10 (Minimum) to 50 (Maximum) DDSD_Pre_binary (grouping variable, taking the values 1.00 (overall disposition tending towards deep learning) or 2.00 (overall disposition tending towards surface learning), based on students' (pre-)dispositions for deep and surface learning)

The group statistics regarding students' realized surface approaches to learning in groups 1 and 2 are given in Table 4:

hen's *d* these conventions are .2, .5, and .8 respectively (Cohen, 1988). For further information on statistical power analysis, effect size indices, and conventional values for statistical tests, see, e.g., Aberson (2010); Borenstein, Hedges, Higgins, and Rothstein (2009); Cohen (1992a, 1992b); Ellis (2016); Lenhard and Lenhard (2016); and Liu (2014).

[308] All effect sizes are calculated on the basis of Cohen's *d*, and classified on the basis of their magnitude according to Cohen (1988).

Table 4. Realized Surface Approach to Learning (Post-Test 2a) – Group Statistics

Group Statistics

	Grouping variable DDSD_Pre_binary	*N*	*Mean*	*Std. Deviation*	*Std. Error Mean*
Realized Surface Approach to Learning (Post-Test 2a)	1.00	41	23.22	4.942	.772
	2.00	40	26.83	6.139	.971

As can be seen from the table, the mean score of actual/realized surface approaches to learning in the portfolio-based learning environment is lower in the group of students with a disposition tending towards deep learning (M_1 = 23.22) than in the group of students with a disposition tending towards surface learning (M_2 = 26.83). The independent samples t-test statistics, presented in Table 5, is as follows:

Table 5. Realized Surface Approach to Learning in Task Processing (Post-Test 2a) – Independent Samples t-Test

Independent Samples Test

			Realized Surface Approach to Learning in Task Processing (Post-Test 2a)	
			Equal variances assumed	Equal variances not assumed
Levene's Test for Equality of Variances	F		1.484	
	Sig.		.227	
t-test for Equality of Means	t		-2.915	-2.907
	df		79	74.767
	Sig. (2-tailed)		.005	.005
	Mean Difference		-3.605	-3.605
	Std. Error Difference		1.237	1.240
	95 % Confidence Interval of the Difference	Lower	-6.067	-6.076
		Upper	-1.144	-1.135

As can be seen from a comparison of the mean scores of students' actual/realized surface approaches to learning in task processing, there is a Mean Difference of -3.605. Based on Levene's Test for Equality of Variances, equal variances could be assumed. Based on the independent samples t-test run, this study found that there was a significant (p < .01) difference in the mean scores regarding actual surface approaches to

learning realized in task processing by students with a more academic overall disposition for learning (M_1 = 23.22, SD_1 = 4.942) as compared to actual surface learning approaches in task processing realized by students with a more non-academic overall disposition for learning (M_2 = 26.83, SD_2 = 6.139), $t(79) = -2.915$, $p = .005$.[309] The effect size was calculated as $d = -.65$, which represents a medium effect.

With regard to Sub-Hypothesis $H_{1.2}$, there is a significant difference in group means, too. Thus, the null hypothesis can be rejected. The effect size is intermediate.

Sub-Hypothesis $H_{1.3}$	Pre-service teachers having an overall disposition tending towards deep learning adopt an overall learning approach tending more towards deep learning in task processing than do pre-service teachers having an overall disposition tending towards surface learning.
Statistical procedure	Independent samples t-test (parametric procedure)
Variables involved	Quot_RealDASA_Post2a (relative score of actual/realized deep and surface approaches to learning in task processing), ranging from .2 (Minimum) to 5 (Maximum) DDSD_Pre_binary (grouping variable, taking the values 1.00 (overall disposition tending towards deep learning) or 2.00 (overall disposition tending towards surface learning), based on students' (pre-)dispositions for deep and surface learning)

The group statistics regarding the quotient Realized Deep Approach/Realized Surface Approach to learning in the two groups can be seen from Table 6:

[309] Based on conventional levels of significance, $p \leq .05$ is regarded as representing a statistically significant result. Again, the sub-hypothesis is directional, making possible the application of a one-tailed test, resulting in $p = .005 / 2 = .0025$.

Table 6. Quotient Realized Deep/Surface Approach to Learning (Post-Test 2a)

Group Statistics

	Grouping variable DDSD_Pre_binary	*N*	*Mean*	*Std. Deviation*	*Std. Error Mean*
Quotient Realized Deep/Surface Approach to Learning (Post-Test 2a)	1.00	41	1.3358	.51858	.08099
	2.00	40	1.0195	.45250	.07155

As can be seen from the group statistics, the mean of the quotient representing the actual overall approach to learning realized in task processing is higher in the group comprising the students with a disposition tending towards deep learning (M_1 = 1.3358) than is the mean of this quotient in the group of students tending in their dispositions towards surface learning (M_2 = 1.0195). The test statistics, provided in Table 7, is as follows:

Table 7. Quotient Realized Deep/Surface Approach to Learning (Post-Test 2a) – Independent Samples t-Test

Independent Samples Test

			Quotient Realized Deep/ Surface Approach to Learning (Post-Test 2a)	
			Equal variances assumed	Equal variances not assumed
Levene's Test for Equality of Variances	F		.416	
	Sig.		.521	
t-test for Equality of Means	t		2.922	2.927
	df		79	78.044
	Sig. (2-tailed)		.005	.004
	Mean Difference		.31629	.31629
	Std. Error Difference		.10825	.10807
	95 % Confidence Interval of the Difference	Lower	.10083	.10115
		Upper	.53176	.53143

As can be seen from a comparison of the mean scores of actual overall approaches to learning realized in task processing, there is a Mean Difference of .31629. Based on Levene's Test for Equality of Variances, equal variances could be assumed. Based on the independent samples t-test run, this study found that there was a significant (p < .01) difference in the mean scores regarding actual overall approaches to learning real-

ized in task processing by students with a more academic overall disposition for learning (M_1 = 1.3358, SD_1 = .51858) as compared to actual/realized overall learning approaches in task processing realized by students with a more non-academic overall disposition for learning (M_2 = 1.0195, SD_2 = .45250), $t(79) = 2.922$, $p = .005$.[310] The effect size was calculated as $d = .65$, which represents a medium effect.

In order to proceed with extra care with regard to students' actual *overall* approaches to learning in task processing (as represented by the quotients of realized deep and surface approaches to learning), an additional test was run on the basis of a non-parametric procedure, namely on the basis of the Mann-Whitney U-Test as the non-parametric procedure equivalent to the independent samples t-test (Universität Zürich, 2016a).[311] The results of the Mann-Whitney U-Test are given in Tables 8 and 9:

[310] Based on conventional levels of significance, $p \leq .05$ is regarded as representing a statistically significant result. Here again, the sub-hypothesis is directional, making possible the application of a one-tailed test, resulting in $p = .005 / 2 = .0025$.

[311] The line of reasoning was as follows: Non-parametric statistical procedures have less power than parametric statistical procedures. Thus, as a rule of thumb, parametric procedures are to be preferred if they can be reasonably applied. While with regard to the comparisons involving the *absolute* scores of students' actual/realized deep and surface approaches to learning in task processing it was argued that t-tests are considered to be robust, it is yet to be discussed whether the application of an independent samples t-test to students' *overall* approaches to learning and the quotients representing them would not strain too much the robustness of the t-test as a parametric statistical procedure. Thus, in order not to neglect this consideration, the Mann-Whitney U-Test as the non-parametric procedure of the independent samples t-test was employed *in addition* to the independent samples t-test run. The assumption was that if both procedures would yield a result to the same effect, i.e., a statistically significant or non-significant difference in actual/realized learning approaches in task processing between the two groups of academically oriented and non-academically oriented students, this difference could be assumed to be statistically significant or non-significant in any case.

Table 8. Quotient Realized Deep Approach/Realized Surface Approach to Learning (Post-Test 2a) – Mann-Whitney U-Test, Ranks

Ranks

	'academically oriented' vs. 'non-academically oriented'	*N*	*Mean Rank*	*Sum of Ranks*
Quotient Realized Deep Approach/ Realized Surface Approach to Learning (Post-Test 2a)	1.00	41	48.18	1975.50
	2.00	40	33.64	1345.50
	Total	81		

Table 9. Quotient Realized Deep Approach/Realized Surface Approach to Learning (Post-Test 2a) – Mann-Whitney U-Test, Test Statistics

Test Statistics[a]

	Quotient Realized Deep Approach/ Realized Surface Approach to Learning (Post-Test 2a)
Mann-Whitney U	525.500
Wilcoxon W	1345.500
Z	-2.782
Asymp. Sig. (2-tailed)	.005
Exact Sig. (2-tailed)	.005
Exact Sig. (1-tailed)	.003
Point Probability	.000

a. Grouping Variable: 'academically oriented' vs. 'non-academically oriented'

The median values in the two groups are given in Tables 10 and 11:

Table 10. Quotient Realized Deep Approach/Realized Surface Approach to Learning (Post-Test 2a) – Median in Group 1

Statistics[a]

Quotient Realized Deep Approach/Realized Surface Approach to Learning (Post-Test 2a)

N	Valid	41
	Missing	0
Median		1.2400

a. 'academically oriented' vs. 'non-academically oriented' = 1.00

Table 11. Quotient Realized Deep Approach/Realized Surface Approach to Learning (Post-Test 2a) – Median in Group 2

Statistics[a]

Quotient Realized Deep Approach/Realized Surface Approach to Learning (Post-Test 2a)

N	Valid	40
	Missing	0
Median		.9844

a. 'academically oriented' vs. 'non-academically oriented' = 2.00

As can be seen from the calculation, students who are academically oriented adopt an overall learning approach tending more towards deep learning in task processing (Mdn_1 = 1.2400) than do pre-service teachers who are non-academically oriented (Mdn_2 = .9844, z = -2.782, Asymp. Sig. (2-tailed) p = .005, Exact Sig. (1-tailed) p = .003). The effect size based on Cohen's d is .65, equaling a medium effect.

Both the independent samples t-test *and* the Mann-Whitney U-test indicate a significant difference between the two groups of students. Thus, with regard to Sub-Hypothesis $H_{1.3}$, the null hypothesis can be rejected, too. The effect size equals a medium effect.

5.2 Students' learning dispositions and students' realized levels of cognitive task processing in portfolio construction

Again, scores from the disposition questionnaire, used to measure students' dispositions regarding learning, were related to scores from the task processing questionnaire, in the present case the scores regarding students' levels of cognitive task processing in portfolio construction.

The scores for students' levels of cognitive task processing, both deep and surface, could range from (8*1 =) 8 (minimum) to (8*5 =) 40 (maximum) respectively. Again, groups were formed based on students' dispositions for deep and surface learning at the beginning of the course (i.e., as represented based on the disposition questionnaire administered in the pre-test). Students with an overall disposition tending towards deep learning were assigned to group 1 (n_1 = 41), students with an overall disposition tending towards surface learning were assigned to group 2 (n_2 = 40).

Sub-Hypothesis $H_{2.1}$	Pre-service teachers having an overall disposition tending towards deep learning attain a higher score of deep cognitive processing in portfolio construction than is the case with pre-service teachers having an overall disposition tending towards surface learning.
Statistical procedure	Independent samples t-test (parametric procedure)
Variables involved	DCTP_Post2a (absolute score of actual/realized deep cognitive task processing in portfolio construction), ranging from 8 (Minimum) to 40 (Maximum) DDSD_Pre_binary (grouping variable, taking the values 1.00 (overall disposition tending towards deep learning) or 2.00 (overall disposition tending towards surface learning), based on students' (pre-)dispositions for deep and surface learning)

The group statistics regarding students Realized Deep Cognitive Task Processing in groups 1 and 2 are given in Table 12:

Table 12. Realized Deep Cognitive Task Processing (Post-Test 2a) – Group Statistics

Group Statistics

	Grouping variable DDSD_Pre_binary	*N*	*Mean*	*Std. Deviation*	*Std. Error Mean*
Realized Deep Cognitive Task Processing (Post-Test 2a)	1.00	41	31.34	3.766	.588
	2.00	40	29.43	5.481	.867

As can be seen from the table, with students tending towards deep learning in their dispositions the mean score for actual/realized deep cognitive task processing in portfolio construction was higher (M_1 = 31.34) than in the group of students tending in their dispositions towards surface learning (M_2 = 29.43). The t-test statistics, provided in Table 13, is as follows:

Table 13. Realized Deep Cognitive Task Processing (Post-Test 2a) – Independent Samples t-Test

Independent Samples Test

			Realized Deep Cognitive Task Processing (Post-Test 2a)	
			Equal variances assumed	Equal variances not assumed
Levene's Test for Equality of Variances	F		2.392	
	Sig.		.126	
t-test for Equality of Means	t		1.838	1.830
	df		79	68.934
	Sig. (2-tailed)		.070	.072
	Mean Difference		1.916	1.916
	Std. Error Difference		1.043	1.047
	95 % Confidence Interval of the Difference	Lower	-.159	-.173
		Upper	3.992	4.006

As can be seen from a comparison of the mean scores of actual/realized deep cognitive task processing, there is a Mean Difference of 1.916. Based on Levene's Test for Equality of Variances, equal variances could be assumed. Based on the independent samples t-test run and one-tailed hypothesis testing, this study found that there was a significant difference in the mean scores regarding actual/realized deep cognitive task processing

by students with a more academic overall disposition for learning (M_1 = 31.43, $SD1$ = 3.766) as compared to actual deep cognitive task processing realized by students with a more non-academic overall disposition for learning (M_2 = 29.43, SD_2 = 5.481), $t(79)$ = 1.838, p = .070 (2-tailed), and p =.035 (1-tailed).[312] The effect size based on Cohen's d is .41, representing a small effect.

On the basis of this test statistics, as regards Sub-Hypothesis $H_{2.1}$, the null hypothesis can be rejected.

Sub-Hypothesis $H_{2.2}$	Pre-service teachers having an overall disposition tending towards deep learning attain a lower score of surface cognitive processing in portfolio construction than is the case with pre-service teachers having an overall disposition tending towards surface learning.[313]
Statistical procedure	Independent samples t-test (parametric procedure)
Variables involved	SCTP_Post2a (absolute score of actual/realized surface cognitive task processing in portfolio construction), ranging from 8 (Minimum) to 40 (Maximum) DDSD_Pre_binary (grouping variable, taking the values 1.00 (overall disposition tending towards deep learning) or 2.00 (overall disposition tending towards surface learning), based on students' (pre-)dispositions for deep and surface learning)

[312] Based on conventional levels of significance, $p \leq .05$ is regarded as representing a statistically significant result. Main Hypothesis 2 as well as all sub-hypotheses derived from it are directional, so testing on a one-tailed basis is appropriate. This results in p = .070 / 2 = .035.

[313] Which – looked at from the converse, corresponding point of view – of course means that pre-service teachers having an overall disposition tending towards surface learning attain a higher score of surface cognitive processing in portfolio construction.

The group statistics regarding students' Realized Surface Cognitive Task Processing in groups 1 and 2 can be seen from Table 14:

Table 14. Realized Surface Cognitive Task Processing (Post-Test 2a) – Group Statistics

Group Statistics

	Grouping variable DDSD_Pre_binary	*N*	*Mean*	*Std. Deviation*	*Std. Error Mean*
Realized Surface Cognitive Task Processing (Post-Test 2a)	1.00	41	18.15	5.369	.839
	2.00	40	21.60	5.532	.875

With students tending towards deep learning in their dispositions, the mean score for actual/realized surface cognitive task processing in portfolio construction was lower (M_1 = 18.15) than with students having a disposition tending towards surface processing (M_2 = 21.60). The results of the independent samples t-test run are provided in Table 15:

Table 15. Realized Surface Cognitive Task Processing (Post-Test 2a) – Independent Samples t-Test

Independent Samples Test

			Realized Surface Cognitive Task Processing (Post-Test 2a)	
			Equal variances assumed	Equal variances not assumed
Levene's Test for Equality of Variances	F		.268	
	Sig.		.606	
t-test for Equality of Means	t		-2.851	-2.850
	df		79	78.763
	Sig. (2-tailed)		.006	.006
	Mean Difference		-3.454	-3.454
	Std. Error Difference		1.211	1.212
	95 % Confidence Interval of the Difference	Lower	-5.865	-5.866
		Upper	-1.043	-1.042

As can be seen from a comparison of the mean scores of actual surface cognitive task processing realized in portfolio construction, there is a Mean Difference of -3.454. Based on Levene's Test for Equality of Variances, equal variances could be assumed. Based on the independent samples t-test run, this study found that there was a significant ($p < .01$) difference in the mean scores regarding actual/realized surface cognitive

task processing by students with a more academic overall disposition for learning (M_1 = 18.15, SD_1 = 5.369) as compared to actual deep cognitive task processing realized by students with a more non-academic overall disposition for learning (M_2 = 21.60, SD_2 = 5.532), $t(79) = -2.851$, $p = .006$.[314] The effect size was calculated as $d = -.63$, representing a medium effect.

With regard to Sub-Hypothesis $H_{2.2}$, the null hypothesis can be rejected. The effect size is intermediate.

Sub-Hypothesis $H_{2.3}$	Pre-service teachers having an overall disposition tending towards deep learning attain an overall score of cognitive processing in portfolio construction tending more towards deep processing than is the case with pre-service teachers having an overall disposition tending towards surface learning..
Statistical procedure	Independent samples t-test (parametric procedure)
Variables involved	Quot_DCTPSCTP_Post2a (absolute score of actual/realized surface cognitive task processing in portfolio construction), ranging from .2 (Minimum) to 5 (Maximum) DDSD_Pre_binary (grouping variable, taking the values 1.00 (overall disposition tending towards deep learning) or 2.00 (overall disposition tending towards surface learning), based on students' (pre-)dispositions for deep and surface learning)

The group statistics regarding students' Realized Overall Cognitive Task Processing in groups 1 and 2 are given in Table 16:

[314] Based on conventional levels of significance, $p \leq .05$ is regarded as representing a statistically significant result. A one-tailed test results in $p = .006 / 2 = .003$.

Table 16. Realized Overall Cognitive Task Processing (Post-Test 2a) – Group Statistics

Group Statistics

	Grouping variable DDSD_Pre_binary	*N*	*Mean*	*Std. Deviation*	*Std. Error Mean*
Realized Overall Cognitive Task Processing (Post-Test 2a)	1.00	41	1.9053	.69922	.10920
	2.00	40	1.4746	.51454	.08136

The mean of the scores for overall actual/realized levels of cognitive task processing is higher for students with a disposition for deep learning.

The results of the independent samples t-test run are given in Table 17:

Table 17. Realized Overall Cognitive Task Processing (Post-Test 2a) – Independent Samples t-Test

Independent Samples Test

		Realized Overall Cognitive Task Processing (Post-Test 2a)	
		Equal variances assumed	Equal variances not assumed
Levene's Test for Equality of Variances	F	1.357	
	Sig.	.248	
t-test for	t	3.151	3.163

Equality of Means	df		79	73.502
	Sig. (2-tailed)		.002	.002
	Mean Difference		.43067	.43067
	Std. Error Difference		.13668	.13617
	95 % Confidence Interval of the Difference	Lower	.15861	.15931
		Upper	.70273	.70203

As can be seen from a comparison of the mean scores of actual/realized overall cognitive task processing, there is a Mean Difference of .43067. Based on Levene's Test for Equality of Variances, equal variances could be assumed. Based on the independent samples t-test run, this study found that there was a highly significant ($p < .01$) difference in the mean scores regarding actual/realized overall cognitive task processing by students with a more academic overall disposition for learning ($M_1 = 1.9053$, $SD_1 = .69922$) as compared to actual deep cognitive task processing realized by students with a more non-academic overall disposition for learning ($M_2 = 1.4746$, $SD_2 = .51454$), $t(79) = 3.151$, $p = .002$.[315] The effect size was calculated as $d = .7$, representing a medium effect.

In order to proceed with extra care as regards the comparison of students' *overall* levels of cognitive processing in portfolio construction, again, an extra test was run in the form of an additional Mann-Whitney U-Test.[316] The results of the Mann-Whitney U-Test are presented in Tables 18 and 19:

[315] Based on conventional levels of significance, $p \leq .05$ is regarded as representing a statistically significant result. Here again, a one-tailed test of significance is appropriate, resulting in $p = .002 / 2 = .001$.

[316] The line of reasoning regarding the *additional* application of a non-parametric procedure with regard to students' *overall* measures is given in Sub-Chapter 5.1.

Table 18. Quotient Realized Deep Cognitive Task Processing/Realized Surface Cognitive Task Processing (Post-Test 2a) – Mann-Whitney U-Test, Ranks

Ranks

	'academically oriented' vs. 'non-academically oriented'	*N*	*Mean Rank*	*Sum of Ranks*
Quotient Realized Deep Cognitive Task Processing/Realized Surface Cognitive Task Processing (Post-Test 2a)	1.00	41	48.27	1979.00
	2.00	40	33.55	1342.00
	Total	81		

Table 19. Quotient Realized Deep Cognitive Task Processing/Realized Surface Cognitive Task Processing (Post-Test 2a) – Mann-Whitney U-Test, Test Statistics

Test Statistics[a]

	Quotient Realized Deep Cognitive Task Processing/Realized Surface Cognitive Task Processing (Post-Test 2a)
Mann-Whitney U	522.000
Wilcoxon W	1342.000
Z	-2.815
Asymp. Sig. (2-tailed)	.005
Exact Sig. (2-tailed)	.005
Exact Sig. (1-tailed)	.002
Point Probability	.000

a. Grouping Variable: 'academically oriented' vs. 'non-academically oriented'

The median values calculated for the two groups are given in Tables 20 and 21:

Table 20. Quotient Realized Deep Cognitive Task Processing/Realized Surface Cognitive Task Processing (Post-Test 2a) – Median in Group 1

Statistics[a]

Quotient Realized Deep Cognitive Task Processing/Realized Surface Cognitive Task Processing (Post-Test 2a)

N	Valid	41
	Missing	0
Median		1.8824

a. 'academically oriented' vs. 'non-academically oriented' = 1.00

Table 21. Quotient Realized Deep Cognitive Task Processing/Realized Surface Cognitive Task Processing (Post-Test 2a) – Median in Group 2

Statistics[a]

Quotient Realized Deep Cognitive Task Processing/Realized Surface Cognitive Task Processing (Post-Test 2a)

N	Valid	40
	Missing	0
Median		1.4505

a. 'academically oriented' vs. 'non-academically oriented' = 2.00

As can be seen from the test statistics, pre-service teachers' overall levels of cognitive processing in portfolio construction are higher in the group of academically oriented students (Mdn_1 = 1.8824) than in the group of non-academically oriented students (Mdn_2 = 1.4505, z = -2,815, Asymp. Sig. (2-tailed) p = .005, Exact Sig. (1-tailed) p = .002). Cohen's d as calculated on the basis of z and N, and a subsequent conversion between r and d, is .66 (i.e., close to .7), corresponding to a medium effect.

Thus, with regard to Sub-Hypothesis 2.3, the null hypothesis can be rejected: The difference between group means is calculated as being significant both based on the parametric and on the non-parametric procedure. The effect size is intermediate.

5.3 Development of students' learning dispositions

The development of students' dispositions for quality learning was analyzed on the basis of the relevant scores from the disposition questionnaire. While the first two main hypotheses were concerned with differences between groups of students, the third main hypothesis is about presumed changes in students' disposition for deep learning, i.e., for quality learning.

As noted, the range of scores of students learning dispositions, both deep and surface, was from (6*1 =) 6 (minimum) to (6*5 =) 30 respectively. In order to analyze the development of students' disposition for deep learning, a paired samples t-test was run.[317]

Main Hypothesis H_3	Learning within a portfolio-based learning environment enhances pre-service teachers' dispositions for deep learning.
Statistical procedure	Paired samples t-test (parametric procedure)
Variables involved	DD_Pre (absolute score of disposition for deep learning in t_0)
	DD_Post1 (absolute score of disposition for deep learning in t_1)
	DD_Post2b (absolute score of disposition for deep learning in t_2)
	With all three variables, the range is from 6 (Minimum) to 30 (Maximum).

[317] As is the case with the independent samples t-test, there are several assumptions the paired samples t-test is based on (see, e.g., Universität Zürich, 2016b). Again, as was laid out with regard to the independent samples t-test, a possible deviation from one or more of these assumptions does not categorically preclude its use. The t-test being robust to deviations from one or more of the underlying assumptions and the sample of 81 cases clearly superseding the conventional threshold of 30 cases, the deviation from the assumption of normality as given in the present context is regarded as not precluding the use of the paired samples t-test as a parametric procedure.

As was laid out in Section 4.5.1, t_0 was at the beginning of the course *Schulpraktische Studien 1 (SPS 1)*, t_1 was at the end of classes, before the two-week school practicum, and t_2 was at the end of the course, after the school practicum and after the completion of portfolio construction. In order to look at the development of students' dispositions addressed in Hypothesis 3, the changes in students' absolute scores of disposition for deep learning between t_0 and t_1, t_1 and t_2, as well as between t_0 and t_2 were analyzed.

The paired samples statistics, the paired samples correlations, and the paired samples test are given in Tables 22, 23, and 24:

Table 22. Student Disposition for Deep Learning – Paired Samples Statistics

Paired Samples Statistics

		Mean	*N*	*Std. Deviation*	*Std. Error Mean*
Pair 1	Student Disposition for Deep Learning (Pre-Test)	16.44	81	3.256	.362
	Student Disposition for Deep Learning (Post-Test 1)	13.40	81	2.787	.310
Pair 2	Student Disposition for Deep Learning (Post-Test 1)	13.40	81	2.787	.310
	Student Disposition for Deep Learning (Post-Test 2b)	17.14	81	3.513	.390
Pair 3	Student Disposition for Deep Learning (Pre-Test)	16.44	81	3.256	.362
	Student Disposition for Deep Learning (Post-Test 2b)	17.14	81	3.513	.390

Table 23. Student Disposition for Deep Learning – Paired Samples Correlations

Paired Samples Correlations

		N	*Correlation*	*Sig.*
Pair 1	Student Disposition for Deep Learning (Pre-Test) & Student Disposition for Deep Learning (Post-Test 1)	81	.647	.000
Pair 2	Student Disposition for Deep Learning (Post-Test 1) & Student Disposition for Deep Learning (Post-Test 2b)	81	.625	.000
Pair 3	Student Disposition for Deep Learning (Pre-Test) & Student Disposition for Deep Learning (Post-Test 2b)	81	.606	.000

Table 24. Student Disposition for Deep Learning – Paired Samples Test

Paired Samples Test

		Paired Differences			
		Mean	*Std. Deviation*	*Std. Error Mean*	*95% Confidence Interval of the Difference* *Lower*
Pair 1	Student Disposition for Deep Learning (Pre-Test) – Student Disposition for Deep Learning (Post-Test 1)	3.049	2.573	.286	2.480

Pair 2	Student Disposition for Deep Learning (Post-Test 1) - Student Disposition for Deep Learning (Post-Test 2b)	-3.741	2.805	.312	-4.361
Pair 3	Student Disposition for Deep Learning (Pre-Test) - Student Disposition for Deep Learning (Post-Test 2b)	-.691	3.015	.335	-1.358

Table 24. Student Disposition for Deep Learning – Paired Samples Test (continued)

Paired Samples Test

		Paired Differences 95% Confidence Interval of the Difference Upper	t	df	Sig. (2-tailed)
Pair 1	Student Disposition for Deep Learning (Pre-Test) - Student Disposition for Deep Learning (Post-Test 1)	3.618	10.665	80	.000
Pair 2	Student Disposition for Deep Learning (Post-Test 1) - Student Disposition for Deep Learning (Post-Test 2b)	-3.120	-12.001	80	.000

Pair 3	Student Disposition for Deep Learning (Pre-Test) - Student Disposition for Deep Learning (Post-Test 2b)	-.025	-2.064	80	.042

As can be seen from the paired samples t-test, there is a mean difference of 3.049 between students' absolute scores for deep learning disposition in t_0 as compared to students' absolute scores for deep learning disposition in t_1. This difference (M_{t0_t1} = 3.049, SD_{t0_t1} = 2.573) is (highly) significant, with $t(80) = 10.665$, $p < .001$. There is a mean difference of -3.741 between students' absolute scores for deep learning disposition in t_1 as compared to their absolute scores for deep learning disposition in t_2. This difference (M_{t1_t2} = -3.741, SD_{t1_t2} = 2.805) is (highly) significant, with $t(80) = -12{,}001$, $p < .001$. Finally, there is a mean difference of M_{t0_t2} = -.691 (SD_{t0_t2} = 3.015) between students' absolute scores for deep learning disposition in t_0 as compared to their absolute scores for deep learning disposition in t_2. This difference M_{t0_t2} is significant, with $t(80) = -2.064$, $p = .042$.[318] Effect sizes based on Cohen's *d* are .996 for Pair 1, -1.155 for Pair 2, and -.204 for Pair 3, equaling two strong effects and one small effect.

5.4 Impact of the form of the portfolio on student learning: Electronic portfolios (e-portfolios) vs. traditional, paper-based portfolios

In order to analyze a possible impact of the *form* of portfolio on student learning, traditional, paper-based portfolios were compared to the more recent form of portfolio, electronic portfolios (e-portfolios), the latter constructed in the context of the present study based on the e-portfolio platform Mahara, thus representing web-based portfolios.

In a first step, the starting conditions of the students in the two groups (paper-based portfolios vs. e-portfolios) were compared, using the data collected at the beginning of

[318] All *p* values listed on this page result from two-tailed testing (see Table 24).

the course *Schulpraktische Studien 1 (SPS 1)* in t_0. Based on independent samples t-tests run, no significant differences were found with regard to students' dispositions towards learning in the two group of students constructing a traditional, paper-based portfolio (n = 36) and the group of students constructing an e-portfolio (n = 45).

The group statistics regarding students' dispositions for deep and surface learning – in the two groups 'paper-based portfolio' and 'electronic portfolio' – are given in Table 25:

Table 25. Paper-Based and Electronic Portfolios (e-portfolios) – Group Statistics (Pre-Test)

Group Statistics

	Form of portfolio constructed	*N*	*Mean*	*Std. Deviation*	*Std. Error Mean*
Student Disposition for Deep Learning (Pre-Test)	Paper-based portfolio	36	15.83	3.238	.540
	Electronic portfolio	45	16.93	3.222	.480
Student Disposition for Surface Learning (Pre-Test)	Paper-based portfolio	36	17.33	4.085	.681
	Electronic portfolio	45	17.36	3.874	.577
Quotient Disposition for Deep Learning/ Disposition for Surface Learning (Pre-Test)	Paper-based portfolio	36	.9827	.35759	.05960
	Electronic portfolio	45	1.0374	.34753	.05181

All three independent samples t-tests run on the basis of the data turned out to result in non-significant differences between the two groups.[319]

In comparing the two groups, the focus of interest was on possible differences in students' approaches to learning in task processing as well as on students' levels of cognitive processing in portfolio construction.

The group statistics regarding students' realized deep and surface approaches to learning in task processing as well as their realized deep and surface cognitive task processing, given in Table 26, are as follows:

Table 26. Paper-Based and Electronic Portfolios (e-portfolios) – Group Statistics (Post-Test 2a)

Group Statistics

	Form of portfolio constructed	*N*	*Mean*	*Std. Deviation*	*Std. Error Mean*
Task Processing - Realized Deep Approach to Learning (Post-Test 2a)	Paper-based portfolio	36	27.56	6.704	1.117
	Electronic portfolio	45	26.64	6.948	1.036
Task Processing - Realized Surface	Paper-based portfolio	36	24.31	6.572	1.095

[319] When comparing students' dispositions for deep learning (pre-test) in the two groups, based on the data provided in the table, the result of the t-test was a Mean Difference of -1.100, with $t(79) = -1.523$, $p = .132$. As regards students' dispositions for surface learning (pre-test), the result of the t-test was a Mean Difference of -.022, with $t(79) = -.025$, $p = .980$. As for students' overall dispositions for deep and surface learning (pre-test), the t-test resulted in a Mean Difference of -.05474, with $t(79) = -.695$, $p = .489$. Therefore, students in the two groups (paper-based portfolio vs. e-portfolio) were considered to have similar starting conditions. Taking into account the considerations regarding the application of a t-test to students' overall disposition towards learning as represented by a quotient, a Mann-Whitney U-test was run in addition. No significant difference between students' dispositions towards learning was found on the basis of this non-parametric procedure, either, with Mann-Whitney $U = 740.000$, $z = -.666$, Asymp. Sig. (2-tailed) $p = .506$.

Approach to Learning (Post-Test 2a)	Electronic portfolio	45	25.56	5.150	.768
Portfolio Construction - Realized Deep Cognitive Processing (Post-Test 2a)	Paper-based portfolio	36	30.47	5.868	.978
	Electronic portfolio	45	30.33	3.717	.554
Portfolio Construction - Realized Surface Cognitive Processing (Post-Test 2a)	Paper-based portfolio	36	19.92	6.451	1.075
	Electronic portfolio	45	19.80	5.070	.756

Regarding the actual/realized deep approach to learning in task processing, the Mean Difference between the two groups is .911, with $t(79) = .596$, $p = .553$. As for the actual/realized surface approach to learning in task processing, the Mean Difference between the two groups is -1.250, with $t(79) = -.960$, $p = .340$. As for actual/realized deep cognitive processing in portfolio construction, the Mean Difference between the two groups is .139, with $t(56{,}455) = .124$,[320] $p = .902$, while for actual/realized surface cognitive processing in portfolio construction, the Mean Difference is .117, with $t(79) = .091$, $p = .928$. Thus, all t-tests result in group differences that are not statistically significant.

The development of students' dispositions towards learning can also be looked at based on the division between students constructing a paper-based portfolio and students constructing an e-portfolio. The paired samples statistics and the paired samples correlations are provided in Tables 27 and 28:

[320] As regards the comparison of realized deep cognitive processing in portfolio construction in the two groups, equal variances are not assumed (based on Levene's test).

Table 27. Paper-Based and Electronic Portfolios (e-portfolios) – Paired Samples Statistics

Paired Samples Statistics

			Mean	*N*	*Std. Deviation*	*Std. Error Mean*
Paper-based port-folio	Pair 1	Student Disposition for Deep Learning (Pre-Test)	15.83	36	3.238	.540
		Student Disposition for Deep Learning (Post-Test 1)	13.28	36	2.824	.471
	Pair 2	Student Disposition for Deep Learning (Post-Test 1)	13.28	36	2.824	.471
		Student disposition for Deep Learning (Post-Test 2b)	16.67	36	3.703	.617
	Pair 3	Student Disposition for Deep Learning (Pre-Test)	15.83	36	3.238	.540
		Student disposition for Deep Learning (Post-Test 2b)	16.67	36	3.703	.617
E-port-folio	Pair 1	Student Disposition for Deep Learning (Pre-Test)	16.93	45	3.222	.480
		Student Disposition for Deep Learning (Post-Test 1)	13.49	45	2.785	.415

	Pair 2	Student Disposition for Deep Learning (Post-Test 1)	13.49	45	2.785	.415
		Student disposition for Deep Learning (Post-Test 2b)	17.51	45	3.348	.499
	Pair 3	Student Disposition for Deep Learning (Pre-Test)	16.93	45	3.222	.480
		Student disposition for Deep Learning (Post-Test 2b)	17.51	45	3.348	.499

Table 28. Paper-Based and Electronic Portfolios (e-portfolios) – Paired Samples Correlations

Paired Samples Correlations

			N	*Correlation*	*Sig.*
Paper-based port-folio	Pair 1	Student Disposition for Deep Learning (Pre-Test) & Student Disposition for Deep Learning (Post-Test 1)	36	.574	.000
	Pair 2	Student Disposition for Deep Learning (Post-Test 1) & Student Disposition for Deep Learning (Post-Test 2b)	36	.523	.001
	Pair 3	Student Disposition for Deep Learning (Pre-Test) & Student Disposition for Deep Learning (Post-Test 2b)	36	.543	.001
E-port-folio	Pair 1	Student Disposition for Deep Learning (Pre-Test) & Student Disposition for Deep Learning (Post-Test 1)	45	.713	.000

	Pair 2	Student Disposition for Deep Learning (Post-Test 1) & Student Disposition for Deep Learning (Post-Test 2b)	45	.718	.000
	Pair 3	Student Disposition for Deep Learning (Pre-Test) & Student Disposition for Deep Learning (Post-Test 2b)	45	.648	.000

The paired samples t-test shows that in the group of students constructing a paper-based portfolio, the mean difference in Pair 1 is 2.556, with $t(35) = 5.432$, $p < .001$; in Pair 2, the mean difference is -3.389, with $t(35) = -6.199$, $p < .001$; and in Pair 3, the mean difference is -.833, with $t(35) = -1.496$, $p = .144$. In the group of students constructing an e-portfolio, the paired samples t-test results in a mean difference in Pair 1 of 3.444, with $t(44) = 9.996$, $p = < .001$; in Pair 2, the mean difference is -4.022, with $t(44) = -11.435$, $p < .001$; and in Pair 3 the mean difference is -.578, with $t(44) = -1.405$, $p = .167$.[321]

As can be seen from the results of the t-tests related to deep learning in task processing and to deep cognitive processing in portfolio construction, none of the differences found is statistically significant. With a view to the development of students dispositions for deep learning, the developments are comparable in direction and scope in both groups, with students constructing paper-based portfolios and students constructing e-portfolios. Yet, from a scientific, statistical point of view, the results of the t-tests related to students' approaches to learning in task processing and their levels of cognitive task processing in portfolio construction do not warrant the assumption that in reality there do not exist any differences. This is due to issues of the tests' power. More on this limitation in statistical hypothesis testing will be laid out in the discussion of the results, now following in Chapter 6.

[321] The effect sizes were calculated are as follows: In the group of students constructing paper-based portfolios, Cohen's *d* is .836 (Pair 1), -1.009 (Pair 2), and -.238 (Pair 3); in the group of students constructing e-portfolios, Cohen's *d* is 1.129 (Pair 1), -1.28 (Pair 2), and -.176 (Pair 3).

6 Discussion

"It is a narrow mind which cannot look at a subject from various points of view."

George Eliot, *Middlemarch* (1871)

THE RESULTS OF THE STUDY CONDUCTED WILL NOW BE DISCUSSED in the penultimate chapter of this dissertation. The chapter consists of two distinct sections: The first part contains the discussion of the results of the empirical study conducted within the context of the course *Schulpraktische Studien 1 (SPS 1)*, while in the second part there is a critical appraisal of the whole of the project undertaken for this dissertation – including the systematic review of the literature on portfolio as one of its key components – and of the original research conducted on the basis of the instructional system that was designed – on the basis of theoretical and conceptual scholarly literature and prior empirical research, both identified over the course of the project, and of personal teaching experience with portfolio, increasing over the years – for practical implementation within the concrete context of one university course.

In Subchapter 6.1, the results of data collection and analysis as described and reported in Chapters 4 and 5 will be interpreted, both with a view to potential implications of the results as such and in comparison with the pertinent literature. In Subchapter 6.2, reflections regarding the limitations of the whole dissertation project undertaken will follow. The conclusions drawn on the basis of the comprehensive body of literature reviewed and the original research conducted will be presented in Chapter 7, following this discussion and representing the concluding chapter of this dissertation.

6.1 Discussion of the results of the empirical study conducted

The discussion of the results of the study will be structured corresponding to their presentation in the previous chapter.[322]

- First, the links between students' (pre-)dispositions and their task processing within the portfolio-based learning environment – their approaches to learning realized in task processing and their levels of cognitive processing realized in portfolio construction – will be discussed (see Main Hypotheses 1 and 2).
- Then, the development of students' dispositions regarding deep learning will be looked at (see Main Hypothesis 3).
- Finally, students' approaches to learning realized in task processing, their levels of cognitive processing realized in portfolio construction, and the development of dispositions for deep learning in the student group constructing an e-portfolio (parallel groups 1, 3, and 5, making up treatment group 'e-portfolio') and the student group constructing a traditional, paper-based portfolio (parallel groups 2, 4, and 6, constituting treatment group 'paper-based portfolio') will be compared (see Main Hypothesis 4).

Students' (pre-)dispositions towards learning and their actual approaches to learning realized in the portfolio-based learning environment designed

Main Hypothesis 1: Pre-service teachers having an overall disposition tending towards deep learning adopt a deeper learning approach in task processing than do students tending towards surface learning in their dispositions.

[322] Prior to the discussion of the results, it is to be noted that it is interesting to see that there can be made a distinction indeed between students who in their approaches to learning are more 'academically oriented' and students who are less so (Biggs and Tang, 2011). The phenomenon of varying degrees of academic orientation among university students is plausible and neither new nor surprising to higher education practitioners. Yet, it is remarkable to see it actually manifested in the data collected and analyzed.

As can be seen from the results of statistical hypothesis testing presented in Section 5.1, there could be found significant differences between the actual approaches to learning realized in the portfolio-based learning environment by the group of students with a higher overall disposition for deep learning (considered to be the group of more 'academic', or more 'academically oriented', learners) and the group of students with a lower overall disposition for deep learning (considered as the group of comparatively 'non-academic', or rather 'non-academically oriented', learners).[323]

Independent samples t-tests were run both with regard to students' *absolute* scores regarding their realized approaches to learning (deep approach to learning and surface approach to learning) and their *overall* scores regarding their realized approaches to learning in the portfolio-based learning environment (the latter being represented by the quotient of the realized deep learning and realized surface learning scores). In all tests run, there was found a significant difference between the mean scores of the group of 'academic learners' and the group of 'non-academic' learners that had been constructed on the basis of students' (pre-)dispositions towards learning.

With regard to students' absolute scores of actual deep approaches to learning realized in task processing, relevant in the statistical testing of Sub-Hypothesis 1.1., the Mean in

[323] In characterizing and labeling the two groups, it is to be emphasized once more *that there is no such thing as an – inherently pre-determined – 'academic' or 'non-academic' learner*, in particular by no means is it to be implied that some students should be judged as incorrigible 'non-academic' learners, i.e., 'non-academic' characters. What we are looking at is students' *dispositions*, or *orientations*, which are based on – and, thus, influenced by – students' previous educational experiences and can be considered as being malleable. We are dealing with states, not with traits. No student is inherently doomed to be – or to remain – a 'non-academic' learner. If in this dissertation there are used the labels of 'academic' and 'non-academic', this is only to denote the classification of student approaches and behaviors from an academic point of view, i.e., as being considered appropriate, desirable, and conducive to learning and reflection in the academic context of higher education – or as not being so. Both, 'academic' and 'non-academic' ways of thought and action are open to change through educational experiences. While it has been pointed out that a surface approach to learning is not always inappropriate (e.g., as might be the case in simply rote learning figures, where a more surface approach may well be sufficient and efficient), it is a deep approach that remains the desired way of learning in most contexts in – as well as an intended learning outcome (ILO) of – higher education.

the group of academically oriented learners – those students with an overall (pre-) disposition tending towards deep learning – was M_1 = 28.93 (SD_1 = 6.290, n_1 = 41), the Mean in the group of non-academically oriented learners – those with an overall (pre-) disposition tending towards surface learning – was M_2 = 25.13 (SD_2 = 6.866, n_2 = 40), resulting in a Mean Difference of 3.802. This Mean Difference, between the higher mean score in the group of students tending in their dispositions towards deep learning and the lower mean score in the group of students tending in their dispositions towards surface learning, is significant (t(79) = 2.600, p = .011),[324] so the null hypothesis can be rejected. Cohen's d was calculated as .58, representing an intermediate effect.

As for students' absolute scores of actual surface approaches to learning realized in task processing, relevant in statistically testing Sub-Hypothesis 1.2, the Mean in the group of 'academic' learners was M_1 = 23.22 (SD_1 = 4.942, n_1 = 41), while the Mean in the group of 'non-academic' learners was M_2 = 26.83 (SD_2 = 6.139, n_2 = 40), resulting in a Mean Difference of -3.605.[325] This difference is significant (t(79) = -2.915, p = .005),[326] too, allowing the rejection of the null hypothesis. Cohen's d was calculated as -.65, representing an intermediate effect.

When looking at students' realized overall approaches to learning, represented by the quotient of realized deep and surface approaches to learning and involved in Sub-Hypothesis 1.3, the Mean in the group of 'academic' learners was M_1 = 1.3358 (SD_1 = .51858, n_1 = 41), while the mean in the group of 'non-academic' learners was M_2 = 1.0195 (SD_2 = .45250, n_2 = 40), resulting in a Mean Difference of .31629. Again, this Mean Difference is significant (t(79) = 2.922, p = .005),[327] so the null hypothesis can be rejected. Cohen's d was calculated as .65, representing an intermediate effect.

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[324] p = .011 (2-tailed), p = .0055 (1-tailed).

[325] The negative value of the Mean Difference results from the Group Mean regarding the surface approach to learning realized in task processing being lower in Group 1 (students tending in their dispositions towards deep learning) than in Group 2 (students with a disposition tending towards surface learning). This result was as expected, students with a tendency towards surface learning trying to keep to their preferred way of learning.

[326] p = .005 (2-tailed), p = .0025 (1-tailed).

[327] p = .005 (2-tailed), p = .0025 (1-tailed).

As regards students' realized overall approaches to learning, the hypothesis that there would be a difference as described between the two groups of more 'academically oriented' and more 'non-academically oriented' students was *additionally* tested by means of a non-parametric procedure, in this case by the calculation of the Mann-Whitney U-test as the non-parametric procedure equivalent to the independent samples t-test. As can be seen from the calculation, pre-service teachers who are more academically oriented adopt an overall learning approach tending more towards deep learning in task processing ($Median_1 = 1.2400$) than do pre-service teachers who are more non-academically oriented ($Median_2 = .9844$, $z = -2.782$, $p = .005$).[328] This test statistics allows the rejection of the null hypothesis. The effect size based on Cohen's *d* is .65, equaling an intermediate effect.

The results of all calculations relative to Main Hypothesis 1 were as expected. The relations of group means were as anticipated, and, thus, the differences in the approaches to learning realized in the two groups were as predicted, with all Mean Differences between the two groups of students being calculated as being significant.

These significant differences in the measures of central tendency – with regard to the absolute as well as to the overall scores of actual approaches to learning realized in task processing in the portfolio-based learning environment and in levels of cognitive processing in portfolio construction – can be considered as being in line with original research findings in the literature on portfolio. Existing research reports on portfolio construction in pre-service teacher education comprise several accounts in which the authors note that portfolio construction as implemented in the contexts of the concrete studies *did* benefit students, but to varying extent, and that while some students actively engaged in portfolio-based learning and reflection, others did not.[329]

[328] Asymp. Sig. (2-tailed): $p = .005$, Exact Sig. (1-tailed): $p = .003$, as calculated by SPSS.

[329] Observations to this effect are reported by Kabilan and Khan (2012), stating that the portfolio approach implemented did not work for all students, with some students remaining passive and negative. Further evidence that portfolio construction has differential effects on students' learning and reflection and their perceptions thereof can be found in articles by, e.g., Bolliger and Shepherd (2010), and by Wade and Yarbrough (1996).

So, while portfolio can be assumed to have *the potential* to be useful *to all learners* involved in portfolio construction (Barry & Shannon, 1997), there clearly are differences in the approaches to learning students choose in the context of portfolio-based learning. As there exist differences in individual learning and reflection in portfolio-based learning environments (e.g., Imhof & Picard, 2009; Kabilan & Khan, 2012), there can be assumed to be corresponding differences in cognitive task processing as well as – consequently and ultimately – in students' learning outcomes. These differences can be assumed to be both qualitative and quantitative in nature, deep approaches to learning being superior to surface approaches to learning in portfolio-based, reflection-oriented task processing for modern 21st century teacher education. In the literature on portfolio in pre-service teacher education, variation in the effects of portfolio are attributed to student characteristics, including students' learning orientations (e.g., Imhof & Picard, 2009). This causal attribution is plausible, as, with a view to broader, general theories and considerations of learning, individual approaches to learning vary with students' characteristics, such as their conceptions of learning, thus resulting in individual differences both in the process and in the outcomes of learning.[330]

As noted by Wade and Yarbrough (1996), portfolio success in their study was not *universal*, which is one of the instances of portfolio construction demonstrating that the introduction of portfolio into a teacher education program is by no means a sure-fire success that would benefit all students.[331] It appears that portfolio in pre-service teacher education benefits many, albeit not all students. In order to profit from the full potential of portfolio construction to support students' learning and reflection, students have to actively take up the opportunities for learning and reflection provided by portfolio-based designs of higher education.[332] They are more likely to do so if their learn-

[330] Differential effects of students' individual learning orientations in portfolio construction are also put to discussion, e.g., by Mansvelder-Longayroux, Beijaard, Verloop, and Vermunt (2007).

[331] Careful introduction and continuous support of portfolio construction are necessary, but not sufficient for success.

[332] The fact well-known to practitioners in constructivist approaches to education, that instructors, including teacher educators, can only provide *opportunities* for learning, including reflection, which then have to be taken up actively by the learner, has been illustrated in Chapter 2, with reference to the *Angebots-Nutzungs-Modell* ('Offer-and-Use-Model').

ing orientations and their conceptions of learning are appropriate for and, thus, conducive to learning in the context of a portfolio-based learning environment.

Statistical hypothesis testing shows that in the course *Schulpraktische Studien 1 (SPS 1)* students with a higher overall (pre-)disposition for deep learning actually *did* adopt (i.e., *did* realize and engage in) a deeper approach to learning in task processing, task processing being represented by students' learning in the portfolio-based learning environment. There are significant differences between the approaches to learning realized in the more academically oriented group of learners in comparison with the approaches to learning realized in the other group of learners, who on the basis of their overall dispositions for learning can be regarded as less academically oriented. Thus, the individual differences in portfolio-based learning reported in the pertinent literature could be observed indeed in the context of the original research conducted.

On the basis of the literature and the results obtained from the study conducted, it appears that portfolio provides the opportunity for deep learning that is taken up more readily by more academically oriented learners. This is in line with what is to be expected: Students inclined to approach tasks in higher education learning in ways representing deeper learning do so in portfolio-based pre-service teacher education, too. Students tending towards a surface approach to learning also try to keep to ways of learning corresponding to this disposition. There are significant differences in the quality of students' learning. Students attending a course in teacher professional preparation at a higher education institution bring along (pre-)dispositions relative to deep and surface approaches to learning that have been shaped over many years of educational experiences at school and, as the case may be, in previous university studies. Those students bringing along a disposition geared more towards high-quality, academic, meaningful, deep learning for understanding can be assumed to realize and actively take up the opportunities provided in the form of portfolio-based learning and reflection, while those students starting the course with a disposition tending more towards non-academic surface learning may miss the point in portfolio-based learning and reflection, and may consider portfolio construction as merely one more addition to their workload. They may thus try to stick to their surface approach to learning as far

as possible.[333] Students oriented more towards surface learning certainly will have little opportunity for rote learning in properly carrying out well-designed portfolio tasks intended to induce a deep approach to learning and to evoke and foster higher-order learning activities and higher-order thinking. Yet, these students will probably not go as far and as deep in their learning as those students who see the benefits of portfolio construction and readily take up the opportunities for learning and reflection – geared at professional development and personal growth – provided by this method. In addition, on the basis of their previous educational experiences, students with a disposition for surface learning in all probability have little practice of – and, thus, strategies experienced as successful for – meaningful learning, therefore, for motivational reasons as well as for a lack of readily accessible strategies, refraining from going deeper in their learning, clinging to their usual approach to learning as far as possible.

Considering the results of statistical hypothesis testing, it can be assumed that in a portfolio-based learning environment, pre-service teachers tending in their overall dispositions towards deep learning adopt a deeper approach to learning in task processing

[333] As has been noted, a surface approach to learning may not always be *completely* inappropriate: With regard to lessons in which there is exclusively or primarily factual knowledge to be acquired, a surface approach – i.e., learning this factual knowledge by heart, with no intention to go any further in learning – might be considered as being sufficient. Yet, there can be assumed to be a small number of courses only in which higher education students are expected to merely acquire factual knowledge. Students would not have the opportunity to acquire the attributes expected in university graduates if their learning were restricted to – or primarily based on – rote learning. Rote learning of information does not contribute to the formation of a critical mind. In the course *Schulpraktische Studien 1 (SPS 1)*, during the presentations of some students there were striking instances of the effects of mere rote learning: When asked to define technical terms or to explain a piece of information, those students simply could not do so. They were completely dependent on what they had learnt by heart in preparing their presentations, and unable to elaborate on what they had just presented, with varying degrees of confidence, to their peers and to the teacher educator. There is one more point that suggests that deep learning is superior to surface learning: It is well-known that the learning of adults, and thus of students in higher education settings, is different from the learning of younger learners. In learning, adults link new information to what they already know, e.g., to previous experiences stored in their minds. Research in the field of educational psychology illustrates that information is stored and retrieved (i.e., remembered) more effectively in cases where the information was processed in more depth.

than do students tending in their overall dispositions towards surface learning, the portfolio-based learning environment offering the opportunity for deep learning.

Students' (pre-)dispositions towards learning and students' actual/realized levels of cognitive task processing in portfolio construction

Main Hypothesis 2: Pre-service teachers having an overall disposition tending towards deep learning attain a higher level of cognitive processing in portfolio construction.

While the items referring to *students' actual, realized approaches to learning* in the portfolio-based learning environment were based on the R-SPQ-2F questionnaire and related to the whole of the course *Schulpraktische Studien 1 (SPS 1)*,[334] for measuring *students' actual, realized levels of cognitive processing* in portfolio construction, specific items were formulated. These items were to represent key learning activities involved in the construction of students' portfolios in the concrete context under study, and were associated either with higher-order or with lower-order thinking activities in learning. Again, the students in the two groups formed on the basis of the students' (pre-)dispositions towards learning were to be compared: students with a higher disposition for deep learning and students with a lower disposition for deep learning (as represented by the value of the quotient of an individual student's deep learning disposition and this student's surface learning disposition). The groups formed were the same as with Main Hypothesis 1 ($N = 81$, $n_1 = 41$, $n_2 = 40$).

Once more, statistical hypothesis testing was conducted on the basis of three independent samples t-tests. In the first t-test, relevant to Sub-Hypothesis 2.1, Group Means of the absolute scores of realized deep cognitive processing were calculated and compared. In the group of the more academically oriented learners, having a higher overall disposition for deep learning, the Group Mean was $M_1 = 31.34$ ($SD_1 = 3.766$, $n_1 = 41$), while in the group of more non-academically oriented learners, with a lower over-

[334] Such a specification is considered viable and appropriate by Biggs, Kember, and Leung (2001), who expressly state that the items of the R-SPQ-2F questionnaire can be adapted and formulated as related to students' approaches to learning in one specific, concrete course.

all disposition for deep learning, the Group Mean was M_2 = 29.43 (SD_2 = 5.481, n_2 = 40). The Group Mean was higher in group 1 than in group 2 – as had been expected –, and the resulting Mean Difference of 1.916 was calculated as being significant on the basis of a one-tailed test of significance ($t(79)$ = 1.838, p = .035),[335] so the null hypothesis can be rejected. Here, Cohen's d can be calculated as .41, equaling a small effect.

In the second t-test, comparing students' realized surface cognitive processing in the two groups formed, in order to statistically test Sub-Hypothesis 2.2, the Group Mean of the absolute scores of surface cognitive processing was M_1 = 18.15 (SD_1 = 5.369, n_1 = 41) in the group of students with a higher disposition for deep learning, and M_2 = 21.60 (SD_2 = 5.532, n_2 = 40) in the group of students with a lower disposition for deep learning. The Mean Difference calculated as -3.454 is statistically significant ($t(79)$ = -2.851, p = .006),[336] so the null hypothesis can be rejected. Cohen's d was calculated as -.63, representing a medium effect.

In the third t-test, in which students' overall scores of realized cognitive task processing in portfolio construction were compared, the Group Mean of the overall score of cognitive processing was M_1 = 1.9053 (SD_1 = .69922, n_1 = 41) in the group of students with a higher disposition for deep learning, while it was M_2 = 1.4746 (SD_2 = .51454, n_2 = 40) in the group of students with a lower disposition for deep learning. Statistically, the resulting Mean Difference of .43067 is significant ($t(79)$ = 3.151, p = .002),[337] making possible the rejection of the null hypothesis. Cohen's d is .7, which equals a medium effect.

As was the case with Main Hypothesis 1, an additional statistical test was run on the basis of a non-parametric procedure, namely the Mann-Whitney U-test as the non-parametric equivalent of the independent samples t-test. Students' overall levels of

[335] p = .070 (2-tailed), p = .035 (1-tailed). All differences calculated in relation to Main Hypotheses 1 and 2 are significant on the basis of two-tailed hypothesis testing except for the difference in actual deep cognitive task processing: The difference examined in the context of Sub-Hypothesis 2.1 is the only instance of a p value where statistical significance is given in one-tailed testing only.

[336] p = .006 (2-tailed), p = .003 (1-tailed).

[337] p = .002 (2-tailed), p = .001 (1-tailed).

cognitive processing in portfolio construction are higher in the group of academically oriented students ($Median_1$ = 1.8824) than in the group of non-academically oriented students ($Median_2$ = 1.4505, z = -2,815, p = .005).[338] Here again, the difference is calculated as being significant. Cohen's d is about .7, corresponding to a medium effect.

What can be inferred from these results? All three differences examined turn out to be statistically significant on the basis of one-tailed testing. This can be explained in a way similar to the line of reasoning in the discussion of results related to Main Hypothesis 1: Students with an overall disposition tending towards deep learning can be assumed to take up the opportunity for deep cognitive task processing (i.e., higher-order learning activities) more readily than do students tending in their overall dispositions towards surface learning. This is not different from what was discussed in relation to Main Hypothesis 1. Yet, there is a specific feature of portfolio task design: With a view to *portfolio construction* – the activity at the very core of a portfolio-based learning environment designed for learning and reflection –, in order to *appropriately* carry out the tasks set for portfolio construction (in fact: in order to carry out these tasks *at all*), students are *required* to actively engage in higher levels of cognitive processing required for the construction of a proper portfolio. Thus, students in both groups engage in deep cognitive processing, i.e., in cognitive activities which in taxonomies of learning represent higher-order cognitive activities, and they are prompted to do so regardless of their individual dispositions. The outcomes of learning as documented in the portfolio may vary according to students' prior experience of and, thus, attitude towards and competence in higher-order thinking and learning, yet higher-order cognitive processes it is that are to be applied if the tasks in portfolio construction are to be carried out properly as set.

It can be seen that in both groups of students, the Group Means regarding realized surface cognitive processing are notably lower than the Group Means regarding realized deep cognitive processing. Looking at the realized overall scores of cognitive processing, in both groups these clearly tend towards higher levels of cognitive processing, the group of students with a higher disposition for deep learning scoring still higher

[338] Asymp. Sign. (2-tailed): p = .005, Exact Sig. (1-tailed): p = .002, as calculated by SPSS.

than the group of student with a lower disposition for deep learning. In the portfolio literature, the potential of portfolio to support students' higher-order thinking is noted by Çimer (2011),[339] with Mansvelder-Longayroux, Beijaard, and Verloop (2007) pointing out their own findings as well as findings in the pertinent literature suggesting that deep processing is more likely to occur in instances where there is personal involvement on the part of the learner. It can be assumed that such personal involvement is given in both groups of learners, regardless of their (pre-)dispositions towards learning, as students in the course *Schulpraktische Studien 1 (SPS 1)* usually express a lot of involvement and interest in their first school practicum. Yet, students with a disposition for surface cognitive processing may still resort to this form of processing where possible.

Based on the results of statistical hypothesis testing, the assumptions expressed in Main Hypothesis 2 can be retained.

Development of students' learning dispositions

Main Hypothesis 3: Learning within a portfolio-based learning environment enhances (i.e., increases) pre-service teachers' dispositions for deep learning.

In order to find out about the development of students' disposition for deep learning, a set of paired samples t-tests were run.

[339] Although students' realized approaches to learning and their levels of cognitive task processing are measured on the basis of different scales and, thus, different items, the following observation is considered to be interesting: While with regard to Group Means regarding a realized deep approach to learning, students in both groups score in the lower half of the range of possible values, both Group Means regarding realized deep cognitive processing in portfolio construction are clearly in the upper part of the third quarter of possible values. Thus, when comparing approaches to learning realized in the portfolio-based learning environment *as a whole* and levels of cognitive processing realized in tasks related to portfolio construction *in particular*, it can be assumed that (the particular design and implementation of) portfolio (in the course *SPS 1*) has the potential to induce students to engage in higher levels of thinking and learning, regardless of students' dispositions towards learning.

The disposition questionnaire was administered at three different points in time: At the beginning of the course *Schulpraktische Studien 1 (SPS 1)*, in order to measure the (pre-)dispositions students brought along (pre-test, t_0); in the last meeting in class, to find out whether any changes in students' dispositions could be found up to that point (post-test 1, t_1); and at the end of the course *Schulpraktische Studien 1 (SPS 1)*, after students had completed their practicum and the construction of their portfolios (post-test 2b, t_2).

Statistical hypothesis testing in the form of three t-tests showed that while there was a significant decrease in the dispositions students stated for deep learning in t_0 and t_1, there was an even more pronounced increase reported in the dispositions for deep learning between t_1 and t_2, finally resulting in a total increase in students' dispositions reported for deep learning. All three differences are statistically significant.

It is interesting to see that there are these statistically significant changes in dispositions for deep learning students reported. The reason for the change between t_0 and t_1, namely the decrease of students' deep learning dispositions between the beginning and the end of classes in the context of the course *Schulpraktische Studien 1 (SPS 1)*, in which the first part of portfolio construction was carried out, may be found in the fact that in direct temporal proximity to t_1, students had to take their exams in other courses. Following the Bologna reform, students report – and often complain – that they have to learn a lot for their exams that has to be crammed into memory, to be forgotten soon after the exam. A temporary focus on these exams other than portfolio may have led to the dispositions for deep learning *as reported by students* being lower, due to *students' (self-)assessment of their dispositions being influenced and overlaid* by students' temporary, but acute, focus on learning in a particular – presumably more surface – way for the exams to be passed.

The total increase in students' dispositions for deep learning as reported, resulting from a comparison of scores in t_0 and in t_2, may be considered an instance of what is described in the literature: the potential of educational portfolio construction to support students' deep learning, and to stimulate reflective practice and lifelong learning (e.g., Aalderink, 2007; Barrett, 2004; Cambridge, 2010; Guder, 2013; Heinrich et al.,

2007).[340] However, it is to be noted that there was created no control group and no comparison group, so the change in scores found cannot be attributed unequivocally to portfolio construction, but may be due to other causes as well. Thus, while the assumption represented by Main Hypothesis 3 is plausible with a view to prior investigations and experiences of portfolio reported in the literature, and while no contradictory evidence was found in the original research conducted, there is no conclusive evidence either. It can be assumed that portfolio construction may have contributed to the increase in students' dispositions for deep learning, but this cannot be claimed for sure. On this basis, it is advisable to carefully examine any assumption of changes in students' dispositions observed in the context of the present study as being possibly effected by portfolio construction.

Comparison of the student groups (parallel treatment groups) based on the forms of portfolio constructed (paper-based vs. electronic portfolio)

Main Hypothesis 4: Given the same instructional design of classes for both groups (e-portfolio vs. paper-based portfolio) and identical tasks set for portfolio construction, there is no *difference in the effects of e-portfolios as opposed to the effects of paper-based traditional portfolios on …*

… *pre-service teachers' approaches to learning realized in the portfolio-based learning environment (Sub-Hypothesis 4.1).*

… *pre-service teachers' levels of cognitive processing realized in portfolio construction (Sub-Hypothesis 4.2).*

[340] With regard to healthcare professionals, acting in the domains of medicine and care, which throughout this dissertation are looked at, too, Cheung (2011, p. 27) claims that "… the educational portfolio is the most widely used component of lifelong learning – a vital aspect of modern medical practice. When used effectively, portfolios provide evidence of continuous learning and promote reflective practice." Reflective practice, i.e., the practice of academic reflection, can be seen as a basis of lifelong learning.

... *the development of pre-service teachers' dispositions for deep learning (Sub-Hypothesis 4.3).*

As is shown by statistical hypothesis testing, there was found *no* difference between the students in the groups constructing a paper-based and the students in the groups constructing an electronic portfolio. There were *no* significant differences in students' approaches to learning in task processing, and there were *no* significant differences in students' levels of cognitive processing in portfolio construction. As for the development of students' dispositions for deep learning, based on statistical hypothesis testing these can be considered to be comparable.

This correspondence of student approaches to learning, task processing being based either on paper-based or on electronic portfolios, as well as the similarity of levels of cognitive processing in portfolio construction based on one of the two portfolio forms, is plausible: If it is only the form of portfolio that is deliberately varied, portfolio contents and task being kept as identical as possible in the two groups, the two treatments are likely be conducive in the same way to (desirable) student approaches to learning and (desirable) levels of cognitive processing in portfolio construction. No significant differences were found in student learning as examined, apart from the form in which the portfolios were constructed.[341] While it is usual in science to formulate research hypotheses in a way that they express expected associations or developments (i.e., the existence of associations and developments), here, it was assumed that there would be *no* differences between the two treatment groups, so the hypotheses were formulated in a way reflecting this assumption.

In the literature, there were found only few empirical studies where a parallel construction of paper-based and e-portfolio was investigated (e.g., Driessen, Muijtjens et al., 2007). Regardless of enthusiastic assertions of proponents of digital learning and e-

[341] Paper-based and electronic portfolios being different, resulting in different perceptions of and activities in portfolio construction, it is clear that students' thoughts, emotions, and actions did differ. Yet, with regard to students' learning as investigated and intended, no significant differences were found by means of the research approach chosen between the group of students creating paper-based portfolios and the group of students building e-portfolios.

portfolio construction, there appears to exist to date no conclusive evidence as to exclusive benefits of e-portfolios for student learning and reflection, and thus, with regard to any superiority of e-portfolios *for learning*. While there *do* exist several advantages of e-portfolio regarding practicability which can be considered of relevance to teaching and learning in higher education (e.g., issues of storage and availability, universal access to online portfolios via the Internet), the choice of higher education practitioners regarding what form of portfolio is to be constructed should not be based on these practical advantages only.[342] While there can be built plausible chains of reasoning regarding potential effects of e-portfolio on student learning (e.g., easy access to online portfolios leading to an increase to frequency and/or duration of processing), the fundamental fact remains: As yet, there is no conclusive evidence that e-portfolios would be superior to their more traditional, paper-based counterparts.[343, 344, 345]

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[342] First of all, issues of effectiveness and efficiency of an educational instrument are to be considered. If there is assumed to be no difference between the effectiveness and the efficiency of the variants of a given tool (or between tools to be compared), issues of practicability may tip the scales.

[343] Tochel et al. (2009) in their review article on the effectiveness of portfolios for post-graduate assessment and education in the domain of healthcare note several benefits of electronic versions of portfolio. They, too, conclude with regard to research of educational portfolios:

> The evidence base is extensive, but contains few high quality studies with generalisable messages about the effectiveness of portfolios. There is, however, good evidence that if well implemented, portfolios are effective and practical in a number of ways including increasing personal responsibility for learning and supporting professional development (Tochel et al., 2009, p. 320).

There are noted the limited generalizability of research findings and the necessity of careful portfolio implementation if portfolio as an educational tool is to support students' learning and reflection.

[344] Three more observations are to be made at this point: First, it is to be noted that clearly, online e-portfolios, e.g., as constructed on the basis of Mahara and as used in the course *Schulpraktische Studien 1 (SPS 1)*, provide the opportunity to get in contact with the other participants in the course and form a community of learners. Yet, ample observations of students' use of Mahara suggest that there are hardly any students making use of this option. Judging from the insights gained into student e-portfolio construction on the basis of Mahara, virtually all students construct their portfolio within their individual space on the platform. There is a community of learners indeed in the portfolio-based learning environment as designed and implemented for the *course Schulpraktische Studien 1 (SPS 1)*, but this community is formed, fostered, and sustained by means of personal presence and

With a view to the importance of student ownership of portfolio both as a process of learning and as a product, the choice of the *form* of portfolio to be constructed – paper-based or digital – could – and from a pedagogical point of view: probably should – be given to the individual learner, if such a choice of portfolio forms on the part of the students can be implemented in everyday higher education teaching practice in a reasonable way, i.e., with justifiable efforts on the part of the teacher educator and at acceptable costs for the institution. If the choice of the *form* of the portfolio to be constructed is given to the students (in their capacity as adult learners in higher education, with all other elements of the context, the contents, and the tasks of learning being kept exactly the same), not only is the ownership of learning actually transferred even further to the students, but it can also be assumed that this actual increase in ownership will be perceived by the students and, thus, may have a positive effect on student learning.

Following the discussion of the findings, the limitations of the study conducted will now be critically examined. As stated at the beginning of this chapter, limitations both

face-to-face communication in class, not in the course of the digital construction of portfolio on the internet. Second, there is the possibility of students including *autonomously* in their portfolios interesting artefacts other than texts, e.g., videos of lessons observed or held at school, podcasts, and internet links. Yet, while there can be observed many students showing high levels of engagement in properly carrying out *the tasks set*, the number of students making autonomous additional use of the technological affordances of digital portfolio construction, exceeding the active execution of the tasks set, has been decidedly lower over the years. Third, there are two purposes indeed that may be thought of that may suggest that the teacher educator opt for the digital form of portfolio, namely, (1) if it is the acquisition of technology skills on the part of the students that is aimed at, and/or (2) if students are to be prepared to construct digital portfolios with their pupils in school teaching. These two purposes may be seriously considered, as portfolio as an educational tool appears to have the potential to support students' learning, and while to date there is no conclusive evidence that digital portfolios with a view to their form would be inherently *superior* to paper-based portfolios, there is also no evidence as yet – and no reason given by the results of the original research conducted for this dissertation – that digital portfolios would be *inferior* to paper-based portfolios in their effects on student learning.

345 At this point, note once again key arguments and considerations pro/contra e-portfolios against the background of no difference in effects on learning having been found so far.

with regard to the empirical research undertaken in the course *Schulpraktische Studien 1 (SPS 1)* and to the dissertation project as a whole – the latter with a special view of the comprehensive, systematic review of the literature undertaken – will be discussed.

6.2 Limitations of the project undertaken and the study conducted

As is the case with any scientific investigation, limitations of the research undertaken have to be allowed for when considering the validity and the generalizability of the findings obtained. In chronological correspondence to the research process embarked on, such limitations can be relative to the topic chosen and determined to be the focus of interest; the relevant theoretical and conceptual background; the process as well as the results of the review of the pertinent literature; the design of the empirical study planned and implemented; and the collection and the analysis of the data obtained. It is clear that in the end, the execution of this chain of steps in the research process as well the limitations that are to be considered take effect on the interpretation and the discussion of the findings obtained as well as on the conclusion arrived at on that basis.

Limitations relative to the topic of the dissertation: Portfolio in (teacher) education

First of all, the multitude of potential portfolio implementations imaginable within the virtually infinite range of 'portfolio' as an educational concept has to be taken into account. In this study, one specific conceptualization of portfolio as an educational tool was concretized within one particular learning environment, i.e., within the setting of pre-service teacher education for vocational schools at a university in Southern Germany. While it is common in educational research to examine a given context shaped by the real-life practice of teaching and learning in a natural setting, it clearly limits the generalizability of the findings, as each and every implementation of portfolio differs from other portfolio implementations – to varying extent – with regard to the contents of the portfolio (as embodied in the topics covered by the curriculum, demanded by faculty, and added by the students), the tasks set, the materials selected to repre-

sent given topics, etc., unless, if this were possible, two approaches were adopted that were completely – or at least essentially – alike.[346] So, the findings of this study apply first and foremost to the particular portfolio conceptualization and concretization for the course *Schulpraktische Studien 1 (SPS 1)*, combining a university seminar and a two-week practicum at school with independent student work. As a matter of fact, it may be difficult to decide on the effectiveness of portfolio as an educational tool in general, as there is much variation between individual portfolio implementations, i.e., as there is no such thing as *the* portfolio in education.[347] So, in researching the effects of portfolio-based pre-service teacher education, it became clear at a very early stage that it is – and on the basis of the broad scope of the concept of portfolio as an educational approach in all probability will remain – difficult to make statements about the potential effects of portfolio if portfolio is considered something given, possessing predetermined, unchangeable qualities. As was laid out in Chapter 2, the central characteristic of portfolio that is widely agreed on as its key feature is the inclusion of reflec-

[346] Such complete concordance would contradict the very idea and the purposes of individualized portfolio construction in education. In the course of the review of the portfolio literature, some pieces of original research on particular portfolio conceptualizations used in broader contexts, e.g. the EPOSTL in Europe (Cakir & Balcikanli, 2012), were identified. There also exists empirical research on portfolio where authors report research on one particular implementation of portfolio in several articles, each article dealing with a particular aspect of portfolio construction (e.g., Chetcuti, 2007; Chetcuti, Buhagiar, & Cardona, 2011; Chetcuti, Murphy, & Grima, 2006). Yet, most of the portfolio literature seems to be related to one particular implementation of portfolio, and the large majority of authors seem to have published single articles on one given implementation.

[347] It has to be assumed that in this respect one key asset of portfolio, its potential for individualization, may make it difficult to make general statements on the effectiveness and the effects of portfolio as an educational tool: Not only is there variation in students' performance regarding the tasks set, students are also entitled and expected to take individual decisions and make individual additions to their portfolios. This may explain why most authors take a holistic stance towards portfolio research and practice, focusing on students' overall 'portfolio experience' rather than on particular facets of portfolio construction. Given the desired flexibility of the instrument and the variety of implementations found in teacher education practice, the call for the investigation of particular facets of portfolio construction is comprehensible from the scientific point of view, but rather questionable with a view to portfolio practice. Other than with research in the natural sciences or in medicine, in educational research it is hardly conceivable that two portfolio-based learning environments should ever be identical apart from controlled modifications of one or more of these particular facets.

tion into the process and product of portfolio-based education. Virtually all other aspects appear to be open to thorough pedagogical decisions to be taken within the context of instructional design, as long as the basic idea of portfolio as an educational concept is kept in mind. Based on the purposes of portfolio construction, the choice of portfolio contents and the design of portfolio tasks is virtually unlimited, which is one of the strengths of portfolio-based education.

Limitations relative to the theoretical and the conceptual background of this dissertation

As was pointed out in Chapter 2, it is not only the concept of portfolio as an educational tool that to some extent remains elusive, but also the concepts of learning – as a multifaceted human activity and a complex function of the brain[348] – and, in particular, the concept of reflection. This elusiveness of concepts, resulting in various conceptualizations and definitions used by different authors, contributed to the difficulty of scientifically researching the complex human processes that are the basis of education, and of gaining a broad, coherent picture in the form of integrated theories reliably depicting reality.

Limitations relative to the review of the literature on portfolio in teacher education (1993-2017)

The course of action taken for the review of the literature is open to discussion. The timespan of a quarter of a century – extending back to the dawn of portfolio literature and, thus, in all probability comprising a large part of the literature of potential interest – can be considered quite extensive, as can be the search of several major scientific databases. The hand search of renowned journals might have been extended further, as might have been the examination of literature listed in the references of relevant texts

[348] Independent of individual approaches to learning, the human brain never stops learning from and trying to make sense of experience. Everything we experience, we process, both while being awake and while being asleep. Life is learning.

identified. While over the course of time an additional hand search was conducted, and reference lists of texts of particular interest were perused with special care, the resources available did not allow doing this systematically. However, it can be assumed that the large majority of pertinent texts are included in the scientific databases, and, as has been mentioned in Chapter 3, the search of scientific databases should prove to be more efficient by far than a hand search of reference lists. The journal articles identified were read and re-read several times over the course of the dissertation project, and their quality was assessed both against the background of the principles specified for scientific research in education (Shavelson & Towne, 2002) and against the overall quality of portfolio research conducted during the last 25 years. Although the assessment of quality was undertaken with great care, it has to be assumed that different researchers might arrive at different evaluations of study quality in cases not being at the very ends of the quality spectrum, i.e., not being of very high quality or showing major flaws.

With a view to the systematic review of the literature undertaken, it would be desirable for the findings to be combined even more, with further links between studies being pointed out. Yet, the combination of research findings on a topic as complex as portfolio is difficult. The variety of portfolio implementations makes abstraction difficult, and the distinctive local context has to be taken into account in all cases of educational research in natural settings.[349]

So, what specifics, in particular what limitations are to be taken into account with regard to the approach chosen for literature search and selection?

[349] See Zeichner and Wray (2001), requiring the provision of details relative to portfolio design and implementation. There are two (very different) book chapters of recent date dealing with the current state of empirical research on portfolio (Koch-Priewe, 2013; Orland-Barak & Maskit, 2017). With a view to the latter text, it seems somewhat peculiar to offer a list of literature on portfolio only, without commenting the references any further. Yet, with a view to this dissertation, the long list of texts on portfolio compiled by Orland-Barak and Maskit (2017) can be seen as confirming the large body of portfolio literature compiled for this dissertation, as the very large majority of the references contained were well-known to the author. Koch-Priewe (2013) in her text refers to the challenges and difficulties in research on portfolio in teacher education.

The search for literature

With regard to the *sources* searched, it is *the range and the selection of databases* which have to be discussed first of all. While the selection of the major databases that were made use of was made deliberately on the basis of their matching the topic of this dissertation – i.e., their being exclusively focused on educational literature (e.g., ERIC, Teachers' Resource Center) or their comprising pedagogical texts (e.g., EBSCO Academic Search Premier) – as well as on the basis of their being compiled by notable institutions, their renown, and their being widely used, the fact that these databases do not comprise all literature relative to a given subject cannot be ruled out. Yet, as has been laid out above, it is virtually impossible to identify all existing literature on a given subject, and the databases chosen can be considered a reasonable starting point for a systematic search for literature. *General scientific search engines* such as Google Scholar and Scopus were used in order to crosscheck that a large range of the existing pertinent literature had been found – a crosscheck that was continuously carried out on the internet as well as with printed texts and reference lists –; yet, ultimately, additional results obtained in that way were excluded from consideration in the *systematic* review of the literature, in order to focus on the renowned scientific databases named in Appendices A.1–A.2 (p. 436). Though certainly of benefit to users, Google Scholar and other scientific search engines often refer to sources other than journal articles and to grey literature. The use of major databases comprising distinguished scientific journals also ensures the availability of articles to those who wish to obtain the texts reviewed for individual examination and closer study of their own.

The next point to consider is *the search terms looked for* in titles, abstracts, and keywords. The selection, combination, and permutation of keywords can be expected to cover the identification of pertinent articles, as it can be expected that if portfolio is the focus of a study, the term will appear in at least one of these elements. Independent of the observation that there are useful studies where the term of 'portfolio' is not mentioned in the title, it seems justifiable to preclude studies where the term is not mentioned in the abstract and/or the keywords either.

The limitation of texts to articles from peer-reviewed journals only is of importance to ensure that the basis of this review is formed by literature that can be expected to come up to agreed standards of scientific research. However, as has been stated during the search and the selection of literature, even articles in peer-reviewed journals may not be up to the mark, which was noted both during the initial search for literature and in the iterative consideration of the articles identified and originally considered apt for inclusion, leading to a reduction of the 119 articles originally selected to a final collection of 77 articles to be considered, 21 of which are presented in more detail in Chapter 3.[350] Considerable variation in the quality of studies when put against the principles of scientific research makes the reader aware of the fact that there seem to exist differences in the rigor of peer-reviewing processes. Texts other than original research articles published in scientific journals (e.g., dissertations, conference papers, studies published in monographs) were excluded from the review. Here again, a practical decision as to the systematic limitation of texts, combined with the aim of an initial quality control by means of peer reviewing, had to be taken.

Only articles published in English were considered for inclusion, in order to enable members of the international scientific community to read the texts for themselves. Looking at the references in articles and the origin of prolific authors and author groups identified (e.g., Erik W. Driessen, Olga Dysthe, Desirée Mansvelder-Longayroux, Kari Smith, and Harm Tillema), there is likely to exist more scientific research in e.g., Dutch, Norwegian, and – regarding the list of recent publications on portfolio – Turkish. However, this would be a matter for further literature reviews, which might be conducted by authors having a good command of the respective language in order to examine the state of research in a given (language) area. This specific approach would be interesting in order to see how teachers and learners go about portfolio construction in particular countries and cultures. The intention of this review being the provision of a comprehensive overview of global research on portfolio, in

[350] The 119 studies selected from the 1,015 results were grouped according to the topic(s) addressed and the focus(es) of research reported. The categorization made is presented in Appendix A.4 (p. 445). Synoptic overviews regarding the contents of the 77 articles in the final selection and of the 21 articles presented in detail in Subchapter 3.3.2 can be found in Appendices A.5–A.7 (p. 455).

order to make possible this breadth, a limitation of depth was unavoidable. It can be assumed that the majority of high quality articles can be found in international journals published in English, as authors will try to reach the international scientific community and disseminate their research findings. The *references* of sources identified were scanned for potentially relevant literature. This was done in order to crosscheck that seminal texts relative to the topic at hand and possible original research had been identified, while a limitation was made to the articles found in databases. A pyramid principle would probably have been less efficient than a thorough search in renowned databases. The use of databases also makes possible the replication of the search in a systematic literature review.

Taking into account the fact that the processes of learning and reflection by means of portfolio construction in higher education for different professions (e.g., teaching, medicine, nursing) can be held to be comparable in as far as they are *highly similar* (e.g., Driessen, 2008), there might have been included in the systematic search for literature articles from domains other than teaching and teacher education. While articles from these domains were in fact retrieved and examined in order to gain a comprehensive overview of portfolio construction for learning and reflection in higher education, they are not systematically presented in this review, which is focused on portfolio construction in pre-service teacher education. If a topic available research on which was to be reviewed were specified more closely – as opposed to the broad approach chosen for this review –, it might prove fruitful to collate research findings relative to portfolio construction by students in (preferably all) comparable domains and situations in higher education (e.g., pre-service teachers, pre-service doctors, and pre-service nurses in practical phases of their programs of study). As noted, the similarity and comparability of processes involved in the two fields of teacher education and medical education is pointed out by Driessen (2008).[351]

[351] The similarities in professional thinking and action – and, thus, in educational processes assumed to be conducive to the preparation of future professionals, who are to manage the complexity and unpredictability of professional practice skillfully, responsibly, and confidently – are also evident from the works by Donald Schön (e.g., Schön, 1987) and Lee Shulman (e.g., Shulman, 1987b).

The selection of literature

As regards *the selection of original research articles*, *inclusion/exclusion criteria* were pre-determined and documented in a transparent and binding way in order to ensure not only a systematic search, but also a methodical selection. These inclusion/exclusion criteria were applied both at the very initial stage, when searching for pertinent literature (in those cases where parameters could be set for database searches), and then when skimming the results of the databases, scanning the contents of the articles, and reading the selection of articles for closer analysis. Independent of the formulation of rigorous inclusion/exclusion criteria, *subjectivity*, which is hard to avoid when there is one researcher only, may have taken its toll with regard to both dimensions the final selection of articles as well as the detailed presentation of articles were based on: *Relevance* of an article was determined based on its *contents* and its *focus of research*. While in the majority of articles identified and selected for this review portfolio is clearly named and treated as the focus of study (e.g., Bataineh et al., 2007; Mansvelder-Longayroux, Beijaard, Verloop et al., 2007; Oner & Adadan, 2011), there are also articles deemed fruitful by the author of this dissertation which in their titles are *not* explicitly focused on the educational tool of portfolio (e.g., Kaasila & Lauriala, 2012), and thus might be overlooked and omitted easily. *Follow-up reviews by larger groups of authors* seem justified in both fields of the literature, on traditional paper-based portfolios as well as on more recent e-portfolios, in order to provide for even more scope and depth. The research reported being focused on different aspects of portfolio construction may have led to fuzzy edges of the body of research included in this review. A large number of articles deal with many aspects at the same time (which can be assumed to be due to interviews being conducted for data collection), some or all of which are not considered in depth. Thus, many aspects of interest are mentioned in a large number of studies, either as a focus of study – which makes things easier – or only marginally. However, if mention is made of an aspect of portfolio construction that seems to be of interest, authors' findings, discussions, and conclusions related to this issue should be taken into account in order to collate from different sources what is known on this topic.

There may be considered to be *a two-tier challenge*: (1) To distinguish the studies dealing exclusively or in parts with the educational instrument of portfolio – as opposed to those which are not –, and (2) to distinguish the studies with a clear focus on important aspects related to students' learning and reflection (e.g., student approaches to learning and levels of reflective thinking) from those which deal with too large a range of aspects and/or with secondary aspects only. Learning and reflection being human activities comprising an array of complex cognitive, emotional, motivational, and social processes (see Section 2.2.1), the literature may be considered virtually endless inasmuch as all aspects of portfolio construction may be seen as relative to these two processes. *The lack of universally approved definitions of the concepts of portfolio, learning, and reflection* (see Sections 2.1 and 2.2 respectively) does not make things easier. So, the essential question asked by Paulson et al. (1991): "What makes a portfolio a portfolio?", which is fundamental for this review, too, and which proves to be so difficult to answer, in a way remains open. *For the purpose of the literature review*, traditional paper-based and digital e-portfolios are considered as being based on the same pedagogical principles; both forming the foundation as well as the documentation of holistic cognitive, emotional, and social student learning based on tasks set and subject matter encountered by students over time; both containing artefacts as well as reflective entries, thus making possible continuous, iterative processes of learning and reflection; both intended, designed, and implemented with a view to achieving learning outcomes relative to the professional development and the personal growth of learners, i.e., pre-service teachers (e.g., learning of subject matter, reflection on action during practical phases in the program of study). There is agreement in the literature that reflection in the form of reflective entries can be considered the key aspect of portfolio development, so for the purposes of this review it is considered as the *conditio sine qua non* of portfolio construction in pre-service teacher education.

Having discussed the composition of the body of original research forming the basis of the literature review, there will now follow a consideration of methodological aspects of the study on portfolio-based learning and reflection conducted in the course *Schulpraktische Studien 1 (SPS 1)*.

Limitations relative to the setting of the original research conducted in the context of this dissertation

The portfolio approach designed and continuously developed and refined by the author of this dissertation was implemented within one particular context of teacher education at one university in Germany, which means that the findings cannot be readily transferred to other contexts of teacher education. Keeping in mind the importance of context noted in educational literature in general as well as in literature on portfolio in particular, it must be assumed that the implementation of portfolio in different contexts (i.e., in different teaching/learning environments) will lead to different processes induced and, thus, to different outcomes. Looking at instructional systems design and the 3P model of teaching and learning, variations in the presage factors (student factors as well as elements of the teaching/learning environment) will in all probability lead to variations in task processing in the form of portfolio construction and, thus, in the outcomes of portfolio-based learning and reflection.

With regard to the portfolio as such, there are different ways of selecting its contents and designing the tasks to be carried out in portfolio construction. In order to implement portfolio construction in the course *Schulpraktische Studien 1 (SPS 1)*, one specific combination of contents and tasks had to be determined in order to provide students with a portfolio concept on the basis of which to learn and reflect. It seems plausible that another way of designing the portfolio would have had other effects, and with regard to the effects investigated another way of designing the portfolio – yet to be found – might have been still more effective in supporting student learning and reflection (or effective for the learning and reflection of still more students). Yet, the author of this dissertation having been a teacher in secondary and higher education for almost two decades now, there is reason for confidence that informed decisions regarding the curriculum and the instructional design of the course (including portfolio and task design) were taken – decisions informed on the basis of evidence and knowledge reported in the literature on teaching and learning in higher education, and on the basis of teacher knowledge and personal teaching experience, acquired and reflected over the course of time.

The cohort of students participating in the study in the fall/winter semester of the academic year 2013–2014 can be considered to be representative, as there was no indication of its being atypical, i.e., different from other cohorts. However, the number of students in the sample is limited. The main study has not yet been conducted over the course of more than one semester, i.e., with more than one cohort of students, so at present the findings are related to one cohort of students only.

The students taking part in the course *Schulpraktische Studien 1 (SPS 1)* were asked to construct their portfolios over a period of several months: during the lecture period of the fall/winter semester – in class as well as between classes –, and then on an individual basis during the time between terms, especially in January/February of the following year, during and after their school practicum. If students started portfolio construction at the beginning of classes in mid-September, completing their portfolios for submission in mid-February,[352] this resulted in a total time available for portfolio construction of about five months. This is longer than in a number of studies, where portfolios were constructed over the course of some weeks only (e.g., Breault, 2004; Trent & Shroff, 2013); yet, the total time for portfolio construction was less than in cases where portfolios were composed over the course of several semesters (e.g., Bartlett, 2002; Hartmann & Calandra, 2007) or as program portfolios over the course of whole programs of study (e.g., Zidon, 1996).[353] In addition, outside the classroom, students

[352] It was mandatory for students to hand in their portfolios in mid-February for review, grading, and feedback. Independent of this preliminary completion of the portfolios as one requirement for the successful completion of the course *Schulpraktische Studien 1 (SPS 1)*, great care was taken to give students the option to further develop their portfolios in subsequent stages of their teaching careers, in case they choose to take up professional teaching and, in doing so, continue work on their portfolio, e.g., during the master's program of study, during the second phase of teacher education, and/or during in-service teaching. Thus, students are enabled to make continual, lifelong use of their portfolios, which they had started at the very beginning of practice-oriented, reflective teacher education, linking theory and practice within the context of the first teaching practicum in the bachelor's program of study.

[353] Duration of portfolio construction differs considerably between the studies reviewed. Information on the duration of portfolio construction reported in the studies reviewed is provided in the synopses in Appendix A (p. 436). In many cases, portfolio is constructed in the context of a school practicum, and the duration of portfolio construction is one semester (the student teaching semester). With regard

were free to decide on the extent of independent work they invested in portfolio construction. On the basis of observations by the author and occasional remarks by students, it can be assumed that while the large majority of students *did* work continually on their portfolios, there were also students who, while working in a structured way during classes, completed their portfolios after their school practicum in one go, shortly before they were due for submission. This observation corresponds to the statement by Shepherd and Hannafin (2009) that in their study students tended to delay portfolio construction until shortly before portfolio submission.[354]

In addition to the limited time of about five months available for portfolio construction, the limited scope of portfolio construction as compared to the program of study as a whole must be taken into account. In the context of the course *Schulpraktische Studien 1 (SPS 1)*, a course portfolio was constructed. While great care was taken with regard to contents and tasks to design this course portfolio in a broad and comprehensive way, the scope of portfolio construction in one course only – and thus potential effects of portfolio construction on student learning and reflection – must be assumed as limited in comparison to program portfolios composed over the course of whole programs of study or at least in several parallel and/or subsequent courses within those programs.

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to the duration of portfolio use, again, it is obvious that in many cases the information on the context of portfolio implementation is incomplete, i.e., the duration of portfolio construction can only be inferred or remains unclear. Fiedler, Mullen, and Finnegan (2009) suggest that the many contradictions in research findings reported in the literature on portfolio may be due to the variations in the contexts of portfolio activity. Thus, it becomes evident once more that the requirement stated by Zeichner and Wray (2001), for information on the context of portfolio construction to be provided, is of paramount importance. As regards information on the duration of portfolio construction, the requirement for details to be given is clearly not met in all cases.

354 Student procrastination and delay in portfolio construction could be avoided quite easily by means of binding schedules, and deadlines for the mandatory submission of portfolio parts distributed evenly over the course of portfolio construction. However, this would mean still more regulations in higher education and (such regulations being contrary – or at least restrictive – to students' self-regulation and ownership of learning and their perceptions thereof) should be considered with caution.

While there may be boundaries regarding a possible program-wide realization of portfolio, the conceptualization and implementation of portfolio in the course *Schulpraktische Studien 1 (SPS 1)* are coherent and adapted to the purposes and the context of portfolio construction *in situ*; they are not only commonplace. With a view to the introduction of portfolio into the program of study in Economic and Business Education, a tailor-made approach was created more than a decade ago, and this approach has been continuously developed and refined ever since. While some portfolio proponents derive potential benefits of the tool from rather theoretical, abstract ideas only, here, a concrete implementation was designed, implemented, investigated, and evaluated.

General considerations as to limitations relative to the design of the study

Formation of a control group / Selection of a comparison group

In designing the empirical study for this dissertation, no control group was planned for. This is due to the fact that the study was not conducted under laboratory conditions, but in real-life higher education teaching and learning in a natural setting. In view of the potential benefits of portfolio-based education reported and described in the literature and experienced by the author of this dissertation in previous years, the pedagogical decision was taken *not* to deprive a part of the students of the portfolio experience within the course *Schulpraktische Studien 1 (SPS 1)*, encompassing a wealth of experiences in the context of cooperation in class, and in the practicum – comprising student teaching – at school. There was seen no point in selecting a comparison group, e.g., students of a cohort in pre-service teacher education at another university, due to the differences existing between institutions of higher education, university departments, and the design of programs and courses of study.

While the absence of a control or a comparison group weakens the inferences that can be made with regard to Main Hypothesis 3, it has no effect on the other key elements of the study conducted, i.e., on the investigation of the existence of differences between learners in a cohort of pre-service teacher education students constructing a portfolio, namely between academically oriented and non-academically oriented stu-

dents, and the tests for a non-existence of differences between the effects of paper-based portfolio as compared to the effects of e-portfolios, both as hypothesized. Main Hypotheses 1, 2, and 4, as well as the sub-hypotheses related to them, all deal with differences between two student groups, so with regard to the considerations based on these hypotheses, no control or comparison group was needed.

Data collection

As regards the instruments used, after the extensive review of educational literature, both on higher education teaching and learning in general as well as on portfolio in particular, it can be assumed that the instruments developed are instruments appropriate for the study.[355] Yet, there might be limitations relative to the adaption of the scales from preexisting questionnaires. In the Principal Component Analysis (PCA) of the dispositions questionnaire, only a limited amount of variance was explained, so a further analysis and optimization (i.e., re-wording) of the items as contained in the questionnaire constructed might be taken into account. Yet, the factor solution as chosen is plausible, and the Cronbach's alpha values can be considered to be satisfactory. Approaches to learning as conceptualized in the pertinent literature are rather broad constructs, so issues of dimensionality and factor analysis are rather complex. Other theoretical/conceptual backgrounds to portfolio-based teaching and learning and other forms of operationalization might have been chosen from the literature; yet, a decision had to be taken. John Biggs, David Kember, and Doris Leung involved in the construction of the Revised Two-Factor Study Process Questionnaire (R-SPQ-2F) are prominent in their fields of research and often cited, as are higher education researchers Keith Trigwell, Michael Prosser, Noel Entwistle, and many others referred to in this dissertation. Great care was taken to focus on one coherent frame of reference throughout this dissertation (which, in a broad sense, is the concept of student approaches to learning as represented in the 3P model of student learning); and via the works of the authors named, in particular by David Kember and colleagues, a connec-

[355] A quantitative approach by means of questionnaires (i.e., a survey approach) was chosen in order to question all students in the cohort taking part in the course *SPS 1* and to subsequently analyze the data collected for relationships that had been presumed (as represented in the research hypotheses).

tion of student approaches to learning and levels of reflective thinking, the latter of key importance in portfolio construction and deep learning, could be made. The frame of reference chosen is compatible with constructivism as one prominent paradigm in research on and the practice of teaching and learning – and, thus, in the design of learning environments for higher education based on constructive alignment, the focus of attention being on 'what the student does' and 'quality learning' (i.e., the quality, and not (only) the quantity of student learning outcomes) as two decisive ideas.

Based on the questionnaires administered to students in the course *Schulpraktische Studien 1 (SPS 1)*, there are students' self-reports only. Self-reports by learners always carry the risk of being inaccurate – be it due to real inability on the part of the learner to properly judge and communicate reality and/or due to a deliberate decision on the part of the learner to provide an answer or a rating that deviates from reality (as might be the case, e.g., if students feel embarrassed or do not trust that there really is anonymity). With a view to students' processing of the questionnaires administered in the context of the present study, it can be assumed with confidence that students were able to give the ratings they were asked for, and that they did so to the best of their knowledge and ability: Students actively participated in the surveys, showing active support of and interest in the study; they had an accurate individual image of their university learning, as can be assumed from many conversations; and with anonymity guaranteed, there was no reason for fudged information. The University of Mannheim being a research university, students are used to participation in projects of scientific research, and, thus, to answering questions on the basis of rating scales, having become quite proficient in doing so.

In the design of the disposition questionnaire, answers to the items on deep and surface learning as well as on levels of cognitive processing were given on the basis of a 5-point rating scale. As regards the number of points in a rating scale, the decision should be made depending on the focus of interest. With regard to the information to be provided by students on their approaches to learning (both dispositions and actual, realized approaches to learning), the minimum option is that a deep or surface approach to learning is never chosen, and the maximum is that is always followed. Thus, dealing with frequency, it is important to offer participants a medium rating, repre-

senting the option "half of the time". Thus, a rating scale representing the *frequency* of a phenomenon is different from a traditional Likert-type scale, where participants' degrees of *agreement* (or disagreement) with an issue are to be expressed. The latter having a medium option might well bear the risk of less decisive individuals dodging any clear positioning, while the former having no medium option would certainly bear the risk of distorted results. Biggs et al. (2001) use a 5-point rating scale in the Revised Two-Factor Study Process Questionnaire (R-SPQ-2F), which in order to keep to the design of the original instrument and against the background of the considerations outlined in this paragraph was kept. The fundamental scales representing students' dispositions for deep and surface learning and students' actual, realized approaches of learning being based on a 5-point rating scale, a 5-point rating scale was decided on with regard to the scales representing deep and surface cognitive processing, too.[356]

As for the possibility of a mixed-methods study, a content analysis of students' portfolios would have been – and still is – possible. Yet, students would have to be informed about the contents of their work being analyzed for purposes of scientific research, which might distort what they write in their portfolios, and would probably mar the idea of student ownership of the portfolios constructed. In the course *Schulpraktische Studien 1 (SPS 1)*, students are assured from the very first meeting, throughout classes, and in all written and oral communication that portfolio construction is about individual portfolios as well as about student ownership of the process and the product of portfolio-based learning and reflection, and that it is the student who is to benefit from this particular approach to university pre-service teacher education.[357] This could hardly be imagined to work out if students assumed that the contents of their portfolios were not only read for individual feedback, but also analyzed for scientific research – or that portfolio construction was not specifically for their professional and personal benefit, but grounded in research material needed. In research designs involving a content analysis of portfolios and a matching of results with the data from questionnaires administered, full anonymity in surveys would not be given.

[356] A 5-point rating scale was also kept to for measuring students' levels of reflective thinking.

[357] Independent of the assessment required, and the very broad, basic distinction of 'pass' and 'fail'.

Over the course of the years, extensive conversations and communication with students participating in the course *Schulpraktische Studien 1 (SPS 1)* have taken place. In fact, in several semesters, semi-structured interviews were conducted with a sample of participants in order to gain deeper insights into student learning and reflection in the course, and as a possible basis for further research. While this dissertation is focused on the questionnaire survey conducted, further interviews can be organized in future semesters in order to gain additional information on selected issues of interest in portfolio construction in university pre-service teacher education that can only be won by means of in-depth interviews with students.

Data analysis

As regards the analysis of data, the choice was made to use parametric procedures for statistical hypothesis testing. In the extensive literature on statistics, both in monographies and in scientific journals, there have been in the past animated discussions on the properties of scales in psychometric measurement as well as on the use and abuse of parametric procedures in social and behavioral research, including education. With regard to the properties of scales, opinions are divided in the literature as to whether scores derived from rating scales with disjunctive levels can be treated as metric data, or whether they have to be treated as ordinal data. With regard to levels of *agreement*, it seems plausible that there may be a lack of equidistance between the levels of a scale. Yet, in the present study, it was basically levels of *frequency/extent* that were to be assessed (the levels having been assigned numbers from 1 to 5); the verbal labels were carefully chosen; and participants were students in their fifth semester, used to taking part in university research projects based on questionnaires including scales with equidistant levels – so they can be assumed to have interpreted the scale that way. There is also discussion on whether scales should comprise an even or an odd number of levels, the former leading to a 'forced choice' scale, the latter offering a middle level that may be chosen by participants. In this study, scales with five levels were used, as this was the number of levels in the original instruments, and with regard to the assessment of levels of *frequency/extent*, a middle level was to be offered. While, with

agreement, it seems preferable to elicit a tendency, as people may tend to avoid positioning, it would have seemed inappropriate to omit the middle level with regard to frequency/extent – it would not be plausible to assume that there are no participants whose thought and/or action in question does not occur half of the time.

Statistical hypothesis testing for this dissertation is mainly based on several t-tests run. The application of this procedure is considered uncritical, as in the literature the t-test is considered to be robust regarding deviations from one or more conditions. Yet, to be very sure that the differences calculated would be statistically significant indeed, additional analyses were run based on non-parametric tests, the results of which confirmed the significance of the differences calculated.[358] Thus, it is assumed with confidence that the differences between groups of students, as found in the statistical testing of Main Hypotheses 1 and 2, can actually be considered to be significant.

With regard to Main Hypothesis 3, there is no conclusive evidence that portfolio actually leads to an increase in students' dispositions for deep learning. While there actually was an increase in students' dispositions for deep learning, this increase cannot be claimed to be caused unequivocally by portfolio construction, as there was established no control group and no comparison group. Thus, the potential effects of portfolio construction on pre-service teachers' dispositions regarding their approaches to learning, i.e., their learning orientations, have to be further researched.

As for Main Hypothesis 4, no significant differences were found between the groups of students constructing paper-based and electronic portfolios as regards students' approaches to learning and their levels of cognitive processing. The development of students' dispositions for deep learning can be regarded as being similar in both groups.

[358] The reasoning relative to this course of action was as follows: If there are more conditions to be met for the application of parametric tests, i.e., if parametric tests are assumed to be stricter with regard to what is required, non-parametric tests are available at any rate, too, with conditions assumed to be less strict. If both types of statistical procedure, parametric as well as non-parametric, lead to the same result – i.e., in the case of statistical hypothesis testing for this dissertation a difference between two groups of students being significant or not –, this result can be assumed with confidence.

In sum, the consideration of actual and possible limitations of the dissertation project undertaken and the research conducted in its context imply that while for various reasons the results may not be generalizable across different settings of portfolio-based pre-service teacher education, it can be stated that with regard to the particular design and implementation of portfolio researched there were found differences in students' approaches to learning and their levels of cognitive processing, both based on portfolio, while there was found no indication of differential effects of paper-based and e-portfolios.

The results of the study and the dissertation project as a whole having been discussed, this dissertation will now be concluded by Chapter 7. In this closing chapter, it will be summarized what we know and what we need to know, and an outlook on the possible future of portfolio as a tool in higher education teaching and learning, as given in the domain of university pre-service teacher education, will be provided.

7 Conclusion

"A little learning is a dangerous thing;
Drink deep, or taste not the Pierian spring:
There shallow draughts intoxicate the brain,
And drinking largely sobers us again."

Alexander Pope, *An essay of criticism* (1709)

"The ancient philosopher certainly gave a wise counsel when he said: "Know thyself."
For surely this knowledge is of all the most important."

James Boswell, *Boswell's London journal, 1762–1763*

A LITTLE LEARNING IS A DANGEROUS THING: The instructive observation stated by the eminent English poet Alexander Pope (1688–1744), advising deep learning, is as accurate and relevant today as it was more than three centuries ago. With a view to educating future teachers in teacher professional education; learning to teach; teaching as a career choice; and effective, accountable everyday teaching as a professional activity, it appears to be evident that the scope of Pope's observation, when in an initial step related to the acquisition of knowledge and skills for teacher professional development and personal growth, must be complemented by considerations regarding aspects of teacher identity as well as issues of professional ethics and responsibility.[359, 360]

Teacher effectiveness can be seen as the ability to expertly – and, thus, proficiently and efficiently – design learning environments at school that are conducive to pupils' learning, i.e., to design instruction in ways for it to take positive effect on the development

[359] Issues central to teacher identity, ethics, and responsibility can be found in students' statements of their personal teaching philosophies, created within portfolio-based learning environments in the context of higher education teacher preparation (as is the case, e.g., with e-portfolio use as reported by Liu, Tan, & Salleh, 2014).

[360] The acquisition of knowledge and skills also needs to be complemented by an acquisition of values, of the basics of aesthetics, etc. There is so much required for – and involved in – genuinely 'good' teaching.

of pupils' knowledge, skills, and dispositions.[361] To some extent, this ability may be represented in the basic ideas of technical rationality (e.g., Alarcao & Moreira, 1993). However, this is not enough by far, since teaching, based on diagnosing students' needs and supporting their individual learning, development, and growth, is a complex undertaking. Teachers intending to remain up-to-date are required to continuously pursue their own professional development and their personal growth by means of lifelong learning based on experiential and reflective learning.

While, from a historical point of view, it was impossible for Alexander Pope to be acquainted with the modern-day educational concepts of deep and surface learning, originating in the latter half of the 20th century, he obviously warned against superficial, inadequate, non-academic – i.e., surface – learning, which indeed is dangerous – in a sense that issues and matters dealt with on a surface level only may *seem* to be learnt, and may thus convey the learner a false sense of 'mastery', while in reality they are not understood or not understood properly, and easily forgotten soon afterwards.[362] Even if the intention to understand is given, "the illusion of knowing" (Glenberg, Wilkinson, & Epstein, 1982) easily occurs. For a substantial, sound, and reliable basis of knowledge, skills, and dispositions for professional teaching to develop, it is of vital importance for teacher education students to avoid illusions of understanding and to be aware and accepting of inevitable limits of their understanding; to continuously improve on the basis of lifelong, active learning where professional development and personal growth are possible; and to acquiesce and deal with teaching in the best ways possible where they are not. "Know thyself" – the counsel originating in ancient Greece (Brown, 2002) – is of vital importance to pre-service as well as to in-service teachers: All have to be conscious of their knowledge, skills, and dispositions as a prerequisite for continuous self-assessment and self-improvement with a view to professional development as

[361] Teachers are required and expected to act in pedagogically thoughtful ways. Teaching is what van Manen (2016, xi) qualifies as "… surely the most vital of all human endeavors."

[362] Thorough, deep, elaborate learning of complex contents is – and always will be – a matter of learner activity, engagement, and effort. As noted by Brown, McDaniel, and Roediger (2014, p. 3): "Learning is deeper and more durable when it's effortful. Learning that's easy is like writing in sand, here today and gone tomorrow."

teachers and personal growth as individual human beings. If a model of teacher education for the 21st century (and beyond) is to be developed, this – philosophical as well as educational – insight combined with the supreme aims of generating and supporting student quality learning as well as achieving desirable generic attributes in university graduates may serve as a promising starting point.

Preceding a final review of what at present is known about portfolio construction in pre-service teacher education (Section 7.1), a complementary summary of what is not yet known – and, thus, still needs to be known – (Section 7.2), and a closing outlook on a possible future of portfolio use in teacher education (Section 7.3), the aim of this dissertation, the issues to be addressed, and the course of action followed will be summed up for recollection.

The paramount aim of this dissertation project was to make a contribution both to portfolio theory and to the practice of portfolio construction in university (pre-service) teacher education.[363] Current issues worth addressing and examining with regard to portfolio construction in tertiary (teacher) education for professional development and personal growth were determined to be (1) the identification and synthesis of the theoretical and conceptual bases of portfolio construction as an educational method; (2) an overview of key purposes and present-day practices of portfolio construction in international teacher education; (3) a review of the existing literature on portfolio in education – focused on, but by no means restricted to, pre-service teacher education –; as well as (4) an empirical investigation and an evaluation of portfolio construction in one particular context – the course *Schulpraktische Studien 1 (SPS 1)* within the bachelor's program of study in Economic and Business Education, offered at the University of Mannheim, including a comparison of the effects of the form of portfolio (paper-based vs. electronic).

When, more than a decade ago, the decision was taken at the University of Mannheim to introduce portfolio in the context of the school practicum embedded in the course

[363] This contribution to portfolio theory and practice may then serve as a basis for decisions which have to be taken in education, by policy-makers, higher education institutions, and faculty, setting the general frame for teacher education programs and designing these programs and courses in detail.

Schulpraktische Studien 1 (SPS 1), it was deemed important to gain a comprehensive overview of the literature on portfolio on an international basis, and to examine and evaluate the concrete portfolio model to be designed for and implemented in the course.

Thus, at the outset of this dissertation project, an extensive search for and analysis of literature were embarked on, leading to a comprehensive body of literature on portfolio as an educational tool.[364] Subscriptions to the services of various renowned publishers were made, continuing up to the present and beyond.[365] Thus, an ongoing, thorough overview of the latest research, theory, and practice in (portfolio) education was – and is – assured.

The systematic review of the literature led to a pool of more than 1,000 potentially relevant references (see Appendix A.2, p. 440), which were analyzed with a view to possible inclusion in the presentation of the systematic literature review. An outline of the contents of a total of 77 articles is included in the tabular overview in Appendix A.7 (p. 473), while 21 of the articles considered to be of particular relevance to the purposes of this dissertation are portrayed in detail in Chapter 3. The findings of the systematic review of the literature indicate that portfolio as an educational tool can be assumed to have the potential to benefit student teacher learning and reflection, and that on an international basis, there exists a considerable body of research on portfolio, with

[364] The search for portfolio literature has been going on for many years – and continues to do so. Up to the completion of this dissertation in October 2018, a total of more than 7,500 references of all kinds (portfolio literature, both from teacher and medical education; educational and psychological literature on learning and reflection; literature on learning and assessment in higher education; literature on scientific methodology, including statistics, etc.) have been collected and saved for further use.

[365] Subscriptions were made – and held over the years – to the New Online First Articles service (covering scholarly journals such as the *Journal of Teacher Education*, the *Journal of Teacher and Special Education*, the *American Educational Research Journal*, the *Journal of Psychoeducational Assessment*, *Theory and Research in Education*) as well as to Table of Contents alerts (for, e.g., *Educational and Psychological Measurement*, the *Review of Eductional Research*, the *Educational Researcher*) and others. New original research published is monitored and, where relevant and appropriate, taken into consideration.

mixed findings, but positive in its tendency, which needs to be further corroborated in a systematic way.

For the students participating in the course *Schulpraktische Studien 1 (SPS 1)*, a portfolio-based approach to teacher education was designed and implemented, providing students with a learning environment for deep, reflective learning (i.e., quality learning for professional development and personal growth), and with ownership – and at the same time responsibility – for their learning in higher (and thus, adult) education, based on the principles of constructivism. Most of the artefacts to be included in the portfolio were prescribed – as was the production of reflective entries accompanying the majority of these artefacts –;[366] yet, students had the possibility to decide on what exactly they would write and create in response to the questions posed and the tasks set. They were also free to decide on what they would include as artefacts and reflective entries in the final section of their portfolios (see Appendix B, p. 536), and to join further artefacts and reflective entries of their choice to the ones prescribed. This portfolio-based learning environment was then investigated and evaluated.

Linking the extensive insights gained in all of these steps, there will now be derived implications for portfolio practice, and suggestions for further research will be made, before a concluding answer will be endeavored regarding the question of whether portfolio appears to be just one more educational fad or whether it can be assumed to have a promising future in university teacher education. To take up the question put so pithily by Judy Lombardi: "To portfolio or not to portfolio: Helpful of hyped?" (Lombardi, 2008, p. 7).

[366] It is to be pointed out once more that this was neither intended nor considered to be a restriction to student ownership of and creativity in individual portfolio construction. Students need a clear structure for this way of learning and reflecting, as most of them have not practiced it before. Students were given ample opportunity to select portfolio contents and to complement artefacts and reflective entries, which they made use of.

7.1 Implications for portfolio practice: What we know …

After three decades of portfolio construction in teacher education, there is quite a lot we know on the basis of sustained portfolio practice at higher education institutions around the world and the experience of this practice. As regards scientific research, various aspects of portfolio construction have been studied, albeit not systematically, i.e., in the sense of comprehensive research projects involving, e.g., experts from a range of scientific disciplines and from various contexts building consistent inquiry on a systematic identification of gaps in previous research. As has been noted, statements on the availability and scope of original research on portfolio are in some cases downright contradictory, while it was – and still is – impossible to identify a comprehensive, systematic review of international scientific literature on the effects of portfolio construction on students' approaches to learning and students' reflection that would have been published in recent years. In view of this absence of such a literature review, the thorough, methodical review of international portfolio literature presented in Chapter 3 of this dissertation was undertaken. Based on the findings of this review and on the results of the original research conducted for this dissertation, what is currently known of portfolio practice in (pre-service) teacher education will now be summarized, and implications for portfolio practice as well as suggestions for further research will be laid out.[367, 368]

[367] The author's personal teaching experience will also be considered in summarizing these implications. It is clear that personal experience does not possess – and is not intended or supposed to possess – the quality of findings arrived at on the basis of rigorous scientific research. Yet, as described in previous chapters, numerous insights were gained in the course of more than a decade of portfolio practice in initial teacher education, and these insights were documented in research journals, notes on conversations with students on their portfolios and their learning, etc. It would be regrettable not to base implications for portfolio practice on such insights resulting from personal teaching practice, which may be considered a form of 'wisdom of practice' as advocated by Lee Shulman and as desired for everyday teaching practice based on inquiry and observation. Insights gained on the basis of this personal teaching practice are clearly marked as such and intended as proposals, as a possible basis of further scientific research and discussion.

[368] The focus of these concluding sections is on a summary combing all elements of this dissertation project. For a detailed presentation and summary of "what we know" on the basis of available original

With regard to the findings of the study conducted, e-portfolios have not been found to be inherently superior to paper-based portfolios as regards students' approaches to learning and their levels of cognitive processing. Neither has such a superiority been found in prior original research reported in the literature and analyzed for this dissertation. As to date e-portfolios have not been found to be superior to paper-based portfolios – and as they have not been found to be inferior either –, it is open to switch from paper-based to e-portfolios as regards student approaches to learning and their levels of cognitive task processing.[369]

Things look different if the intended learning outcomes (ILOs) of a teacher education program or course include the acquisition of technology knowledge, skills, and/or dispositions based on the construction of e-portfolios. E-portfolio construction in pre-service teacher education can also be considered as preparing students for e-portfolio construction yet to come, with pupils at school. If the acquisition of technological capability and the preparation for future e-portfolio construction with pupils are intended, the decision not only might, but should be in favor of the implementation of e-portfolios in pre-service teacher education.[370, 371, 372]

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research, readers may refer to the literature review in Chapter 3 of this dissertation as well as to the related overview in Appendix A (p. 436).

[369] As has been noted, in past years, students in the course *Schulpraktische Studien 1 (SPS 1)* showed a clear preference for paper-based portfolios as tangible products of learning; a preference that has been shown and voiced once again by several students participating in the course in the fall/winter semester of the academic year 2018–2019.

[370] The absence of significant differences between paper-based and digital portfolios in original research implies both, that e-portfolios are neither significantly superior, nor significantly inferior to their traditional predecessors. So it is the purpose(s) of portfolio construction that the decision for one of the two forms should be based on. (Simple issues of practicability may be taken into account, too, yet the starting point of pedagogic considerations should *always* be the purposes of portfolio construction, the intended learning outcomes (ILOs) aimed at, and the contribution of different designs of portfolio in reaching these aims. As long as instructional designs are viable, practical, and reasonable, the design most conducive to students' learning and reflection should be chosen.)

[371] With regard to portfolio, there is to be noted the importance of student collaboration, conversation, and discussion in class to guide and support student learning and reflection. It is the author's firm

In teacher professional development programs, development for effective, responsible teaching as well as for personal growth in the sense of *Bildung* are important, as are formative assessment for and summative assessment of learning. Portfolio is an instrument for reflective learning as well as for educational assessment; for assessment *of* learning, and in particular for assessment *for* learning, which can be represented by an instruction and assessment cycle (Mandinach & Lash, 2016). There is ample evidence in the literature that portfolio has the potential to be used productively – and concurrently – for the aims of learning and assessment (formative as well as summative), if designed and implemented properly. For those teaching, it is evident that the aims of portfolio learning and *high-stakes* summative assessment are difficult to reconcile, while portfolio learning for professional development and personal growth combined with formative assessment (with feedback from peers, teacher educators at university, and cooperating teachers at schools) in all probability do not pose a problem.

So, what conclusions can be drawn based on the original research conducted and the evaluation made of the portfolio-based instructional system in the course *Schulpraktische Studien 1 (SPS 1)*?

With a view to Main Hypothesis 1 and its sub-hypotheses, it can be stated that the opportunity to realize a deep approach to learning offered by the portfolio-based learning environment was evidently realized, taken up, and made use of by those students in particular who already came to the course *Schulpraktische Studien 1 (SPS 1)* with an

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belief that no technological solution, however sophisticated and advanced, is likely to replace real face-to-face interaction in the classroom. One solution to this might be a blended learning approach.

372 With regard to the hype that often seems to surround everything 'e', one more individual observation is to be stated: Over the course of the two academic years in which students constructed paper-based and digital (e-)portfolios in parallel groups, a noticeable number of students commented that they would clearly prefer to construct a paper-based portfolio instead of a digital portfolio. No such comments to the opposite effect were made. Mahara as an e-portfolio software is easy to use, so possible difficulty in technology use on the part of the students may be ruled out. Apparently, students liked the affordances of paper-based portfolios, such as the possibility to draw by hand a creative mind map depicting teachers' professional tasks, the inclusion of material objects from student teaching, and the availability of their portfolio as a tangible product, both as work in progress and as the final product.

overall disposition tending towards deep learning. So, in this group of learners – Group 1, comprising the students considered 'academically oriented'–, the deep approaches to learning followed by the students on average were more pronounced than were the deep approaches to learning realized in the other group of learners – Group 2, comprising the students considered 'non-academically oriented'. At the same time, students in Group 1 realized a surface approach to learning that on average was lower than in Group 2. With a view to the overall approaches to learning realized by students, again, there was a difference, and, again, this difference was as hypothesized: Students in Group 1 on average realized an overall approach to learning that tended more towards deep learning than did students in Group 2.

These findings are in line with what is reported in the literature. While in instructional design portfolio provides teacher educators with the means to create a learning environment conducive to learning and reflection, offering the opportunity for deep learning, this opportunity has to *be realized, embraced, and used* by students. This appreciation of the opportunities provided by a specific learning environment depends on students' dispositions – as well as on their conceptions of learning – and on their perceptions of the teaching/learning context. Thus, the difference found between students with an overall disposition tending towards deep learning and students with an overall disposition tending towards surface learning is mirrored in the actual approaches to learning eventually realized by students in task processing, i.e., in their learning activities in the phase of task processing.[373] In the literature, several authors state that in the context of their studies portfolio benefited some, but not all students, and that portfolio success was not universal (e.g., Wade & Yarbrough, 1996). When students' perceptions of portfolio construction are investigated, students' views of portfolio are generally reported as being mainly positive (e.g., Cakir & Balcikanli, 2012; Kabilan & Khan, 2012). The way portfolio is perceived and used by students depends on many factors,

[373] To adduce two more of the terms widely used, students dispositions towards learning can also be considered 'learning orientations', or 'preferred ways of learning' (the latter term being used, e.g., by Biggs, 1993, p. 75). Here, the crucial difference made between students is based on students' intention to (truly) understand, and not to learn the minimum only in order to pass the course or the program of study.

among which there are the contents of the portfolio and the tasks set, as well as the introduction to portfolio construction and the guidance and support offered. At the start, students have to experience a benefit from portfolio construction, and in the course of portfolio construction, they have to perceive, i.e., to experience, the benefits offered by portfolio-based learning. As is concisely noted by Driessen (2017, p. 223), "portfolios do not work for themselves". Success depends on the design, the introduction, and the implementation of portfolio-based learning.[374, 375] Eventually, students' approaches to learning realized in the portfolio-based learning environment of the course *Schulpraktische Studien 1 (SPS 1)* were found to reflect the basic distinction made with regard to students' overall dispositions towards learning: Students having an overall disposition tending towards deep learning were found to actually adopt more of a deep approach to learning than did students having an overall disposition tending towards surface learning. Thus, it can be assumed that the portfolio-based learning environment designed for and implemented in the course *Schulpraktische Studien 1 (SPS 1)* provided academically oriented students with the opportunity to follow their inclinations towards meaningful learning for understanding.

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374 As regards possible ways of introducing the concept of portfolio to students, see, e.g., Krause (1996) as well as van Tartwijk, van Rijswijk, Tuithof, and Driessen (2008).

375 For more than a decade of portfolio construction in the course *Schulpraktische Studien 1 (SPS 1)*, the large majority of students have readily participated in the portfolio experience offered. The levels of deep and surface learning in the portfolio-based learning environment as well as the levels of deep and surface cognitive processing in portfolio construction vary; yet, virtually all students appear to get involved and to take up the opportunities for learning and reflection provided. In class, student activity in the portfolio-based learning environment can be observed, e.g., in group discussions most students eagerly engage in, especially where issues of professional and personal interest are concerned (e.g., students' motivations for becoming a teacher, students' individual teaching philosophy). Personal involvement and the level of cognitive processing can also be evaluated when reading the portfolios constructed. (With a view to the relevance of personal involvement for deep processing, see Mansvelder-Longayroux, Beijard, & Verloop, 2007). However, independent of the eager activity that can be observed in particular situations throughout the semester, and the personal involvement obvious in the large majority of the portfolios constructed in the course *Schulpraktische Studien 1 (SPS 1)*, it must be assumed that students with a disposition for surface learning are prone to look for a simplification of learning and an ease of workload where possible.

The division between learners based on their overall dispositions was also found reflected in students' levels of cognitive processing realized in portfolio construction, as had been hypothesized in Main Hypothesis 2 and its sub-hypotheses. Again, students with an overall disposition tending towards deep learning were found to perform higher quality learning than were students with an overall disposition tending towards surface learning. Students in Group 1 attained a higher mean score of deep cognitive task processing than did students in Group 2, while with regard to surface cognitive task processing the situation was converse. Students in Group 1 also attained a higher mean score regarding the overall level of cognitive task processing as compared to students in Group 2. These findings can be taken to imply the following: Portfolio construction offers students the opportunity to engage in deep cognitive processing of content (in the case of the course *Schulpraktische Studien 1 (SPS 1)*: of issues related to teaching and learning to be a teacher). This opportunity for deep cognitive processing, i.e., quality learning, can be assumed to be realized and taken up (even) more by students with an overall disposition tending towards deep learning as compared to students with an overall disposition tending towards surface learning.[376] The line of reasoning here is

[376] As regards the evaluation of the portfolio-based learning environment and the portfolio concept designed, it is interesting to see that in *both* the group of more academically oriented students *and* in the group of more non-academically oriented students, the mean scores regarding higher-order cognitive processing are quite high, while the mean scores regarding lower-order cognitive processing are quite low. The descriptive statistics regarding students' approaches to learning in the portfolio-based learning environment and their levels of cognitive processing realized in portfolio construction can be found in Appendix C.3 (p. 543). As regards the mean scores related to deep cognitive processing in portfolio construction, the values are considered positive and encouraging. The clear distinction of the two groups of learners regarding levels of cognitive processing in portfolio construction seems all the more remarkable in face of the items in the questionnaire having been formulated to depict specific learning activities related to portfolio construction in the concrete context of the course *Schulpraktische Studien 1 (SPS 1)*: While the items in many questionnaires in psychology and in education depict thoughts, emotions, or actions derived from the construct to be examined, yet more or less distal to the construct itself, the items measuring students levels of cognitive task processing were formulated so as to clearly depict (desired) student learning activity relative to deep cognitive task processing and (undesired) student learning activity relative to surface cognitive task processing. The possibility of students answering the items in light of social desirability was accepted. Despite the obvious educational desirability of the ways of learning depicted (or the opposite

analogous to what has been written with regard to Main Hypothesis 1: Students with an overall disposition tending towards deep learning realize, take up, and use the opportunities for deep cognitive processing (i.e., quality learning) more than do students with an overall disposition tending towards surface learning. While the absolute mean scores regarding deep cognitive processing in portfolio construction – portfolio construction being at the very core of a portfolio-based learning environment – can be regarded as positive and encouraging with regard to the whole cohort of students, the division in student (pre-)dispositions towards learning is still mirrored in the mean levels of cognitive task processing as realized in the two groups of learners formed. Again, the observations of differences reported in the literature can be agreed to insofar as there can be found differences in student learning, in the case of the evaluation of portfolio construction in the course *Schulpraktische Studien 1 (SPS 1)* with all students engaging in deep cognitive processing to a large extent, but with academically oriented students in Group 1 making *still more* use of the opportunities provided for deep cognitive processing than is the case with non-academically oriented students in Group 2. Thus, portfolio construction as implemented in the course *Schulpraktische Studien 1 (SPS 1)* can be assumed to offer the opportunity for deep cognitive processing, which is taken up by the cohort on the whole, yet to a fuller extent by some students than by others. Again, this corroborates the observations and the reports in the literature that portfolio does not benefit all students to the same extent.

What conclusion can be drawn with regard to portfolio construction and the development of students' dispositions towards learning? With a view to the investigation of portfolio in the context of the course *Schulpraktische Studien 1 (SPS 1)*, it had been hypothesized that portfolio would enhance (i.e., increase) students' dispositions for deep learning. Here, as has been pointed out in the previous chapter, the findings are incon-

thereof), here again, a clear distinction can be shown between Group 1 (academically oriented students) and Group 2 (non-academically oriented students). This is seen as one more indication that, on the whole, students can be assumed to have responded to the items in the questionnaire openly: Had it been common ambition of students to deliberately fake answers and respond to the items in a way so as to best represent themselves (i.e., as engaging in higher, but not in lower levels of cognitive processing), it would have been unlikely to detect differences between Group 1 and Group 2 of the kind found in portfolio construction in the course *Schulpraktische Studien 1 (SPS 1)*.

clusive: While there was found to be a statistically significant total increase in students' dispositions for deep learning as reported, this increase between the start and the (preliminary) end of portfolio construction cannot be considered unequivocally to be an effect of portfolio. The development observed may be due to various other factors (e.g., the maturation of participants, effects of other experiences on the part of the participants). Taking this into account, it has to be stated that in the study conducted there was found no conclusive evidence of portfolio having an actual positive effect on students' dispositions for deep learning. While there exist studies investigating portfolio construction and the development of students' approaches to learning, research examining the (long-term) effects of portfolio construction on students' dispositions regarding learning has yet to be conducted. Thus, while it seems plausible that portfolio construction may influence students' dispositions for deep learning in desirable ways – based on students having positive experiences of their hands-on approaches to portfolio construction –, it cannot be stated as yet whether this really is the case. Questions regarding changes in students' dispositions remain interesting, both from a pedagogical point of view and with regard to portfolio as a means to support continuous professional development, reflective practice, and lifelong learning.

Finally, as regards the findings concerning Main Hypothesis 4, statistically significant differences in the mean scores of the two groups constructing traditional, paper-based portfolios and more recent, electronic portfolios (e-portfolios) were found neither in connection with students' actual approaches to learning in the portfolio-based learning environment, nor pertaining to students' levels of cognitive processing in portfolio construction. Yet, the fact that no differences were found may be due to the research approach chosen and a limited power of the statistical tests employed. It may be considered that while portfolio contents and tasks were deliberately kept as identical as possible in the two groups (paper-based vs. electronic portfolios), the variation of portfolio form is likely to have led to differences in students' thoughts, emotions, and actions. Still, based on the scores calculated, learning with e-portfolios cannot be claimed to be superior to learning with their paper-based predecessors – nor would a converse claim be possible. Genuinely pedagogical advantages offered by e-portfolios can be assumed to exist with regard to technological affordances, such as collaborative learn-

ing via the internet and the possibility of the inclusion of multimedia artefacts (e.g., videos of student teaching for documentation and subsequent analysis and discussion). Variation in these aspects will have to be researched further. As long as there is no conclusive evidence of the superiority of one of the two forms of portfolio, teacher educators may freely choose which form of portfolio to construct with their students. Considerations of practicability may then be taken into account, of course, and may tip the scale towards one of the two forms. The basis of learning offered by the two forms of portfolio being considered on a par – both with a view to the findings of the literature review and of the study conducted –, the choice of portfolio form may also be given to students, which may be assumed to further increase student ownership of portfolio-based learning.

In sum, portfolio construction in the course *Schulpraktische Studien 1 (SPS 1)* can be considered to offer students the opportunity for deep learning and deep cognitive task processing. These opportunities for quality learning are taken up to a larger extent by students with an overall (pre-)disposition tending towards deep learning than by students with an overall (pre-)disposition tending towards surface learning. As regards the influence of portfolio on the development of students' disposition for deep learning, there is no conclusive evidence yet. With a view to student quality learning in the course, there is no indication of one of the two forms of portfolio – paper-based vs. electronic – being inherently superior (or inferior) to the other.

The instruments developed for the investigation and the evaluation of portfolio construction in the course *Schulpraktische Studien 1 (SPS 1)* can be seen as serving their purposes well: Differences between students' dispositions towards learning, students' approaches to learning, and students' levels of cognitive processing could be shown on the basis of the measurements made by means of the instruments developed.

The summary of what is known on portfolio construction in pre-service teacher education – based on the prior research findings collected in the course of the literature review, the investigation and the evaluation of portfolio construction in the course *Schulpraktische Studien 1 (SPS 1)*, and ample practical experience gathered in university teacher education –, will now be followed by complementary considerations as to what

(still) needs to be known regarding the portfolio and its successful implementation for learning and reflection.

7.2 … and what we (still) need to know: Suggestions for further research

Independent of the body of evidence presented, questions remain. As was laid out, one of the benefits of portfolio is that the instrument can be employed at all stages and in all domains of education, including higher and teacher education, and that it can be implemented in the form of a virtually unlimited number of portfolio designs. If portfolio contents and the tasks set vary between programs and courses, and if students, as is intended in portfolio construction and desirable in student-centered education, individually conceive, construct, and complement their portfolios, no two portfolios will turn out to be exactly alike. Thus, it is to be assumed that on the basis of highly variable individual portfolios constructed, the individual processes and products of student learning and reflection based on these portfolios vary considerably, too.

In relation to research of portfolio construction, it was noted throughout the preceding chapters of this dissertation that in light of this variability, it may be difficult to generalize original research findings on portfolio. This can be easily illustrated based on John Biggs' 3P model: If student factors and teaching/learning environments (and, thus, students' perceptions of context) vary considerably, task processing and the product(s) of learning will invariably vary, too. Yet, it is well possible *to evaluate the design and the implementation of given instances of portfolio construction in specific, concrete teacher education programs and courses*. It can also be assumed to be possible to research portfolio concepts in education that are kept constant in their basic structure across contexts, e.g., the European Language Portfolio (ELP).[377]

[377] For more information on the European Language Portfolio, see the information provided by the Council of Europe (https://www.coe.int/en/web/portfolio, accessed on 2018-04-04). Another instance of portfolio construction with common guidelines across (teacher education) programs is the edTPA, developed by Stanford University and SCALE (the Stanford Center for Assessment, Learning, & Equity), and powered and provided by Pearson Education (see http://www.edtpa.com/Home.aspx, accessed on 2018-04-04). Judging from the literature, there appear to be mixed reviews and consider-

So, in light of these challenges to scientific research due to one of the major benefits of portfolio – its adaptability and its potential for individualization, both by teacher educators and by students as owners of their learning and as portfolio authors –, what aspects of portfolio construction can be suggested for further research, i.e., what is worth knowing that we (still) need to know?

Retracing the path that was followed in the making of this dissertation, additional theoretical and conceptual clarifications relative to portfolio might be aimed at in the first place. 'Portfolio' as an educational tool, i.e., as an instrument, a method, a strategy for student deep learning and reflection, means many things to many people in educational policy, research, and practice. The same observation can be made with regard to reflection and reflective practice: There are different theories, models, and frameworks research and practice of reflective thought and reflective learning are based on, so research findings and instructional approaches are difficult to compare.

The systematic review of the literature on portfolio in teacher education presented in Chapter 3 of this dissertation is based on literature in English. English being the *lingua franca* in global research, this focus was chosen in order to make most probable that the majority of relevant, substantial original research articles would be identified during continual, thorough searches in several internet databases recording articles in scholarly journals. Yet, there might be pertinent research in languages other than English, and the review of literature showed that sometimes original research findings are published in book chapters or papers – which means that they are not recorded in the internet databases searched.[378] If more resources had been available, a still broader

able controversy surrounding the edTPA, which focuses on performance assessment (possibly at the expense of learning). What is also unclear are the implications of 'outsourcing' processes of teacher professional education with a commercial company involved. In view of high-stakes assessment and its focus on assessment scores, the problems relative to the assessment of portfolios can be assumed to take full effect.

[378] This decision having been taken, portfolio literature in German was not included in the search process during the systematic review. This approach is different from most German-language texts on portfolio identified and analyzed: In those texts, the focus is on portfolio literature in German, often representing texts other than original research, e.g. anecdotal reports, lessons learnt, or theoretical considerations. As regards German portfolio literature, works of well-known experts in the field (e.g.,

review could have been undertaken, integrating sources in languages other than English and from publications other than scholarly journals. Having referred to the large body of original research on portfolio in domains such as medical and nursing education, a review of literature could be conducted which systematically takes into account portfolio from various domains of higher/professional education, as long as they are assumed to be comparable (as is the case with teacher and medical education, as was pointed out repeatedly throughout this dissertation). Portfolio construction for learning, reflection, professional development, and personal growth being researched basically unsystematically in different disciplines, multidisciplinary research teams could be established to negotiate and implement a shared approach to collectively research portfolio. Taking into account the observation that portfolio originates in educational practice, expert teams could also further relate portfolio to theories and concepts of human learning and reflection.

With regard to an overview of available literature on portfolio as an educational tool in teacher education, it is interesting to note that to date there seems to exist no comprehensive, systematic review of international portfolio literature on students' approaches to learning and students' levels of reflective thinking apart from the one undertaken for the purpose of this dissertation. Reasons for this absence of another systematic literature review can only be assumed: Considering the elusiveness of portfolio as a concept, and looking at the complexity of human learning as the aim of educational portfolio construction, the composition of a systematic literature review based on research findings from all over the globe is a challenging endeavor indeed. Independent of the literature review in Chapter 3 and several available literature reviews dealing with particular aspects of portfolio construction in higher and teacher education, still more research comprehensively collating existing research would certainly be beneficial for portfolio theory and practice. Gaps in research methodically identified could then be systematically addressed.

Thomas Häcker, Tina Häscher, Barbara Koch-Priewe, Andreas Kraler) were not presented in the systematic review of the literature in Chapter 3, but taken into consideration as a background to its composition and/or referred to in previous chapters of this dissertation, where appropriate.

Regarding student self-knowledge and self-reflection, more research on students' subjective perceptions and evaluations of the quality of reflective thinking, as compared to the actual, objective quality of their reflection as documented in their portfolios, would be of interest (e.g., Ogan-Bekiroglu, 2014).[379]

Due to methodological issues, it is difficult for researchers to identify the contributions of teacher education programs to teacher learning (Wiens, 2012). Yet, as is the case for influencing students' learning approaches and learning dispositions as well as for teaching reflection: the foundations have to be laid, ideally from the very beginning. Within the context of teacher education as a complex, social undertaking, neither teacher educators nor researchers should resign. With regard to tools for teacher education, the question of what approaches are best to bring about the developments desired – effectively and efficiently – should be addressed. There might be undertaken (1) a comparison of portfolio with other approaches to reflective teaching and learning (questions of portfolio *efficiency* not having been the focus of extensive research so far);[380] (2) more research on the effects of paper-based vs. e-portfolios; and (3) the implementation and investigation of different designs of portfolio construction varied only marginally, i.e., of different 'micro-techniques' and 'micro-approaches' within the broad context of a portfolio-based learning environment.

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[379] Systematic, academic reflection being a process that needs to be taught, modeled, and trained, and most written student reflection being rated as representing lower levels of reflection, it would be interesting to see whether students can really evaluate the quality of their own reflections, i.e., whether students' and higher education teachers' evaluations of written student reflection intersect. Probably a majority of students tends to overrate the quality of their reflections as documented in their portfolios. Years ago, a common reaction to the introductory announcement that reflection would be a key element of the course *Schulpraktische Studien 1 (SPS 1)* was several students' questioning of such importance given to the practice of reflection, usually on the basis of those students claiming that they would "reflect anyway". The illustration of the importance of reflective practice has been refined over the years, and it is well possible that nowadays students are sensitized to the importance of reflection at school. At any rate, there has been no noticeable questioning of the importance of reflection in recent semesters.

[380] Regarding portfolio *efficiency*, a basis for comparison, i.e., a benchmark, may be difficult to determine.

As pointed out by McIntyre and McIntyre (2010), Carney (2004) in her literature review found very few studies meeting standards for exemplary research when she was looking for empirical evidence on the effects of portfolio. In a way, this lack of *substantive* empirical research seems to continue. In addition, there seems to be no systematic research on portfolio in the sense of the agenda set by Carney. A coordinated research agenda, i.e., systematic research on portfolio, ideally on an international level, appears to be desirable.

Regarding student approaches to learning, links between students' realized approaches to learning as reported and aspects of the products of learning – in the form of the portfolios constructed – might be researched. This would require a content analysis of students' portfolios and a matching of individual student data (gained, e.g., by means of questionnaires) with the individual student's portfolio. The capacity to match data reported by the students with the contents of their portfolios would clearly extend the database and, thus, the scope of possible investigations. Student approaches to learning might also be compared with and related to students' levels of reflection in portfolio construction. While in the literature there is posited a clear connection of these two concepts, more research on their relation in the specific area of portfolio construction could be done.[381]

Further research might be undertaken regarding the differential effects of portfolio construction. Portfolio provides the opportunity for personalized student learning. Yet, as reported in the literature and shown by the findings of the original research conducted in the course *Schulpraktische Studien 1 (SPS 1)*, there are differences in ap-

[381] As can be seen from the description of the study undertaken (Chapter 4) and the questionnaires administered to the students participating in the course *Schulpraktische Studien 1 (SPS 1)* (the key scales of the questionnaires are given in Appendix D, p. 570), data on students dispositions for reflective thinking and their reflective thinking realized in task processing (i.e., portfolio construction) were collected. Yet, the thorough execution of all investigations originally considered in the context of this dissertation project proved to be too broad an enterprise. Thus, the presentation of findings in this dissertation is focused on students' approaches to learning and their levels of cognitive processing. The data gathered on students' reflective thinking may be considered in subsequent analyses, e.g., of the relation of students' approaches to learning and students' reflective thinking.

proaches to learning and levels of cognitive task processing depending on students' (pre-)dispositions relative to learning. Research might look for ways to overcome these differences, i.e., to further induce and support students with a rather 'non-academic' inclination to make use of portfolio-based learning.

Most of the studies reviewed focus on a limited period of time, e.g., on the semester in which portfolio construction took place. It would be interesting to extend research on the long-term effects of portfolio construction and to see if – and if so: in what ways – students maintain their portfolios in the long run. Thus, it would be interesting to investigate whether the beneficial effects attributed to portfolio construction last over time, and whether students experience and realize these potential benefits and thus continue to work on their portfolio.

Approaches to learning and levels of reflective thinking being broad concepts in educational science and instructional design, it would be interesting to investigate specifically and in more detail particular cognitive, emotional, motivational, and social processes involved in deep learning, deep cognitive processing, and deep reflection in a portfolio-based learning environment.

It would also be of interest to design one basic, generic portfolio approach for practical elements of study in teacher education programs at higher education institutions offering teacher education, and then research the effects of the implementation of that approach at more than one institution. Examples of such an approach, going beyond the borders of one particular institution, would be the European Portfolio for Student Teachers of Languages (EPOSTL) and the edTPA.[382]

Further research should continue the investigation of how portfolio-based learning and reflection can be supported best. Such research should not only look at the effects of different characteristics of a given portfolio implementation as such (e.g., portfolio contents, specifics of the tasks set, type and form of portfolio), but also of accompany-

[382] Judging from the available literature and the discussions reported, the edTPA meets with mixed success. Looking at details of its implementation – e.g., apparent mass adoption regardless of purpose and format, as warned against by Driessen (2017), and a commercial company being involved in the scoring process –, the controversy surrounding the edTPA seems hardly surprising.

ing measures, such as modelling, mentoring, and feedback, which are considered important for productive portfolio construction. In this vein, the effects of variations in the design of portfolio-based learning and reflection should be studied on the basis of scientific study designs (case study designs, treatment/control group designs, parallel group designs, etc.), with yet more research being conducted on the differences between paper-based and electronic (digital) portfolios.

A final suggestion for further research would be to take a look at commonly agreed intended learning outcomes (ILOs) of portfolio-based teacher education, and to examine the ways in which – as well as the extent to which – these ILOs are achieved by students constructing a portfolio. Considering the importance of linking teaching theory and practice (e.g., Korthagen et al., 2001; Korthagen, 2010), a closer look seems warranted as to the *exact* ways in which this integration of theory and practice takes place in the context of portfolio-based learning and reflection. Thinking of the Self-Determination Theory (SDT), corresponding to a remarkable extent with portfolio-based learning and reflection, it could be further researched whether – and to what extent – perceptions of autonomy, competence, and relatedness are induced on the part of the students, and what in turn are the effects of these perceptions on the processes and products of portfolio-based learning and reflection.

Based on the available evidence presented and the questions that remain, a summary and an outlook regarding the possible future of portfolio construction in university teacher education will now be given.

7.3 Portfolio construction in university teacher education – merely one more educational fad? An evidence-based summary and an outlook

As noted at the very beginning of this dissertation, teaching is a complex, challenging undertaking (Beutel, 2010; Brandt, 1986; Darling-Hammond, 2006; Oakley et al., 2014; Sparks-Langer & Colton, 1991; Zeichner, 2009), and so are teacher education (Cochran-

Smith et al., 2014; Zeichner et al., 2015) as well as learning to be a teacher (Britzman, 1986; Lambe et al., 2013; Valencia et al., 2009).[383]

Teacher preparation is – and in all probability will remain – a never-ending quest for quality – as manifested in the aims of quality learning and reflection in teacher education, and in the education of teachers who are supposed to implement and offer quality teaching at schools. There continue to exist – as well as to come up – pressing concerns, problematic issues, and unresolved questions, leading Schneider (2017) to write about a history of problems and dilemmas in teacher preparation, and to aptly use the image of teacher preparation as "marching forward, marching in circles", a phenomenon teacher educators are quite familiar with.[384]

As noted by Shepherd and Hannafin (2009), pre-service teacher portfolio construction for various purposes related to learning and assessment started in the mid-1980s, so there has been portfolio use in initial teacher education for more than three decades now. Portfolio use in teacher education programs has come to be widely accepted practice (Gugino, 2018), while – the fate of many an educational 'innovation' being well-known in retrospect – one key question remains: Does portfolio construction really represent an innovative, durable approach to the education of professional teachers, committed to and capable of effective, responsible teaching and reflective practice, or is it merely one more educational fad, doomed to disappear in a few years' time?

While claiming the ability to foretell the future of portfolio as an educational tool would exceed the boundaries of proper science, an attempt at a prognosis in the form of a probabilistic assumption – clearly labeled as such – can be considered admissible if

[383] Learning *to be* a teacher, as has been argued emphatically throughout this dissertation, comprises much more than only learning to teach professionally in the sense of merely carrying out instructional activities effectively. It comprises learning to truly *think* and *act* as a pedagogue – with motivation, deliberation, reflection, and responsibility.

[384] The continual, rapid changes to university teacher education caused by continuous changes in higher education and teacher education policies can hardly be assumed to contribute to continuity in and reliability of the conditions framing teacher educators' work. In all probability, a state of constant reform can be assumed not to be conducive to the quality of teacher education either, as teacher educators' attention is constantly required and taken up by activities other than actual teaching.

such a prognosis is based on the available evidence regarding the effectiveness of portfolio construction in attaining fundamental aims of teacher education.

Is portfolio worth its while, or is it simply a cumbersome additive to the 'core curriculum' of teacher education? What are the unique characteristics of portfolio that justify, based on scientific evidence, the prognosis of a promising future in teacher professional education?[385]

Ideally, good implementations of portfolio for teacher education are tailor-made; they can be – and are meant to be – constructively aligned on the part of faculty to fit the local context (portfolio purpose(s), ILOs, contents of the curriculum, issues of assessment, etc.), and personalized by students in the course of their individual and collective learning. Portfolio is one particular approach to learning and instruction – 'portfolio' being an umbrella term for many different concretizations and, thus, types of the instrument –; it can be considered to be a container for and a compilation of both the substance of teacher education and the tasks to be performed on this substance.

Portfolio construction as an approach to university teacher education has several advantages:

- Portfolio is comprehensive: Whatever the intended learning outcomes (ILOs) of a specific teacher education program or course may be, the material of portfolio construction – i.e., the contents of the portfolio as well as the tasks to be performed on these contents – can be chosen and set freely, as suitable and appropriate for the local context of teaching and learning. Materials can be chosen and tasks designed to address *all* aspects deemed important for pre-service teachers' professional development and personal growth, including issues of teacher identity construction. There are various paths of student learning leading towards the intended learning outcomes (ILOs). Thus, portfolio as a tool has

[385] Throughout this dissertation, priority is given to evidence provided by substantive original research conducted on the basis of sound scientific principles. Yet, experiences and observations reported by portfolio practitioners in higher and teacher education are also collated and considered.

the potential to address and cover *all* areas of teacher professional education; essentially, there is no restriction of purpose or topics.[386]

- Portfolio is integrative: From a chronological, viz. longitudinal, point of view, portfolio has the potential to integrate the past (e.g., experiences students bring along from their time as pupils at school; beliefs regarding teaching and learning they hold on that basis), [387] the present (the processes and products of professional higher education, comprising classroom as well as practical experiences, e.g., in the form of student teaching), and the future (students' plans regarding their professional development and their careers; students' expectations as to their professional and personal future, etc.).[388] From a cross-sectional point of view, portfolio has the potential to support students in integrating the elements of a teacher education program, which comprises the formation of links both within and between theory (as acquired in the university classroom) and practice (as experienced in practicums at school). Thus, students who get involved and actively engage in the construction of their portfolios have the opportunity of constructing for themselves the 'big picture' that is to be grasped and understood. Students are enabled to form their personal theories of teaching (e.g., Korthagen et al., 2001), based both on theory and practice, developing over the years 'wisdom of practice' (Feldman, 1997; Shulman, 1987b, 2004, 2007).

[386] An apparent exception to the appropriateness and usefulness of portfolio implementation would be contexts of teaching and learning where the focus is clearly on rote learning of knowledge. Such courses can be assumed to be rare in higher education, and even if there were courses emphasizing mere memorization of course contents, portfolio could still be used – clearly, to a very restricted extent – to foste students' self-regulated learning skills, on the basis of reflective thinking.

[387] The fact that pre-service teachers bring along to teacher education programs the school experiences they made as pupils, the influence of these experiences on their teaching and their learning to teach, and the implications of this phenomenon for teacher education design is pointed out, e.g., by Calderhead (1991).

[388] The potential of portfolio to address and bring together the past, the present, and the future is confirmed, e.g., by Bataineh et al. (2007), by Niikko (2002), and by Trent and Shroff (2013) – in the latter two cases with a particular view to students' teaching practicum, i.e., the very context reported most often in pre-service teacher education literature as the context of portfolio use, and of particular interest as regards this dissertation project.

- Portfolio is flexible and, thus, adaptable: It can be adapted to address all purposes and all learning outcomes intended in a particular course or program of teacher education. Portfolio construction can be – and should be – implemented as a unique, distinctive approach, made to measure to address local, particular contexts of (teacher) education.

- Portfolio is a multi-purpose approach that can serve learning as well as assessment: There is no categorical opposition between the dual aim of learning and assessment, if the challenges in (concurrently) following these aims are known and (teacher) educators act accordingly. Portfolio can be used for a variety of purposes with regard to these two typical aims of institutionalized education, concurrently or consecutively, as the case may be.

- Portfolio is independent of pedagogical zeitgeist and fashion: As a concept denoting an educational approach based on deep learning and reflection, it is always up-to-date, as both portfolio contents and portfolio tasks can be adapted at any time to accommodate changes in curriculum and advances in educational science. Both can be taken into account by means of changes in portfolio contents and portfolio tasks. Portfolio is a timeless way of teaching and learning; a frame that can be re-designed at any time.

- Portfolio – if properly designed and implemented – acquaints students with deliberate, systematic, academic reflection as an approach to professional teaching and – if students take up the opportunity provided – involves them in processing their experiences – past and present, in the university classroom as well as in student teaching – with the aims of gaining new insights by means of learning for understanding and productive reflection. Experience has to be processed in order to be educative: It is not sufficient to only make and casually notice an experience, but students must *get involved* and *actively engage* in deliberate, systematic, academic reflection.[389]

[389] Regarding students' experiences during a school practicum, Beraza (1996) rightly points out that it is not *any* school experience that would be useful to pre-service teacher preparation. Practicums are to

- Portfolio construction in professional higher education offers preparatory training opportunities conducive to learners' becoming reflective practitioners: Students in teacher education are to become effective, professional teachers, with attributes of the 'reflective practitioner' as described in the literature (e.g., Adler, 1991; Copeland et al., 1993; Gilbert, 1994; Korthagen & Wubbels, 1995; Lawrence-Wilkes & Ashmore, 2014; Lyons, 1998c; Ostorga, 2006; Schön, 1983, 1987), including an inquiry-oriented stance. The aim of reflective professional practice is constant (self-)improvement.

- Portfolio construction has the potential to address all aspects of learning – cognitive, emotional, motivational, and social. It can support students in developing critical minds, professionally as well as personally, and to acquire attributes considered to be important for higher education graduates, including values and dispositions. As noted in Chapter 1, professional teaching at school must be effective and responsible. Portfolio can address all issues involved.

- Portfolio is continuous: Started at the beginning of teacher education, portfolio to students is a companion on their professional and personal journey, the embodiment of their learning, both as a process and as a (preliminary or final) product. This tangible documentation can be further processed in an iterative process at any time. With a view to lifelong learning, portfolio is continuously developable, i.e., extendable, alterable, and improvable; there is connectivity throughout all stages of professional education and professional teaching.

- Portfolio construction as an approach corresponds to current, up-to-date educational theories (e.g., constructivism, transformational learning, adult learning, situated learning, communities of practice, communities of learners, storytelling).

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result in "rich experiences" (Beraza, 1996, p. 269). Reflection is a means of productively processing experience, with the aim of learning. Portfolio as the process and the product of "documenting experience" (Orland-Barak & Maskit, 2017) can serve as the basis of reflection for learning, in independent as well as in collaborative learning.

- Portfolio is a student-centered, holistic way of learning and assessment (e.g., Curtis, 2017). Portfolio makes possible individualized, constructive learning.

- Portfolio in pre-service teacher education provides a frame for the expression of students' thoughts as well as of their emotions, the latter meeting with increasing interest in research of professional teaching and teacher education.[390, 391]

- Portfolio construction allows students to take a step back from their usual way of studying, often centered on the acquisition of isolated items of knowledge and skills for mere reproduction in formal exams. Portfolio, if properly designed and implemented, is aimed at student ownership of the process and the product of learning.

- Portfolio combines the outside with the inside: Portfolio learning is not restricted to students' observable performance only; students are also offered the opportunity to express and put up to discussion what goes on in their minds.[392] Most learners like to talk about their thoughts, feelings, and actions, and to relate their experiences. This should be made fruitful use of.

- Portfolio can be implemented independent of technology: There is no need to replace paper-based portfolios with digital (e-)portfolios, as both forms of portfolio have the potential to support students' learning and reflection, depending

[390] The impression of emotions in teaching and teacher education gaining importance as a focus of research is supported by a corresponding observation by Uitto, Jokikokko, and Estola (2015). Examples of scientific texts on teacher emotions published in recent years are, e.g., Anderman and Klassen (2016); Becker, Goetz, Morger, and Ranellucci (2014); Darby (2008); Jiang, Vauras, Volet, and Wang (2016); Lohbeck, Hagenauer, and Frenzel (2018); O'Connor (2008); and Taxer and Frenzel (2015).

[391] The importance of emotions in teaching and learning to teach is emphasized throughout the course *Schulpraktische Studien 1 (SPS 1)*, with regard to teaching in general and reflection and reflective practice in particular (for an instance of emotions in the context of a cyclical model of reflective practice, see Gibbs, 1988). Teachers being human after all, it would be surprising if emotions (and the regulation of emotions) were irrelevant to professional teaching.

[392] The thematic openness in portfolio construction enables students to write about their thoughts; their emotions; their concerns; perceived strengths they are confident and proud of; perceived weaknesses they have to work on; etc., which would be lost otherwise.

on the context and the intended learning outcomes (ILOs). As noted by Curtis (2017, p. 3), writing about the affordances of Web 2.0 for portfolio construction, "… in spite of such technological advances, the basic nature of the student portfolio is much the same now as it was 20 years ago."[393] As regards the original research conducted in the course *Schulpraktische Studien 1 (SPS 1)*, no statistically significant differences were found in students' approaches to learning and students' cognitive task processing between the group of students constructing paper-based portfolios and the group of students constructing e-portfolios. On this basis, it is open whether teacher educators choose to switch from paper-based to e-portfolios.

- As has also been found in the original research conducted for this dissertation, portfolio as implemented in the course *Schulpraktische Studien 1 (SPS 1)* can be considered conducive to deep learning approaches and deep cognitive task processing. In portfolio construction, there are many paths students can choose to reach the intended learning outcomes.

- Portfolio can be of help to students with regard to future employment: While all previous aspects in this list are directly related to (teaching and) learning as the core of education, there is one more element to portfolio construction that is not to be neglected – the possibility of presenting a carefully constructed professional portfolio to future employers (e.g., Boody, 2009; Fanning, 2008; Whitworth, Deering, Hardy, & Jones, 2011).

In order to realize this large range of potential portfolio benefits, ideally to its full extent, the paramount importance is to be highlighted once more of clear, transparent portfolio purpose(s); thoughtful portfolio design; careful introduction to students of the concept of portfolio in general as well as of the concrete implementation intended; student and faculty buy-in; and guidance, support, and feedback for students. If students (and faculty) expect and/or experience no benefits of a particular learning environment designed on the basis of portfolio, portfolio as an approach to higher and

[393] So paper-based portfolios can be considered as remaining a long-term option. For one more reference critical of technology use in portfolio construction, see the article by Xerri and Campbell (2016).

teacher education will not result in the positive effects attributed to the instrument, and in the long run is doomed to fail.

There are ample instances in the literature of positive reports on portfolio construction by teacher education practitioners. What is even more – from the point of university teacher education informed by scientific evidence: Original research on portfolio in pre-service teacher education – as obtained and reviewed for this dissertation – can be considered to be predominantly positive. So, is portfolio a panacea, a universal remedy to all issues and questions in teacher professional preparation in higher education settings? The answer is: It is certainly not. Yet, on the basis of what we know, there is reason to assume that portfolio has the potential indeed to support students' quality learning and reflection, if portfolio is designed and implemented properly. As noted by Biggs (2014b), students who experience no success with rote learning under portfolio assessment are induced to go deeper in their learning. Both with a view to the processes involved and the learning outcomes intended, portfolio construction can be considered the very antithesis to rote learning.

Over the course of the past three decades, portfolio has developed into what might be seen as one of the 'signature pedagogies' (Falk, 2006; Parker, Patton, & O'Sullivan, 2016; Shulman, 2005) in teacher professional education and teacher professional learning. Based on the promising evidence gathered in the context of this dissertation, there is reason to suppose that the success story is going to continue. Portfolio, in all probability, is here to stay – as an effective, engaging approach to holistic, human, 21st century teacher education,[394] preparing students for the science, the craft, and the art of quality teaching, guiding and accompanying them in both their professional development and in their personal growth.

[394] Instructional design (ID), as well as 'learning experience design (LX design)', is about the design of learning environments that are effective, efficient, and engaging (e.g., Merrill, 2013). Portfolio has a lot to offer in these respects. As regards portfolio and holistic learning, see, e.g., Curtis (2017); as for portfolio and the human dimension of learning, see, e.g., Chau and Cheng (2010).

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Appendices

Appendix A. The systematic review of the international portfolio literature: Process and findings

A.1 The systematic review protocol

Review objectives

It will be the aim of this systematic literature review to identify, analyze, organize, evaluate, and synthesize *high-quality primary research pertaining to the influence of portfolio development on pre-service teachers' learning and reflection*.[395]

More specifically, this review will look at the *processes and products of learning and reflection* in a portfolio-based learning environment as presented in primary research of pre-service teacher education published in scholarly journals. It will also take into account *portfolio purposes found in practice, contextual factors of portfolio development, pre-service teachers' perceptions of portfolio development* as well as *key theories, concepts, and pedagogies underlying portfolio development in pre-service teacher education*.

[395] Subsequent explanatory note (November 2018): In the systematic review protocol, the term 'primary research' is meant to denote original research on an empirical basis. The term 'portfolio development' is meant to refer to the activity of portfolio construction (i.e., the creation and subsequent development of a portfolio) on the part of those learning, and the practical use of the tool in higher education teaching on the part of those teaching, i.e., it denotes practical *portfolio use* on the part of *portfolio users*. In the context of this dissertation project and throughout this dissertation, the terms 'portfolio development' and 'portfolio construction' are basically used as synonyms, unless otherwise stated or illustrated. The decision regarding the use of the two terms as synonyms was taken in light of the technical terminology as commonly used in the English-language literature read. An actual differentiation between 'portfolio developers' (i.e., those who develop and refine a portfolio conceptualization for use in education) and 'portfolio users' (i.e., those who actually use the portfolio: students and teachers) is made, e.g., by Driessen (2017). In this sense, the students taking part in the course SPS 1 would be 'portfolio users', and the author of this dissertation would be a 'portfolio user' and a 'portfolio developer' at the same time.

Background

The use of portfolio, both paper-based electronic, is widespread in teacher education. The popularity of portfolio keeps growing, as can be inferred from its introduction into teacher education programs worldwide, and its potential value as an educational tool for purposes related to learning and assessment is widely acknowledged. Yet, an extensive revision of portfolio literature leads to the impression that the attractiveness of the instrument and its assumed benefits might be based more on anecdotal reports by proponents than on findings of systematic, substantial empirical research. Statements as to the scope and the quality of available primary studies are contradictory. To the best of the author's knowledge, there exists no up-to-date systematic literature review comprehensively summing up the international literature on the influence of portfolio development on pre-service teachers' learning and reflection. The uncertainty with regard to the availability of high-quality empirical evidence as well as the potential lack or insubstantiality of a knowledge base founded in high-quality empirical research warrant, to the author's mind, a comprehensive, systematic literature review examining what is currently known and what needs to be known on the topic.

Search strategy

To identify pertinent primary research, internet databases listing educational research articles will be searched for original research on the influence of portfolio development on pre-service teachers' learning and reflection. The selection of internet databases will encompass the databases Academic Search Premier, ERIC, PsycARTICLES, PSYNDEX, PsycINFO, Teacher Reference Center, and Web of Science. It is assumed that a search in these databases will provide a thorough overview of available research on the topic. The search will be limited to articles published in a timespan of two decades (1994-2014).[396] Making use of search parameters offered, in this first step the search will be

[396] Additional searches covering the time between this first search and the progress of this dissertation and the literature review contained were run up to May 2017. The same databases were searched –

limited as far as possible to articles published in peer-reviewed journals. Keeping in mind the varying terminology referring to pre-service teachers and initial teacher education, the search term 'portfolio' will be used in combination with 'teacher education', 'teacher training', and 'teacher preparation' respectively. In order to gain a broad overview of portfolio research and practice, and to avoid passing over potentially relevant results, neither narrowing search terms such as 'pre-service teachers' (student teachers, teacher candidates, etc.) nor the focusing keywords 'learning' or 'reflection' will be used at this stage of the reviewing process. The lists of results obtained from the database queries will be saved and archived for further use and permanent documentation. On the basis of the titles/abstracts retrieved, there will be a first collation of literature potentially eligible for inclusion in the systematic literature review, and an exclusion of literature which is not. This first selection will be based on the criteria: (1) Empirical study, (2) primary focus on portfolio, and (3) article on topic.

Analysis, organization, evaluation, data extraction, and synthesis of the evidence

The research articles deemed eligible for inclusion in the systematic literature review will be obtained in full. They will then be analyzed in detail and organized according to their main focuses. On this basis, categories will be formed inductively and the articles will be assigned to one these categories in order to structure the results of the literature search.[397] At the same time, an overall evaluation of the quality of the studies will be carried out, based on the guiding principles for educational research as stated by Shavelson and Towne (2002), and it will be checked again whether a text meets the criteria taken as a basis for the collation of literature in the first step. This means that

and the same parameters were set, as far as possible –, and the lists of results were continuously completed.

[397] Subsequent explanatory note (November 2018): Assigning an article to one category only turned out to be difficult, as in many articles more than one focus of research is reported. Thus, the decision was taken to assign articles to more than one category where necessary, and to mark in the tabular overview created the articles assigned to more than one category. The result this categorization is provided in Appendix A.4 (p. 445).

in this systematic literature review there will be incorporated articles based on the following inclusion criteria:[398] The articles must report primary research on the influence of portfolio development on pre-service teachers learning and reflection. They must have been published in a scholarly, peer-reviewed journal, which is intended to ensure their academic quality. They date of publication must be in the two decades between 1994 and 2014.[399] All articles reviewed must meet a minimum threshold based on the guiding principles for educational research as stated by Shavelson and Towne (2002). In addition, they must be written in English so as to be easily accessible for the international scientific community. From the articles meeting these criteria, data will be extracted by means of a data extraction form specifically designed for this purpose, encompassing data related to study characteristics and data pertaining to the research questions set. These data will then by synthesized and reported in a descriptive way, priority being given to the studies the observed quality of which is deemed to be highest.

[398] The criteria for exclusion can be derived as the converse.

[399] As noted, further searches were run, the period considered eventually comprising the years from 1993 to 2017.

A.2 The process of literature search and selection

The search for literature in key internet databases (Original search, May/June 2014)

Table 29. List of results in original search for literature.

Internet database/ Limiters and expanders selected	Search terms in Boolean search	Number of results	Note(s)
Academic Search Premier (via EBSCO host) Scholarly (Peer Reviewed) Journals; Apply related words; Published Date: 19940101-20141231	portfolio AND "teacher education"	194 results	No field(s) selected in query form; full text of articles not searched.
	portfolio AND "teacher training"	120 results	
	portfolio AND "teacher preparation"	49 results	
ERIC (http://eric.ed.gov) Peer-reviewed only; Publication Date: Since 1995 (last 20 years); Publication Type: Journal Articles; Descriptor: preservice teacher education	portfolio AND "teacher education"	282 results	Parameter "Since 1995" selected as the longest timespan available in limiters ("last 20 years").
	portfolio AND "teacher training"	10 results	
	portfolio AND "teacher preparation"	36 results	
PsycARTICLES (via EBSCO host) No limiters or expanders selected	portfolio AND "teacher education"	---	No results found at all.
	portfolio AND "teacher training"	---	
	portfolio AND "teacher preparation"	---	
PSYNDEX (via EBSCO host) Limitation to: Academic Journals	portfolio AND "teacher education"	5 results	Records only for publication dates between the years 2001 and 2012.
	portfolio AND "teacher training"	1 result	
	portfolio AND "teacher preparation"	---	
PsycINFO (via EBSCO host) Publication Year: 1994-2014; Published Date 19940101-20141231; Peer Reviewed; Publication Type: Peer Reviewed Journal; Exclude Dissertations	portfolio AND "teacher education"	115 results	---
	portfolio AND "teacher training"	12 results	
	portfolio AND "teacher preparation"	12 results	

(Table 29 continued on next page)

Internet database/ Limiters and expanders selected	Search terms in Boolean search	Number of results	Note(s)
Teacher Reference Center (via EBSCO host) Apply related words; Publication Date: 19940101-20141231; Peer Reviewed	portfolio AND "teacher education"	84 results	Contents of the database: Indexing and abstracts for 280 peer-reviewed journals pertaining to teaching.
	portfolio AND "teacher training"	49 results	
	portfolio AND "teacher preparation"	24 results	
Web of Science Search terms in title; document type: article; timespan: 1994-2014	portfolio AND "teacher education"	18 results	
	portfolio AND "teacher training"	1 result	
	portfolio AND "teacher preparation"	3 results	
Total number of results obtained		**1,015 results**	Total number of results from all databases, prior to subsequent steps (see Figure 9)

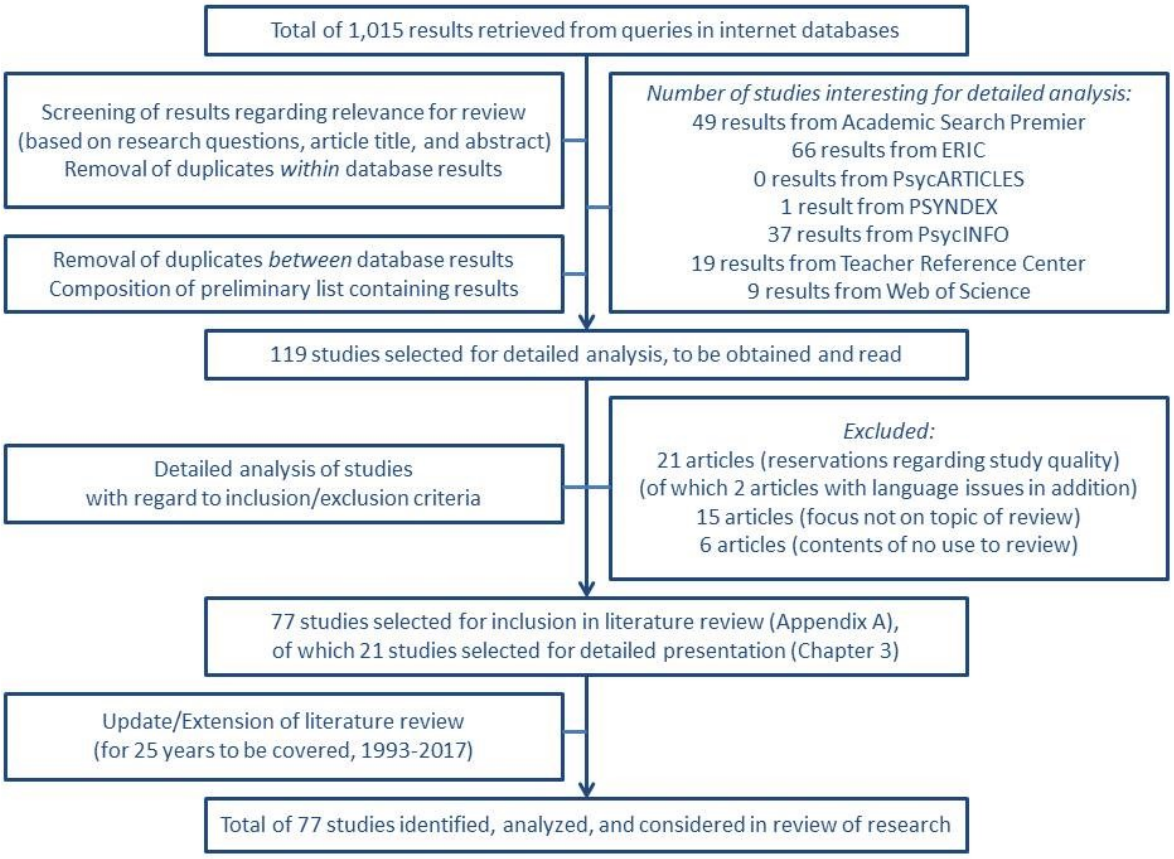

Figure 9. The process of literature search and selection.

Presented in the form of a flow chart, based on PRISMA - Transparent Reporting of Systematic Reviews and Meta-Analyses (2009b).

A.3 The data extraction form

Figure 10. The data extraction form as designed for the systematic literature review.

Study no. (ID) ..... , author(s), year: .....

General characteristics of the study

Purpose(s) of study	*[Specify]*
Form of portfolio	☐ Paper-based ☐ Electronic portfolio
Region and context	*[Specify]*
Participants	Number of participants: *[Specify]* ☐ Whole group/cohort ☐ Some students only: *[Specify]*
Duration of portfolio development	☐ One semester ☐ More or less than one semester: *[Specify]*
Research methodology	☐ Quantitative ☐ Qualitative ☐ Mixed methods
Instrument(s) used in the study	☐ Questionnaires ☐ Interviews ☐ Analysis of portfolio contents ☐ Other: *[Specify]*

Research questions

Research questions		Data in study
RQ 1:	What are **the purposes of portfolio development** in pre-service teacher education reported in the studies selected for this review?	
RQ 2:	What is **the influence of portfolio development on pre-service teachers' learning and reflection**, with regard to task processing as well as in relation to (intended) learning outcomes?	
RQ 3:	What is **the influence of contextual factors on portfolio development** in pre-service teacher education?	
	RQ 3.1: What **student characteristics** are considered to influence pre-service teachers' learning and reflection in developing portfolios?	
	RQ 3.2: What **features regarding the learning environment** of portfolio development may take effect on pre-service teachers' learning and reflection, what factors are regarded as facilitators, what factors as taken to be impediments?	
RQ 4:	What are **perceptions of portfolio development** – both paper-based and electronic – in pre-service teacher education **held by students** and **teacher educators**?	
RQ 5:	What are **the theories and conceptual foundations underlying portfolio use** in pre-service teacher education as referred to in the studies reviewed?	
Statements regarding available empirical research		
Comments on study, e.g., related to quality evaluation		

A.4 Topics covered by original portfolio research: An arrangement in groups

Table 30. Overview and categorization of portfolio research according to focus of research.

Topic/focus of article	Total pool of 119 articles compiled for more detailed analysis[400]	
Portfolio and learning to teach	1.	Avraamidou & Zembal-Saul (2006)
	6.	Barry & Shannon (2006)
	9.	Bataineh et al. (2007) (1)
	19.	Carroll, Potthoff & Huber (1996)
	26.	Chetcuti (2007) (1)
	32.	Darling (2001)
	58.	Klenowski (2000) (1)
	73.	Mokhtari, Yellin, Bull & Montgomery (1996) (1)
	80.	Pecheone, Pigg, Chung & Souviney (2005) (1)
	81.	Pelliccione & Raison (2009) (1)
	96.	Stone (1998)
	100.	Swan (2009)
	117.	Yoo (2009) (1)
Portfolio to promote/ foster reflective thinking	2.	Ayan & Seferoğlu (2011)

[400] As noted in Appendix A.1, articles may have been assigned to several groups (categories) if there is more than one focus of research reported. In these cases, articles are marked by a number following the citation, pointing out the fact that several topics are looked at by the author(s). The number preceding the citation is the number assigned to an article in the context of the systematic review of the literature (Study ID), for reasons of quick identification and reference. Thus – to offer an example for purposes of illustration –, the number 9 preceding the reference to Bataineh et al. (2007) in the first category created shows that the study has been assigned the number 9 (Study ID S9), and the number 1 in brackets, following the citation, indicates that this is the first mention of the study, with more to come.

Topic/focus of article	Total pool of 119 articles compiled for more detailed analysis[400]
	18. Cakir & Balcikanli (2012) (1)
	26. Chetcuti (2007) (2)
	55. Jones (2010) (1)
	61. Lambe, McNair & Smith (2013) (1)
	65. Lyons (1998d)
	66. Mansvelder-Longayroux, Beijard & Verloop (2007)
	68. McKinney (1998) (1)
	72. Milman (2005) (1)
	76. Oakley, Pegrum & Johnston (2014) (1)
	78. Oner & Adadan (2011)
	81. Pelliccione & Raison (2009) (2)
	85. Rijdt, Tiquet, Dochy & Devolder (2006)
	91. Shepherd & Hannafin (2009) (1)
	93. Smith et al. (2001) (1)
	94. Spendlove & Hopper (2006) (1)
	99. Sunstein & Potts (1998)
	102. Thomas & Liu (2012)
	104. Vanhulle (2005) (1)
	106. Wade & Yarbrough (1996)
	110. Wilson, Wright & Stallworth (2003) (1)
	116. Yao, Aldrich, Foster & Pecina (2009) (1)
	117. Yoo (2009) (2)

Topic/focus of article	Total pool of 119 articles compiled for more detailed analysis[400]	
Portfolio to promote reflective practice	15.	Borko et al. (1997)
	30.	Chuang (2010) (1)
	39.	Ellsworth (2002)
	43.	Groom & Maunonen-Eskelinen (2006) (1)
	58.	Klenowski (2000) (2)
	76.	Oakley, Pegrum & Johnston (2014) (2)
	79.	Orland-Barak (2005)
Portfolio for inquiry	92.	Shepherd & Hannafin (2011)
Portfolio to foster/ improve learning	3.	Bairral & dos Santos (2012)
	13.	Blau, Mor, & Neuthal (2013)
	17.	Cáceres, Chamoso & Azcárate (2010)
	23.	Chang (2001)
	26.	Chetcuti (2007)
	31.	Çimer (2011) (1)
	46.	Hartmann & Calandra (2007)
	47.	Hauge (2006) (1)
	50.	Hootstein (1998) (1)
	52.	Imhof & Picard (2009) (1)
	63.	Loughran & Corrigan (1995)
	67.	Mansvelder-Longayroux, Beijard, Verloop & Vermunt (2007)
	73.	Mokhtari, Yellin, Bull & Montgomery (1996) (2)

Topic/focus of article	Total pool of 119 articles compiled for more detailed analysis[400]	
	80.	Pecheone, Pigg, Chung & Souviney (2005) (2)
	83.	Pleasants, Johnson & Trent (1998)
	95.	Stansbery & Kimes (2007)
	101.	Tang & Lam (2014) (1)
	108.	Wickersham & Chambers (2006) (1)
	117.	Yoo (2009) (3)
Portfolio and independent/ autonomous learning	24.	Chau & Cheng (2010)
	69.	Meeus, Petegem, Meijer (2008a)
	70.	Meeus, Petegem, Meijer (2008b)
Portfolio and approaches to learning	87.	Segers, Gijbels & Thurlings (2008) (1)
Portfolio for self-assessment	68.	McKinney (1998) (2)
Portfolio as a reflective learning tool	9.	Bataineh et al. (2007) (2)
	27.	Chetcuti, Buhagiar & Cardona (2011)
Portfolio for professional development	36.	Dutt, Tallerico & Kayler (1997) (1)
	59.	Kocoglu (2008) (1)
	53.	Johnson (1999)
	61.	Lambe, McNair & Smith (2013) (2)
	73.	Mokhtari, Yellin, Bull & Montgomery (1996) (3)
	76.	Oakley, Pegrum & Johnston (2014) (3)

Topic/focus of article	Total pool of 119 articles compiled for more detailed analysis[400]	
	86.	Scherz, Bialer & Eylon (2008)
	89.	Senne & Rikard (2004)
	94.	Spendlove & Hopper (2006) (2)
	104.	Vanhulle (2005) (2)
	109.	Willis & Davies (2002) (1)
	111.	Winsor, Butt & Reeves (1999)
	114.	Wray (2007) (1)
	118.	Zidon (1996) (1)
Portfolio and personal theory	55.	Jones (2010) (2)
Portfolio for assessment	4.	Bannink (2009)
	5.	Breault (2004)
	34.	Denney, Grier & Buchanan (2012)
	36.	Dutt, Tallerico & Kayler (1997) (2)
	37.	Dutt-Doner & Gilman (1998) (1)
	108.	Wickersham & Chambers (2006) (2)
	110.	Wilson, Wright & Stallworth (2003) (2)
	116.	Yao, Aldrich, Foster & Pecina (2009) (2)
	119.	Zou (1)
Portfolio and learner engagement	5.	Barrett (2007)
	91.	Shepherd & Hannafin (2009) (2)

Topic/focus of article	Total pool of 119 articles compiled for more detailed analysis[400]	
Portfolio to promote collaboration	93.	Smith et al. (2001) (2)
	101.	Tang & Lam (2014) (2)
	103.	Trent & Shroff (2013) (1)
	107.	Wang (2009)
	114.	Wray (2007) (2)
Portfolio as preparation for performance assessment and technology use	7.	Bartlett (2002) (1)
Students' perceptions of portfolio	8.	Bartlett & Sherry (2006) (1)
	9.	Bataineh et al. (2007) (3)
	12.	Birgin (2011)
	14.	Bolliger & Shepherd (2010)
	18.	Cakir & Balcikanli (2012) (2)
	29.	Chitpin & Simon (2009)
	31.	Çimer (2011) (2)
	35.	Deveci, Ersoy & Ersoy (2006)
	37.	Dutt-Doner & Gilman (1998) (2)
	50.	Hootstein (1998) (2)
	52.	Imhof & Picard (2009) (2)
	57.	Kabilan & Khan (2012) (1)
	59.	Kocoglu (2008) (2)
	62.	Lin (2008)
	71.	Meyer & Tusin (1999)

Topic/focus of article	Total pool of 119 articles compiled for more detailed analysis[400]	
	74.	Niikko (2002)
	75.	Ntuli, Keengwe & Kyei-Blankson (2009)
	77.	Ok & Erdogan (2010)
	82.	Plaisir, Hachey & Theilheimer (2011)
	87.	Segers, Gijbels & Thurlings (2008) (2)
	90.	Sevim (2012)
	109.	Willis & Davies (2002) (2)
	110.	Wilson, Wright & Stallworth (2003) (3)
	115.	Wright, Stallworth & Wray (2002)
	116.	Yao, Aldrich, Foster & Pecina (2009) (3)
	118.	Zidon (1996) (2)
Comparison of formative and summative portfolios	10.	Beck, Livne & Bear (2005) (1)
	28.	Chetcuti, Murphy & Grima (2006)
Comparison of different portfolio implementations in context	38.	Dysthe & Engelsen (2011) (1)
	40.	Fiedler, Mullen & Finnegan (2009)
	43.	Groom & Maunonen-Eskelinen (2006) (1)
	88.	Senne & Rikard (2002)
Influence of context on portfolio practices	38.	Dysthe & Engelsen (2011) (2)
Portfolio and professional development	10.	Beck, Livne & Bear (2005) (2)

Topic/focus of article	Total pool of 119 articles compiled for more detailed analysis[400]	
Portfolios as repertoires of practice	11.	Berrill & Addison (2010)
E-portfolios and competence in technology	7.	Bartlett (2002) (2)
	8.	Bartlett & Sherry (2006) (2)
	48.	Herner-Patnode & Lee (2009)
	68.	McKinney (1998) (3)
	72.	Milman (2)
	94.	Spendlove & Hopper (2006) (3)
	103.	Trent & Shroff (2013) (2)
	105.	Waddoups & Wentworth (2004)
	108.	Wickersham & Chambers (2006) (3)
Portfolio to foster teacher autonomy	18.	Cakir & Balcikanli (2012) (3)
Supervision by means of e-portfolio development and impact on student reflections	20.	Cebrián de la Serna (2011)
	57.	Kabilan & Khan (2012) (2)
Analysis of reflections in portfolio	21.	Chamoso & Cáceres (2009)
	22.	Chamoso, Cáceres & Azcárate (2012)
Quality of evidence in portfolios	33.	Delandshere & Arens (2003)
Portfolio content analysis	84.	Potthoff, Carroll, Anderson, Attivo & Kear (1996)

Topic/focus of article	Total pool of 119 articles compiled for more detailed analysis[400]	
Student (pre-)dispositions and learning process	25.	Cheng & Chau (2013)
Influence of weblogs in portfolios	30.	Chuang (2010) (2)
	101.	Tang & Lam (2014) (3)
Teacher educators experiences/views of e-portfolio development	41.	Granberg (2010)
	18.	Cakir & Balcikanli (2012) (3)
Portfolio to change conceptions about teaching	42.	Green & Smyser (1995)
Portfolio and (teacher) identity formation	44.	Hallmann (2007)
	45.	Haniford (2010)
	103.	Trent & Shroff (2013) (3)
Response groups when working with portfolios	49.	Hoel & Haugaløkken (2004)
Impact of portfolio *assessment* on portfolio *learning*	50.	Hootstein (1998)
	51.	Hung (2012)
	119.	Zou (2)
Comparison of different e-portfolio implementations	54.	Johnson-Leslie (2008)
	97.	Strudler & Wetzel (2005)
	98.	Strudler & Wetzel (2008)
Comparison of reflective processes in different contexts	56.	Kaasila & Lauriala (2012)

Topic/focus of article	Total pool of 119 articles compiled for more detailed analysis[400]	
Effects of particular way of introduction to portfolio	60.	Krause (1996) (1)
Effects of instruction on comprehension	60.	Krause (1996) (2)
	119.	Zou (2003) (3)
Portfolio and ease of transition into practice/ work	109.	Willis & Davies (2002) (3)
Process of e-portfolio development	112.	Woodward & Nanlohy (2004a)
	113.	Woodward & Nanlohy (2004b)
Portfolio to overcome frontiers in curriculum	64.	Lurdes Gonçalves & Andrade (2007)

A.5 The studies presented in detail: Basic description

Table 31. Basic description of the studies presented in detail.

Study ID	Author(s), year of publication	Context of teacher education	Form of portfolio, duration of portfolio construction	Type of study, participants, way of data collection	Details on portfolio given (guidelines, contents, tasks)
S9	Bataineh et al. (2007)	Jordan, university pre-service teacher education; social sciences and English as a foreign language	Paper-based* One semester ** not stated explicitly/inferred from article*	Qualitative 50 pre-service teachers in three intact classes; interviews (self-reports)	No, guidelines for portfolio development given in appendix, but no details
S10	Beck et al. (2005)	United States, university teacher education; pre-service and in-service teacher education	Electronic Less than one semester*	Quantitative 207 teachers (188 pre-service, 19 in-service); questionnaire (self-assessment)	No, the degree of detail in the description of the four portfolio curricula varies.
S15	Borko et al. (1997)	United States, university teacher education; school-based professional seminar with student teaching	Paper-based One semester	Qualitative 21 student teachers; written reflections (21 students), interviews (8 students)	No, only rough outline of expected portfolio contents and mention of assignments
S18	Cakir and Balcikanli (2012)	Turkey, university pre-service language teacher education; English Language Teaching (ELT), EPOSTL	Electronic One semester	Qualitative 25 student teachers, 4 teacher trainers; Interviews	No, contents and implementation of the EPOSTL outlined, but no details given on tasks, etc.

Study ID	Author(s), year of publication	Context of teacher education	Form of portfolio, duration of portfolio construction	Type of study, participants, way of data collection	Details on portfolio given (guidelines, contents, tasks)
S27	Chetcuti et al. (2011)	Malta, university pre-service teacher education; primary and secondary teaching of mathematics or science	Paper-based* More than one semester	Qualitative Interpretative case study; 15 first-year teachers; interviews	No, global statement: "artefacts and reflective writings" (p. 61)
S29	Chitpin and Simon (2009)	Canada, pre-service teacher education; eight-month B.Ed. program, primary/ junior division (K-6)	Paper-based More than one semester	Qualitative 15 pre-service teachers; interviews, classroom discussions, pre-service teachers' reflections	No, it cannot be seen from the article what kind of contents there are in the portfolio.
S31	Çimer (2011)	Turkey, university pre-service biology teacher education; course module, no practical teaching in this context	Paper-based One semester	Qualitative 35 student teachers; content analysis of students' written reflections	No, outline of portfolio contents is given, but no details
S33	Delandshere and Arens (2003)	United States, university pre-service teacher education; 3 different elementary teacher education programs	Paper-based More than one semester	Comparison of portfolio implementation in three programs; several data collection strategies	No, outline of form and contents of portfolios in three programs, but no details
S47	Hauge (2006)	Norway, university initial teacher education; one-year full	Electronic More than one	Mixed methods study	No, only a few words related to the assignments

Study ID	Author(s), year of publication	Context of teacher education	Form of portfolio, duration of portfolio construction	Type of study, participants, way of data collection	Details on portfolio given (guidelines, contents, tasks)
		time practical pedagogical program	semester	Interviews (5 student teachers) and electronic survey (all 55 student teachers)	in the portfolio
S52	Imhof and Picard (2009)	Germany, pre-service teacher education; teacher training	Paper-based More than one semester	Mixed methods study 144 pre-service teachers, 15 supervisors Questionnaires	No, information on portfolio components given, but no details on tasks, etc.
S56	Kaasila and Lauriala (2012)	Finland, university pre-service teacher education; second year Subject Didactic Practicum, mathematics	Paper-based Less than one semester	Qualitative 53 pre-service teachers; in-depth content analysis of 3 selected portfolios	No, guidelines, contents, and tasks in portfolio development not specified
S57	Kabilan and Khan (2012)	Malaysia, university pre-service teacher education; TESOL program (teaching English to speakers of other languages)	Electronic One semester	Qualitative 55 pre-service teachers; student journals, pre-/ post survey (questionnaire)	No, only outline of weekly and discussion journals as key elements of portfolio
S62	Lin (2008)	United States, elementary teacher education at college; students (juniors and	Electronic More than one semester*	Mixed methods study Case study,	No, outline of contents to be included, but no details on tasks,

Study ID	Author(s), year of publication	Context of teacher education	Form of portfolio, duration of portfolio construction	Type of study, participants, way of data collection	Details on portfolio given (guidelines, contents, tasks)
		seniors) in a 3-credit course		exploratory 38 pre-service teachers E-portfolio survey at end of course and selected interviews	etc.
S66	Mansvelder-Longayroux, Beijaard, and Verloop (2007)	The Netherlands, one-year teacher education course, students of languages and the exact sciences	Paper-based One semester (one-year course, two portfolios developed, one each semester)	Qualitative Content analysis 25 student teachers; 39 student teacher learning portfolios analyzed	No, but the reader can get an idea of the portfolio that was developed
S67	Mansvelder-Longayroux, Beijaard, Verloop et al. (2007)	The Netherlands, one-year postgraduate teacher training course, training for secondary education in languages and sciences	Paper-based One semester (one-year course, two portfolios developed, one each semester)	Qualitative Interviews with 21 student teachers, analysis of portfolio evaluation reports	No, but the reader can get an idea of the portfolio that was developed
S72	Milman (2005)	United States, elective pre-service teacher education course (*Electronic Teaching Portfolios*)	Electronic One semester	Qualitative 9 pre-service teachers Primary data collection methods: interviews, participant	No, only very rough outline given

Study ID	Author(s), year of publication	Context of teacher education	Form of portfolio, duration of portfolio construction	Type of study, participants, way of data collection	Details on portfolio given (guidelines, contents, tasks)
				observation	
S77	Ok and Erdogan (2010)	Turkey, university pre-service teacher education in seven different teaching areas (elementary and secondary teaching)	Paper-based More than one course, and more than one semester; differing frequency of usage	Qualitative Case study 23 student teachers; Semi-structured individual interviews	No, only very rough outline of portfolio contents/coverage given
S78	Oner and Adadan (2011)	Turkey, pre-service chemistry teacher education, teaching practicum	Electronic One semester	Mixed-methods study 19 pre-service teachers; Content analysis of web-based portfolio entries, questionnaire	Partly, one of the most detailed descriptions of all outlines reviewed in detail
S88	Senne and Rikard (2002)	United States, pre-service university physical education teacher education (PETE)	Paper-based One semester	Mixed-methods study 67 interns in two PETE programs; collection of quantitative and qualitative data	Partly, outline of portfolio contents given
S103	Trent and Shroff (2013)	Hong Kong, undergraduate teacher education program at the Hong Kong Insti-	Electronic Portfolio throughout an 8-week	Qualitative Exploratory study	No, only rough description of e-portfolio plat-

Study ID	Author(s), year of publication	Context of teacher education	Form of portfolio, duration of portfolio construction	Type of study, participants, way of data collection	Details on portfolio given (guidelines, contents, tasks)
		tute of Education (HKIEd)	practicum (i.e., less than one semester)	6 ethnic Chinese undergraduate students; three interviews each	form given
S106	Wade and Yarbrough (1996)	United States, university pre-service elementary teacher education program	Paper-based One semester	Mixed methods study Exploratory study 212 teacher education students from two consecutive fall semesters; in-depth interviews, students' essays and survey data	No, only rough outline of portfolio contents given

A.6 The studies presented in detail: Synopsis of contents (Research Questions 1–4)

Table 32. Synopsis of contents from the studies presented in detail (Research Questions 1–4).

Study ID	Author(s), year of publication	RQ1: Purposes of portfolio construction	RQ2: Effects on learning/ reflection	RQ3: Influence of contextual factors	RQ4: Pre-service teachers' perceptions
S9	Bataineh et al. (2007)	Portfolio to support pre-service teachers' learning to teach; portfolio as a reflective learning tool *Jordan; university pre-service teacher education; social sciences and English as a foreign language*	Wide range of benefits reported in interviews with pre-service teachers: Perceived development of students' knowledge, skills, attitudes, personal traits and values by means of portfolio development	*Not investigated explicitly.*	Pre-service teachers' perceptions of the benefits of portfolio as a reflective learning tool are reported as being very positive. Keeping a (well-constructed) portfolio reported as having a positive influence on the motivation to learn
S10	Beck et al. (2005)	Portfolio to promote teacher development; portfolio to improve professional practice [Reflection in all four types of portfolio] constructed *United States, university teacher education; pre-service and in-service teacher education (credential and Master of Arts in*	For four out of five factors concerning professional outcomes the means of the three formative portfolios constructed were significantly higher than those of the summative accountability portfolio built; these factors included "overall teacher	Student factors: No gender differences were found with regard to the effects of the electronic portfolios on professional development Learning environment: The curricula represented by the three formative portfolios were rated significantly higher with regard to their	Participants' ratings of the four different portfolios were favorable, with the three formative portfolios being rated significantly higher with regard to their overall contribution to professional develop-

Study ID	Author(s), year of publication	RQ1: Purposes of portfolio construction	RQ2: Effects on learning/ reflection	RQ3: Influence of contextual factors	RQ4: Pre-service teachers' perceptions
		Teaching programs); in-service teachers with 1-2 years of service	development, including reflective skill" and "the benefit of teacher peer collaboration"	contribution to professional development	ment.
S15	Borko et al. (1997)	Student teaching portfolios as a tool for promoting reflective practice *United States, university teacher education; school-based professional seminar taken concurrently with student teaching; student teachers*	Benefits of participation in the portfolio experience: Portfolio as a tool for reflection (individual strengths and weaknesses, teaching, educational philosophy), connections between theory and practice Costs of participation: issues related to time and workload	Learning environment: Major facilitator to portfolio construction: Support and guidance from the university program Hindrances to portfolio construction: Portfolio guidelines felt to be too restrictive; timing and time constraints; restrictions during student teaching; past experiences in program of study	Participants commented most frequently about the benefits of the portfolio experience, with each participant identifying multiple benefits. Comments about costs of the portfolio experience were much less frequent and voiced by a much smaller number of participants only.
S18	Cakir and Balcikanli (2012)	EPOSTL as a reflection tool, for self-assessment of competences and monitoring of progress, for the documentation of teaching experiences	Portfolio beneficial for reflection, awareness, and self-assessment	Student factors/ learning environment: Most students found the use of the EPOSTL challenging due to lack of self-assessment skills and perceived work-	"The student teachers seem to have positive views regarding the use of the EPOSTL in their pre-service teacher educa-

Study ID	Author(s), year of publication	RQ1: Purposes of portfolio construction	RQ2: Effects on learning/ reflection	RQ3: Influence of contextual factors	RQ4: Pre-service teachers' perceptions
		Turkey, university pre-service language teacher education (English Language Teaching, ELT)		load	tion. … Most participants were highly positive about the effectiveness of the EPOSTL in the pre-service teacher education context." (p. 9)
S27	Chetcuti et al. (2011)	Portfolio for professional growth and development, portfolio for learning through reflection; intention: portfolio to enable student teachers to link theory and practice, and to develop their own philosophy of teaching and learning *Malta, university pre-service teacher education; primary teaching/secondary teaching of mathematics or science*	Most participants indicated that "… one of the most important skills which they acquired while they were preparing their PDP … was the skill of reflection." (p. 64) All participants continued to reflect in their first year of practice; in most cases this was not a continuation of the PDP, but 'informal' reflection. Yet, the development of the PDP seems to have created a reflective stance.	*Not applicable here.*	*Not applicable here.*

Study ID	Author(s), year of publication	RQ1: Purposes of portfolio construction	RQ2: Effects on learning/ reflection	RQ3: Influence of contextual factors	RQ4: Pre-service teachers' perceptions
S29	Chitpin and Simon (2009)	Portfolio to promote reflection *Canada, pre-service teacher education, eight-month Bachelor of Education program, primary/junior division (K-6) [of the 15 pre-service teachers participating in the study, 2 had been teaching assistants for several years]*	Construction of the professional portfolio including reflection was perceived as changing habitual practice in the form of questioning what was previously granted	*Not applicable here.*	General shift in attitude during portfolio construction: While initially skeptical, all participants came to identify benefits Pre-service teachers generally appreciated self-assessment and continuous reflection as elements of the portfolio construction process
S31	Çimer (2011)	Portfolio to contribute to student teachers' learning and development (main purpose, a summative assessment component was included as well); emphasis on reflection *Turkey, university pre-service biology teacher education, course module ('Assessment and evaluation'), no practical student teaching in this con-*	The self-reflection requirements, esp. the reflection prompts … *made* student teachers study regularly (p. 167); their study habits became more regular (p. 168); the portfolio process helped students notice their individual strengths and weaknesses related to their learning (p. 168); increased	Learning environment: "Overall, reflection prompts in this study served as the cues to elicit reflection." (p. 169)	In general, student teachers' views about the portfolio process became more positive over time; involvement improved feelings All overall reflections at the end of the process were positive Positive cognitive outcomes

Study ID	Author(s), year of publication	RQ1: Purposes of portfolio construction	RQ2: Effects on learning/ reflection	RQ3: Influence of contextual factors	RQ4: Pre-service teachers' perceptions
		text	retention and higher-order learning (pp. 169-170); reflection on experience turned learning into a more conscious process and led to increased self-assessment (p. 169)		were accompanied by positive affective outcomes
S33	Delandshere and Arens (2003)	Portfolio development in preparation for initial licensure *United States; university pre-service teacher education; 3 different elementary teacher education programs (one with several portfolios at different times, two with continuing development of one portfolio)*	The portfolios "… lack explanations or conceptual structure and represent teaching as an eclectic set of discrete and generic skills, beliefs, and activities." (p. 62) "Philosophy of education" statements shallow and in most cases inconsistent with the rest of the portfolio.	General misunderstanding of evidence, explanation, and reflection on the part of the students as problem "The context in which the artifacts are produced also contributes to shaping the representation of teaching and learning reflected in the portfolio." (p. 65)	Students think that "… one of the most beneficial aspects of the process is to think critically about their own teaching." (p. 61)
S47	Hauge (2006)	Portfolio for professional learning *Norway, university initial teacher education, one-year full time*	Portfolios prompted professional learning for the student teachers; portfolios turned	<u>Student factors:</u> Individual conceptions of technology, learning, and teaching led to variations	Majority of students see portfolios as "… helpful means in concretising theory in

Study ID	Author(s), year of publication	RQ1: Purposes of portfolio construction	RQ2: Effects on learning/ reflection	RQ3: Influence of contextual factors	RQ4: Pre-service teachers' perceptions
		practical pedagogical program; one third of the students have a master's degree, the others have a bachelor's degree	out to be productive tools for bridging the gaps between theory and practice in teacher education	in the impact of the integrated technology activities Influence of initial technological competence on learning and experiences	the study programme, in reflecting on subject matter and contributing to contact and collaboration with fellow students." (p. 29)
S52	Imhof and Picard (2009)	Portfolio to "… replace traditional reports and to enhance professional development, to encourage cooperative learning, and to structure and document the communication between pre-service teachers and both their mentors and supervisors." (p. 150) *Germany, pre-service teacher education, teacher training*	No significant differences with regard to the aspects of professional development that were measured "The portfolio did not make a significant difference in any of the quantitative scales and variables." (p. 151) – i.e., in professional attitudes and competences	Student factors: The effects of portfolio seem to vary on the basis of student characteristics, such as learning orientation	Rather mixed general evaluation of the portfolio; differing views with regard to perceived importance and usefulness
S56	Kaasila and Lauriala (2012)	*Not stated explicitly, as portfolio not focus of study* *Finland, university pre-service teacher education; second year Subject Didactic*	The breadth and the depth of the pre-service teachers' reflection processes varied greatly. Through acquaint-	Student factors: Former experiences seemed to have great impact on the pre-service teachers' reflections when teaching for the first	*Not stated explicitly, as portfolio not focus of study*

Study ID	Author(s), year of publication	RQ1: Purposes of portfolio construction	RQ2: Effects on learning/ reflection	RQ3: Influence of contextual factors	RQ4: Pre-service teachers' perceptions
		Practicum, mathematics	ance with research articles, reflection deepened and also seemed to broaden.	time Learning environment: The participants' consideration of biographical contexts was helpful to their understanding and their reflections of other contexts.	
S57	Kabilan and Khan (2012)	Portfolio for meaningful reflective learning *Malaysia, university pre-service teacher education, TESOL (Teaching English to Speakers of Other Languages), one course (not related to school practicum)*	Performance and achievements are traced; electronic portfolios function as a monitoring tool; six competencies emerged from e-portfolio practices, including comprehension of content knowledge and gain of ICT skills	Portfolio did not work for all students; some remained passive and negative Challenges identified with regard to the learning environment, including time constraints, workload, and ethical issues	Pre-service teachers were appreciative of electronic portfolios, while a few students remained passive and negative about the e-portfolio project
S62	Lin (2008)	Portfolio to document achievement of standards related to teaching and technology; portfolio for reflection *United States, college elementary teacher education program, portfolio use in one*	Hands-on approach led to positive attitude towards learning by doing (p. 196); e-portfolio construction for skills development	Importance of ownership for students to use the process function of portfolios; possible influence on process function: student teachers' learning orientation, students' experiences in	Positive (also see self-reported effects): enhancing students' marketability (p. 198); negative: portfolio seen to have little effect on development;

Study ID	Author(s), year of publication	RQ1: Purposes of portfolio construction	RQ2: Effects on learning/ reflection	RQ3: Influence of contextual factors	RQ4: Pre-service teachers' perceptions
		course (introduction to portfolio concept) (p. 196)	(p. 196); application and development/ transfer of what had been learnt in class; learning through reflection (reviewing, revisiting, rediscovering); development of self-assessment skills, of a sense of purpose and focus, and of synthesis skills; learning from communications and interactions; learning and reviewing technology skills (p. 196)	e-portfolio production, instruction and supervision (here, reference is made to Beck et al., 2005)	frustrations due to technology (p. 198)
S66	Mansvelder-Longayroux, Beijaard, and Verloop (2007)	Portfolio as a tool for student teachers' reflection/self-reflection *The Netherlands, university pre-service teacher education; 1-year teacher education program, two portfolios produced, one each semester*	Students tended to concentrate on their teaching practice and how to improve it Students discussed individual experiences important to them and the connections of these over a period of time	Supervision and guidance important to encourage learning activities Findings in keeping with earlier findings that deep processing is more likely to occur if "… the matter hand demands personal involvement" (Desforges, 1995, S. 393, as cited	Not focus of research.

Study ID	Author(s), year of publication	RQ1: Purposes of portfolio construction	RQ2: Effects on learning/ reflection	RQ3: Influence of contextual factors	RQ4: Pre-service teachers' perceptions
				by the authors)	
S67	Mansvelder-Longayroux, Beijaard, Verloop et al. (2007)	Portfolio to support the learning process of individual student teachers; portfolio to advance learning *The Netherlands, university student teacher education, 1-year teacher education program, two portfolios produced, one each semester*	Portfolio fulfilling seven portfolio functions (two product functions, five process functions); most student teachers considered portfolio as serving several functions at a time; portfolio for retrospection on action, for personal development, understanding, and development of personal teaching theory	(Only marginal element of research study, reference to other studies): Influence of context/supervision and student teachers themselves (ownership and task value as important variables, other factors mentioned in the literature: experience with portfolio, instruction and supervision, student teachers' learning orientations)	n/a, not researched in detail (research focused on student teachers' views of portfolio, but not with regard to positive/negative views, viz. acceptance vs. rejection)
S72	Milman (2005)	Portfolios to learn digital teaching portfolio creation by means of the World Wide Web; reflection on coursework and teaching experiences; increase in proficiency in technology use *United States, university pre-service teacher education, elective*	Assertion: Digital teaching portfolio creation as a constructivist process promoted student reflection through an examination of beliefs, philosophies, etc. and through collaboration Assertion: Digital	Numerous advantages and challenges of using the World Wide Web for digital portfolio creation	Students viewed the creation of a teaching portfolio as valuable; they considered the technology skills they acquired as useful, both personally and professionally

Study ID	Author(s), year of publication	RQ1: Purposes of portfolio construction	RQ2: Effects on learning/ reflection	RQ3: Influence of contextual factors	RQ4: Pre-service teachers' perceptions
		course	teaching portfolios fostered students' confidence in professional and technology skills		
S77	Ok and Erdogan (2010)	(Based on students' responses): Several purposes, with learning and assessment most common; collection of evidence, provision of feedback, monitoring of student progress, reflection, evaluation, guidance of students' professional development *Turkey, university pre-service teacher education*	Students considered portfolio development to contribute to various aspects of professional, personal, and social development, e.g., portfolio building facilitating understanding and reflection	Time issues, document availability, scope and contents of portfolio (clarity of direction and guidelines), continuity of feedback	Variety of definitions, portfolio was perceived both as a learning and as an assessment tool; judging from the influence/effects of portfolio reported, the students' attitude *seems* to have been rather positive, although this is not mentioned explicitly
S78	Oner and Adadan (2011)	Development of pre-service teachers' reflective skills; reflection-based tasks to enrich pre-service teachers' internship experiences *Turkey, university pre-service teacher educa-*	Pre-service teachers demonstrated different levels of reflective skills throughout a semester; improvement in the number of high-level reflective indicators in second reflection	Web-based portfolios for anytime and anywhere access to the portfolio; several additional benefits of web-based portfolios; perceived increase in the quality of students' work due to the public	Participants perceived web-based platform as a medium providing easy access, making possible better portfolio artefacts; almost all students ex-

Study ID	Author(s), year of publication	RQ1: Purposes of portfolio construction	RQ2: Effects on learning/ reflection	RQ3: Influence of contextual factors	RQ4: Pre-service teachers' perceptions
		tion	task as compared to the first (statistical significance given)	nature of the portfolios (feedback received over the web as well as consciousness of publicity)	pressed positive reactions towards using the web-based platform implemented (Mahara)
S88	Senne and Rikard (2002)	University 1: Portfolio development to promote growth to more complex levels of psychological maturity, adult development University 2: Portfolio development process to examine continual professional growth *United States, university pre-service teacher education*	No significant development shown by quantitative data; qualitative data implies that students from University 1 were positive in their overall responses; students from University 2 felt positive about their professional growth	Importance of time management issues and student introduction relative to the portfolio process	University 1: Most comments on the portfolio process were positive; reflective elements mentioned most often as a beneficial portfolio components; most students considered the portfolio process as valuable University 2: Findings much more mixed
S103	Trent and Shroff (2013)	Portfolio to allow students to collect their work, showcase examples of their teaching practice, and to reflect upon what they have learned Portfolio for faculty to	Participants believed e-portfolio construction to have changed their personal and professional identity development	Community building and maintenance by means of portfolio	Positive evaluation of the e-portfolio used as a means of teacher identity construction

Study ID	Author(s), year of publication	RQ1: Purposes of portfolio construction	RQ2: Effects on learning/ reflection	RQ3: Influence of contextual factors	RQ4: Pre-service teachers' perceptions
		monitor student learning *Hong Kong, pre-service teacher education at teacher education institute*			
S106	Wade and Yarbrough (1996)	Portfolio with both professor and student purposes; opportunities for student choice; representation of a range of decisions and record of each student's individual growth *United States, university pre-service elementary teacher education (social studies)*	The portfolio experience was different for different students; portfolio worked differentially as help with reflection; majority of students agreed that portfolio helped them with reflection and, thus, learning; portfolio success was not universal	Initial introduction (presentation and explanation) of portfolio development important to avoid initial struggle and frustration; importance of guided support; influence of students' prior experience with portfolios and students' beliefs; importance of students' personal investment	More than half of the students agreed that portfolio creation was a valuable experience for them, that they enjoyed creating the portfolio, that portfolio helped them in their reflections

A.7 The extended pool of studies: A synoptic overview of 77 studies

Table 33. A synoptic overview of 77 studies on portfolio in pre-service teacher education.

Author(s), year, publication **Purpose of portfolio development** **Overall focus of study**	**Purpose(s) of study** **Form of portfolio examined** **Context and participants**	**Theoretical/ conceptual foundation** **Design of study** **Duration of portfolio development**	**Key findings of study** **General conclusion(s)** **Tendency (+ / - /o)**	**Comment(s) [Ideas, notes, and links documented when analyzing the studies]**
Avraamidou, L., & Zembal-Saul, C. (2006). Exploring the Influence of Web-Based Portfolio Development on Learning to Teach Elementary Science. *AACE Journal*, *14*(2), 178–205. Portfolio for *learning to teach* *Process* of portfolio development	To explore the influence of web-based portfolio development on learning to teach; to investigate the support provided by web-based portfolio for reflective thinking and learning Electronic (web-based) United States/ Elementary science teacher education internship; 2 participants	History of portfolio use in teacher education outlined; literature review of pertinent studies; no specific theoretical foundation referred to Qualitative case study design Data sources: content analysis of portfolios and reflective statements Duration of portfolio development: One semester	"… web-based portfolios appeared to be a powerful tool for supporting the participants' learning" (p. 199) by means of engaging them in thoughtful reflection Impact of web-based portfolio development on participants' conceptions and understandings of teaching and learning science Positive	Advantages of e-portfolios over paper-based portfolios laid out (p. 180)[401] Advantages of hypermedia (web-based) portfolios over other forms of electronic portfolios (p. 181) Teaching philosophy referred to Importance of task(s) in portfolio [Title formulated rather vaguely, considering the demand for detailed examination of portfolio elements]

[401] As prescribed for scientific research, page numbers are given with verbatim quotes. In Table 33, page numbers are additionally provided with various notes, in order to document references and to allow readers to find these references quickly for themselves if they wish to do so.

Author(s), year, publication **Purpose of portfolio development** **Overall focus of study**	**Purpose(s) of study** **Form of portfolio examined** **Context and participants**	**Theoretical/ conceptual foundation** **Design of study** **Duration of portfolio development**	**Key findings of study** **General conclusion(s)** **Tendency (+ / - /o)**	**Comment(s) [Ideas, notes, and links documented when analyzing the studies]**
Ayan, D., & Seferoğlu, G. (2011). Using electronic portfolios to promote reflective thinking in language teacher education. *Educational Studies*, *37*(5), 513–521. doi:10.1080/03055698.2010.539782 Portfolio for *reflective thinking* *Process* of portfolio development	To investigate the influence of e-portfolio use on reflective thinking; to examine the support of portfolio use in fostering reflective thinking skills Electronic (web-based) Turkey/ Undergraduate language teacher education practicum course; 8 participants	Reflective thinking (Dewey, 1933; Schön 1983,1987; Valli, 1997); levels of reflective thinking (Hatton & Smith, 1995; Van Manen, 1977) Case study method in order to gather in-depth data Data sources: portfolio content analysis and interviews Duration of portfolio development: One semester	"… writing reflective journals in an electronic portfolio helped pre-service teachers develop reflective thinking skills …" (p. 519) Further desirable effects of portfolio use (p. 519) Positive	Portfolio and reflective thinking presented with regard to pertinent theoretical and conceptual background, but no reference to existing empirical studies that might exist
Barry, N. H., & Shannon, D. M. (1997). Portfolios in Teacher Education: A Matter of Perspective. *The Educational Forum*, *61*(4), 320–328. doi:10.1080/00131729709335277 Portfolio for *learning* *Perceptions* of portfo-	To examine "… the teaching-internship portfolio process … from three perspectives: interns, university supervisors, and educational employers or public school administrators" (p. 321); perceptions of portfolio purpose, usefulness, desirable proce-	Short outline of portfolio in pre-service teacher education Questionnaire developed on the basis of a literature review; questionnaire distributed to 222 interns (201 questionnaires (91 %) returned), 33 uni-	"The summative, rather than formative, function of portfolios seemed to be of paramount interest …" (p. 325) with all groups; interns need background information, support, and an adequate learning environment for self-reflection and	Subject(s) not specified Some insights into portfolio for learning Individualized learning (p. 320), (also see Bairral & dos Santos, 2012) 5 required portfolio

Author(s), year, publication **Purpose of portfolio development** **Overall focus of study**	**Purpose(s) of study** **Form of portfolio examined** **Context and participants**	**Theoretical/ conceptual foundation** **Design of study** **Duration of portfolio development**	**Key findings of study** **General conclusion(s)** **Tendency (+ / - /o)**	**Comment(s) [Ideas, notes, and links documented when analyzing the studies]**
lio development	dures, desirable components; potential differences in perceptions Paper-based/ traditional United States/ University teacher education internship; participants: 222 interns, 33 supervisors, 121 employers	versity supervisors (17 questionnaires (52 % returned), and 121 employers (47 questionnaires (39 %) returned) Duration of portfolio development: Not clear	self-improvement to occur; "Portfolios can be useful to *all* individuals involved in the process …" (p. 326); portfolio development process as a potentially valuable learning experience (p. 326) Positive	components Intended function and audience of portfolio guide contents and format
Bartlett, A. (2002). Preparing Preservice Teachers to Implement Performance Assessment and Technology through Electronic Portfolios. *Action in Teacher Education*, *24*(1), 90–97. doi:10.1080/01626620.2002.10463270 Portfolio for *learning* *Perceptions* of portfolio development	To examine "… the use of electronic portfolios in teacher education …" and to evaluate "… responses from … preservice teachers …" (p. 90) Electronic (presentation software and multimedia, but not web-based) Hawaii/ Undergraduate elementary teacher education in the	Performance assessment; teaching portfolio (Shulman, 1998); types of teacher portfolios (Wolf, 1999) Survey (6 questions) completed after each of two semesters of portfolio development; open-ended questions on the evaluation of the electronic portfolio assignment and recommendations for improve-	Pre-service teachers rated the electronic portfolio assignment positively Evaluations showed several advantages, e.g., "… opportunities to learn about educational technology and new ways to organize and present ideas" (p. 90) Positive	Most pre-service teachers rated the two electronic portfolio assignments positively [which is in line with students' attitudes reported in other studies]

Author(s), year, publication Purpose of portfolio development Overall focus of study	Purpose(s) of study Form of portfolio examined Context and participants	Theoretical/ conceptual foundation Design of study Duration of portfolio development	Key findings of study General conclusion(s) Tendency (+ / - /o)	Comment(s) [Ideas, notes, and links documented when analyzing the studies]
	fields of general and special education, with focus on field experience; 26 participants	ment Duration of portfolio development: One year (two semesters)		
Bartlett, A., & Sherry, A. C. (2006). Two Views of Electronic Portfolios in Teacher Education: Non-Technology Undergraduates and Technology Graduate Students. *International Journal of Instructional Media*, 33(3), 245–253. Portfolio for *learning* *Perceptions* of portfolio development	To investigate teacher education students' perceptions of electronic portfolios Electronic (multimedia, but not web-based) United States/ College of education; participants: 23 non-technology undergraduates preparing for certification in general and special education, 14 graduate students in educational technology	Short outline of electronic portfolios and technology in teacher education Descriptive study Data source: 39-item survey on completion of the students' respective programs; items based on earlier qualitative research with the same students Duration of portfolio development: Two years or more in the students' respective programs	Students from both groups satisfied with the portfolios they completed; both groups rated the electronic portfolio assignment highly when compared to other assignments Graduate students differed in their views from undergraduate students, e.g., with regard to use of class time, difficulties experienced, guidance and support Positive	[Can be linked to considerations of assessment preferences, e.g., to work by Menucha Birenbaum]
Bataineh, R. F., Al-Karasneh, S. M., Al-Barakat, A. A., & Bataineh, R. F.	To investigate how electronic portfolios supported pre-service teachers'	Summary of portfolio and portfolio definitions in education	Portfolio provided pre-service teachers with productive learning experiences	Categories determined for analysis of interview responses seem to be

Author(s), year, publication **Purpose of portfolio development** **Overall focus of study**	**Purpose(s) of study** **Form of portfolio examined** **Context and participants**	**Theoretical/ conceptual foundation** **Design of study** **Duration of portfolio development**	**Key findings of study** **General conclusion(s)** **Tendency (+ / - /o)**	**Comment(s) [Ideas, notes, and links documented when analyzing the studies]**
(2007). Jordanian Pre-service Teachers' Perceptions of the Portfolio as a Reflective Learning Tool. Asia-Pacific Journal of Teacher Education, 35(4), 435–454. doi:10.1080/13598660701611420 Portfolio for *learning* to teach/portfolio for *reflective learning* *Perceptions* of portfolio development	learning to teach Paper-based/ traditional Jordan/University teacher education; participants: pre-service teachers in three complete classes, 50 students, 32 of which from the field of social studies, 18 in the field of TEFL (teaching English as a foreign language)	Practice of portfolio in teacher education Outline of available empirical evidence Descriptive study Primary source of data: open-ended interviews with participants Duration of portfolio development: One semester	in many domains, encompassing knowledge, skills, attitudes, personal traits, motivation to learn, and interpersonal relationships Participants considered the portfolios developed "… a highly effective tool in their learning to teach." (p. 435) Positive	(too) wide-ranging and (too) general Study could be more focused on (a) particular aspect(s) of learning
Beck, R. J., Livne, N. L., & Bear, S. L. (2005). Teachers' self-assessment of the effects of formative and summative electronic portfolios on professional development. *European Journal of Teacher Education*, *28*(3), 221–244. doi:10.1080/02619760500268733 Portfolio for *learning*	To "… compare the effects of four electronic portfolio curricula on pre-service and beginning teachers' self-ratings of their professional development" (p. 221) Electronic portfolio (not web-based) United States/ Total of 207 participants, either in	Portfolio for assessment in teacher education; portfolio types (development vs. accountability) Four different samples: Pre-service teachers in samples A (62), B (67 participants), and C (59), beginning in-service teachers in sample D (19); 3 formative portfolios, 1 summa-	With regard to 3 out of 5 factors concerning professional outcomes within overall teacher development, including matters of reflection and understanding, the formative portfolios A, C, and D scored significantly higher than did the summative portfolio B Formative portfolios	The authors conclude that "… portfolios should not be used for the summative accountability of teachers" (p. 221) [a recommendation that is well worth considering as a reminder that summative portfolio assessment may be delicate, depending on the situation; yet, this recommenda-

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[professional development as learning] *Context* of portfolio development (comparison of formative and summative portfolios)	credential or Master of Arts in Teaching (MAT) programs at university (pre-service teachers) or 1-2 years in service (beginning teachers)	tive Electronic Portfolio Assessment Scale (ePAS) containing 34 self-report statements; 5 hypotheses examined Duration of portfolio development: Up to 3 months	focusing on teacher development are more conducive to professional outcomes than summative accountability portfolios Positive	tion seems to go too far]
Berrill, D. P., & Addison, E. (2010). Repertoires of practice: Re-framing teaching portfolios. *Teaching and Teacher Education, 26*(5), 1178–1185. doi:10.1016/j.tate.2010.02.005 Portfolio for *learning* [Identity negotiation as a form of learning] *Perceptions* of portfolio development	To explore "… the possible role of teaching portfolios as an effective tool both for the negotiation of identity and for the demonstration of teaching competence" (p. 1178) Paper-based/ traditional Canada/University teacher education, participants: 367 (27 %) out of 1372 graduates from a B.Ed. postgraduate program (elemen-	Rationale for teaching portfolios; multiple and contradictory purposes; sociocultural historical theory (repertoires of practice, communities of practice, identity negotiation) Larger questionnaire containing 3 questions on portfolio; participants could also refer to the portfolio in relation with open-ended items Duration of portfo-	No significant differences between perceptions of subgroups – gender, program division (elementary or secondary), teaching area (arts or sciences) "The portfolio as an effective tool in the construction of teacher identity" (p. 1182) Positive	"There are seven sections/categories that must be included in the Portfolio …" (p 1181) [the decisions of what to include in the portfolio are not given completely to students; also see Barry and Shannon (1997)]

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	tary and secondary school)	lio development: One semester (?), mostly less than the duration of the program (1 year)		
Birgin, O. (2011). Pre-service mathematics teachers' views on the use of portfolios in their education as an alternative assessment method. *Educational Research and Reviews*, 6(11), 710–721. Portfolio for *assessment* *Perceptions* of portfolio development	To investigate "... the views of pre-service mathematics (PSM) teachers on the use of portfolios as an alternative assessment method" (p. 710) Paper-based/ traditional Turkey/University mathematics teacher education; participants: 146 pre-service mathematics teachers (elementary and secondary)	Traditional and alternative assessment; portfolio in education; types of portfolios; uses of portfolio in teacher education 34 item questionnaire on the basis of prior studies on portfolio assessment: participants' views on portfolio assessment and the contribution of the portfolio to their individual, social, and professional development Duration of portfolio development: One semester	"... most of the PSM teachers believed that the portfolio assessment application facilitated an active learning process, allowed them to monitor their progress and to remedy their deficiencies, and to gain professional knowledge and experiences in portfolio assessment method." (p. 710); use of portfolio assessment contributed to individual, social, and professional development Positive	Issues of time management are addressed
Bolliger, D. U., & Shepherd, C. E. (2010). Student per-	To explore "... students' perceptions regarding the inte-	Portfolios/ electronic portfolios, online educa-	"ePortfolios positively impacted some students'	ePortfolios benefiting some, but not

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ceptions of ePortfolio integration in online courses. *Distance Education*, *31*(3), 295–314. doi:10.1080/01587919.2010.513955 Portfolio for *assessment/learning* *Perceptions* of portfolio development	gration of electronic portfolios (ePorfolios) in two online graduate-level courses at university Electronic (internet-based, Google Sites) United States/ "… two asynchronous graduate-level online instructional technology courses taught by the same instructor …" (p. 299); 40 students remaining as participants after exclusion of duplicate participants	tion, connectedness and communication Exploration of research questions, four of which are given "… mixed-methods approach using multiple techniques to collect quantitative and qualitative data" (p. 300); 39-item questionnaire, student reflections in threaded discussion Duration of portfolio development: One semester	perception of peer communication." (p. 302); "ePortfolios positively impacted most students' perceptions of their learning." (p. 304); "Many respondents agreed or strongly agreed that they valued the integration of an ePortfolio in the course (67.5%)." (p. 305); effect of prior experience and gender, as opposed to age and degree program; ePortfolios benefited some students, but not all Positive	all students
Borko, H., Michalec, P., Timmons, M., & Siddle, J. (1997). Student Teaching Portfolios: A Tool for Promoting Reflective Practice. *Journal of Teacher Education*, *48*(5), 345–357. doi:10.1177/002248719	To explore the factors that students perceive as facilitators and hindrances in the portfolio construction process "… to investigate whether student	Reflection in teacher education Explorative study, action research project Data sources: written reflections by all 21 students and	Comments on benefits, costs, factors facilitating portfolio construction, factors hindering portfolio construction, suggested refinements; "… participants commented most frequently	Student teacher identity addressed [Deeper understanding; deep learning, learning for understanding]

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7048005004 Portfolio for *learning* [portfolio for *professional development/ reflective practice*] *Perceptions* of portfolio development	teachers' construction of portfolios would enhance their reflection on practice" (p. 347) United States/ School-based professional seminar taken concurrently with student teaching (p. 346), "... 21 students in the fall 1994 cohort ..." (p. 347), taking part in the portfolio project	semi-structured interviews with 8 of these students Duration of portfolio development: One semester (during the student teaching semester)	about the benefits of the portfolio experience ..." (p. 350); "... opportunity for reflection was the most often frequently benefit (p. 351); broader perspective on the student teaching experience, deeper understanding (p. 355) Positive	
Breault, R. A. (2004). Dissonant themes in preservice portfolio development. *Teaching and Teacher Education*, 20(8), 847–859. doi:10.1016/j.tate.2004.09.006 *Portfolio for assessment/learning* *Perceptions* of portfolio development	To examine "... the use of portfolio assessment to determine the extent to which student teachers are able to demonstrate INTASC principles in their teaching."; to investigate "... the role of perception and assumption ..." (p. 847) Traditional/ not explicitly e-	Almost no background/foundation given, short introduction on teaching portfolios Four semi-structured individual interviews conducted with each participant; interviews were audiotaped, transcribed, and coded Duration of portfo-	There is dissonance on several dimensions: purpose, perception, and context Dissonance may influence the overall quality of the portfolio experience Recommendations for good portfolio use are derived *Neutral/critical, but*	One of the few articles overtly critical towards portfolio development Importance of participants' overall attitudes relative to the portfolio process pointed out Portfolio as a "learning activity" and as a "final attainment"

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	portfolio,[402] though containing videotape, etc. United States/ University preservice teacher education, school placement; 10 preservice teachers (invited/volunteers)	lio development: 8 weeks (during student teaching)	*not negative, pointing to elements to be considered*	(p. 850) Multiple portfolio purposes are possible (p. 850)
Cáceres, M. J., Chamoso, J. M., & Azcárate, P. (2010). Analysis of the revisions that preservice teachers of mathematics make of their own project included in their learning portfolio. *Teaching and Teacher Education, 26*(5), 1186–1195. doi:10.1016/j.tate.2010.01.003 Portfolio for *learning*	See article title/ purpose(s) of study pointed out in the text, e.g., " … to analyse the progress that each preservice teacher showed in his/her work as a result of the training received in the module." (p. 1190) Traditional/not explicitly e-portfolio Spain/University preservice teacher	Reflection on teaching practice; portfolios in teacher education Analysis of the papers include in the pre-service teachers' portfolios, papers related to the students' projects Analysis of reconstruction of initial ideas in relation to the instruction	"The outcomes showed significant differences in the revisions carried out in all categories except *Activities*. Although the use of portfolio promoted the successful development of each pre-service teacher's initial ideas, the training received during the teacher-education program had limited influence." (p. 1186)	[The article may be considered with a view to theoretical/ conceptual issues relative to portfolio; the background is presented in detail and includes several key ideas.]

[402] In studies where the form of portfolio is not mentioned explicitly, and where it is not possible to derive the form of portfolio constructed from indications in the text, it is assumed that the form of portfolio was traditional/paper-based.

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Product/Process of portfolio development	education in mathematics; 30 pre-service teachers completing all activities of the module (out of 37 students enrolled)	received One module/one academic year	Positive	
Cakir, A., & Balcikanli, C. (2012). The Use of the EPOSTL to Foster Teacher Autonomy: ELT Student Teachers' and Teacher Trainers' Views. *Australian Journal of Teacher Education*, *37*(3). doi:10.14221/ajte.2012v37n3.7 Portfolio for *learning* *Perceptions* of portfolio development	"... to investigate ELT student teachers' and teacher trainers' views on the use of the EPOSTL in pre-service language teacher education" (p. 1) Investigation of student teachers' experiences/teacher trainers evaluation of EPOSTL use Traditional/EPOSTL Turkey/Pre-service university teacher education; 25 student teachers and 4 teacher trainers participating	Learner autonomy; teacher autonomy (reflection, awareness, and self-assessment) Interviews, transcription, constant comparative analysis, qualitative analysis One semester	"The findings indicated that both student teachers and teacher trainers found the use of the EPOSTL beneficial in terms of reflection, self-assessment and awareness." (p. 1) Positive	EPOSTL: European Portfolio for Student Teachers of Languages EPOSTL as an international/ multinational 'reflection tool for student teachers of languages', developed by the European Centre for Modern Languages, supported by the Council of Europe Conversion of the EPOSTL into an electronic format recommended

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Carroll, J. A., Potthoff, D., & Huber, T. (1996). Learnings from Three Years of Portfolio Use in Teacher Education. *Journal of Teacher Education*, 47(4), 253–262. doi:10.1177/0022487196474003 Portfolio for *multiple uses* *Perceptions* of portfolio development	To investigate faculty perceptions on portfolio use – "… what were faculty perceptions of portfolio use, [w]hat did faculty perceive to be the key purposes of the portfolio, [w]ith what parts of the portfolio plan did faculty most and least agree?" (p. 256) Traditional/not electronic United States/ University undergraduate teacher education; 21 out of 37 undergraduate teacher education faculty responding to an e-mail requesting feedback, 12 participating in interviews, 30 in survey	Portfolio definitions; portfolio purposes; portfolio benefits E-mail for faculty feedback, faculty interviews, and faculty survey E-mails asking faculty what they had learnt through portfolios use; interviews with volunteers; construction of 74-item portfolio survey Duration of portfolio development: Four semesters (four "blocks", with presentation of portfolio in Block IV)	"… the faculty are still learning about portfolios, seeking clarity of definition, purpose, and benefits. The data suggest several key issues of portfolio use in teacher education: purpose and benefits, training, assessment, and ownership." (p. 259) Neutral, but not negative	Investigation of faculty perceptions of portfolio use [Not only student buy-in is required, but faculty buy-in is required as well.]
Cebrián de la Serna, M. (2011). Supervision Using E-	To examine "… tutorial activity when using e-	Portfolio and e-portfolio	"There are significant differences in the number of re-	

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Portfolios and Its Impact on Student Reflections during the Practicum: a Case Study. *Journal of Education*, 354. Retrieved from http://gtea.uma.es/mcebrian/wordpress/wp-content/uploads/2012/07/Art.Rev_.Edu2010Eng.pdf Portfolio for *reflection* *Product/Process* of portfolio development	portfolios and its impact on students' reflections during *Practicum*.", and "... to compare supervision tasks monitored by means of 'dialogic communication' and e-portfolios, as opposed to face-to-face supervision exclusively." (page numbers n/a) Electronic portfolios Spain/Primary teacher education at university; participants see next cell	Analysis of student diaries in e-portfolios Five academic years, each portfolio composed of 8 to 14 weekly diaries 141 e-portfolios analyzed, 1.349 diaries included Duration of portfolio development: Up to five years [duration remains unclear]	flections and topics suggested by students in the e-portfolios, according to the different supervising methods that were analysed in this study. Such differences have been most significant when comparing the use of e-portfolios to the "traditional" methods." (page numbers n/a) Basically positive	
Chamoso, J. M., & Cáceres, M. J. (2009). Analysis of the reflections of student-teachers of mathematics when working with learning portfolios in Spanish university classrooms. *Teaching and Teacher Education*, 25(1), 198–206.	To assess "... the reflective thinking of student-teachers about the teaching-learning process carried out in the training classroom as expressed in their written journals included in the learning portfolio"	Assessment; portfolio for assessment; portfolio for learning and reflection/reflective learning Qualitative analysis of portfolio contents Identification of units of information	"... in spite of ... the training in reflection carried out in the classroom, the student-teachers, in their reflections, mainly described aspects related to the teaching-learning process without becoming involved, and a	

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doi:10.1016/j.tate.2008.09.007 Portfolio for *reflection* *Product* of portfolio development	(p. 200) Traditional/no indication of electronic portfolios given Spain/Primary mathematics teacher education at university, participants: 33 student teachers	and classification Duration of portfolio development: (Maximum of) one academic year [duration remains unclear]	much lower percentage of them argued according to their own reasoning, or contributed." Critical/Negative	
Chamoso, J. M., Cáceres, M. J., & Azcárate, P. (2012). Reflection on the teaching-learning process in the initial training of teachers. Characterization of the issues on which pre-service mathematics teachers reflect. *Teaching and Teacher Education*, *28*(2), 154–164. doi:10.1016/j.tate.2011.08.003 Portfolio for *reflection* *Product* of portfolio	"… to highlight the issues of the reflections of pre-service mathematics teachers in their learning portfolio about the teaching-learning process taking place in a university teacher-training classroom." (p. 154); "… to analyze the content of pre-service teachers' reflections on the learning acquired in the university training classroom." (p. 155)	Reflection, learning portfolios Content analysis of written reflection; identification of informational units and categorization Duration of portfolio development: (Maximum of) one academic year	"The study revealed that the preparation of a portfolio can help pre-service teachers learn more about themselves and provide educators insight into how to help pre-service mathematics teachers engage in the teaching-learning process." (p. 154); "… the pre-service teachers found it difficult to make in-depth comments and apply the knowledge learned."	[Example of study on portfolio where portfolio is not mentioned in the title.]

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development	Traditional Spain/Pre-service mathematics teacher education at university; participants: 32 pre-service teachers		(p. 163) Tentatively positive, with critical comments on the levels of reflection attained by pre-service teachers	
Chau, J., & Cheng, G. (2010). Towards understanding the potential of e-portfolios for independent learning: A qualitative study. *Australasian Journal of Educational Technology*, *26*(7), 932–950. Retrieved from http://ascilite.org.au/ajet/ajet26/chau.html Portfolio for *learning* *Perceptions* of portfolio development	To investigate "…the use of e-portfolios to develop independent learning, from the perspectives of teachers and students in a Hong Kong university", to examine "…the potential and identify the challenges of supporting e-portfolio-mediated independent learning" (p. 932) Electronic/web-based Hong Kong/ Undergraduate university education, 63 students from 21 academic	E-initiatives, cognitive constructivism, e-portfolios, purposes of e-portfolios, socio-constructivism, independent learning – including personalized learning and leaner responsibility Qualitative research design, post-event semi-structured interviews with individual participants, complemented with data from students' artefacts and reflective entries; grounded theory, constant comparative analy-	"While most of the findings confirm the value of e-portfolio practice reported in other contexts, they throw into relief a complicated interplay and conflict of factors that may thwart the good intentions of e-portfolio design and implementation." (p. 932); "To develop independent learning within an e-portfolio environment requires commitment, purpose, strategies, and due recognition of the human dimension of learning." (p. 943)	[Independent learning as one important strand of research on student learning] Study basically positive, i.e., portfolio seems to be conducive to student learning with regard to independent learning, too. Broad range of academic disciplines involved, but pre-service teacher education/teaching not included.

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	disciplines, 13 EL teachers	sis Duration of portfolio development: About three months	Mainly positive	
Cheng, G., & Chau, J. (2013). A study of the effects of goal orientation on the reflective ability of electronic portfolio users. *Internet and Higher Education, 16*, 51–56. doi:10.1016/j.iheduc.2012.01.003 Portfolio for *reflection* *Student factors* in the process of portfolio development	To explore "… the effects of different goal orientations on students' reflective ability as demonstrated in their electronic portfolios (ePortfolios)" (p. 51) Electronic/web-based/open-source ePortfolio platform (Elgg) Hong Kong/ University undergraduate education; participants: 26 Hong Kong (Chinese) students from various academic disciplines taking part in an English language enhancement program (invited/volunteers)	E-portfolio pedagogy, goal orientation, reflective ability Analysis of goal orientation and reflection level as recorded in the participants' e-portfolios; coding according to coding schemes Duration of portfolio development: Three months	"… the ePortfolio is a valuable tool in fostering students' reflective competence by emphasizing both process (mastery-oriented) and product (performance-oriented)" (p. 51); "… most participants tended to set mastery goals rather than performance goals in their showcases, while some selected a combination of both" (p. 51); "participants with dual goal orientations appeared to demonstrate a higher level of persistence and reflection than those with only single goal orientations …" (p. 51)	As is the case with other studies with participants from fields other than pre-service teacher education, this study can be used to corroborate what is known on the process and product of portfolio development. One of the few studies investigating the influence of student factors on portfolio development.

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			Positive	
Chetcuti, D. (2007). The use of portfolios as a reflective learning tool in initial teacher education: a Maltese case study. *Reflective Practice*, 8(1), 137–149. doi:10.1080/14623940601139111 Portfolio for *reflection/learning/ professional development* *Process/Product* of portfolio development	To explore "… the use of portfolios as a reflective learning tool in initial teacher education" (p. 137); explicit aim of study: To explore "… whether student teachers used their PDP as a reflective learning tool and what they learnt from the process of developing their PDP [professional development portfolio]" (p. 137) Traditional Malta/University initial teacher education; participants: see next cell	Portfolio in teacher education; assessment of learning and assessment for learning, reflective practitioner Questionnaires (72 B.Ed. (Hons.) fourth-year students, 46 returning the completed questionnaire) and in-depth interviews with 8 science students Start of portfolio development in 2001, presentation in May 2005 (more than one semester)	The PDP helped student teachers "… to reflect on their practice and grow and develop a sense of identity of who they were as teachers. However, they were also very aware that their PDP would be used for employment purposes. The tension between the formative and summative aspects of the PDP was resolved by carrying out small group tutorial sessions" (p. 137) Positive	[See articles on portfolio development and teacher identity; see articles on tension of purposes, e.g., Breault (1997).] Good presentation of theoretical background
Chetcuti, D., Buhagiar, M. A., & Cardona, A. (2011). The Professional Development Portfolio: learning through	To explore "… whether the reflective learning skills … acquire[d] in … preservice [teacher] education are re-	Reflective practice, difference of "common-sense" and academic views of the concept (with reference to Moon	Four out of 15 first-year teachers continued to compile their PDP and to engage in formal reflection (i.e., in a	Examination of learning outcomes, long-term perspective Study investigates

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reflection in the first year of teaching. *Reflective Practice*, *12*(1), 61–72. doi:10.1080/14623943.2011.541095 Portfolio for *reflection/learning* *Product* of portfolio development/ *Outcomes* of portfolio development	tained …" (p 61), "…whether new teachers retain the 'academic' view of reflection …; … whether … [they] use reflective learning processes as they seek to continue their … growth" (p. 63) Traditional Malta/University (pre-service) teacher education; participants: 15 first-year teachers	2004) Open-ended, semi-structured one-to-one interviews to examine first-year teachers' views, perceptions, and ideas about their professional development portfolios (PDPs) Duration of portfolio development: See above	kind of 'academic' reflection as defined by Moon 2004); 11 of the first-year teachers engaged in informal reflection and "…reported that the reflective skills acquired throughout the PDP process were retained in their first year of teaching." (p. 67) Positive	in what sense the reflective skills acquired during initial teacher preparation were retained
Chetcuti, D., Murphy, P., & Grima, G. (2006). The formative and summative uses of a Professional Development Portfolio: a Maltese case study. *Assessment in Education: Principles, Policy & Practice*, *13*(1), 97–112. doi:10.1080/09695940600563553	To examine "… the rationale and the uses of portfolios in initial teacher education."; to consider "… the responses of students and lecturers to this mode of assessment; in particular, how the tensions between the formative and summative functions of portfolios	Teaching portfolios; portfolio assessment; portfolio in initial teacher education; evidence of potential advantages and limitations of portfolios; purposes and functions of portfolios in initial teacher education No study in the	"The evidence from the trial, although only a small sample, showed that with appropriate support the portfolio could meet its formative function. Staff were clearly committed to the formative function; however the extent to which they can meet the challenges involved	[This article can be used to corroborate research findings/practice reports regarding the topic of formative vs. summative (portfolio) assessment and possible ways to solve pertaining problems.]

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Portfolio for *assessment* *Perceptions* of portfolio development	were experienced and responded to at institutional level." (p. 97) Traditional Malta/University pre-service teacher education; debates and discussions between the authors	strictest sense of the word: (Only) debated and discussions between the authors	remains to be established." (p. 110) Basically positive	
Chitpin, S., & Simon, M. (2009). 'Even if no-one looked at it, it was important for my own development': Pre-service teacher perceptions of professional portfolios. Australian Journal of Education, 53(3), 277–293. doi:10.1177/000494410905300306 Portfolio for *reflection/learning* *Perceptions* of portfolio development	To examine "...how constructing a professional portfolio helps pre-service teachers examine their identity as learners." (p. 277) Traditional Canada/University pre-service teacher education, participants: 15 pre-service teachers enrolled in the Reflective Practice Seminar in the primary/junior division at the university.	Professional portfolios in education and the health sciences; reflective practice; Wolf and Dietz (1998) Data sources: Interviews, informal classroom conversations and reflections over an eight-month period. Perceptions concerning purpose, process and impact of portfolio development Duration of portfolio development:	"Despite the overwhelming nature of reflection, pre-service teachers in this study said that constructing a professional portfolio challenged them to cyclically reflect on taken-for-granted assumptions, articulate growth and gain perspectives." (p. 277) Importance of exemplars and peer as well as teacher feedback within the reflective seminar	Deep learning with regard to process/processing (quality learning) and contents (self/core reflection and learning, see onion model by Korthagen & Vasalos 2005) The topic of portfolio and teacher identity seems to be focus of a number of studies Affective component of portfolio as a very personal way of learning.

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		Eight months	Positive	
Chuang, H.-H. (2010). Weblog-based electronic portfolios for student teachers in Taiwan. *Educational Technology Research and Development*, 58(2), 211–227. doi:10.1007/s11423-008-9098-1 Portfolio for *reflective practice* *Product/Perceptions* of portfolio development	To explore "… how the use of weblogs within the portfolio framework affected portfolio production and development for student teachers, and how the weblog-based electronic portfolio (WBEP) shaped student teachers' reflective practice during the student teaching practicum." (p. 211) Electronic portfolios/weblog-based Taiwan/University pre-service teacher education, participants: 31 elementary school student teachers	Innovative technology in education, blogging; portfolio in teacher education; weblogs and reflective journaling; weblog-based electronic portfolios Qualitative study; data sources: Participants WBEPs, in-depth interviews at the end of the one-year practicum, open-ended survey questions Duration of portfolio development: Less than a year, but more than a semester	About half the participants' portfolios were at maturation level 2 (Level 1: Scrapbook, Level 2: Curriculum Vitae; Level 3: Curriculum Collaboration); "The two most prominent features of the WBEP platform on participants' reflective practice were personal editorship and dialogues with others. Additionally, blog publicity promoted mandated dossier-like portfolios with which to evaluate … contents were rather uniform" (p. 211) Neutral	"Most prominently, blogs also support active learning as learning logs track the progress of knowledge construction through all iterations rather than simply displaying finished work (Ferdig & Trammell, 2004, cit. by Chuang, 2010, p. 212).
Çimer, S. O. (2011). The effect of portfolios on students' learning: student teachers' views. *Eu-*	To report "… on student teachers' views of portfolios as a learning tool when they are com-	Portfolios in alternative assessment/in education Data source: Stu-	"… a majority of student teachers initially felt that compiling a portfolio would be time-	Suggestions for successful portfolio implementation are made

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***ropean Journal of Teacher Education*, *34*(2), 161–176. doi:10.1080/02619768.2011.552183** Portfolio and *learning* *Perceptions* of portfolio development	bined with a weekly test conducted at the end of each lesson to help student teachers self-evaluate." (p. 161) To investigate "student teachers' views of the effects of using portfolio on their own learning" (p. 162) Traditional Turkey/University teacher education; participants: 35 student teachers enrolled in a university course	dent teachers' written reflections Duration of portfolio development: One semester	consuming and an extra burden added to their already busy schedule. However, later on they all found that the process was a useful learning experience. Moreover, the portfolio process – especially combining self-reflection with weekly tests – encouraged students to study regularly, increased retention and made learning more enjoyable." (p. 161) Positive	"... there is a large body of literature on portfolios, but most of these studies are theoretical in nature, explaining the rationale for using portfolios and the benefits associated with them ..." (p. 162); "There is not enough qualitative empirical research examining student learning in the portfolio process to back up the claims about the benefits of portfolios. (p. 162) Portfolio as a "journey" (p. 163)
Delandshere, G., & Arens, S. A. (2003). Examining The Quality Of The Evidence In Preservice Teacher Portfolios. *Journal of Teacher Education*, *54*(1), 57–73. doi:10.1177/002248710	To examine "... the quality of the evidence represented in preservice teacher portfolios and the inferences drawn from them" (p. 57) – purposes of portfolio use ..., representations of teaching	Teaching and teacher education; portfolio assessment; standards in portfolio construction and portfolio assessment; case study; data sources: multiple sources of data (interviews	"... a pressing concern among teacher educators to rally evidence that the students are "meeting the standards" without much opportunity for meaningful dialogue and debate about educa-	Importance of inferences drawn from the contents of portfolios Differences between artefacts, reflection, and evidence Focus on elemen-

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2238658 Portfolio and *learning* *Product* of portfolio development	and quality of evidence, inferences drawn from portfolios Traditional/paper-based United States/ Elementary pre-service teacher education; 2-3 faculty members from 3 institutions, 12 students	with faculty; focus group discussion, survey, and individual interviews with students) Duration of portfolio development: Probably more than one course/more than one semester, since program is mentioned	tion, teaching, and learning" (p. 57); "...students use evidence and artifacts interchangeably to mean something tangible ..., and their notions of explanation and reflection are quite problematic." (p. 57) Critical/Negative	tary programs; there may be differences between elementary and secondary teachers
Deveci, H., Ersoy, A. F., & Ersoy, A. (2006). The Views of Prospective Elementary School Teachers on the Use of Portfolio Assessment in Teacher Education. *Educational Sciences: Theory & Practice*, *6*(1), 193–199. Portfolio for *learning/assessment* *Perceptions* of portfolio development	To investigate "... the views of prospective elementary school teachers on the portfolios that they prepared" (p. 193) Traditional Turkey/University pre-service teacher education; participants: 18 students (volunteers)	Short outline of portfolio assessment Qualitative research based on semi-structured interviews; data analyzed inductively, five categories formed (1. Portfolio preparation experience; 2. Materials produced; 3. Problems faced; 4. comparison of traditional and portfolio assessment; 5. contribution of portfolio development to	"... the prospective teachers felt panic in the begining (sic) because they had never prepared any portfolio before. However, they enjoyed the experience once they got comfortable with it. ... the students' problems differed ... portfolio study as an important experience for their professional development" (p. 193); advantages over	[Students need to be introduced to the concept of portfolio; it is important that they expect portfolio development to be useful and that they experience portfolio development to be useful.]

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		professional development) Duration of portfolio development: Probably one semester [remains unclear]	traditional assessment Positive	
Dutt, K. M., Tallerico, M., & Kayler, M. A. (1997). Assessing student teachers: The promise of developmental portfolios. *The Teacher Educator*, *32*(4), 201–215. doi:10.1080/08878739709555147 *Portfolio* for assessment/professional development *Process* of portfolio development	To examine "... how portfolios might contribute to ... assessment and professional development ...." (p. 201); "... to explore the experiences of ... preservice and cooperating teachers" related to portfolios for the evaluation of student teacher development (p. 203) Traditional United States/ University preservice teacher education; participants: see next cell	Educational assessment; teaching portfolios; Participant observation of 26 portfolio review sessions (primary means of data collection) and open-ended interviews with 13 student teachers and 13 co-operating teachers Duration of portfolio development: Not stated cleary	Findings from the study can be categorized as "individuality in the portfolio review process" and "effects" or "by-products" of the portfolio process (p. 205) Positive (e.g., see summary of positive effects given on p. 209)	Here, as in numerous other cases, the focus of research/ the research question is stated in a rather vague way. "... it is generally agreed upon that the portfolio's form, presentation, and content should vary, depending upon its intended purpose ..." (p. 202)

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Dutt-Doner, K., & Gilman, D. A. (1998). Students react to portfolio assessment. *Contemporary Education*, *69*(3), 159–165. Portfolio for *assessment* *Perceptions* of portfolio development	To investigate and understand how students perceived their experience with portfolio evaluations and the advantages and limitations of portfolio evaluation identified by students Traditional United States/ 621 university students in undergraduate teacher preparation for secondary and elementary education	Apart from short reference to the topic in question and some existing research, no background is given. Open-ended survey following the final portfolio conference Duration of portfolio development: One semester	Students developed techniques in portfolio development. Among several potential benefits of portfolios provided for students are "A more accurate reflection of student learning than tests, knowledge about teaching and the teaching profession ..., development of professional attitudes, enhancing professional skills and self-confidence, improved relationships ..., practice in building portfolios ..." (pages n/a); students also expressed concerns Positive	Description of study design imprecise; survey questions not given. Here again, as in a large number of articles, it is noted that "[f]or many of the students, this was their first experience in developing and being evaluated by a portfolio" (page numbers n/a) Rather a report on portfolio assessment and students' evaluation thereof than a well-founded study
Fiedler, R. L., Mullen, L., & Finnegan, M. (2009). Portfolios in Context: A Comparative Study in Two Preservice Teacher Education	To examine "...how portfolio tools, along with external influences and institutional contexts, mediate the experiences of pre-	Cultural-historical activity theory (Engeström, 1987); portfolio in education Multisite case study;	Broader context had an impact on how teacher candidates perceived the portfolio experience and on their decisions on how to represent	Influence of context of portfolio activity, tools, institutions "Portfolio authoring in teacher education programs has many

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Programs. *Journal of Research on Technology in Education (International Society for Technology in Education)*, *42*(2), 99–122. Portfolio for *assessment* *Process/Perceptions (students' experiences)* of portfolio development	service teachers creating program-required portfolios" (p. 99) E-portfolios (web-enabled database portfolio tools) United States/ Higher education, pre-service teacher education, participants: 6 students from each of the two institutions selected (volunteers, purposeful sampling)	Data collection involved a variety of individual and focus group interviews, informal interviews, observations, and document reviews (p. 105) Duration of portfolio development: Probably more than one semester, since there is mentioned a "… one-semester snapshot of the portfolio experience" (p. 103)	themselves in their portfolios; stress, tensions, and difficulties talked about by pre-service teachers; tensions related to stakeholders different perspectives Neutral/Critical (tensions and difficulties are addressed)	stakeholders: students, professors, administrators, accreditors, prospective employers, and software vendors." (p. 103)
Green, J. E., & Smyser, S. O. (1995). Changing Conceptions about Teaching: The Use of Portfolios with Pre-Service Teachers. *Teacher Education Quarterly*, *22*(2), 43–53. Portfolio for *learning* *Product* of portfolio	"… to determine whether the use of teaching portfolios affects the meaning given to basic concepts in education by pre-service teachers"; to investigate "… whether the use of teaching portfolios alters meaning that prospective teachers give to … basic	Portfolio assessment; formative and summative information; benefits of portfolio use Pre-/post-test design with experimental group (eg) and control group (cg); first cycle: 32 students eg and 36 students cg; second cycle in following	Measurable shifts in meaning in the first phase of the study; inconclusive findings in the second phase; general conclusion: portfolio use in pre-service teacher education has the potential to positively influence attitudes and beliefs concerning certain educational con-	Key question: Does portfolio use have an effect on pre-service teachers' conceptions relative to educational processes?

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development	concepts ..." (p. 46) Traditional United States/ Pre-service teacher education at two universities; participants: see next cell	semester: 17 students eg and 12 students in cg; eg was given guidance in portfolio development Duration of portfolio development: One semester	cepts Positive	
Groom, B., & Maunonen-Eskelinen, I. (2006). The use of portfolios to develop reflective practice in teacher training: a comparative and collaborative approach between two teacher training providers in the UK and Finland. *Teaching in Higher Education*, *11*(3), 291–300. doi:10.1080/13562510600680632	"... to identify how the portfolio was used to support student teacher development ...", "... to identify similarities and differences in approach and outcomes between the two institutions and to identify to what extent this supported or enhanced reflective practice" (p. 293) Traditional UK and Finland/ Higher education teacher training; participants: see	Portfolio in teacher education and assessment Small-scale collaborative project, qualitative and interpretive in nature Review of literature; review of the two educational settings; exchange visits; interviews with key personnel; analysis of 40 portfolios (20 from each institution), semi-structured interviews with 20 students (10 from each institution)	"In both institutions students generally reported that the process of the portfolio had a positive outcome in terms of perceiving the role of the teacher as a reflective practitioner"; "Although both student groups were generally positive about their experiences in collating their portfolios some students reported an initial reluctance and some trepidation in beginning work on it." (p. 298)	"Interviews with trainees strongly indicated that they required a supportive framework from tutors to feel secure in their use of the portfolio to develop and further their reflective practice." (p. 298)

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	next cell	Duration of portfolio development: Not stated clearly	Positive	
Hartmann, C., & Calandra, B. (2007). Diffusion and reinvention of ePortfolio design practices as a catalyst for teacher learning. *Technology, Pedagogy and Education*, *16*(1), 77–93. doi:10.1080/14759390601168080 Portfolio for *learning* *Product* of portfolio development	To investigate how "… design practices changed during [students'] tenure in the program, and how acquiring these practices supported their development of habits of mind …"(p. 77) Electronic (web-based) United States/ University undergraduate teacher education; participants: 7 prospective secondary mathematics teachers (14 volunteers, 10 students willing to be interviewed, 7 selected on the basis of purposeful sampling)	Teaching portfolios; Roger's (2003) concepts of 'diffusion' and 'reinvention' Data collection: Portfolio artefacts and other sources; final analysis of a sample of 15 portfolio artefacts; analysis of portfolio presentations and interviews with students to corroborate findings of document analysis Duration of portfolio development: Three semesters	Observed change in content and form of the participants' ePortfolios across three semesters "… creation and diffusion of innovative design models, accentuated by reinvention of existing models, led to the appearance of increasingly rich representations of practice in the participants' ePortfolios" (p. 90) E-portfolios increasingly elaborated over time within social context Positive	"… the participants' experiences in the portfolio seminar supported the processes of diffusion and reinvention as the participants (a) invented designs to describe their teaching; (b) reinvented the designs through observation and critique; and (c) constructed links between their teaching experiences and the pedagogical theories introduced to them during their preparation program:" (p. 91) [See articles on portfolio as a bridge between theory and practice in teacher education]

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Hauge, T. E. (2006). Portfolios and ICT as means of professional learning in teacher education. *Studies in Educational Evaluation*, 32(1), 23–36. doi:10.1016/j.stueduc.2006.01.002 Portfolio for *learning* *Perceptions* of portfolio development	To investigate "… how portfolios combined with new learning technologies interact with student teachers' understanding of teaching and learning", "how … student teachers perceive portfolios and new learning technologies …", "to what extent … electronic portfolios support … professional development" (p. 24) Electronic (not fully web-based) Norway/Pre-service teacher education	Portfolios in teacher education; types of portfolios; types of artefacts (Wartofsky, 1983; Cole, 1996) Exploratory study Data collection: Open-ended interviews with 5 student teachers; survey conducted with all students (N = 55) at the end of the educational program Duration of portfolio development: Not stated clearly, probably 1 year	"… the learning portfolios play a significant role for students' learning and development in the education programme" (p. 32) Several positive effects of portfolio use Students differ in their views on benefits and outcomes of technology for their learning Positive	"Compared to how the portfolio work has been productive for community building and reflections on learning, the online activities have not become that influential." (p. 33)
Herner-Patnode, L. M., & Lee, H.-J. (2009). A Capstone Experience for Pre-service Teachers: Building a Web-Based Portfolio. *Journal of Educational Technology &*	To examine the use of technology to enhance the portfolio process for teacher candidates; to determine the effectiveness of using a web-based	Technology use in higher education; web-based portfolios in teacher education; purported advantages of electronic portfolios over paper-based, traditional portfoli-	Knowledge and skills base related to technology and state standards increase; disposition towards using technology in order to create and maintain	

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***Society*, *12*(2), 101–110.** Portfolio for *learning* *Product* of portfolio development	portfolio Electronic portfolio (web-based United States/ University pre-service teacher education; participants: 41 graduate students, 21 seeking early childhood Certification, 20 seeking Middle Childhood Certification	os Comparison of "perceived knowledge, skills and dispositions about technology literacy and usage in developing an e-portfolio" (p. 101) as measured by means of a pre-/ post survey Duration of portfolio development: One year (p. 103)	portfolios improves Positive	
Hung, S.-T. A. (2012). A washback study on e-portfolio assessment in English as a Foreign Language teacher preparation program. *Computer Assisted Language Learning*, *25*(1), 21–36. doi:10.1080/09588221.2010.551756 Portfolio for *assessment*	To explore "(…) the positive and negative washback effects that e-portfolio assessments produced on learning." (p. 21) Electronic (web-based) Taiwan/University pre-service teacher education in languages; participants: 18 English as a For-	Washback in testing; e-portfolios in teacher training; portfolios as a tool for assessment; blogs in e-portfolio development Data collection by means of multiple instruments (including interviews, observations, document analysis, and reflective journals)	"The findings suggest that e-portfolio assessments generate positive washback effects on learning, including building a community of practice, facilitating peer learning, enhancing learning of content knowledge, promoting professional development, and cultivating critical	Though assessment is mentioned in the title of the study, the questions in the interview are aimed at learning. Topic of washback clearly related to the process of learning and reflection. Study useful with a view to the review of the literature and the empirical re-

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Process of portfolio development	eign Language (EFL) student teachers in a graduate course of a Master's program	Duration of portfolio development: One course (18 weeks)	thinking." (p. 21) There are also some negative washback effects (e.g., test anxiety). Positive	search to be conducted Enhancing learning of content knowledge as an indication of deep learning [Good example of relevance of studies of assessment for issues of student learning]
Imhof, M., & Picard, C. (2009). Views on using portfolio in teacher education. *Teaching and Teacher Education*, 25(1), 149–154. doi:10.1016/j.tate.2008.08.001 Portfolio for *learning* *Perceptions* of portfolio development	To investigate the acceptance of portfolio by pre-service teachers and the effects of portfolio on pre-service teachers' professional attitudes and competences; additionally, to examine teacher educators' assessment of portfolio as an educational method. Traditional Germany/Pre-service teacher	Competence orientation in teacher education and the role of portfolio; professional portfolios in the learning process Surveys, both students and teacher educators were administered a questionnaire Duration of portfolio development: Not specified, at the time of data collection students had	The general evaluation of the portfolio turned out to be rather mixed. "Individuals with a strong proactive attitude tent to find the portfolio more important and useful than individuals with a weak proactive attitude." (p. 152) Almost all teacher educators saw potential in the instrument of portfo-	Minimum consensus on defining features of portfolio as an instrument (p. 149) The descriptions of study design and of duration of portfolio development remain vague. Differences between students and related differences in students' perceptions

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	education; participants: 144 preservice teachers, 15 teacher educators	been working with portfolios for different periods of time	lio. Positive/mixed	
Jones, E. (2010). Personal theory and reflection in a professional practice portfolio. *Assessment & Evaluation in Higher Education*, 35(6), 699–710. doi:10.1080/02602930902977731 Portfolio for *learning* Portfolio for *assessment* fostering *reflection (learning)* *Process/Perceptions* of portfolio development	To investigate "… the development, teaching and evaluation of a portfolio used as the final assessment tool in a two-year professional development programme for RTs" [special education resource teachers] (p. 701) Traditional New Zealand/Two-year university postgraduate professional development program; participants: 91 RTs from different cohorts (invited, 54 % accepting), 4 faculty members	Portfolio for assessment; portfolio construction; rationale for portfolio assessment for the promotion of reflective practice Data of two types: Products of the program (e.g., completed portfolios); data designed for the study: pre-/ post-test questionnaire, interviews Duration of portfolio development: Maximum duration of one year	"The findings of this study strongly suggest that a portfolio in which students are required to select and annotate evidence from practice, and reflect on the evidence, is a powerful tool for the development of reflective practice. The articulation of a PT is an important aspect of the process." (p. 708) PT: Personal theory Positive	Good introduction of background „Although claims are made that portfolios promote reflection, the nature of such reflection and the mechanisms that promote it in the portfolio process are not well understood." (p. 699) "… tension between the summative and formative purposes …, a more comprehensive understanding of reflection … many RTs reported that articulating their PT …impacted positively on their ability to reflect on practice" (p. 699)

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Kaasila, R., & Lauriala, A. (2012). How do pre-service teachers' reflective processes differ in relation to different contexts? *European Journal of Teacher Education*, 35(1), 77–89. doi:10.1080/02619768.2011.633992 Portfolio for *reflection/learning* *Process* of portfolio development	"... to look at pre-service teachers' reflection processes and their breadth and depth in four different contexts." (p. 77);"... to highlight the meaning of multicontextuality concerning the quality of pre-service teachers' reflection processes" (p. 78) Traditional Finland/University pre-service teacher education; participants: 53 mathematics pre-service teachers	Reflectivity; reflection in teacher education; Qualitative study/ content analysis: "... three portfolios selected for closer scrutiny" (p. 77) Duration of portfolio development: Maximum duration of 3 months (p. 79)	The breadth/depth of the pre-service teachers' reflection processes varied greatly; their former experiences as learners of mathematics seemed to have great impact on their reflection when they taught mathematics for the first time; acquaintance with research articles gained led to deeper and seemingly broader reflection; consideration of biographical contexts was of help in understanding and reflecting other contexts Neutral	Good introduction of background This study, published in 2012, is an example that e-portfolios are not substituted for traditional paper-based portfolios in all cases.
Kabilan, M. K., & Khan, M. A. (2012). Assessing pre-service English language teachers' learning using e-portfolios: Benefits, challenges and com-	"... to ascertain the future teachers' practices with e-portfolios in their learning and to determine if these practices lead to teaching competen-	Traditional and alternative assessment; e-portfolios; teacher competencies; communities of practice Three instruments	Participants appreciated e-portfolio development; e-portfolios functioned as a monitoring tool in learning and the identification of strengths	TESOL: Teachers of English to Speakers of Other Languages

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petencies gained. *Computers & Education*, *58*(4), 1007–1020. doi:10.1016/j.compedu.2011.11.011 Portfolio for *assessment* *Process*/*Product* of portfolio development	cies. … to identify the benefits and challenges of using an e-portfolio as a tool for learning and self-assessment." (p. 1007) Electronic portfolio Malaysia/Pre-service university TESOL education; participants: 55 pre-service teachers	to collect data: weekly journals, discussion journals, survey questionnaire Duration of portfolio development: An individual e-portfolio was created and maintained as a part of the assessment during a 14-week-course	and weaknesses; challenges related to e-portfolio use were identified; several teaching competencies emerged from pre-service teachers' e-portfolio practices (e.g., development of understanding and comprehension, gain of ICT skills, new approaches, activities, and insights) Positive	
Klenowski, V. (2000). Portfolios: Promoting teaching. *Assessment in Education: Principles, Policy & Practice*, *7*(2), 215–236. doi:10.1080/713613329 Portfolio for *assessment* and *learning* *Product* of portfolio development	To examine "… the use of portfolios for assessment and learning purposes in an initial teacher education course …", to investigate "… the extent to which the use of portfolios for such purposes promoted the development of reflective practice and teaching skills"	Portfolio assessment; teaching portfolios; portfolios, professionalism, and reflective practice Multiple methods (survey, interview, etc.) and multiple sources (pre-service teachers, staff, documents) Participants: 7 staff,	"These changes helped provide a learning environment for pre-service teachers which was characterised by: a focus on progress and improvement; participation, interaction and exchange of ideas; deeper understanding; enjoyment and satisfaction (for pre-service teachers and	Portfolio comprising interrelations of curriculum, assessment, and pedagogy Portfolio for the development and the assessment of intended learning outcomes (ILOs) Principles for the use of portfolios for assessment

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	(p. 215) Traditional Hong Kong/Initial teacher education in university-level institution (Hong Kong Institute of Education); participants: see next cell	40 pre-service teachers from eight classes (four English, four Chinese) Duration of portfolio development: One year	their lecturers); initiative; communication; comfort." (Klenowski, 2000, p. 230–231) Basically positive	"… the use of portfolios for assessment purposes to promote learning (Klenowski, 2000, p. 215); combination of learning and assessment; assessment for learning in a non-high-stakes environment
Koçoğlu, Z. (2008). Turkish EFL student teachers' perceptions of the role of electronic portfolios in their professional development. *The Turkish Online Journal of Educational Technology*, *7*(3). Portfolios for *professional development* *Perceptions* of portfolio development	To investigate "… the perceptions of EFL student teachers on e-portfolios as a learning tool"; "… to describe EFL student teachers' perceptions on the role of electronic portfolios in their professional development" (page numbers n/a) Electronic, but not web-based Turkey/University pre-service teacher education; participants: 5 senior level teacher candidates	Portfolio in teacher education; electronic portfolios in teacher education Descriptive study Data collection and analysis: Interviews were conducted with students, transcribed, analyzed, concepts and major themes identified Duration of portfolio development: Two semesters (one semester methods course, one semester practice teach-	"… e-portfolios helped student teachers keep current with innovations in the digital world; a fancy tool that serves them in the job search; and a collection of materials that showed their best work; an opportunity to work collaboratively which in turn support their ongoing professional development. However, the student teachers in this study did not believe that electronic portfolios can	EFL: English as a Foreign Language "Most portfolios that are being used in teacher education programs are mainly printed and compiled in a 3-rings binder (i.e., paper portfolios)" (page numbers n/a); while it is open whether this claim is true, it can be noted at least that e-portfolios are not used everywhere and that there continue to be many instances of paper-

Author(s), year, publication Purpose of portfolio development Overall focus of study	Purpose(s) of study Form of portfolio examined Context and participants	Theoretical/ conceptual foundation Design of study Duration of portfolio development	Key findings of study General conclusion(s) Tendency (+ / - /o)	Comment(s) [Ideas, notes, and links documented when analyzing the studies]
	in an undergraduate program	ing)	be an important tool to develop reflective thinking." (page numbers n/a) Basically positive	based portfolios
Lambe, J., McNair, V., & Smith, R. (2013). Special educational needs, e-learning and the reflective e-portfolio: implications for developing and assessing competence in pre-service education. *Journal of Education for Teaching*, 39(2), 181–196. doi:10.1080/02607476.2013.765191 Portfolio and *assessment for learning*; *Perceptions* of portfolio development	To examine "… how the e-portfolio can be utilised as an assessment tool in pre-service education, specifically for the assessment of student teachers ' learning and competence in practice relating to special needs education and inclusion" (p. 186) Electronic portfolio, web-based Northern Ireland/ University one-year post-primary Post-Graduate Certificate in Education (PGCE) program (different subjects); participants: cohort of 22 pre-service	Portfolio for assessment and learning; types of e-portfolios; assessment in pre-service teacher education; competence and assessment of competence Evaluation study Data collection and analysis: Online threaded discussions and short survey; qualitative approach in analysis Duration of portfolio development: Two semesters	Students were very positive about the development of an individual(ized) e-portfolio and its presentation for assessment; clear emphasis on critical reflection was recognized (as opposed to the mere fulfillment of tasks) Students were very positive about the use and functionality of the specific software used; students reported a sense of ownership and pride; self-regulation of the process was seen as important Positive	Report of findings of qualitative analysis remains vague; small sample as the study was only a pilot study. [Idea: Combine these results – critical reflection as deep learning, students' positive attitude likely to support critical reflection.]

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	teachers out of 108			
Lin, Q. (2008). Pre-service teachers' learning experiences of constructing e-portfolios online. *The Internet and Higher Education*, *11*(3-4), 194–200. doi:10.1016/j.iheduc.2008.07.002 Portfolio and *learning* *Perceptions* of portfolio development	To explore "… how 38 preservice teachers' understanding of the e-portfolios evolved …" (p. 194) – exploration of learning experiences, acquisition of technology skills, potential frustrations and challenges, meanings attached to experiences Electronic, web-based United States/ College pre-service elementary teacher education; participants: 38 pre-service teachers	E-portfolio as a learning strategy; e-portfolio as a reflective tool; e-portfolio as a reflective tool One-year case study Data collection: 18-item-survey at the end of the course and interviews during student teaching Duration of portfolio development: One course, i.e., one semester	Positive aspects: reviewing and rediscovering, development of self-assessment skills, development of a sense of purpose and focus, development of synthesis skills, learning from communications and interactions, learning and reviewing technology skills, enhancement of candidates' marketability; negative aspects were fewer, but not all students viewed e-portfolio development positively Basically positive	
Loughran, J., & Corrigan, D. (1995). Teaching portfolios: A strategy for developing learning and teaching in preservice education.	To report "… on the effectiveness and value of portfolios from the student-teachers' perspective by exploring how their under-	Portfolio in teacher education; portfolio as process; portfolio as product Data collection: Open-ended ques-	Initial lack of understanding of portfolio, both with regard to the process as with regard to the product; understanding	

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***Teaching and Teacher Education, 11*(6), 565–577. doi:10.1016/0742-051X(95)00012-9** Portfolio for *learning* *Perceptions* of portfolio development	standing of the task evolved as they completed their preservice teacher education program" (p. 565) Traditional Australia/University pre-service science teacher education; participants: 22 students out of a cohort of 30	tionnaire completed by 22 students at the end of the course; interviews with sub-set of 8 students (volunteers) Duration of portfolio development: Up to one year (depending on when students started working on their portfolios)	evolved; practical application of portfolio was seen on completion Basically positive	
Mansvelder-Longayroux, D. D., Beijaard, D., & Verloop, N. (2007). The portfolio as a tool for stimulating reflection by student teachers. *Teaching and Teacher Education, 23*(1), 47–62. doi:10.1016/j.tate.2006.04.033 Portfolio for *learning/reflection* *Process* of portfolio	To study "… the nature of reflection in the portfolios of student teachers" (p. 47); to investigate what learning activities comprised in reflection were carried out by student teachers in the development of their learning portfolios Traditional The Netherlands/ University one-year	Reflection as a principle for teacher education; reflection as a process; reflection in portfolio development; theory on learning activities Data collection and analysis: Total of 39 portfolios collected and analyzed Duration of portfolio development: One semester (two semesters, one	Student teachers tended to focus on their own practice and on how to improve that practice "… learning activities that addressed immediate performance and the improvement of performance in teaching practice were found much more often than learning activities that addressed the understanding of	Supervision and guidance as key elements of successful portfolio development (p. 47) Deep processing more likely if there is personal involvement (Desforges, 1995) > portfolio may be considered conducive to deep processing, since (1) field experiences in general lead to a high(er) level of student involve-

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development	teacher education course; participants: 25 student teachers (drop-out of 4 student teachers not included in the research findings)	learning portfolio produced in each semester)	underlying processes that can play a role in the actions of practising teachers." (p. 60) Critical (due to limited contents of the reflections the in portfolios)	ment and (2) students in their portfolios can focus on what is important to them
Mansvelder-Longayroux, D. D., Beijaard, D., Verloop, N., & Vermunt, J. D. (2007). Functions of the Learning Portfolio in Student Teachers' Learning Process. *Teachers College Record*, *109*(1), 126–159. Portfolio for *learning* *Process* of portfolio development	"... to develop a framework that could be used to describe the value of the learning portfolio for the learning process of individual student teachers." (p. 126); to investigate what student teachers understand by working on a learning portfolio (functions in their learning process, relations of functions (p. 128) Traditional The Netherlands/ One-year postgrad-	Portfolios in teaching and teacher education; the learning portfolio; the process function of the learning portfolio; reflection and portfolio; self-regulation of learning; construction of practical knowledge Data collection and analysis: Retrospective interviews with 21 student teachers; 39 portfolio evaluation reports written by students Duration of portfolio development: One semester (two	It was possible to differentiate between process and product functions; seven functions of the portfolio in the student teachers' learning process emerged, which could be categorized into two subgroups, depending on what type of learning they facilitated Different views were expressed by student teachers about the value of the portfolio Neutral, differenti-	Questions of student learning styles, motivation, etc. are considered

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	uate teacher training course; participants: 25 student teachers (drop-out of 4 students not included in the research findings)	semesters, one learning portfolio produced in each semester)	ated view of portfolio development with regard to student differences	
McKinney, M. (1998). Preservice Teachers' Electronic Portfolios: Integrating Technology, Self-Assessment, and Reflection. *Teacher Education Quarterly*, *25*(1), 85–103. Portfolio for *learning* *Process* of portfolio development	To investigate: (1) what pre-service teachers see as important about the portfolio process, (2) the effect of technology on the portfolio process, (3) changes over time and with experience, (4) necessary support structures, (5) impediments Electronic, but not web-based United States/ University undergraduate elementary teacher preparation; participants: total of 21 pre-service teachers	Portfolio assessment and technology in teacher preparation Mixed-methods study making use of portfolio analysis, survey, questionnaire, and focus group interview Duration of portfolio development: One semester (two semesters, one portfolio produces in each semester)	On the whole, pre-service teachers found that portfolios allowed them to be reflective and that they helped them to see connections both between their classes and their classes and their field experiences. Students responses to technology were positive, but problematic issues were commented on. Changes over time; physical and human resources necessary; impediments exits (e.g., limited time) Basically positive	The connections observed by pre-service teachers (connections between their classes, connections between their classes and their field experiences) can be seen as elaboration/deep learning Total of 21 pre-service teachers; 5 students developing electronic portfolios, 16 students developing paper portfolios

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Meeus, W., Petegem, P. Van, & Meijer, J. (2008). Portfolio as a means of promoting autonomous learning in teacher education: a quasi-experimental study. *Educational Research*, 50(4), 361–386. doi:10.1080/00131880802499837 Portfolio for *learning* *Process* of portfolio development	"… to examine the usefulness of portfolio as a means of promoting autonomous learning." (p. 361) Traditional, e-portfolio as option Belgium (Flanders)/ University preschool and primary school initial teacher education; participants: 174 teacher education students, 44 supervisors	Dissertation in higher education Pre- and post-test quasi-experimental study; use of validated questionnaires focusing on metacognition, self-direction, cognitive processing strategies, mental learning models and learning orientations Duration of portfolio development: One course	The learning portfolio leads to a higher increase in students' capacity for autonomous learning than the alternative dissertation model that was examined (literature study with practical processing). It is necessary for supervisors to give students opportunities for autonomous learning in order for students to increase their capacity for autonomous learning. Positive	E-portfolio as option: "Students are not compelled to submit an electronic learning portfolio, but this is certainly encouraged." (p. 363)
Milman, N. B. (2005). Web-Based Digital Teaching Portfolios: Fostering Reflection and Technology Competence in Preservice Teacher Education Students. *Journal of Technology and Teacher Edu-*	To examine preservice teacher education students' experiences and reasons for creating digital teaching portfolios (p. 373); to investigate the process of portfolio construction, to	Portfolios; teaching portfolios; portfolios and reflection; students' perceptions of portfolios; digital teaching portfolios; advantages and challenges of digital portfolios; paradigm of interpretive in-	"… the process of creating digital teaching portfolios was a constructivist one that fostered self-confidence in students' professional and technical skills. … students enrolled in the	Importance of guidance for students; acquisition of ICT skills when developing a digital portfolio See synonyms for 'digital teaching portfolios' listed in

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***cation*, *13*(3), 373–396.** Portfolio for *learning* *Process* of portfolio development	investigate what students learnt from portfolio construction and to examine the challenges of the WWW regarding digital portfolio publication (p. 374) Electronic, web-based United States/ University pre-service teacher education; participants: 9 pre-service teacher education students	quiry for study; constructivist theory as theoretical framework for study Qualitative study Several methods of data collection Duration of portfolio development: One course/one semester (p. 381)	course to enhance their technology skills, for guidance in the process of developing a digital teaching portfolio, and to create a portfolio that would make them more marketable." (p. 373) Positive	article
Mokhtari, K., Yellin, D., Bull, K., & Montgomery, D. (1996). Portfolio Assessment in Teacher Education: Impact on Preservice Teachers' Knowledge and Attitudes. *Journal of Teacher Education*, *47*(4), 245–252. doi:10.1177/002248719	"… to field-test the use of portfolios in a language arts course …" (p. 246) for eventual program-wide implementation Traditional United States/ University pre-service teacher education; participants: 66 female	Portfolio as alternative assessment Pilot study Primary source of data: Portfolio assessment questionnaire, constructed for the study on the basis of literature previously published; main sections: knowledge of	Concerning the benefits of portfolio, there was substantial agreement that portfolio assessment promoted collaborative learning and that portfolios helped promote student reflection Overall positive attitudes towards	The authors mention that the portfolio (hands-on) experience may contribute to a positive development of beliefs and attitudes towards portfolio and refer to similar findings of another study (p. 251)

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6474002 Portfolio for *assessment for learning* *Process/Perceptions* of portfolio development	junior and senior elementary education majors	portfolio, attitudes towards portfolio Duration of portfolio development: One semester/one course	portfolio assessment Positive	
Niikko, A. (2002). How do Kindergarten Teachers Evaluate Their Portfolio Working Process? *International Journal of Early Years Education*, *10*(1), 61–74. doi:10.1080/09669760220114854 Portfolio for *learning* *Perceptions* of portfolio development	"… to study the use of voluntary portfolios at the university, and kindergarten students' involvement with portfolio working over a period of 3 years" (p. 61) Traditional Finland/University pre-service kindergarten teacher education; participants: 49 kindergarten student teachers at the start, 5 female student teachers kept portfolio throughout the 3 years	The concept of portfolio in education; meaning of portfolio in post-modern education Qualitative evaluation study/case study Data collection: Researcher's diary, observations; open-ended questionnaire and in-depth interviews with 5 student teachers after 3 years; phenomenological analysis (themes, categories) Duration of portfolio development: Up to 3 years	"… many students would have liked to work on a portfolio but did not have enough resources and energy to do it. Only very few student teachers continued with their portfolio for 3 years. The results show that these students had intrinsic motivation and their commitment was quite strong." (p. 61) Beneficial effects of portfolio development on learning reported by the students Critical	Existing constraints keep students from keeping portfolios on a voluntary basis. [It is to be noted that it is the constraints that are considered as being critical, which is a matter of context in the first place, not a matter of portfolio as a tool.]

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Ntuli, E., Keengwe, J., & Kyei-Blankson, L. (2009). Electronic Portfolios in Teacher Education: A Case Study of Early Childhood Teacher Candidates. *Early Childhood Education Journal*, *37*(2), 121–126. doi:10.1007/s10643-009-0327-y Portfolio for *learning* *Perceptions* of portfolio development	To explore "… teacher candidates' attitudes toward electronic portfolios and the differences that electronic portfolios bring to their profession." (p. 121); to explore the benefits and challenges students are faced with; to investigate students' perceptions of portfolios use; to explore to what extent technology skills are improved Electronic, web-based United States/ University pre-service teacher education; participants: 4 teacher candidates (2 participants in-service students at Master level)	Portfolios for assessment in education; definitions of portfolio; purposes of portfolio development Qualitative study In-depth, semi-structured interviews Duration of portfolio development: Not stated clearly	Students were aware of the benefits of electronic portfolios in theory; however, they took no initiative in artefact selection and did not make use of the opportunities for collaborative learning (p. 125) Students considered portfolio preparation and training as inadequate (p. 125) Students saw no effect of electronic portfolio use on the improvement of their technology skills (p. 125) Critical	The findings on the use of e-portfolio affordances are partly in line with other observations of students' reservations towards electronic portfolios Students' use of electronic portfolios as observed in this study is not in line with what is stated by e-portfolio advocates Issues of training are highlighted

Author(s), year, publication **Purpose of portfolio development** **Overall focus of study**	**Purpose(s) of study** **Form of portfolio examined** **Context and participants**	**Theoretical/ conceptual foundation** **Design of study** **Duration of portfolio development**	**Key findings of study** **General conclusion(s)** **Tendency (+ / - /o)**	**Comment(s) [Ideas, notes, and links documented when analyzing the studies]**
Oakley, G., Pegrum, M., & Johnston, S. (2014). Introducing e-portfolios to pre-service teachers as tools for reflection and growth: lessons learnt. *Asia-Pacific Journal of Teacher Education*, *42*(1), 36–50. doi:10.1080/1359866X.2013.854860 Portfolio for *learning* *Perceptions* of portfolio development	To investigate "… how pre-service teacher viewed and used their developmental e-portfolios as platforms for reflection and, second, the collection of supporting artefacts included in the e-portfolios" (p. 41) Electronic, web-based, use of wikis Australia/University pre-service teacher education; participants: 23 out of 26 first-year Master of Teaching students accepting an invitation	Literature review on benefits and challenges of e-portfolios; critical reflection; importance of preparation and scaffolding Descriptive study; mixed-methods approach (initial survey, e-portfolio analysis, in-depth interviews) Duration of portfolio development: One year (first two semesters of portfolio development over 2-year Master of teaching program with portfolio as central element)	Participants were of a positive disposition at the beginning of e-portfolio development; however, none of them had any previous experience of e-portfolio creation Purpose of e-portfolio was not clear to all participants Pre-service teachers generally saw the value of reflection, but a few considered it time-consuming and tedious; most students achieved at least a medium level of reflection Neutral	Study classified as 'neutral' – at least not clearly positive
Ok, A., & Erdogan, M. (2010).-Prospective teachers' perceptions on different aspects of portfolio. *Asia Pacific Educa-*	To examine "… how portfolio and portfolio assessment were perceived by prospective teachers." (p. 301), com-	Traditional assessment; portfolio for alternative assessment; purposes of portfolio	Almost all participants considered portfolio to be a learning tool; enhancing individual development and	"… participants reported that developing portfolio not only motivated them to obtain pedagogical content

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***tion Review*, *11*(3), 301–310. doi:10.1007/s12564-010-9095-z** Portfolio and *assessment for learning* *Perceptions* of portfolio development	prising the contribution of portfolio to prospective teachers' development and perceived advantages and drawbacks of portfolio development and assessment (p. 303) Turkey/University pre-service teacher education; participants: 23 prospective teachers from seven different teaching areas	Qualitative case study Data collection: Semi-structured individual interviews including 15 open-ended questions Duration of portfolio development: cannot be determined, participants followed different courses of study, but more than one course/one semester with portfolio being used repeatedly during program of studies	self-correction, portfolio construction contributed to various aspects of student learning, e.g., research attitude and construction of new perspectives expanding students' horizons; portfolio construction conducive to student motivation and student learning Positive	knowledge, subject area, and general culture knowledge, but also reinforced learning and increased retention." (p. 306) [> Portfolio found to motivate students to acquire knowledge and to learn in deeper and more lasting ways]
Oner, D., & Adadan, E. (2011). Use of Web-Based Portfolios as Tools for Reflection in Preservice Teacher Education. *Journal of Teacher Education*, *62*(5), 477–492. doi:10.1177/0022487111	To identify evidence of reflective thinking throughout a semester, to investigate whether high-level reflective indicators increased over time, to investigate pre-service teachers' perceptions of the role of	Reflection skills; teaching portfolios; role of reflection in teacher education; web-based portfolios; reflection; reflection strategies Exploratory mixed-methods study	"… preservice teachers demonstrated high- and low-level reflective skills throughout a semester. There was a statistically significant improvement in the number of high-level reflective indicators in the	Clear presentation of pertaining theoretical background; clear statement of research questions Student reflection: Improvement over the course of one semester found

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416123 Portfolio for *learning* *Perceptions* of portfolio development	web-based portfolio construction in the development of reflective skills (p. 477) Electronic, web-based Turkey/University pre-service teacher education; 19 pre-service teachers in a course in the last semester of their program of study	Data collection: Web-based portfolio entries and an open-ended questionnaire; data analysis both qualitative and quantitative Duration of portfolio development: One semester	second reflection task compared with the first. … the web-based platform was perceived … as a medium that enabled easy access and the development of better portfolio artifacts." (p. 477) Positive	
Pelliccione, L., & Raison, G. (2009). Promoting the scholarship of teaching through reflective e-portfolios in teacher education. *Journal of Education for Teaching*, 35(3), 271–281. doi:10.1080/02607470903092813 Portfolio for *learning* *Product* of portfolio development	To investigate "… whether or not a structured set of guidelines enhances first-year teacher education students' ability to engage in a reflective learning cycle at a deep level." (p. 272-273) Electronic Australia/University pre-service teacher education; participants: purposive	Scholarly teaching practice; Portfolios and e-portfolios in education; the scholarship of teaching in higher education; e-portfolios and reflection; Case study approach; interpretative research approach Duration of portfolio development:	The reflective tool used helped students to structure their reflections in a more cohesive way; without such a structured reflective tool the majority of students' comments were descriptive, and reflective comment tended to be superficial (p. 271) Positive	

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	sample of 15 student portfolios from 3 successive cohorts, i.e. a sample of 45 student portfolios	not clearly stated, but more than a course; e-portfolio development in two stages		
Plaisir, J. Y., Hachey, A. C., & Theilheimer, R. (2011). Their Portfolios, Our Role: Examining a Community College Teacher Education Digital Portfolio Program From the Students' Perspective. *Journal of Early Childhood Teacher Education*, 32(2), 159–175. doi:10.1080/10901027.2011.572231 Portfolio for *learning* *Perceptions* of portfolio development	To assess students' perceptions of their pre-service digital portfolios and their experiences of portfolio construction Electronic United States/ College pre-service early childhood teacher education; participants: 200 student invited to participate, 83 accepted, 4 excluded, total of 79 participant responses	Portfolio development in teacher education; digital portfolios; portfolios and reflection; program assessment and student feedback Survey; questionnaire comprising a 28-question Likert-scale survey and space for verbal responses Duration of portfolio development: Apparently more than one semester (see p. 160 about 1,000 students engaged in some stage of portfolio development 3 years after introduction)	Several contradictions suggested by the data: Students consider portfolios to be valuable, but do not spend extra time on them; students consider their portfolios useful academic reflection tools, but do not take ownership Students wish more faculty support and more class time for work on portfolio; digital portfolios are "… worthwhile pursuing from the students perspective" (p. 159); importance of faculty involvement Neutral	High level of agreement to value of portfolio, students stated that "… work on their portfolios helped them think more deeply about course content" (p. 163) Deep learning Here again, the importance of faculty involvement in order to support beginning digital portfolio construction is pointed out.

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Senne, T. A., & Rikard, G. L. (2002). Experiencing the portfolio process during the internship: A comparative analysis of two PETE portfolio models. *Journal of Teaching in Physical Education*, *21*(3), 309–336. Portfolio for *learning* Comparison of two portfolio models *Perceptions/Product* of portfolio development	To comparatively analyze two PETE portfolio models in order "… to determine the impact on intern perceptions of the value of the teaching portfolio, intern professional growth, and portfolio representation in single and dual internship site placements." (p. 309) Traditional United States/ University undergraduate pre-service teacher education; participants: 67 interns in two PETE programs	Portfolio development in teacher education programs; teacher professional development Mixed-methods study Data collection: Pre- and post-test design (Defining Issues Test; Rest, 1986) to measure professional growth; weekly reflection logs; questionnaire completed at the end of the internship Duration of portfolio development: One semester (internship)	"Although interns showed no change in moral judgment reasoning [used in this study to identify professional growth, M.S.], most valued the portfolio process as an indicator of professional growth. Differences in reflective practice and similarities in dual versus single-site placements were noted." (p. 309) Students' primary concerns were issues of time management and issues related to an early introduction of the portfolio concept (p. 333) Positive	PETE: Physical Education Teacher Education
Sevim, S. (2012). Portfolio aplications (sic) in science teaching. *Energy Education Science*	"…to examine views of student teachers to application of portfolio used as an alternative assess-	Evaluation and measurement; types and purposes of portfolios;	Portfolio assessment can provide a more comprehensive picture of the student and more	Students are encouraged to learn; students report 'meaningful learning' based on port-

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***and Technology Part B: Social and Educational Studies*, *4*(2), 687–694.** Portfolio and *assessment for learning* *Perceptions* of portfolio development	ment tool …" (p. 687) Traditional Turkey/University undergraduate preservice science teacher education; participants: 50 science teacher education program student teachers	Case study Data collection: Interviews, questionnaire Duration of portfolio development: One semester (one course)	authentic/valid information on student learning both to teacher and student, encourage students to learn and to take responsibility for learning, as compared to traditional assessment methods. "72% of student teachers said that portfolio application provided meaningful learning." (p. 690) Positive	folio use [> links to deep learning]
Shepherd, C., & Hannafin, M. (2009). Beyond Recollection: Reexamining Preservice Teacher Practices Using Structured Evidence, Analysis, and Reflection. *Journal of Technology and Teacher Education*, *17*(2), 229–251. Retrieved from	To examine the extent to which structured e-portfolios have an effect on reflective practices, the way structured collection and examination of e-portfolio artefacts influences reflections on classroom practice, and the way formative e-	Portfolio in preservice teacher education; costs and benefits of portfolio development Qualitative study, making use of different data sources Duration of portfolio development: Not clear – produc-	Teaching experiences combined with the systematic collection and analysis of artefacts helped participants refine their perceptions Evidence-based, systematic analysis of artefacts helped many participants reassess classroom	Professional portfolios in pre-service teacher education since the 1980s Evidential reasoning techniques and reflection prompts Here again, portfolio is not mentioned in the title of the study > great care

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http://www.editlib.org/p/28189 Portfolio for *learning* *Process* of portfolio development	portfolio development influences planning and processional development Electronic, web-based United States/ University pre-service social studies teacher education; participants: 6 pre-service social studies teachers	tion was intended to span multiple semesters, but many students constructed their portfolios during the last three weeks of their program	practice Inquiry cycles helped participants identify practices in need of refinement Positive	must be taken in searching for literature on portfolio Examination of participants' practices based on inquiry cycles [> reflective practice; reflective practitioner]
Spendlove, D., & Hopper, M. (2006). Using 'Electronic Portfolios' to Challenge Current Orthodoxies in the Presentation of an Initial Teacher Training Design and Technology Activity. *International Journal of Technology and Design Education*, *16*(2), 177–191. doi:10.1007/s10798-005-3596-9	To examine "… the extent to which a University undergraduate curriculum initiative provided initial teacher trainees with opportunities to challenge orthodox design methodologies through the production of an electronic portfolio within and (sic) extended design and technology activity." (p. 177)	Portfolio in design and technology (D & T); reasons for using portfolio (McMillan, 2004); pedagogical issues in D & T; the portfolio as a "design tool" Evaluation study, qualitative approach Data collection: Questionnaires; open forum discussions, tutorials, end of project review;	The 'electronic portfolio "served primarily as a developmental tool for promoting creative continuity and sound, reflective, design practice within a structured educational design challenge." (p. 177) The portfolio as focus of learning supported students' acquisition of e-learning skills and	Reference to approaches to learning

Author(s), year, publication **Purpose of portfolio development** **Overall focus of study**	**Purpose(s) of study** **Form of portfolio examined** **Context and participants**	**Theoretical/ conceptual foundation** **Design of study** **Duration of portfolio development**	**Key findings of study** **General conclusion(s)** **Tendency (+ / - /o)**	**Comment(s) [Ideas, notes, and links documented when analyzing the studies]**
Portfolio for *learning* *Process* of portfolio development	Electronic United Kingdom (England)/ University undergraduate teacher education; participants: non-probability sample of 12 trainee teachers	participant observation/field notes Duration of portfolio development: One year (final year of undergraduate program)	facilitated the use of new technologies; the use of portfolio facilitated students' engagement with a creative design and technology process Positive	
Stansberry, S. L., & Kymes, A. D. (2007). Transformative learning through "Teaching With Technology" electronic portfolios. *Journal of Adolescent & Adult Literacy*, 50(6), 488–496. Portfolio for *learning* Changes in dispositions and transformative learning based on portfolio development *Product* of portfolio development	To explore whether teachers are more likely to create and maintain web-based e-portfolios and transfer this practice to school after completion of their e-portfolio at university; to explore whether teachers having completed such a portfolio show evidence of transformational learning Electronic, web-based United States/ University pre-	Portfolio in teacher education; Mezirow's theory of transformative learning; portfolio assessment Data collection: Pre-/post-test design; questionnaire adapted from the Technology in Education Competency assessment instrument; post-test with additional open-ended essay-type questions; analysis of quantitative and qualitative data Duration of portfo-	Research question 1: Teachers are likely to employ web-development tools in instruction (statistically significant result), but they are less likely to employ these tools for the creation and maintenance of web-based portfolios Research question 2: There was evidence of transformational learning on the part of the teachers. Positive	"Mezirow (1990, 2000) defined his theory of transformative learning as stages in cognitive restructuring and integration of experience, action, and reflection." (p. 489)

Author(s), year, publication Purpose of portfolio development Overall focus of study	Purpose(s) of study Form of portfolio examined Context and participants	Theoretical/ conceptual foundation Design of study Duration of portfolio development	Key findings of study General conclusion(s) Tendency (+ / - /o)	Comment(s) [Ideas, notes, and links documented when analyzing the studies]
	service teacher education; participants: total of 78 students over 4 semesters	lio development: One semester (one course)		
Stone, B. A. (1998). Problems, pitfalls, and benefits of portfolios. *Teacher Education Quarterly*, 105–114. Portfolio for *learning* *Perceptions* of portfolio development; potential problems in portfolio development	To explore the extent to which students perceived (1) portfolios as a demonstration of learning and accomplishment; (2) portfolios as a means to encourage reflection and learning about teaching; (3) support as meeting their needs; to explore problems of portfolio construction (students' and supervisors' views) Traditional United States/ University preservice teacher education; participants: 25 students	Research on portfolios and portfolio perspectives; portfolio for the assessment of teaching Data collection: Questionnaires for both student teachers in both groups; questionnaires for supervisors of group 2; open-ended semi-structured interviews with students and supervisors Duration of portfolio development: One year (initial and final semesters of student teaching)	Findings regarding research questions 1-3 were more positive in the portfolio group where students received more/specific support Problems identified included lack of time, stress, heavy course loads, problems in portfolio construction and reflective writing; supervisors were insecure in portfolio issues; heavy supervision load prevented adequate portfolio evaluation and feedback Basically positive	25 students in portfolio group (group 1), 60 students in mainstream program (group 2, comparison group)
Strudler, N., & Wetzel, K. (2008). Costs	To investigate "... the benefits and	Literature review of teacher educators	Benefits include: increased opportu-	

Author(s), year, publication Purpose of portfolio development Overall focus of study	Purpose(s) of study Form of portfolio examined Context and participants	Theoretical/ conceptual foundation Design of study Duration of portfolio development	Key findings of study General conclusion(s) Tendency (+ / - /o)	Comment(s) [Ideas, notes, and links documented when analyzing the studies]
and Benefits of Electronic Portfolios in Teacher Education: Faculty Perspectives. *Journal of Computing in Teacher Education*, 24(4), 135–142. doi:10.1080/10402454.2008.10784599 Purposes of *learning* (and *assessment*) *Process/product* of portfolio development; costs and benefits of electronic portfolios in teacher education	costs of using electronic portfolios … in preservice teacher education" (p. 135); to investigate what teacher education faculty see as benefits and costs; to investigate the relation of benefits and costs as viewed by faculty Electronic United States/ University preservice teacher education; participants: six universities in the United States	views on portfolio; reflection in portfolios; issues of standards, program improvement, and accreditation Descriptive study based on case methodology Data collection: Various sources of data Duration of portfolio development: n/a	nities for student learning and reflection, better student understanding of teaching standards, better faculty access for assessing student work, increased faculty communication with students, and improved tracking of student performance … . The costs/disadvantages include: issues pertaining to time and effort and to the lack of compatibility with faculty members' beliefs, values, and needs.	
Tang, E., & Lam, C. (2014). Building an effective online learning community (OLC) in blog-based teaching portfolios. *The Internet and Higher Education*, 20, 79–85. doi:10.1016/j.iheduc.2	To study "… the functions and characteristics of an effective OLC in fulfilling the design objectives of blog-based teaching portfolios." (p. 79); to examine the factors influencing	Online learning communities; blog-based teaching portfolios; Qualitative case study approach Data collection: semi-structured	Technology is not a key factor in conducting digital teaching portfolios; "… what makes the learning process more meaningful and sustainable are active participation and high quality	Relation of meaningful learning process and deep learning.

Author(s), year, publication Purpose of portfolio development Overall focus of study	Purpose(s) of study Form of portfolio examined Context and participants	Theoretical/ conceptual foundation Design of study Duration of portfolio development	Key findings of study General conclusion(s) Tendency (+ / - /o)	Comment(s) [Ideas, notes, and links documented when analyzing the studies]
012.12.002 Portfolio for *learning* *Perceptions* of portfolio development	the effectiveness of an OLC in blog-based teaching portfolios (p. 80) Electronic, blog-/web-based Hong Kong/ University pre-service teacher education; participants: 6 student teachers, 3 in-service teachers (mentors), one member of staff (blog designer)	interviews Duration of portfolio development: not clearly stated "Learners are required to compile their own teaching portfolios and actively participate in discussion during their Teaching Practicum (TP)" (p. 80)	interaction which require collaborative/interactive course elements together with commitment and support from OLC members" (p. 79) Neutral	
Thomas, M., & Liu, K. (2012). The Performance of Reflection: A Grounded Analysis of Prospective Teachers' ePortfolios. *Journal of Technology and Teacher Education*, *20*(3), 305–330. Portfolio for *learning* and *assessment* *Process/product* of	To conduct a detailed analysis of the contents of the reflections in student teachers' e-portfolios; "... to gain a holistic understanding of how student teachers reflect and what they reflect on" (p. 309); to explore the reflective contents of e-portfolios	E-portfolios in teacher education; teacher reflection; levels of reflection (Van Manen, 1977) Primary source of data: pre-service teachers portfolios Duration of portfolio development: more than one semester (portfolio including elements	"... prospective teachers tend to showcase or "sunshine" their teaching and learning experiences rather than reflect on them analytically and critically." (p. 305) There are major reasons contributing to prospective to this way of ac-	Also see Wilson. Wright, and Stallworth (2003): There is little reflection on/little critique of student teachers' development and experiences in student teachers' portfolios. "While many studies claim that ePortfolios may help student

Author(s), year, publication Purpose of portfolio development Overall focus of study	Purpose(s) of study Form of portfolio examined Context and participants	Theoretical/ conceptual foundation Design of study Duration of portfolio development	Key findings of study General conclusion(s) Tendency (+ / - /o)	Comment(s) [Ideas, notes, and links documented when analyzing the studies]
portfolio development	Electronic United States/ University undergraduate elementary teacher education program; participants: 26 preservice teachers	from teaching practicum and student teaching semesters)	tion: Authentic reflective processes must be better supported by both teacher educators and e-portfolio designers. Critical	teachers reflect (e.g. Lyons, 1998), for this study we intended to conduct a close analysis of the content of student teachers' ePortfolio reflections." (p. 309)
Trent, J., & Shroff, R. H. (2013). Technology, identity, and community: the role of electronic teaching portfolios in becoming a teacher. *Technology, Pedagogy and Education*, 22(1), 3–20. doi:10.1080/1475939X.2012.720416 Portfolio for *identity construction* Identity construction by pre-service teachers based on portfolio development *Perceptions/Process* of portfolio development	To understand "… how the construction of participants' identities as teachers was shaped by their engagement with an electronic teaching portfolio throughout an eight-week teaching practicum." (p. 3) Electronic Hong Kong/ University preservice teacher education; participants: 6 Chinese undergraduate students	Electronic portfolios in teachers' professional development; theoretical framework of teacher identity; discourse and agency Exploratory qualitative study Data collection: In-depth interviews (3 semi-structured interviews with each of the participants) Duration of portfolio development: 8 weeks	The pre-service teachers perceived e-portfolios as making a positive contribution to their teacher identities The e-portfolio helped pre-service teachers to connect past experiences, their future imagines identities, and their present experiences in a teaching practicum Basically positive	

Author(s), year, publication **Purpose of portfolio development** **Overall focus of study**	**Purpose(s) of study** **Form of portfolio examined** **Context and participants**	**Theoretical/ conceptual foundation** **Design of study** **Duration of portfolio development**	**Key findings of study** **General conclusion(s)** **Tendency (+ / - /o)**	**Comment(s) [Ideas, notes, and links documented when analyzing the studies]**
Wade, R. C., & Yarbrough, D. B. (1996). Portfolios: A tool for reflective thinking in teacher education? *Teaching and Teacher Education*, *12*(1), 63–79. doi:10.1016/0742-051X(95)00022-C Portfolio for *reflective thinking* *Process/Product* of portfolio development	To examine teacher education students' efforts to think reflectively through the process of constructing portfolios based on their experiences in a service-learning program Traditional United States/ University elementary pre-service teacher education; participants: 212 teacher education students	Portfolios in education; reflection Data collection: student essays, surveys, and standardized, open-ended interviews Duration of portfolio development: One semester	The portfolio process prompted reflective thinking in many students, but not in all of them Recommendations related to portfolio use in teacher education programs: attention to students: initial understanding of process and purpose of portfolio, encouragement of ownership and individual expression, provision of some structure to balance the open-ended nature of portfolios, evaluation of portfolio process and students' responses Basically positive	
Wang, C. X. (2009). Comprehensive Assessment of Student Collaboration in Electronic Portfo-	To investigate the effects of student collaboration in e-portfolio construction on portfolio	Electronic portfolios Evaluation study Data collection:	Positive effects of collaboration found Basically positive	Almost no theoretical and conceptual background provided

Author(s), year, publication **Purpose of portfolio development** **Overall focus of study**	**Purpose(s) of study** **Form of portfolio examined** **Context and participants**	**Theoretical/ conceptual foundation** **Design of study** **Duration of portfolio development**	**Key findings of study** **General conclusion(s)** **Tendency (+ / - /o)**	**Comment(s) [Ideas, notes, and links documented when analyzing the studies]**
lio Construction: An Evaluation Research. *TechTrends: Linking Research & Practice to Improve Learning*, 53(1), 58–66. Portfolio for learning *Product* of portfolio development	quality, student coursework, and students' technology proficiency; to explore students' perceptions and experiences of collaboration Electronic United States/ University teacher education program; participants: 6 students	Various source of data, including pre/post course surveys, reflection papers, interviews Duration of portfolio development: One semester		Participants are not pre-service teachers in the narrow sense of the word
Wickersham, L. E., & Chambers, S. M. (2006). ePortfolios: Using technology to enhance and assess student learning. *Education*, *126*(4), 738–746. Portfolio for *learning and assessment* *Product* of portfolio development *(student learning outcomes)*	To "… to discover and explain the fundamental lessons learned from the beginning stages of ePortfolio implementation in a cohort master's degree program for secondary teachers" (p. 738) Electronic United States/ University teacher education program;	Descriptive study on ePortfolio implementation throughout a teacher education program Questionnaire Three student learning outcomes were assessed: (1) self-knowledge, (2) technological and organizational skills development, and (3) knowledge and	After one semester, students do not see electronic portfolios as related to their teacher education program Students see the concept and the process of portfolio as external to their master's degree and "a separate skill" (p. 738) Technology as a barrier	Here again, learning and assessment ("enhancement and assessment of student learning") are named concurrently; important goal of enhancing student learning; enhancement of student learning named before assessment (see also comment above on the primary goal of teaching staff in higher edu-

Author(s), year, publication **Purpose of portfolio development** **Overall focus of study**	**Purpose(s) of study** **Form of portfolio examined** **Context and participants**	**Theoretical/ conceptual foundation** **Design of study** **Duration of portfolio development**	**Key findings of study** **General conclusion(s)** **Tendency (+ / - /o)**	**Comment(s) [Ideas, notes, and links documented when analyzing the studies]**
	26 students participated at the end of their first semester	skills transfer Duration of portfolio development: One semester	Findings with regard to all three learning outcomes (i.e., student self-reports on these dimensions) mixed Critical	cation) Here again, technology is seen as a barrier
Willis, E. M., & Davies, M. A. (2002). Promise and Practice of Professional Portfolios. *Action in Teacher Education*, *23*(4), 18–27. doi:10.1080/01626620.2002.10463084 Portfolio for *learning* *Perceptions* of portfolio development (students' perceptions of impact)	To examine preservice teachers' perceptions relative to the impact of portfolio on professional development and the transition from school to work Traditional United States/ University teacher education; 93 participants (74 female, 19 male); apparently study with three cohorts of teachers (all in their third semester) over three semesters	Short outline of portfolio in teacher education, but no theoretical background given Survey comprising Likert-type items and sentence stems for completion; quantitative and qualitative analysis Duration of portfolio development: One semester	The portfolio process promoted reflective practice, increased self-confidence, prepared students for the job search, and heightened awareness of professional standards in teacher education Majority of students agreed that the creation of the electronic portfolio increased their technology literacy and that the electronic portfolio would assist them in their job search Positive	Likert-type items referring to the presentation of the portfolio: This is *one specific aspect of the portfolio process* that is examined. So – is it the portfolio or the presentation that is examined? A rough outline of the portfolio contents and the portfolio process – including the presentation –is given

Author(s), year, publication **Purpose of portfolio development** **Overall focus of study**	**Purpose(s) of study** **Form of portfolio examined** **Context and participants**	**Theoretical/ conceptual foundation** **Design of study** **Duration of portfolio development**	**Key findings of study** **General conclusion(s)** **Tendency (+ / - /o)**	**Comment(s) [Ideas, notes, and links documented when analyzing the studies]**
Wilson, E. K., Wright, V. H., & Stallworth, B. J. (2003). Secondary Preservice Teachers' Development of Electronic Portfolios: An Examination of Perceptions. ***Journal of Technology and Teacher Education, 11*****(4), 515–527.** Portfolio for *learning/reflection* *Perceptions* of portfolio development	To examine the perceptions of preservice teachers who had to develop an electronic portfolio as an element of their teacher education program Electronic United States/ University preservice teacher education; 111 preservice majors (foreign language, language arts, mathematics, science, social studies); sequence of four courses over three semesters	National technology standards; portfolio assessment, with a view to pre-service teacher education on particular; outline of pre-existing research findings (positive as well as critical); electronic portfolios in preservice teacher education Qualitative approach; surveys (pre/post), electronic portfolios, field notes, communication between teachers and students Duration of portfolio development: Three semesters	The pre-service teachers agreed that the electronic portfolios were a more authentic method of assessment Their comments contained little reflection on/critique of the development of their pedagogical skills and experiences; the preservice teachers seemed not to reflect on the portfolio or the process Critical	Based on the literature reviewed, in the introductory sections of the article it is stated that research implies that benefits can be gained from traditional as well as from electronic portfolios. Electronic portfolio project requires time and effort both from instructors and from students Summary of portfolio contents given (yet, as is the case in other studies as well, even if a summary of portfolio contents is given, there is no indication as to the specific tasks to be carried out
Winsor, P., Butt, R., & Reeves, H. (1999). Portraying Professional Development	To explore the efficacy of using professional portfolios to enable the partic-	Educational reform and portfolio use in teacher education; there is no extensive	Portfolio is effective in facilitating and documenting professional develop-	Note: Issues in portfolio development change over time, as do students

Author(s), year, publication **Purpose of portfolio development** **Overall focus of study**	**Purpose(s) of study** **Form of portfolio examined** **Context and participants**	**Theoretical/ conceptual foundation** **Design of study** **Duration of portfolio development**	**Key findings of study** **General conclusion(s)** **Tendency (+ / - /o)**	**Comment(s) [Ideas, notes, and links documented when analyzing the studies]**
in Preservice Teacher Education: can portfolios do the job? *Teachers and Teaching*, 5(1), 9–31. doi:10.1080/1354060990050102 Portfolio for *learning and assessment* *Process/Product* of portfolio development	ipants (university faculty, teacher associates at schools, pre-service teachers) to document, understand, and assess the professional growth of student teachers; to examine issues in portfolio development and the time at which they are relevant Traditional Canada/University pre-service teacher education, 15 pre-service teachers	theoretical background presented Longitudinal study; 15 pre-service teachers followed during three years comprising two practicums and one internship Qualitative study; data collection: Interviews (major data source) Duration of portfolio development: more than one semester	ment Positive	skills in and attitudes towards portfolio development One more example of a vague article title
Woodward, H., & Nanlohy, P. (2004). Digital portfolios in pre-service teacher education. *Assessment in Education: Principles, Policy & Practice*, *11*(2), 167–178. doi:10.1080/0969594042000259475	To investigate the process of digital portfolio development, the products, and the learning occurring both with regard to students' acquisition of multimedia skills and to the development of students' understanding of curricu-	Review of the literature, but no *theoretical* background given Qualitative methodology Data sources: Multiple data sources, digital portfolio development of 9	Analysis of the digital portfolios: Students' responses to the task set – creating an interactive portfolio – were "conservative, but comprehensive and individualistic" (p. 233); analysis of the interviews (benefits for students	PowerPoint was used to create hypermedia portfolios > no special portfolio platform such as Mahara (which means no interaction by means of an online portfolio platform) Students portfolios

Author(s), year, publication **Purpose of portfolio development** **Overall focus of study**	**Purpose(s) of study** **Form of portfolio examined** **Context and participants**	**Theoretical/ conceptual foundation** **Design of study** **Duration of portfolio development**	**Key findings of study** **General conclusion(s)** **Tendency (+ / - /o)**	**Comment(s) [Ideas, notes, and links documented when analyzing the studies]**
Portfolio for *learning* Process/Product of portfolio development	lum Digital/electronic Australia/University elementary pre-service teacher education: participants: 9 students from three consecutive cohorts	pre-service teachers (volunteers) was monitored; 3 students volunteered to be interviewed Duration of portfolio development: One semester	learning): "The development of the digital portfolios refined the students' thinking and constantly challenged their beliefs and their learning" (p. 243); process of introspection common to both forms of portfolio, paper-based and digital Positive	exceeded requirements; students view the portfolio positively, as an exciting learning experience; expansion of principles of learning through portfolio development from paper-based to digital form Reference to the depth of engagement in the authoring process (p. 235), to individualization and personal representation
Wray, S. (2007). Teaching portfolios, community, and pre-service teachers' professional development. *Teaching and Teacher Education*, 23(7), 1139–1152. doi:10.1016/j.tate.2006.10.004 Portfolio for *learning*	To examine "… the extent to which participation in a portfolio-focused teacher learning community impacts pre-service teachers' understanding and development of a teaching portfolio … how, whether, and in what ways the group's participants	Teaching portfolios; origins of the portfolio concept; learning to teach; teacher learning communities; social constructionism as a theoretical framework Qualitative study making use of multiple data sources (transcripts of the	"Most students found the process of selecting artifacts, reflecting on coursework and fieldwork experiences while constructing their teaching portfolios contributed to their growth and development. Students also reported the	It is the teacher learning community that is investigated in the first place and that may have an impact on pre-service teachers' understanding and development "Portfolios are complicated and time-consuming to cre-

Author(s), year, publication Purpose of portfolio development Overall focus of study	Purpose(s) of study Form of portfolio examined Context and participants	Theoretical/ conceptual foundation Design of study Duration of portfolio development	Key findings of study General conclusion(s) Tendency (+ / - /o)	Comment(s) [Ideas, notes, and links documented when analyzing the studies]
Process/Product of portfolio development	attribute their own professional development to the portfolio's construction" (p. 1139) Electronic learning portfolio, US/University elementary pre-service teacher education, 9 pre-service teachers	meetings of the learning community, interviews, questionnaire, researcher's log); duration of portfolio development: One semester (student teaching semester)	dialogic and collaborative nature of the teacher learning community enhanced their growth and development as well as their overall understanding of the portfolio requirement" (p. 1139) Positive	ate" (p. 1140) "Within the larger terrain of constructivist theory, where individual actions and events form the nexus for meaning-making, the focus of social constructionism is on the communal production of meaning and understanding as a result of shared language and social practices.(p. 1142) Deep learning – learning for understanding, meaningful learning. Portfolio-based learning environments are based on constructivist principles.

A.8 Complementary search for original research on portfolio in pre-service teacher education (1993–1994 and 2014–2017)

Additional searches for literature published in the years 1993–1994 and 2014–2017 were run in May and June 2017,[403] and the additional results found were analyzed in July and in August 2017. New studies on portfolio-based learning and reflection in higher and teacher education are published continually; yet, a finishing date had to be fixed for the search for literature (both theoretical/conceptual and empirical). Thus, the comprehensive systematic search for literature was temporarily halted on the basis of the state as attained on 31 August 2017. In the course of the complementary search for international original research on portfolio in pre-service teacher education, student learning, and reflection, the following numbers of results were found: [404]

Table 34. Numbers of results identified in the complementary search for original research (1993–1994 and 2014–2017).

Database	1993–1994	2014–2017
Academic Search Premier	---	7 results
ERIC	2 results	22 results
PsycINFO	---	---
Teachers' College Record	---	---
Web of Science	---	1 results

The complementary review of portfolio literature confirms that the tendency of original research findings on portfolio construction in (pre-service) teacher education can be considered to be predominantly positive, which is promising.

[403] The additional time ranges 1993–1994 and 2014–2017 were chosen to round off a 25-year review of portfolio literature and to make sure that all literature documented in the databases up to the year 2017 would be identified. Possible temporal overlaps with the period originally relevant for the systematic review of the literature were considered to be unproblematic, as the aim of the complementary literature review was only to identify any further references not considered up to that point.

[404] A list of the results identified as well as further information can be obtained from the author.

Appendix B. The portfolio-based learning environment implemented in the course *Schulpraktische Studien 1 (SPS 1)*: Details of design

B.1 Purposes of portfolio construction

Figure 11. An overview of the teaching/learning objectives in the course *Schulpraktische Studien 1 (SPS 1)*.

Georg Matthias Schneider, StR *Schulpraktische Studien 1* *Lehrstuhl für Wirtschaftspädagogik I*

Lehr-Lern-Ziele der Schulpraktischen Studien 1

Ziel 1 Berufsorientierung

UZ 1.1	Bewusstmachung der Studien- und Berufswahlmotive
UZ 1.2	Betrachtung der Anforderungen der Lehrertätigkeit
UZ 1.3	Bewusstmachung und Einschätzung der eigenen, für die Lehrertätigkeit relevanten Stärken und Lernbedarfe
UZ 1.4	Formulierung von Entwicklungsaufgaben für die Schulpraktischen Studien

Ziel 2 Grundlagen der professionellen Entwicklung

UZ 2.1	Förderung der Reflexion, sowohl im Hinblick auf die Bereitschaft als auch auf die Fähigkeit
UZ 2.2	Kenntnis der Merkmale guten Unterrichts
UZ 2.3	Bewusstmachung und Überprüfung der subjektiven Theorien zu „gutem Unterricht", Vergleich mit den Ergebnissen der empirischen Unterrichtsforschung
UZ 2.4	Schulung der Beobachtung im Rahmen praktischer Übungen, Erfassung und Beschreibung von Unterricht als Grundlage von Hospitation
UZ 2.5	Übung der Analyse eigenen und beobachteten Fachunterrichts auf der Grundlage von Merkmalen und Indikatoren

Ziel 3 Einführung in das Portfoliokonzept

UZ 3.1	Kenntnis der Grundlagen von Portfolioarbeit
UZ 3.2	Anwendung von Portfolioarbeit
UZ 3.3	Entwicklung einer persönlichen Position zur Portfolioarbeit

Universität Mannheim *Herbst-/Wintersemester 2013*

B.2 Curriculum of the course *Schulpraktische Studien 1 (SPS 1)* and portfolio contents

Figure 12. The curriculum of the seminar *Schulpraktische Studien 1 (SPS 1)*.

Georg Matthias Schneider, StR *Schulpraktische Studien 1* *Lehrstuhl für Wirtschaftspädagogik I*

Lehrveranstaltung „Schulpraktische Studien 1" (SPS 1) – HWS 2013

	KW	Datum	Inhalte der Sitzung	Anmerkungen	
1	36	*02.09.-06.09.2013*	Vorstellung, einführende Informationen und Fragerunde – alles rund um die SPS 1		
2	37	*09.09.-13.09.2013*	Betrachtung der individuellen Studien- und Berufswahlmotive		
3	38	*16.09.-20.09.2013*	Aufgaben des Lehrers; gesellschaftliche Funktionen und pädagogische Aufgaben von Schule als Institution		
4	39	*23.09.-27.09.2013*	„Vormittags Recht und nachmittags frei?" Das Lehrerbild in der Gesellschaft		
	40	*30.09.-04.10.2013*			03.10. Feiertag
5	41	*07.10.-11.10.2013*	KBS, BFW, BK … Das kaufmännische berufliche Schulwesen in Baden-Württemberg		
6	42	*14.10.-18.10.2013*	Was ist „guter Unterricht"? (1) – Betrachtung und Vergleich individueller Erfahrungen/ Positionen		
7	43	*21.10.-25.10.2013*	Was ist „guter Unterricht"? (2) – Konzept; Ergebnisse empirischer Forschung		
8	44	*28.10.-01.11.2013*	Zwischenreflexion zu den SPS 1		01.11. Feiertag
9	45	*04.11-08.11.2013*	Merkmale guten Unterrichts, U'versuche und videobasierte Übungen; U'beob./-analyse (1)	U'versuche/ Referate (1)	
10	46	*11.11.-15.11.2013*	Merkmale guten Unterrichts, U'versuche und videobasierte Übungen; U'beob./-analyse (2)	U'versuche/ Referate (2)	
11	47	*18.11-22.11.2013*	Grundlagen der Unterrichtsplanung: Ein Einblick (Lernziele, Verlaufsplanung etc.)		
12	48	*25.11.-29.11.2013*	Ab in die Praxis! Hinweise zu einem erfolgreichen Praktikum (1) – Classroom Management		
13	49	*02.12.-06.12.2013*	Ab in die Praxis! Hinweise zu einem erfolgreichen Praktikum (2) – Vorbereitung Schulaufenthalt		
			Schulaufenthalt (2 Wochen, Januar/ Februar 2014) Abgabe des Portfolios (1. Vorl'woche im FSS 2014)	Individueller Termin für den Schulaufenthalt	
			Feedback zu den Portfolios (vorauss. ab April 2014)	Individuelles Feedback	

Die Materialen zur Lehrveranstaltung stehen für Sie auf der E-Learning-Plattform ILIAS bereit. Zum Download gelangen Sie über https://plattform.uni-mannheim.de > Meine E-Learning-Gruppen.

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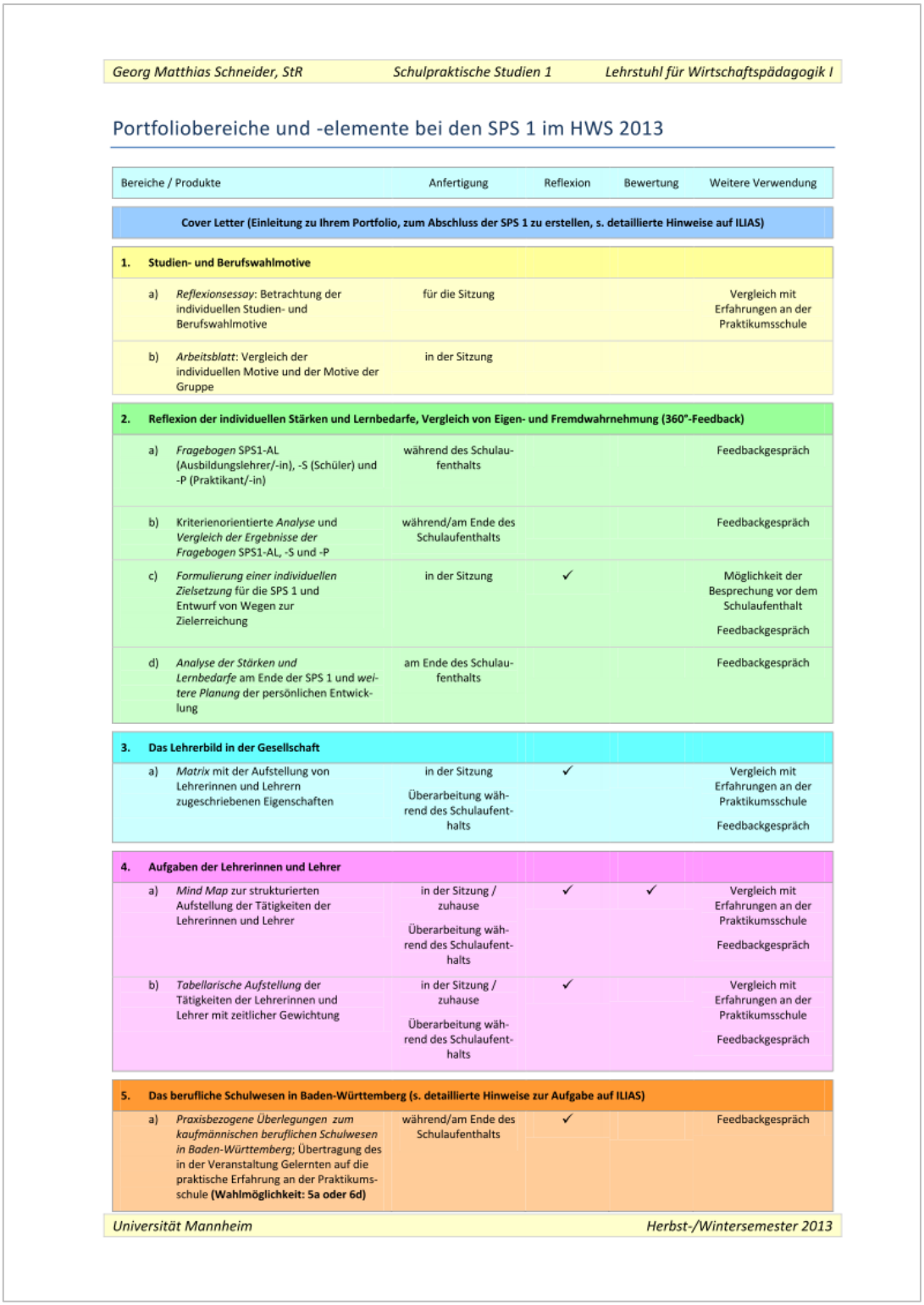
Figure 13. Contents of the portfolio: Thematic divisions, portfolio elements, reflective entries (both paper-based and electronic portfolios, same basic contents to be included).



Georg Matthias Schneider, StR — *Schulpraktische Studien 1* — *Lehrstuhl für Wirtschaftspädagogik I*

Portfoliobereiche und -elemente bei den SPS 1 im HWS 2013

Bereiche / Produkte	Anfertigung	Reflexion	Bewertung	Weitere Verwendung
Cover Letter (Einleitung zu Ihrem Portfolio, zum Abschluss der SPS 1 zu erstellen, s. detaillierte Hinweise auf ILIAS)				
1. Studien- und Berufswahlmotive				
a) *Reflexionsessay*: Betrachtung der individuellen Studien- und Berufswahlmotive	für die Sitzung			Vergleich mit Erfahrungen an der Praktikumsschule
b) *Arbeitsblatt*: Vergleich der individuellen Motive und der Motive der Gruppe	in der Sitzung			
2. Reflexion der individuellen Stärken und Lernbedarfe, Vergleich von Eigen- und Fremdwahrnehmung (360°-Feedback)				
a) *Fragebogen* SPS1-AL (Ausbildungslehrer/-in), -S (Schüler) und -P (Praktikant/-in)	während des Schulaufenthalts			Feedbackgespräch
b) Kriterienorientierte *Analyse* und *Vergleich der Ergebnisse der Fragebogen* SPS1-AL, -S und -P	während/am Ende des Schulaufenthalts			Feedbackgespräch
c) *Formulierung einer individuellen Zielsetzung* für die SPS 1 und Entwurf von Wegen zur Zielerreichung	in der Sitzung	✓		Möglichkeit der Besprechung vor dem Schulaufenthalt Feedbackgespräch
d) *Analyse der Stärken und Lernbedarfe* am Ende der SPS 1 und *weitere Planung* der persönlichen Entwicklung	am Ende des Schulaufenthalts			Feedbackgespräch
3. Das Lehrerbild in der Gesellschaft				
a) *Matrix* mit der Aufstellung von Lehrerinnen und Lehrern zugeschriebenen Eigenschaften	in der Sitzung Überarbeitung während des Schulaufenthalts	✓		Vergleich mit Erfahrungen an der Praktikumsschule Feedbackgespräch
4. Aufgaben der Lehrerinnen und Lehrer				
a) *Mind Map* zur strukturierten Aufstellung der Tätigkeiten der Lehrerinnen und Lehrer	in der Sitzung / zuhause Überarbeitung während des Schulaufenthalts	✓	✓	Vergleich mit Erfahrungen an der Praktikumsschule Feedbackgespräch
b) *Tabellarische Aufstellung* der Tätigkeiten der Lehrerinnen und Lehrer mit zeitlicher Gewichtung	in der Sitzung / zuhause Überarbeitung während des Schulaufenthalts	✓		Vergleich mit Erfahrungen an der Praktikumsschule Feedbackgespräch
5. Das berufliche Schulwesen in Baden-Württemberg (s. detaillierte Hinweise zur Aufgabe auf ILIAS)				
a) *Praxisbezogene Überlegungen zum kaufmännischen beruflichen Schulwesen in Baden-Württemberg*; Übertragung des in der Veranstaltung Gelernten auf die praktische Erfahrung an der Praktikumsschule **(Wahlmöglichkeit: 5a oder 6d)**	während/am Ende des Schulaufenthalts	✓		Feedbackgespräch

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Bereiche / Produkte	Anfertigung	Reflexion	Bewertung	Verwendung
6. Die Praktikumsschule				
a) *Beschreibung* der Praktikumsschule	während des Aufenthalts an der Praktikumsschule		✓	Feedbackgespräch
b) *Unterlagen* zur Darstellung der Praktikumsschule (freie Auswahl)	während des Aufenthalts an der Praktikumsschule	✓		Feedbackgespräch
c) *Essay* zu besonderen Tätigkeiten und Erfahrungen an der Praktikumsschule	während des Aufenthalts an der Praktikumsschule			Feedbackgespräch
d) *Beschreibung* des Qualitätsmanagements an der Praktikumsschule **(Wahlmöglichkeit: 5a oder 6d)**	nach dem Aufenthalt an der Praktikumsschule	✓		Feedbackgespräch
7. Was ist guter Unterricht?				
a) *Reflexionsaufgaben* zum guten Unterricht	für die Sitzung / in der Sitzung			
b) *Präsentation* und *Ausarbeitung* zu zwei Merkmalen guten Unterrichts/zur Unterrichtsbeobachtung anhand von Unterrichtsvideos (Präsentation/Handout)	für die Sitzung	✓		Präsentation in der Sitzung
8. Unterricht an der Praktikumsschule (durch Bearbeitung der Aufgabe für den Unterricht bearbeitet)				
a) *Beschreibung* der Unterrichtsbeobachtungen	während des Schulaufenthalts		✓	
b) Kriterien orientierte *Analyse* der Unterrichtsbeobachtungen	während des Schulaufenthalts		✓	Feedbackgespräch
c) *Ausarbeitung* zur eigenen Unterrichtssequenz	während des Schulaufenthalts	✓		
d) *Kritische Würdigung* der Umsetzung der eigenen Unterrichtssequenz	während des Schulaufenthalts		✓	Feedbackgespräch
9. Die Schulpraktischen Studien				
a) *Reflexionsessay* zum Beitrag der Schulpraktischen Studien auf dem Weg zur individuellen Professionalisierung	am Ende des Schulaufenthalts			Feedbackgespräch
10. Freier Bereich				
a) *Freier Bereich* für Unterlagen, die Schritte auf dem Weg zu den Zielen der Schulpraktischen Studien, zunächst der SPS 1, aufzeigen	während der gesamten SPS 1 (Seminar, Schulaufenthalt)	✓	✓	Feedbackgespräch
b) *Sammlung von Berichten in den Medien*, z.B. zum Lehrerbild oder zu aktuellen Entwicklungen im Kultusbereich, jeweils mit einer kurzen Stellungnahme zur Bedeutung für die persönliche Ausbildung/Biographie		✓		

Die aufgeführten Produkte stellen den Teil des Portfolios dar, der von allen Teilnehmerinnen und Teilnehmern der SPS 1 *als Grundlage* bearbeitet werden soll. In alle Bereiche, speziell in den freien Bereich, können *zusätzliche Unterlagen* aufgenommen werden, die einen thematisch-inhaltlichen Bezug aufweisen. Bitte beachten Sie die Wahlmöglichkeit zwischen den Portfoliobereichen 5a und 6d.

Tabelle 1: Übersicht zu den Portfolioelementen und Reflexionseinlagen (Stand: 12.12.2013).

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B.3 Tasks set for processing

The tasks set for processing were manifold and multifaceted.[405] The design of all tasks was geared towards eliciting and supporting a deep approach to learning, higher levels of cognitive processing, and higher levels of reflection.

The contents of individual as well as collaborative learning and reflection – i.e., of deep learning and reflective thinking as the main objectives of the course *Schulpraktische Studien 1 (SPS 1)* – were the professional development and the personal growth of the individual student as a future teacher and as an individual; the student's environment, in particular at university and at school; and the interaction of the student with the environment.

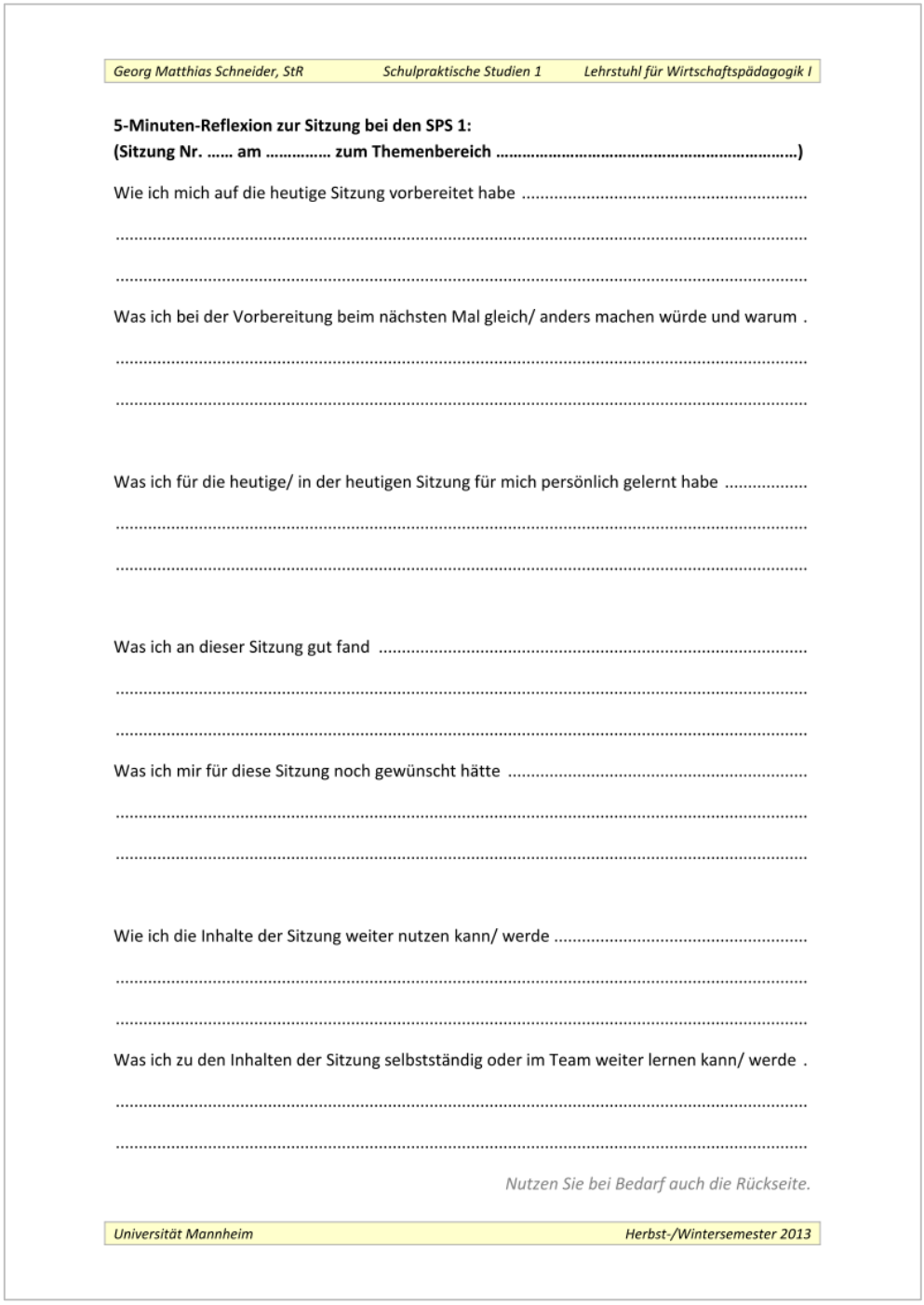
During and between classes, ample opportunity for deep learning and deliberate, systematic, academic reflection was provided. Students were continuously asked to process tasks in preparation for class. During class, the results of this individual preparatory work – or, as was the case with the presentations given by groups of students, of preparatory group work – was discussed, either in small groups of students or in exchanges of ideas of all students moderated by the teacher educator.

The curriculum for the course *Schulpraktische Studien 1 (SPS 1)* as implemented in the fall/winter semesters of the academic years 2012–2013 and 2013–2014 is provided in the previous section of this appendix. When issues were presented by the teacher educator – e.g., on portfolio as an educational tool, on reflection for learning, on approaches to research –, great care was taken to provide opportunities for discussion. Presentations as well as discussions moderated by the teacher educator were used as opportunities to model teacher thought and action, including learning and reflection.

Classes ended with a so-called *Fünf-Minuten-Reflexion* (Five-Minute Reflection), during which students had the opportunity to think about the contents of the class they had just experienced as well as about their individual learning.[406]

[405] Details of the topics presented and discussed, the tasks set, and the materials provided and used in the course *Schulpraktische Studien 1 (SPS 1)* are available from the author on request. The author is well aware of the demand by Zeichner and Wray (2001) that the context of portfolio construction – i.e., the learning environment designed and implemented – be specified in detail.

Figure 14. The *5-Minuten-Reflektion* (5-minute reflection) carried out at the end of each session in class.



Georg Matthias Schneider, StR *Schulpraktische Studien 1* *Lehrstuhl für Wirtschaftspädagogik I*

5-Minuten-Reflexion zur Sitzung bei den SPS 1:
(Sitzung Nr. ..... am ..... zum Themenbereich .....)

Wie ich mich auf die heutige Sitzung vorbereitet habe .....

.....

.....

Was ich bei der Vorbereitung beim nächsten Mal gleich/ anders machen würde und warum .

.....

.....

Was ich für die heutige/ in der heutigen Sitzung für mich persönlich gelernt habe .....

.....

.....

Was ich an dieser Sitzung gut fand .....

.....

.....

Was ich mir für diese Sitzung noch gewünscht hätte .....

.....

.....

Wie ich die Inhalte der Sitzung weiter nutzen kann/ werde .....

.....

.....

Was ich zu den Inhalten der Sitzung selbstständig oder im Team weiter lernen kann/ werde .

.....

.....

Nutzen Sie bei Bedarf auch die Rückseite.

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[406] The aspect of reflection for self-directed/self-regulated learning is evident in this activity. Again, it is pointed out that the focus of reflection as conceptualized for and implemented in the course *Schulpraktische Studien (SPS 1)* is primarily on deep learning and critical reflection. The paramount aim of a teacher education design to educate future teachers to be reflective practitioners of course included many aspects of reflection for self-directed/self-regulated learning, too. The aim of reflective practice is continuous improvement of practice, which again implies self-directed/self-regulated learning.

Where appropriate during small group student discussions in class, the teacher educator asked questions and/or made comments to give additional impulses for discussion, and he was also on standby if further support was desired by the students (scaffolding).

On the basis of the portfolio, reflective learning in the form of deep learning, higher levels of cognitive task processing, and higher levels of reflective thinking was elicited first and foremost by means of (1) the contents and the tasks as such, geared at deep, reflective learning; (2) reflective entries based on reflection prompts provided (mandatory in several sections of the portfolio, while additional reflections could be inserted into the portfolio if the author chose to do so); and (3) the design of the task for student teaching (two 45-minute lessons at school or substantial definable parts thereof) based on the cycle of reflection represented by the ALACT model (e.g., Korthagen, 1985; Korthagen & Kessels, 1999; Korthagen et al., 2001; Korthagen & Vasalos, 2005).

Appendix C. Additional statistical data

C.1 Design and development of the instruments used: Psychometric considerations regarding the disposition questionnaire (Selection)

As Section B of the disposition questionnaire is of crucial importance to the original research conducted, its development will be described in the following, as an exemplary illustration of how the disposition questionnaire was adapted based on the data collected in the pilot study.

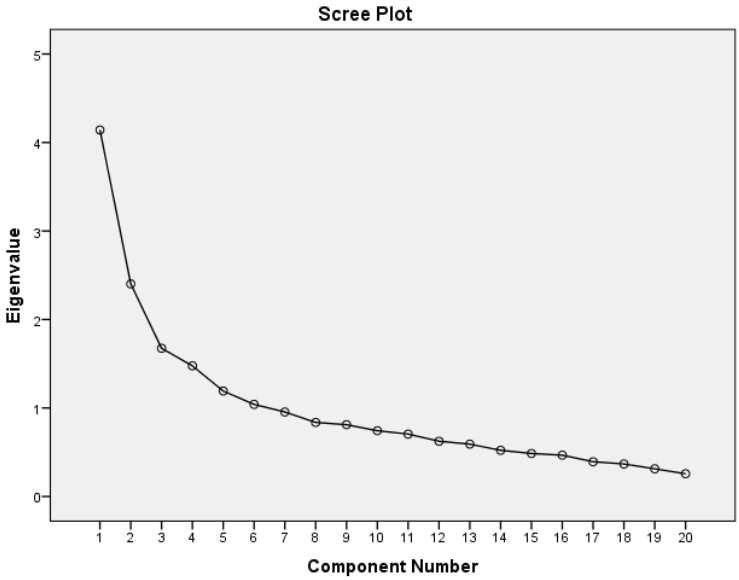
Principal Component Analysis (PCA)

The structure of the instrument to survey students' dispositions for deep and surface learning – the 20 items in Section B of the disposition questionnaire – was examined by means of a Principal Component Analysis (PCA). Both Bartlett's Test of Sphericity (Chi-Square (190) = 721.406, $p < .001$) and the Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy (KMO = .727), showed that the data was suitable for factor analysis. This was confirmed by a visual inspection of the inverse of correlation matrix.

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.727
Bartlett's Test of Sphericity	Approx. Chi-Square	721.406
	df	190
	Sig.	.000

Thus, a Principal Component Analysis with Varimax rotation was run. Although the analysis indicated the existence of 6 factors with an Eigenvalue > 1.0, a two-factor solution was chosen by setting the number of factors to be extracted to 2, following theoretical considerations and the form of the Scree-plot. This led to 32.720 % of the variance being explained.



With the aims of ensuring high factor loadings and reducing the number of items in the disposition questionnaire which was to be administered to students several times, it was decided to dispose of all items with a factor loading of < .50 in the rotated component matrix, and to keep the items with a factor loading of ≥ .50.[407] This selection of items based on the factor loadings in the rotated component matrix led to a reduction of items from 20 to 12, leaving 6 items for the disposition for deep learning and the disposition for surface learning respectively.[408]

[407] As is often the case in statistical analysis, there are rules of thumb regarding acceptable values. As a general rule, factor loadings below ± .20 should not be interpreted. In case an item loads on all factors below ± .20, it should be removed and a new analysis should be made. Factor loadings in the range of ± .30 to ± .40 are acceptable as minimal loadings, while higher loadings are desirable (especially in cases where there is a small sample or a large number of variables). In general, a factor can be interpreted if there are at least 4 variables with a factor loading of ± .60 or more, or if there are at least 10 variables with a factor loading of ± .40 or higher. As is the case with rules of thumb, they have to be applied carefully, as noted above with regard to minimum threshold values for Cronbach's Alpha coefficient. A minimum factor loading of ≥ .50 as set for the selection of items in Section B of the disposition questionnaire can be considered to be quite high.

[408] While based on the PCA of the data in the pilot study and the criterion set for item selection there remained equal numbers of items for the two dimensions (which was important), this equality was not given with regard to the distinction of (deep and surface) motive and strategy, as depicted in the

Rotated Component Matrix[a]

	Component 1	Component 2
B001 - Gefühl tiefer persönlicher Befriedigung beim Lernen (Deep Motive)	-.072	.539
B002 - Zufriedenheit erst bei eigenen Arbeitsergebnissen (Deep Strategy)	-.161	.469
B003 - Ziel: Studienabschluss mit minimalem Aufwand (Surface Motive)	.466	-.099
B004 - Beschäftigung nur mit vorgegebenen Inhalten (Surface Strategy)	.303	-.233
B005 - Offenheit für und Einlassen auf alle Themen (Deep Motive)	-.037	.369
B006 - Eigene, weitere Beschäftigung mit neuen Themen (Deep Strategy)	-.034	.711
B007 - Desinteresse am Studium und minimale Arbeit (Surface Motive)	.434	-.356
B008 - Auswendiglernen auch von nicht Verstandenem (Surface Strategy)	.695	-.024
B009 - Wissenschaftliche Themen fesselnd/ spannend (Deep Motive)	-.170	.593
B010 - Erarbeitung wichtiger Themen bis zum Verstehen (Deep Strategy)	.009	.328
B011 - Ansicht, dass Bestehen auch ohne Verstehen (Surface Motive)	.625	.074
B012 - Beschränkung des Lernens auf das Geforderte (Surface Strategy)	.696	-.070
B013 - Intensive Arbeit im Studium aufgrund von Interesse (Deep Motive)	-.112	.661
B014 - Weitergehendes, eigenes Lernen zu besprochenen Themen (Deep Strategy)	.011	.660
B015 - Oberflächliche Kenntnis von Themen ausreichend (Surface Motive)	.487	-.215
B016 - Lehrende sollten nur prüfungsrelevante Kenntnisse erwarten (Surface Strategy)	.518	-.051
B017 - Vorbereiten von Fragen für Lehrveranstaltungen (Deep Motive)	-.053	.536
B018 - Schaue begleitende Literatur zu Vorlesungen überwiegend an (Deep Strategy)	-.101	.457

literature and in Biggs' et al. (2001) original article on the R-SPQ-2F. As in further analyses of the 10 items belonging to deep and surface learning respectively the theoretical distinction between motive and strategy could not be detected, the particular aspect of this distinction was regarded as negligible for the study on hand, in which the main purpose was to obtain a reliable distinction between two broad dimensions: the disposition for deep learning and the disposition for surface learning.

B019 - Kein Sinn in Erlernen nicht prüfungsrelevanter Inhalte (Surface Motive)	.620	-.145
B020 - Ansicht, Bestehen der Prüfung durch Auswendiglernen (Surface Strategy)	.675	.049

[a] Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization. Rotation converged in 3 iterations.

Reliability Analysis

Full Scale: Deep Learning (10 items); 5 items Surface Motive (SM) and 5 items Surface Strategy (SS), as labeled in the original article

Case Processing Summary

		N	%
Cases	Valid	148	98.7
	Excluded[a]	2	1.3
	Total	150	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.731	.743	10

Item-Total Statistics

	Cronbach's Alpha if Item Deleted
B001 - Gefühl tiefer persönlicher Befriedigung beim Lernen (Deep Motive)	.708
B002 - Zufriedenheit erst bei eigenen Arbeitsergebnissen (Deep Strategy)	.714
B005 - Offenheit für und Einlassen auf alle Themen (Deep Motive)	.721
B006 - Eigene, weitere Beschäftigung mit neuen Themen (Deep Strategy)	.696
B009 - Wissenschaftliche Themen fesselnd/ spannend (Deep Motive)	.700
B010 - Erarbeitung wichtiger Themen bis zum Verstehen (Deep Strategy)	.732
B013 - Intensive Arbeit im Studium aufgrund von Interesse (Deep Motive)	.694
B014 - Weitergehendes, eigenes Lernen zu besprochenen Themen (Deep Strategy)	.703
B017 - Vorbereiten von Fragen für Lehrveranstaltungen (Deep Motive)	.707
B018 - Schaue begleitende Literatur zu Vorlesungen überwiegend an (Deep Strategy)	.723

According to reliability analysis, a minimal increase in the third decimal of Cronbach's Alpha could be achieved by means of the deletion of item B010.

Full Scale: Surface Learning (10 items); 5 items Surface Motive (SM) and 5 items Surface Strategy (SS), as labeled in the original article

Case Processing Summary

		N	%
Cases	Valid	146	97.3
	Excluded[a]	4	2.7
	Total	150	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.764	.763	10

Item-Total Statistics

	Cronbach's Alpha if Item Deleted
B003 - Ziel: Studienabschluss mit minimalem Aufwand (Surface Motive)	.754
B004 - Beschäftigung nur mit vorgegebenen Inhalten (Surface Strategy)	.767
B007 - Desinteresse am Studium und minimale Arbeit (Surface Motive)	.753
B008 - Auswendiglernen auch von nicht Verstandenem (Surface Strategy)	.730

B011 - Ansicht, dass Bestehen auch ohne Verstehen (Surface Motive)	.745
B012 - Beschränkung des Lernens auf das Geforderte (Surface Strategy)	.726
B016 - Lehrende sollten nur prüfungsrelevante Kenntnisse erwarten (Surface Strategy)	.749
B015 - Oberflächliche Kenntnis von Themen ausreichend (Surface Motive)	.749
B019 - Kein Sinn in Erlernen nicht prüfungsrelevanter Inhalte (Surface Motive)	.734
B020 - Ansicht, Bestehen der Prüfung durch Auswendiglernen (Surface Strategy)	.735

According to reliability analysis, a minimal increase in the third decimal of Cronbach's Alpha could be achieved by means of the deletion of item B004.

In the pilot study, the Cronbach's Alpha coefficient values of both scales – student disposition for deep learning and student disposition for surface learning – in Section B of the disposition questionnaire exceed the level of .7 and thus can be considered as acceptable following widespread convention.[409] Taking into account the limitations of

[409] In the literature, there has been reported considerable confusion about the proper use of Cronbach's alpha and its interpretation. For an informed discussion on the use of Cronbach's alpha and the (im-) possibility to use this coefficient for the measurement of the homogeneity and the unidimensionality of scales see, e.g., Cohen, Swerdlik, and Sturman (2013); Cronbach (1951); Cronbach and Shavelson (2004); DeVellis (2017); Graham (2006); Henson (2001); Miller (1995); Nunnally and Bernstein (2010); as well as Streiner (2003). It is demonstrated in the literature that in test construction there are many variables that influence Cronbach's alpha (see, e.g., Cortina, 1993). The limitations of Cronbach's alpha are reported on by Green, Lissitz, and Mulaik (1977); a critical stance towards the "uses and abuses of coefficient alpha" is taken, in article with this title, by Schmitt (1996). Independent of these publications, differences in interpretations of Cronbach's alpha as well as in the levels deemed as acceptable seem to persist. Apparently, in the literature Cronbach's alpha is often simply calculated, reported, and compared to pre-determined levels fixed by convention, without particular consideration of the purpose of the instrument including the scale, the number of items in the scale, etc. In reviewing the literature, it appears that most often Cronbach's alpha coefficients calculated are simply measured against the levels fixed by convention. It is to be noted that the threshold value for 'acceptable' Cronbach's Alpha values depends on the use intended for a scale (e.g., Streiner, 2003). Obviously, it is Cronbach's Coefficient Alpha that is calculated most often in relation to issues of test reliability (Peterson and Kim, 2013). In the psychological literature, Cronbach's Alpha seems to be

Cronbach's Alpha coefficient as well as the fact that as a single figure it is a highly aggregated value, the correlations between the items in a scale should be looked at. As regards discrete inter-item correlations, Streiner (2003), with reference to Clark and Watson (1995), suggests a mean inter-item correlation within the range of .15 to .20 for scales measuring broad characteristics and between .40 to .50 for those dealing with narrower ones. In the pilot study, the mean inter-item correlation of the 10 items in the scale measuring student dispositional deep learning was .224, the mean inter-item correlation of the 10 items in the scale measuring student dispositional surface learning was .244.

reported with particular frequency in connection with personality research; an impression that is confirmed by Shevlin, Miles, Davies, and Walker (2000). In personality research, traits can be assumed to be rather narrow constructs, encompassing only few dimensions. Scales related to such constructs may achieve higher Cronbach's Alpha values than scales related to broader constructs. It is possible to increase the Cronbach's Alpha value of a scale by the addition of further, rather similar items. This artificial inflation of the value cannot be the aim of scale construction, and Cronbach's Alpha values beyond .9 indicate that there is too high a degree of redundancy in the items, as is pointed out by Streiner (2003). Scales related to human behavior and human motivation can be assumed to be rather broad constructs including many dimensions, as opposed to scales related to personality traits, and thus to achieve lower Cronbach's Alpha values than scales related to personality, e.g., in clinical psychology. Taking into account the background to Cronbach's alpha use, calculation, and interpretation, lower values are quite acceptable in certain situations. For more information on the possibilities and the pitfalls of using Cronbach's Alpha for reliability analysis, persisting confusion and misconceptions as well as mathematical procedures suggested to calculate reliability adequately, also see Cho and Kim (2015) as well as Cho (2016). A recent article in defense of Cronbach's alpha would be Raykov and Marcoulides (2017).

C.2 Descriptive statistics: Student factors

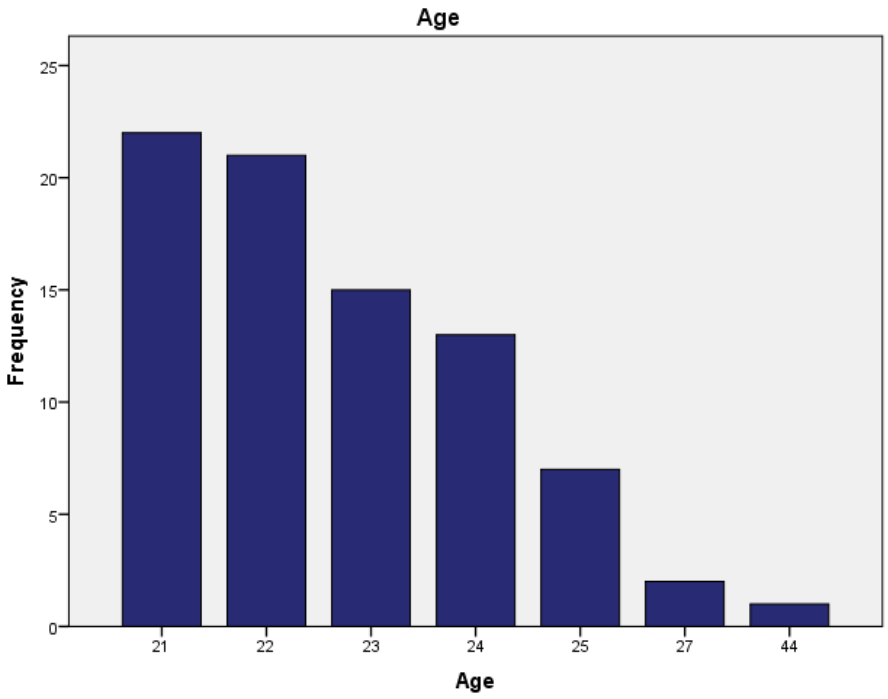
Participants' Age

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Age	81	21	44	22.89	2.788
Valid N (listwise)	81				

Age

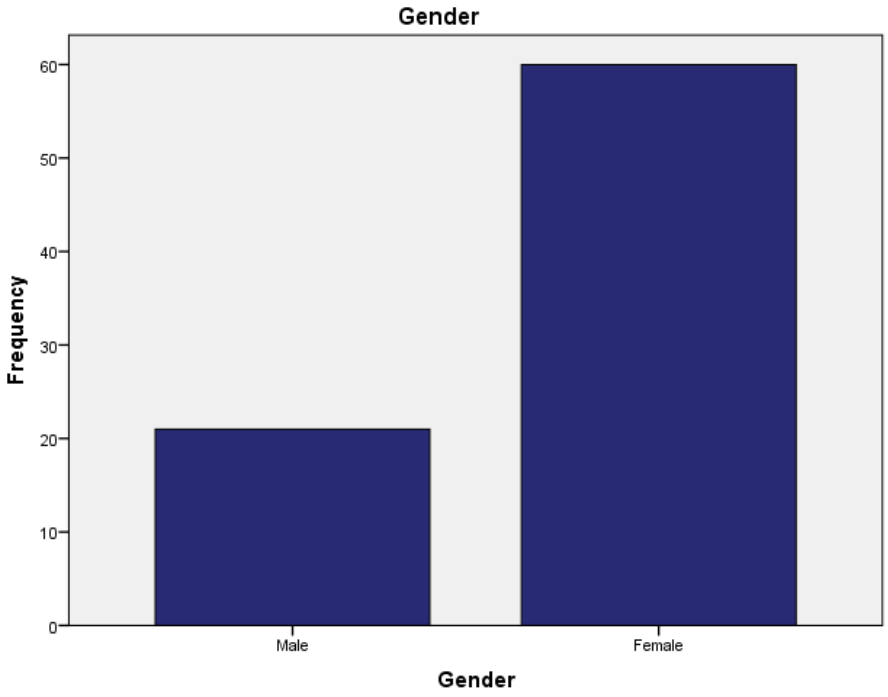
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	21	22	27.2	27.2	27.2
	22	21	25.9	25.9	53.1
	23	15	18.5	18.5	71.6
	24	13	16.0	16.0	87.7
	25	7	8.6	8.6	96.3
	27	2	2.5	2.5	98.8
	44	1	1.2	1.2	100.0
	Total	81	100.0	100.0	



Participants‘ Gender

Gender

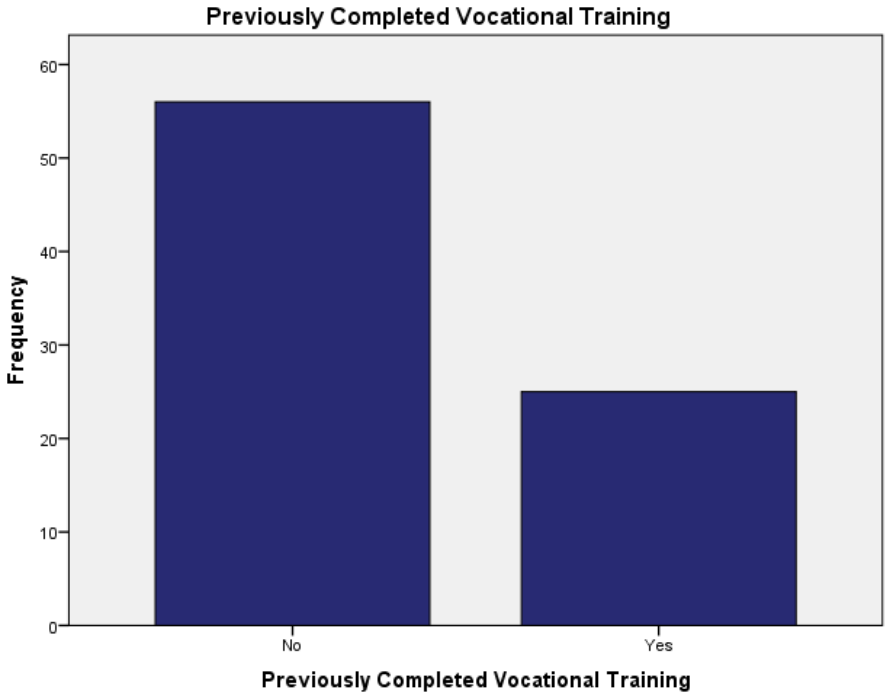
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	21	25.9	25.9	25.9
	Female	60	74.1	74.1	100.0
	Total	81	100.0	100.0	



Vocational Training Previously Completed by Participants

Previously Completed Vocational Training

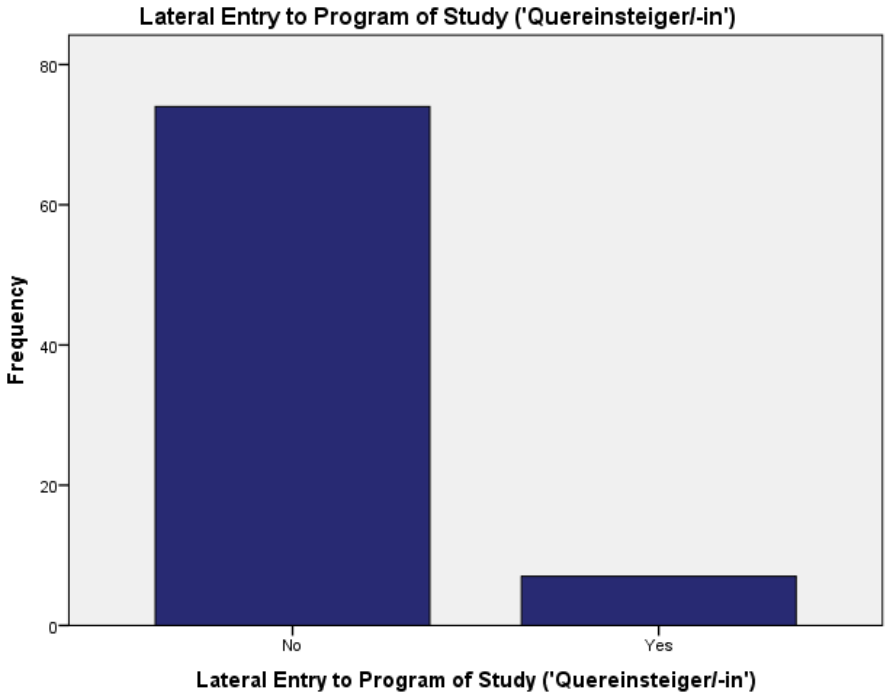
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	56	69.1	69.1	69.1
	Yes	25	30.9	30.9	100.0
	Total	81	100.0	100.0	



Participants with Lateral Entry to the Program of Study ('Quereinsteiger/-in')

Lateral Entry to Program of Study ('Quereinsteiger/-in')

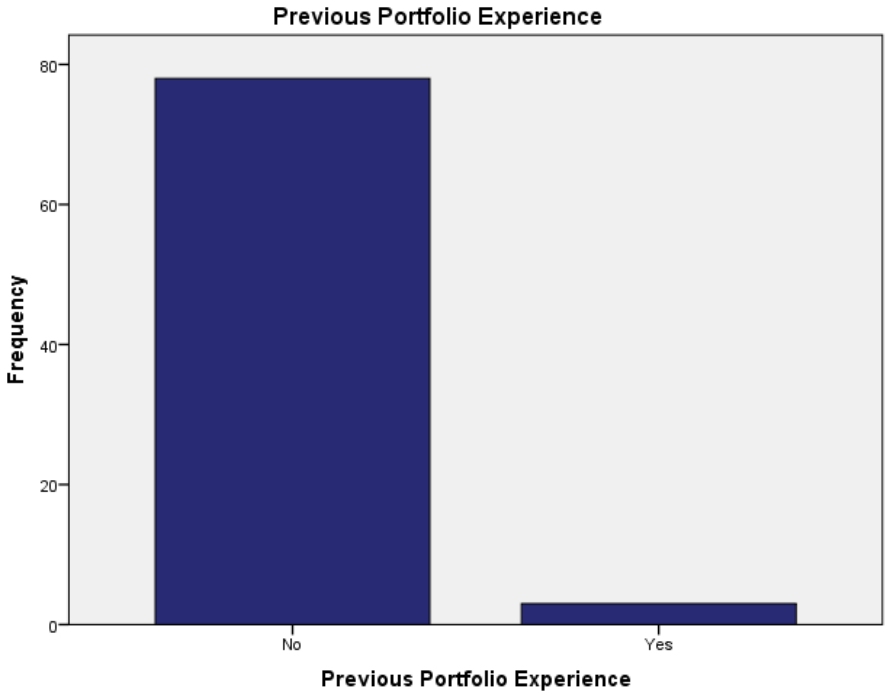
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	74	91.4	91.4	91.4
	Yes	7	8.6	8.6	100.0
	Total	81	100.0	100.0	



Participants' Previous Portfolio Experience

Previous Portfolio Experience

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	78	96.3	96.3	96.3
	Yes	3	3.7	3.7	100.0
	Total	81	100.0	100.0	



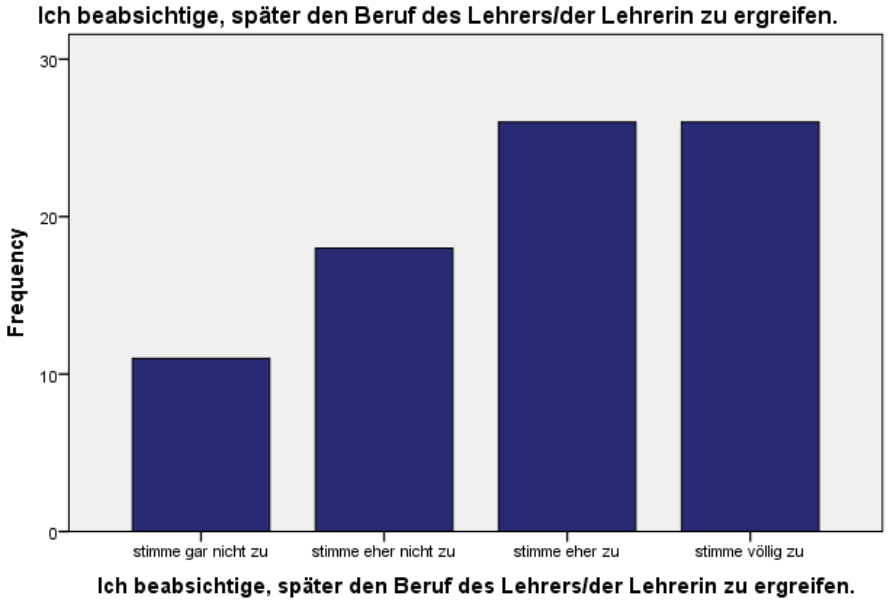
Participants' Plans to Become a Teacher ("I am planning to become a teacher.")

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Ich beabsichtige, später den Beruf des Lehrers/ der Lehrerin zu ergreifen.	81	1	4	2.83	1.034
Valid N (listwise)	81				

Ich beabsichtige, später den Beruf des Lehrers/der Lehrerin zu ergreifen.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	stimme gar nicht zu	11	13.6	13.6	13.6
	stimme eher nicht zu	18	22.2	22.2	35.8
	stimme eher zu	26	32.1	32.1	67.9
	stimme völlig zu	26	32.1	32.1	100.0
	Total	81	100.0	100.0	



"I am planning to become a teacher."

'stimme gar nicht zu': totally disagree; 'stimme eher nicht zu': 'rather disagree'; 'stimme eher zu': rather agree; 'stimme völlig zu': totally agree.

Teaching as the Profession Desired by Participants

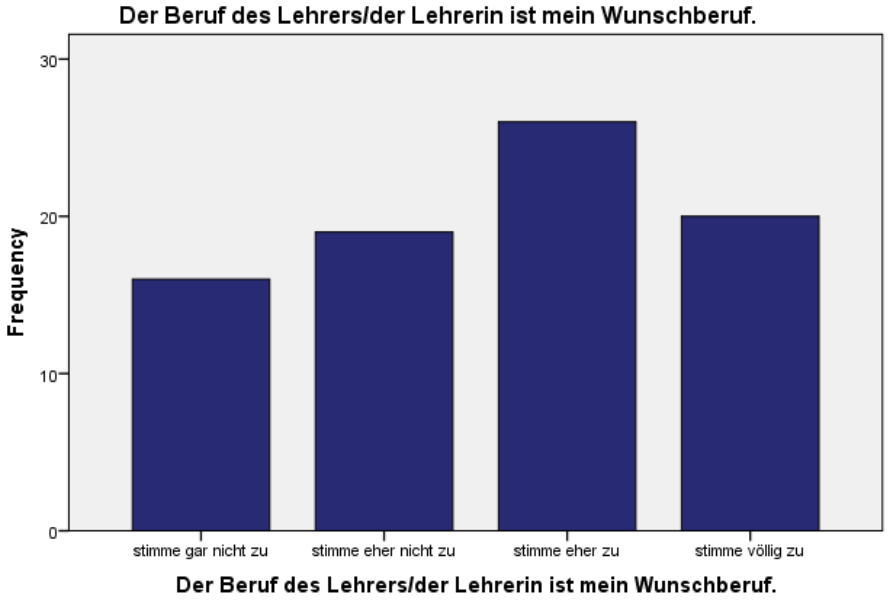
("Teaching is my desired profession.")

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Der Beruf des Lehrers/ der Lehrerin ist mein Wunschberuf.	81	1	4	2.62	1.067
Valid N (listwise)	81				

Der Beruf des Lehrers/der Lehrerin ist mein Wunschberuf.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	stimme gar nicht zu	16	19.8	19.8	19.8
	stimme eher nicht zu	19	23.5	23.5	43.2
	stimme eher zu	26	32.1	32.1	75.3
	stimme völlig zu	20	24.7	24.7	100.0
	Total	81	100.0	100.0	



"Teaching is my desired profession."

'stimme gar nicht zu': totally disagree; 'stimme eher nicht zu': 'rather disagree'; 'stimme eher zu': rather agree; 'stimme völlig zu': totally agree.

C.3 Descriptive statistics: Approaches to learning and levels of task processing

Students' actual approach to learning in task processing –
Realized deep approach to learning in the portfolio-based learning environment

10 items (A201a; A202a; A205a; A206a; A209a; A210a; A213a; A214a; A217a; A218a)
Range of scale: 1 (Minimum) to 5 (Maximum). Scale Center: 3.

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
SPS 1 - Lernen erfüllte mit einem Gefühl tiefer persönlicher Befriedigung	81	1	4	2.49	.896
SPS 1 - Zufriedenheit erst bei eigenen Ergebnissen nach entsprechender Arbeit	81	1	5	3.25	.929
SPS 1 - Ansicht, dass so gut wie jedes Thema interessant sein konnte bei Offenheit und thematischer Auseinandersetzung	81	1	5	3.06	.979
SPS 1 - Interesse für die meisten neuen Themen und eigenständige weitere Beschäftigung damit	81	1	5	2.41	.985
SPS 1 - Ansicht, dass das Studium wissenschaftlicher Inhalte fesselnd und spannend sein konnte	81	1	4	2.22	.908
SPS 1 - Selbstprüfung bei wichtigen Themen, bis diese verstanden waren	81	1	5	2.51	1.074
SPS 1 - Viel für die SPS 1 gearbeitet, da die Themen und Materialien als interessant befunden wurden	81	1	5	2.94	1.053

SPS 1 - Beschäftigung mit interessanten Themen, die besprochen wurden, auch in der Freizeit	81	1	5	2.23	.870
SPS 1 - Vorbereitung von Fragen, auf die eine Antwort gewünscht war	81	1	5	3.54	1.194
SPS 1 - Engagement bei der Auseinandersetzung mit den als begleitende Literatur empfohlenen Texten	81	1	5	2.40	1.242
Valid N (listwise)	81				

Students' actual approach to learning in task processing –
Realized surface approach to learning in the portfolio-based learning environment

10 items (A203a; A204a; A207a; A208a; A211a; A212a; A215a; A216a; A219a; A220a)
Range of scale: 1 (Minimum) to 5 (Maximum). Scale Center: 3.

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
SPS 1 - Ziel: Absolvieren der SPS 1 mit möglichst wenig Aufwand	81	1	5	2.58	1.105
SPS 1 - Beschäftigung nur mit besprochenen/in der Veranstaltungsübersicht genannten Inhalten	81	1	5	3.15	1.074
SPS 1 - Beschränkung der Arbeit auf das Minimum mangels Interesse	81	1	5	2.64	1.133
SPS 1 – Auswendiglernen mancher Inhalte durch ständige Wiederholung, auch wenn die Inhalte nicht verstanden waren	81	1	3	1.37	.641
SPS 1 - Ansicht, dass Bestehen der Prüfung auch durch Auswendiglernen zentraler Inhalte ohne Verstehen	81	1	5	1.78	.935
SPS 1 - Beschränkung des Lernens auf das ausdrücklich Geforderte, Zusatzarbeit wurde für unnötig gehalten	81	1	5	2.99	1.031
SPS 1 - Ansicht, dass ein tiefer gehendes Studium von Themen nicht hilfreich war; die oberflächliche Kenntnis genügte	81	1	5	2.70	1.042

SPS 1 - Ansicht, dass der Dozent kein umfassendes Studium der nicht prüfungsrelevanten Themen oder Materialen erwarten sollte	81	1	5	3.16	1.030
SPS 1 - Keinen Sinn im Erlernen voraussichtlich nicht prüfungs-relevanter Inhalte gesehen	81	1	5	3.09	1.063
SPS 1 - Ansicht, dass der beste Weg zum Bestehen der Prüfung im Auswendiglernen bestand	81	1	5	1.54	.822
Valid N (listwise)	81				

Students' actual level of cognitive task processing –
Deep cognitive processing realized in portfolio construction

8 items (B202a; B203a; B205a; B207a; B208a; B209a; B212a; B216a)
Range of scale: 1 (Minimum) to 5 (Maximum). Scale Center: 3.

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Portfolioarbeit - Überprüfung der Angemessenheit und Tragfähigkeit der beruflichen Orientierung anhand der Erfahrungen und Erkenntnisse bei den SPS 1	81	1	5	4.06	.827
Portfolioarbeit - Überprüfung und ggf. Anpassung des Wissens zu den individuellen Stärken und Lernbedarfen vor dem Hintergrund der SPS 1	81	1	5	3.93	.818
Portfolioarbeit - Erfahrungs- und erkenntnisbasierte Entwicklung eigener Pläne zur weiteren Arbeit an den individuellen Stärken und Lernbedarfen	81	1	5	3.63	1.089
Portfolioarbeit - Entwicklung eines differenzierten Bilds des Lehrerberufs unter Einbezug der eigenen Vorstellungen	81	1	5	4.00	.866
Portfolioarbeit - Auseinandersetzung mit dem persönlichen Bild von gutem Unterricht unter Einbezug von Gründen und persönlichen Erfahrungen	81	2	5	4.26	.818

Portfolioarbeit - Transfer des in der Lehrveranstaltung Gelernten auf den Unterricht an der Praktikumsschule und Herstellung von Zusammenhängen	81	1	5	3.80	1.018
Portfolioarbeit - Entwicklung eigener Ideen in Zusammenhang mit den zu bearbeitenden Aufgaben und Inhalten	81	1	5	3.41	1.127
Portfolioarbeit - Eigenständige Suche nach Antworten auf Fragen, die bei der Beschäftigung mit den Inhalten auftraten	81	1	5	3.31	1.068
Valid N (listwise)	81				

Students' actual level of cognitive task processing –
Surface cognitive processing realized in portfolio construction

8 items (B201a; B204a; B206a; B210a; B211a; B213a; B214a; B215a)
Range of scale: 1 (Minimum) to 5 (Maximum). Scale Center: 3.

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Portfolioarbeit - Portfoliobereiche nacheinander bearbeitet, ohne Zusammenhänge zu suchen oder weiter zu verfolgen	81	1	5	2.17	1.127
Portfolioarbeit – Feedback wird einfach unkritisch-rezeptiv zur Kenntnis genommen und nicht weiter reflektiert	81	1	5	2.16	1.066
Portfolioarbeit - Unkritische Rezeption und Memorieren vorgeschlagener Wege zur Erreichung des persönlichen Ziels	81	1	5	2.57	1.128
Portfolioarbeit - Beschränkung auf unkritische Rezeption und Memorieren von Tipps und Hinweisen zu gutem Unterricht	81	1	5	2.70	1.134
Portfolioarbeit - Beschränkung auf die Erfüllung der Anforderungen ohne Hinterfragen darüber hinausgehender Zusammenhänge	81	1	5	2.44	.975
Portfolioarbeit - Beschränkung der Lernaktivitäten auf das vorgegebene Basismaterial ohne Erweiterung um das angebotene Zusatzmaterial	81	1	5	3.05	1.193

Portfolioarbeit - Beschränkung auf die Rezeption der dargebotenen Inhalte ohne Nachdenken über mögliche Zusammenhänge	81	1	5	2.33	.935
Portfolioarbeit - Beschränkung auf die Rezeption der dargebotenen Inhalte ohne Nachdenken über kritische Einwände	81	1	5	2.42	1.023
Valid N (listwise)	81				

Students' actual levels of reflective thinking–

Level of "Habitual Action" realized in portfolio construction

4 items (C201a; C205a; C209a; C213a)

Range of scale: 1 (Minimum) to 5 (Maximum). Scale Center: 3.

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Portfolioarbeit - Ausführung mancher Aufgaben ohne Nachdenken	81	1	5	2.42	1.273
Portfolioarbeit – Rein routinemäßige Ausführung von Aufgaben	81	1	5	3.19	1.141
Portfolioarbeit – Einfache Wiedergabe der dargebotenen Inhalte, eigenes Nachdenken war dabei nicht allzu sehr erforderlich	81	1	5	2.69	1.103
Portfolioarbeit – Einfache Befolgung der Ausführungen des Dozenten, wobei über die Inhalte nicht allzu sehr nachgedacht werden musste	80	1	5	2.89	1.158
Valid N (listwise)	80				

Students' actual levels of reflective thinking–
Level of "Understanding" realized in portfolio construction

4 items (C202a; C206a; C210a; C214a)
Range of scale: 1 (Minimum) to 5 (Maximum). Scale Center: 3.

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Portfolioarbeit - Auseinandersetzung mit in der Lehrveranstaltung thematisierten Begriffen und Konzepten bis zum Verstehens	81	1	5	3.62	1.091
Portfolioarbeit - Auseinandersetzung mit Inhalten bis zum Verstehen	81	1	5	3.69	1.114
Portfolioarbeit - Auseinandersetzung mit den in der Lehrveranstaltung bespro-chenen Inhalten solange, bis die praktische Anwendung gelang	81	1	5	3.57	1.128
Portfolioarbeit - Fortlaufendes Nachdenken über die Inhalte mit dem Ziel des Verstehens	81	1	5	3.36	.940
Valid N (listwise)	81				

Students' actual levels of reflective thinking–

Level of "Reflection" realized in portfolio construction

4 items (C203a; C207a; C211a; C215a)

Range of scale: 1 (Minimum) to 5 (Maximum). Scale Center: 3.

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Portfolioarbeit - Überlegung bei der Analyse der Hospitations-stunden, wie die beobachtete Lehrperson den Unterricht hätte weiter verbessern können	81	1	5	4.21	.802
Portfolioarbeit - Überlegungen zu alternativen Möglichkeiten der Unterrichtsgestaltung im Rahmen der Vor- und Nachbe-reitung der Unterrichtsversuche	81	1	5	3.77	1.099
Portfolioarbeit - Häufiges Nach-denken über eventuelle Verbes-serungemöglichkeiten bei der Analyse und Bewertung der eigenen Unterrichtsversuche	81	1	5	3.90	.970
Portfolioarbeit - Mehrfaches Durchleuchten der Erfahrungen aus den Unterrichtsversuchen mit dem Ziel des Lernens und der künftigen Leistungsverbesserung	81	1	5	4.09	.964
Valid N (listwise)	81				

Students' actual levels of reflective thinking–
Level of "Critical Reflection" realized in portfolio construction

4 items (C203a; C207a; C211a; C215a)
Range of scale: 1 (Minimum) to 5 (Maximum). Scale Center: 3.

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Portfolioarbeit – Kritische Prüfung des Selbstbildes und kontinuierlicher Vergleich mit den Erfahrungen und Erkenntnissen bei den SPS 1	81	1	5	3.46	1.225
Portfolioarbeit - Infragestellung einiger der festen individuellen Überzeugungen aufgrund der Erfahrungen und Erkenntnisse bei den SPS 1	81	1	5	2.72	1.196
Portfolioarbeit – Kritische Überprüfung des normalen Handelns und Veränderung der Vorgehensweise, wo dies angebracht erschien	81	1	5	3.17	1.212
Portfolioarbeit - Prüfung von Widersprüchen und Unzulänglichkeiten in vormals festen Überzeugungen, die bei den SPS 1 auffielen, und Versuch der Anpassung	81	1	5	3.64	.991
Valid N (listwise)	81				

Appendix D. Key scales used in the study

D.1 Original scales

The Revised Two-Factor Study Process Questionnaire: R-SPQ-2F (Biggs et al., 2001)[410]

1. I find that at times studying gives me a feeling of deep personal satisfaction.
2. I find that I have to do enough work on a topic so that I can form my own conclusions before I am satisfied.
3. My aim is to pass the course while doing as little work as possible.
4. I only study seriously what's given out in class or in the course outlines.
5. I feel that virtually any topic can be highly interesting once I get into it.
6. I find most new topics interesting and often spend extra time trying to obtain more information about them.
7. I do not find my course very interesting so I keep my work to the minimum.
8. I learn some things by rote, going over and over them until I know them by heart even if I do not understand them.
9. I find that studying academic topics can at times be as exciting as a good novel or movie.
10. I test myself on important topics until I understand them completely.
11. I find I can get by in most assessments by memorising key sections rather than trying to understand them.
12. I generally restrict my study to what is specifically set as I think it is unnecessary to do anything extra.
13. I work hard at my studies because I find the material interesting.
14. I spend a lot of my free time finding out more about interesting topics which have been discussed in different classes.
15. I find it is not helpful to study topics in depth. It confuses and wastes time, when all you need is a passing acquaintance with topics.
16. I believe that lecturers shouldn't expect students to spend significant amounts of time studying material everyone knows won't be examined.
17. I come to most classes with questions in mind that I want answering.
18. I make a point of looking at most of the suggested readings that go with the lectures.
19. I see no point in learning material which is not likely to be in the examination.
20. I find the best way to pass examinations is to try to remember answers to likely questions.

[410] The source of the R-SPQ-2F as printed in this appendix is the article *The revised two-factor Study Process Questionnaire: R-SPQ-2F*, published by Biggs et al.(2001). The copyright on the questionnaire is owned by John Biggs and David Kember. The use of the questionnaire for the evaluation of courses and for genuine research purposes has been permitted by the authors. This is to acknowledge the paper named as the source of the questionnaire and to state that the copyright on the questionnaire is owned by the authors. For more details on the outstanding service of John Biggs to tertiary education, especially with regard to curriculum development and assessment, as well as for more information on these fields in the works of John Biggs, also see Biggs (2017).

Reflective Thinking Questionnaire (Kember et al., 2000)[411]

Habitual Action

1. When I am working on some activities, I can do them without thinking about what I am doing.
5. In this course we do things so many times that I started doing them without thinking about it.
9. As long as I can remember handout material for examinations, I do not have to think too much.
13. If I follow what the lecturer says, I do not have to think too much on this course.

Understanding

2. This course requires us to understand concepts taught by the lecturer.
6. To pass this course you need to understand the content.
10. I need to understand the material taught by the teacher in order to perform practical tasks.
14. In this course you have to continually think about the material you are being taught.

Reflection

3. I sometimes question the way others do something and try to think of a better way.
7. I like to think over what I have been doing and consider alternative ways of doing it.
11. I often reflect on my actions to see whether I could have improved on what I did.
15. I often re-appraise my experience so I can learn from it and improve for my next performance.

Critical Reflection

4. As a result of this course I have changed the way I look at myself.
8. This course has challenged some of my firmly held ideas.
12. As a result of this course I have changed my normal way of doing things.
16. During this course I discovered faults in what I had previously believed to be right.

[411] The source of the Reflective Thinking Questionnaire as printed in this appendix is the article *Development of a Questionnaire to Measure the Level of Reflective Thinking*, published by Kember et al. (2000). The copyright on the questionnaire is owned by David Kember, Doris Y.P. Leung, Alice Jones, Alice Yuen Loke, Jan McKay, Kit Sinclair, Harrison Tse, Celia Webb, Frances Kam Yuet Wong, Marian Wong, and Ella Yeung. The use of the questionnaire for the evaluation of teaching and for genuine research purposes has been permitted by the authors. This is to acknowledge the paper named as the source of the questionnaire and to state that the copyright on the questionnaire is owned by the authors.

Technology Acceptance Measure for Preservice Teachers: TAMPST (Teo, 2010)

Using computers will improve my work (PU)

Computers make work more interesting (ATCU)

My interaction with computers is clear and understandable (PEU)

When I need help to use computers, specialized instruction is available to help me (FC)

Working with computers is fun (ATCU)

I find it easy to get computers to do what I want it to do (PEU)

Using computers will increase my productivity (PU)

I find computers easy to use (PEU)

When I need help to use computers, a specific person is available to provide assistance (FC)

People whose opinions I value will encourage me to use computers (SN)

I like using computers (ATCU)

People who are important to me will support me to use computers (SN)

Using computers will enhance my effectiveness (PU)

When I need help to use computers, guidance is available to me (FC)

I find computers a useful tool in my work (PU)

I look forward to those aspects of my job that require me to use computers (ATCU)

Note. PU = perceived usefulness; PEU = perceived ease of use; SN = subjective norm; FC = facilitating conditions; ATCU = attitude toward computer use.

Motivated Strategies for Learning Questionnaire: MSLQ (as reported by Duncan and McKeachie, 2005)

The scales of the Motivated Strategies for Learning Questionnaire (MSLQ) are numerous and extensive. They can be found in an article by Duncan and McKeachie (2005), which at this point is referred to.

Basic Student Needs Scale (Doménech Betoret & Gómez-Artiga, 2011)

a) Autonomy
    1. I have been able to freely decide my own pace of learning in this subject.
    2. I have been able to freely choose the tasks to be done while learning this subject.
    3. The teacher has allowed the students to work independently.
    4. I felt I was capable of deciding about how to learn and work this subject.

b) Competence
    1. I felt I was capable while learning this subject.
    2. I have had the chance to show my capacities during the learning followed in this subject.
    3. I have felt competent enough to meet the challenges and tasks posed in learning this subject.
    4. I have been able to learn new and interesting skills in this subject.

c) Relatedness
    1. The teacher made me feel confident enough so I could ask anything freely.
    2. The teacher has been friendly and cordial with me.
    3. I felt that the teacher was friendly and willing to help.
    4. The teacher has been very understanding (puts his/herself in other people's place) about students' problems (sic).

d) Belonging
    1. There is a strong feeling of friendship in this group/class.
    2. I have felt at ease in this group/class.
    3. Being in this group/class feels like belonging to a large family.
    4. I get the feeling that we form a large team in this subject.
    5. I will remember my classmates from this group/class affectionately in the future.

D.2 Translated and adapted scales

Disposition Questionnaire: Deep and Surface Learning, all 20 items (based on the R-SPQ-2F Questionnaire, Biggs et al., 2001)

1. Manchmal erfüllt mich Lernen mit einem Gefühl tiefer persönlicher Befriedigung.
2. An einem Thema oder einer Aufgabenstellung muss ich so lange arbeiten, bis ich zu eigenen Ergebnissen komme. Vorher bin ich nicht zufrieden.
3. Mein Ziel ist, das Studium mit so wenig Aufwand wie möglich zu absolvieren.
4. Ich beschäftige mich nur mit denjenigen Inhalten ernsthaft, die in einer Lehrveranstaltung besprochen oder in der Veranstaltungsübersicht genannt werden.
5. Ich bin der Ansicht, dass so gut wie jedes Thema hochinteressant sein kann, sobald ich mich darauf einlasse und mich näher damit beschäftige.
6. Ich finde die meisten neuen Themen interessant und verbringe oft zusätzliche Zeit damit, weitere Informationen dazu zu erhalten.
7. Ich findet mein Studium nicht sonderlich interessant, sodass ich meine Arbeit auf das Minimum beschränke.
8. Ich lerne manches auswendig, indem ich es ständig wiederhole, bis ich es flüssig wiedergeben kann, auch wenn ich es nicht verstanden habe.
9. Ich bin der Ansicht, dass das Studium wissenschaftlicher Themen und Fragestellungen manchmal so fesselnd und spannend sein kann wie ein guter Roman oder Film.
10. Bei wichtigen Themen prüfe ich mich selbst, bis ich sie vollständig verstanden habe.
11. Ich bin der Ansicht, dass ich bei den meisten Prüfungen durchkomme, indem ich zentrale Lektionen auswendig beherrsche – auch ohne den Versuch, sie zu verstehen.
12. Im Allgemeinen beschränke ich mein Lernen auf das, was ausdrücklich gefordert wird, da ich Zusatzarbeit für unnötig halte.
13. Für mein Studium arbeite ich viel, da ich die Themen und Materialien interessant finde.
14. Ich verbringe einen großen Teil meiner Freizeit damit, mehr über interessante Themen zu erfahren, die in verschiedenen Lehrveranstaltungen besprochen wurden.
15. Ich finde es nicht hilfreich, Themen tiefer gehend zu studierenden. Es verwirrt und kostet unnötig Zeit, wenn allein die oberflächliche Kenntnis der Themen erforderlich ist.
16. Ich bin der Ansicht, dass Lehrende von Studierenden nicht erwarten sollten, ein beträchtliches Maß an Zeit auf das Studium von Themen oder Materialien zu verwenden, von denen jeder weiß, dass sie nicht Gegenstand einer Prüfung sein werden.
17. Zu den meisten Lehrveranstaltungen komme ich mit Fragen, auf die ich eine Antwort möchte.
18. Ich lege Wert darauf, die überwiegende Zahl der Texte, die als begleitende Literatur für die Vorlesungen empfohlen werden, anzusehen.
19. Ich sehe keinen Sinn darin, Inhalte zu erlernen, die voraussichtlich nicht Teil der Prüfung sein werden.
20. Ich bin der Ansicht, dass der beste Weg zum Bestehen von Prüfungen darin besteht, Antworten auf wahrscheinliche Fragen auswendig zu lernen.

After PCA and item reduction, 12 of the items were retained in the disposition questionnaire (see Appendix D.3, p. 577).

Disposition Questionnaire: Levels of Reflective Thinking (based on the Reflective Thinking Questionnaire, Kember et al., 2000)

1. Manches im Studium kann ich ausführen, ohne dabei darüber nachzudenken.
2. Im Studium müssen wir die von den Dozenten gelehrten Begriffe und Konzepte verstehen.
3. Manchmal hinterfrage ich die Art und Weise, wie andere etwas tun, und versuche, einen besseren Weg zu finden.
4. Infolge meines Studiums hat sich mein Selbstbild verändert.
5. Manches im Studium tun wir so oft, dass ich es inzwischen automatisch ausführen kann.
6. Um im Studium zu bestehen, muss man die Inhalte verstehen.
7. Ich denke gern darüber nach, was ich getan habe, und wäge alternative Wege ab.
8. Das Studium hat mich veranlasst, einige meiner festen Überzeugungen infrage zu stellen.
9. Solange ich das ausgegebene Material bei Prüfungen auswendig beherrsche, muss ich nicht zu viel nachdenken.
10. Ich muss die von den Dozenten gelehrten Inhalte verstehen, um sie praktisch anwenden zu können.
11. Ich denke oft über meine Handlungen nach, um zu sehen, ob ich sie hätte besser ausführen können.
12. Infolge meines Studiums hat sich die Art und Weise, wie ich Dinge normalerweise angehe, verändert.
13. Wenn ich den Ausführungen der Dozenten folge, muss ich im Studium nicht allzu viel nachdenken.
14. Im Studium muss man fortlaufend über die Inhalte, die gelehrt werden, nachdenken.
15. Ich überprüfe meine Erfahrungen oft, sodass ich aus ihnen lernen und meine Leistung künftig verbessern kann.
16. Im Verlauf des Studiums habe ich Widersprüche und Unzulänglichkeiten in vormals festen Überzeugungen entdeckt.

Disposition Questionnaire – Technology Acceptance (based on TAMPST, Teo, 2010)

1. Durch den Einsatz von Computern kann ich meine Arbeit verbessern.
2. Computer machen die Arbeit interessanter.
3. Mit Computern kann ich gut umgehen.
4. Die Arbeit mit Computern macht Spaß.
5. Es fällt mir leicht, beim Einsatz von Computern das von mir gewünschte Ergebnis zu erzielen.
6. Durch den Einsatz von Computern kann ich meine Produktivität steigern.
7. Die Bedienung von Computern fällt mir leicht.
8. Ich arbeite gerne mit Computern.
9. Durch den Einsatz von Computern kann ich effektiver arbeiten.
10. Ich betrachte Computer als hilfreiches Arbeitswerkzeug.
11. Ich freue mich auf die Bereiche meiner späteren Arbeitstätigkeit, die den Einsatz von Computern erfordern.

Disposition Questionnaire – Student Motivation (based on the MSLQ, Duncan & McKeachie, 2005)

The items used in the pilot study in the academic year 2012–2013 can be obtained from the author by request. The items used in the main study in the academic year 2013–2014 can be found in Appendix D.3 (p. 577).

D.3 Instruments used in the main study (fall/winter semester 2013–2014)

Pre-test (t_0): Disposition questionnaire, administered in September 2013

Lehrveranstaltung SPS 1 – Befragung der Teilnehmerinnen und Teilnehmer

Mannheim, im September 2013

Werte Kommilitoninnen und Kommilitonen,

im HWS 2013 nehmen Sie an den „Schulpraktischen Studien 1“ (SPS 1) teil. Diese umfassen die universitäre Begleitveranstaltung, in der wir gemeinsam mit Ihnen Ihren Schulaufenthalt vorbereiten, und einen zweiwöchigen Aufenthalt an einer Praktikumsschule, der im Januar/Februar des kommenden Jahres stattfindet.

Im Rahmen der Lehrveranstaltung SPS 1 führen wir mehrere Befragungen durch mit dem Ziel,

- die Effekte der SPS 1 und deren Beitrag zu Ihrer individuellen Ausbildung festzustellen und
- – aufbauend auf den Ergebnissen der Befragung – eine kontinuierliche Optimierung der Inhalte und des Lehr-Lern-Arrangements der SPS 1 vorzunehmen.

Wir bitten Sie, uns hierbei durch Ihre Mitwirkung zu unterstützen.

Beim Ausfüllen des vorliegenden Fragebogens ist wichtig, dass Sie das **Format der Antwortmöglichkeiten (Abstufungen) beachten, da dieses zwischen den einzelnen Abschnitten (A-F) wechseln kann**. Es gibt keine falschen Antworten; grundlegend ist, dass Ihre Antworten **die Realität so zutreffend wie möglich wiedergeben**. Lesen Sie jede Aussage sorgfältig durch; wenn Sie deren Inhalt erfasst haben, **antworten Sie bitte zügig**. Kreuzen Sie nicht an, sondern **füllen Sie den Kreis mit der zutreffenden Ziffer ganz aus**. Nutzen Sie hierzu bitte einen Stift mit einer dunklen, deckenden Farbe.

Ihre Angaben werden unter Verwendung eines Teilnehmercodes erhoben, **streng vertraulich** behandelt und **ausschließlich zu wissenschaftlichen Zwecken und zur Veranstaltungsoptimierung** verwendet.

Bei Fragen zur Untersuchung wenden Sie sich bitte an mich. Für Ihre Unterstützung danke ich Ihnen.

StR Georg Matthias Schneider

Ihr persönlicher Teilnehmercode

Ihr persönlicher Teilnehmercode (acht Buchstaben) setzt sich zusammen aus

- Den **ersten beiden** Buchstaben des Vornamens Ihrer Großmutter mütterlicherseits (Bsp.: Elisabeth = EL)
- Den **ersten beiden** Buchstaben des Vornamens Ihres Großvaters mütterlicherseits (Bsp.: Thomas = TH)
- Den **ersten beiden** Buchstaben des Vornamens Ihrer Großmutter väterlicherseits (Bsp.: Adelheid = AD)
- Den **ersten beiden** Buchstaben des Vornamens Ihres Großvaters väterlicherseits (Bsp.: Johannes = JO)

Es ergibt sich im Beispiel der Teilnehmercode ELTHADJO.

Ihr Teilnehmercode

A Angaben zu Ihrer Person

001 Ihr Alter

Bsp.: Sie sind 21 Jahre alt. → bei 1. ② und bei 2. ① markieren

1. ② ③ ④

2. ⓪ ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨

n

002 Ihr Geschlecht ① männlich ② weiblich

003 Haben Sie eine abgeschlossene berufliche Ausbildung?

⓪ nein
① ja

004 Sind Sie Quereinsteiger/-in in den Studiengang „Wirtschaftspädagogik“?

⓪ nein
① ja

005 Haben Sie in der Schule/in Ihrem Studium bereits ein Portfolio erstellt?

⓪ nein
① ja

B Bitte beurteilen Sie, inwieweit die folgenden Aussagen <u>für Ihr Studium insgesamt</u> zutreffen.

Falls eine Antwort davon abhängt, an welche der von Ihnen studierten Inhalte Sie denken, beziehen Sie sich bitte auf die Inhalte, die Ihnen am meisten bedeuten.

Bitte beachten Sie die Abstufungen der Antwortmöglichkeiten.

		trifft niemals/nur selten zu				trifft immer/fast immer zu
001	Manchmal erfüllt mich Lernen mit einem Gefühl tiefer persönlicher Befriedigung.	①	②	③	④	⑤
002	Ich finde die meisten neuen Themen interessant und verbringe oft zusätzliche Zeit damit, weitere Informationen dazu zu erhalten.	①	②	③	④	⑤
003	Ich lerne manches auswendig, indem ich es ständig wiederhole, bis ich es flüssig wiedergeben kann, auch wenn ich es nicht verstanden habe.	①	②	③	④	⑤
004	Ich bin der Ansicht, dass das Studium wissenschaftlicher Themen und Fragestellungen manchmal so fesselnd und spannend sein kann wie ein guter Roman oder Film.	①	②	③	④	⑤
005	Ich bin der Ansicht, dass ich bei den meisten Prüfungen durchkomme, indem ich zentrale Lektionen auswendig beherrsche – auch ohne den Versuch, sie zu verstehen.	①	②	③	④	⑤
006	Im Allgemeinen beschränke ich mein Lernen auf das, was ausdrücklich gefordert wird, da ich Zusatzarbeit für unnötig halte.	①	②	③	④	⑤
007	Für mein Studium arbeite ich viel, da ich die Themen und Materialien interessant finde.	①	②	③	④	⑤
008	Ich verbringe einen großen Teil meiner Freizeit damit, mehr über interessante Themen zu erfahren, die in verschiedenen Lehrveranstaltungen besprochen wurden.	①	②	③	④	⑤
009	Ich bin der Ansicht, dass Lehrende von Studierenden nicht erwarten sollten, ein beträchtliches Maß an Zeit auf das Studium von Themen oder Materialen zu verwenden, von denen jeder weiß, dass sie nicht Gegenstand einer Prüfung sein werden.	①	②	③	④	⑤
010	Zu den meisten Lehrveranstaltungen komme ich mit Fragen, auf die ich eine Antwort möchte.	①	②	③	④	⑤
011	Ich sehe keinen Sinn darin, Inhalte zu erlernen, die voraussichtlich nicht Teil der Prüfung sein werden.	①	②	③	④	⑤
012	Ich bin der Ansicht, dass der beste Weg zum Bestehen von Prüfungen darin besteht, Antworten auf wahrscheinliche Fragen auswendig zu lernen.	①	②	③	④	⑤

C Bitte geben Sie wiederum an, inwieweit die folgenden Aussagen <u>für Ihr Studium insgesamt</u> zutreffen.

Bitte nutzen Sie die Abstufung 3 = „unentschlossen“ nur dann, wenn Sie keine andere Aussage treffen können.

Bitte beachten Sie die Abstufungen der Antwortmöglichkeiten.

		stimme überhaupt nicht zu	stimme weitgehend nicht zu	unentschlossen	stimme weitgehend zu	stimme voll und ganz zu
001	Manches im Studium kann ich ausführen, ohne dabei darüber nachzudenken.	①	②	③	④	⑤
002	Im Studium müssen wir die von den Dozenten gelehrten Begriffe und Konzepte verstehen.	①	②	③	④	⑤
003	Manchmal hinterfrage ich die Art und Weise, wie andere etwas tun, und versuche, einen besseren Weg zu finden.	①	②	③	④	⑤
004	Infolge meines Studiums hat sich mein Selbstbild verändert.	①	②	③	④	⑤
005	Manches im Studium tun wir so oft, dass ich es inzwischen automatisch ausführen kann.	①	②	③	④	⑤
006	Um im Studium zu bestehen, muss man die Inhalte verstehen.	①	②	③	④	⑤
007	Ich denke gern darüber nach, was ich getan habe, und wäge alternative Wege ab.	①	②	③	④	⑤
008	Das Studium hat mich veranlasst, einige meiner festen Überzeugungen infrage zu stellen.	①	②	③	④	⑤
009	Solange ich das ausgegebene Material bei Prüfungen auswendig beherrsche, muss ich nicht zu viel nachdenken.	①	②	③	④	⑤
010	Ich muss die von den Dozenten gelehrten Inhalte verstehen, um sie praktisch anwenden zu können.	①	②	③	④	⑤
011	Ich denke oft über meine Handlungen nach, um zu sehen, ob ich sie hätte besser ausführen können.	①	②	③	④	⑤
012	Infolge meines Studiums hat sich die Art und Weise, wie ich Dinge normalerweise angehe, verändert.	①	②	③	④	⑤
013	Wenn ich den Ausführungen der Dozenten folge, muss ich im Studium nicht allzu viel nachdenken.	①	②	③	④	⑤
014	Im Studium muss man fortlaufend über die Inhalte, die gelehrt werden, nachdenken.	①	②	③	④	⑤
015	Ich überprüfe meine Erfahrungen oft, sodass ich aus ihnen lernen und meine Leistung künftig verbessern kann.	①	②	③	④	⑤
016	Im Verlauf des Studiums habe ich Widersprüche und Unzulänglichkeiten in vormals festen Überzeugungen entdeckt.	①	②	③	④	⑤

D Bitte geben Sie an, inwieweit die folgenden Aussagen für <u>Ihre Arbeit mit dem Computer</u> zutreffen.

Bitte beachten Sie die Abstufungen der Antwortmöglichkeiten.		stimme überhaupt nicht zu	stimme weitgehend nicht zu	unentschlossen	stimme weitgehend zu	stimme voll und ganz zu
001	Durch den Einsatz von Computern kann ich meine Arbeit verbessern.	①	②	③	④	⑤
002	Computer machen die Arbeit interessanter.	①	②	③	④	⑤
003	Mit Computern kann ich gut umgehen.	①	②	③	④	⑤
004	Die Arbeit mit Computern macht Spaß.	①	②	③	④	⑤
005	Es fällt mir leicht, beim Einsatz von Computern das von mir gewünschte Ergebnis zu erzielen.	①	②	③	④	⑤
006	Durch den Einsatz von Computern kann ich meine Produktivität steigern.	①	②	③	④	⑤
007	Die Bedienung von Computern fällt mir leicht.	①	②	③	④	⑤
008	Ich arbeite gerne mit Computern.	①	②	③	④	⑤
009	Durch den Einsatz von Computern kann ich effektiver arbeiten.	①	②	③	④	⑤
010	Ich betrachte Computer als hilfreiches Arbeitswerkzeug.	①	②	③	④	⑤
011	Ich freue mich auf die Bereiche meiner späteren Arbeitstätigkeit, die den Einsatz von Computern erfordern.	①	②	③	④	⑤

E Bitte geben Sie an, inwieweit die folgenden Aussagen aus Ihrer Sicht <u>für die Lehrveranstaltung SPS 1</u> zutreffen.

Bitte beachten Sie die Abstufungen der Antwortmöglichkeiten.		Trifft überhaupt nicht zu						Trifft voll und ganz zu
001	Ich gehe davon aus, dass ich in dieser Lehrveranstaltung eine sehr gute Beurteilung erhalten werde.	①	②	③	④	⑤	⑥	⑦
002	Es ist wichtig für mich, die Inhalte dieser Lehrveranstaltung zu erlernen.	①	②	③	④	⑤	⑥	⑦
003	Ich bin überzeugt, dass ich die grundlegenden Konzepte verstehen kann, die in dieser Lehrveranstaltung gelehrt werden.	①	②	③	④	⑤	⑥	⑦
004	Ich bin überzeugt, dass ich auch die komplexesten Zusammenhänge verstehen kann, die der Dozent in dieser Lehrveranstaltung vorstellt.	①	②	③	④	⑤	⑥	⑦
005	An den Themen und Inhalten dieser Lehrveranstaltung bin ich sehr interessiert.	①	②	③	④	⑤	⑥	⑦
006	Ich erwarte, dass ich in dieser Lehrveranstaltung ein gutes Ergebnis erziele.	①	②	③	④	⑤	⑥	⑦
007	Ich denke, dass es für mich nützlich sein wird, die Inhalte dieser Lehrveranstaltung zu erlernen.	①	②	③	④	⑤	⑥	⑦
008	Die Inhalte dieser Lehrveranstaltung gefallen mir.	①	②	③	④	⑤	⑥	⑦
009	Es ist mir sehr wichtig, die Inhalte dieser Lehrveranstaltung zu verstehen.	①	②	③	④	⑤	⑥	⑦
010	In Anbetracht des Schwierigkeitsgrades dieser Lehrveranstaltung und meines Könnens gehe ich davon aus, in dieser Lehrveranstaltung ein gutes Ergebnis zu erzielen.	①	②	③	④	⑤	⑥	⑦

F Die letzten zwei Fragen beziehen sich auf Ihr <u>individuelles Berufsziel</u> und auf den <u>Beruf Lehrer/-in</u>.

Bitte beachten Sie die Abstufungen der Antwortmöglichkeiten.		stimme gar nicht zu	stimme eher nicht zu	stimme eher zu	stimme völlig zu
001	Ich beabsichtige, später den Beruf des Lehrers/der Lehrerin zu ergreifen.	①	②	③	④
002	Der Beruf des Lehrers/der Lehrerin ist mein Wunschberuf.	①	②	③	④

Bitte prüfen Sie noch einmal, dass Sie alle Fragen beantwortet haben.

Vielen Dank für das Ausfüllen des Fragebogens!

Post-test 1a (t_1): Disposition questionnaire, administered in December 2013 (last session in class, start of session)

Befragung der Teilnehmerinnen und Teilnehmer

Mannheim, im Dezember 2013

Werte Kommilitoninnen und Kommilitonen,

wir bitten Sie, uns bei dieser Befragung durch Ihre Mitwirkung zu unterstützen.

Beim Ausfüllen des vorliegenden Fragebogens ist wichtig, dass Sie das **Format der Antwortmöglichkeiten (Abstufungen) beachten, da dieses zwischen den einzelnen Abschnitten wechselt**. Es gibt keine falschen Antworten; grundlegend ist, dass Ihre Antworten **die Realität so zutreffend wie möglich wiedergeben**. Lesen Sie jede Aussage sorgfältig durch; wenn Sie deren Inhalt erfasst haben, **antworten Sie bitte zügig**. Kreuzen Sie nicht an, sondern **füllen Sie den Kreis mit der zutreffenden Ziffer ganz aus**. Nutzen Sie hierzu bitte einen Stift mit einer dunklen, deckenden Farbe.

Ihre Angaben werden unter Verwendung eines Teilnehmercodes erhoben, **streng vertraulich** behandelt und **ausschließlich zu wissenschaftlichen Zwecken und zur Veranstaltungsoptimierung** verwendet.

Bei Fragen zur Untersuchung wenden Sie sich bitte an mich. Für Ihre Unterstützung danke ich Ihnen.

StR Georg Matthias Schneider

Ihr persönlicher Teilnehmercode

Ihr persönlicher Teilnehmercode (acht Buchstaben) setzt sich zusammen aus

- Den **ersten beiden** Buchstaben des Vornamens Ihrer Großmutter mütterlicherseits (Bsp.: Elisabeth = EL)
- Den **ersten beiden** Buchstaben des Vornamens Ihres Großvaters mütterlicherseits (Bsp.: Thomas = TH)
- Den **ersten beiden** Buchstaben des Vornamens Ihrer Großmutter väterlicherseits (Bsp.: Adelheid = AD)
- Den **ersten beiden** Buchstaben des Vornamens Ihres Großvaters väterlicherseits (Bsp.: Johannes = JO)

Es ergibt sich im Beispiel der Teilnehmercode ELTHADJO.

Ihr Teilnehmercode

A Bitte beurteilen Sie, inwieweit die folgenden Aussagen <u>für Ihr Studium insgesamt</u> zutreffen.

Falls eine Antwort davon abhängt, an welche der von Ihnen studierten Inhalte Sie denken, beziehen Sie sich bitte auf die Inhalte, die Ihnen am meisten bedeuten.

Bitte beachten Sie die Abstufungen der Antwortmöglichkeiten.

		trifft niemals/nur selten zu				trifft immer/fast immer zu
101	Manchmal erfüllt mich Lernen mit einem Gefühl tiefer persönlicher Befriedigung.	①	②	③	④	⑤
102	Ich finde die meisten neuen Themen interessant und verbringe oft zusätzliche Zeit damit, weitere Informationen dazu zu erhalten.	①	②	③	④	⑤
103	Ich lerne manches auswendig, indem ich es ständig wiederhole, bis ich es flüssig wiedergeben kann, auch wenn ich es nicht verstanden habe.	①	②	③	④	⑤
104	Ich bin der Ansicht, dass das Studium wissenschaftlicher Themen und Fragestellungen manchmal so fesselnd und spannend sein kann wie ein guter Roman oder Film.	①	②	③	④	⑤
105	Ich bin der Ansicht, dass ich bei den meisten Prüfungen durchkomme, indem ich zentrale Lektionen auswendig beherrsche – auch ohne den Versuch, sie zu verstehen.	①	②	③	④	⑤
106	Im Allgemeinen beschränke ich mein Lernen auf das, was ausdrücklich gefordert wird, da ich Zusatzarbeit für unnötig halte.	①	②	③	④	⑤
107	Für mein Studium arbeite ich viel, da ich die Themen und Materialien interessant finde.	①	②	③	④	⑤
108	Ich verbringe einen großen Teil meiner Freizeit damit, mehr über interessante Themen zu erfahren, die in verschiedenen Lehrveranstaltungen besprochen wurden.	①	②	③	④	⑤
109	Ich bin der Ansicht, dass Lehrende von Studierenden nicht erwarten sollten, ein beträchtliches Maß an Zeit auf das Studium von Themen oder Materialen zu verwenden, von denen jeder weiß, dass sie nicht Gegenstand einer Prüfung sein werden.	①	②	③	④	⑤
110	Zu den meisten Lehrveranstaltungen komme ich mit Fragen, auf die ich eine Antwort möchte.	①	②	③	④	⑤
111	Ich sehe keinen Sinn darin, Inhalte zu erlernen, die voraussichtlich nicht Teil der Prüfung sein werden.	①	②	③	④	⑤
112	Ich bin der Ansicht, dass der beste Weg zum Bestehen von Prüfungen darin besteht, Antworten auf wahrscheinliche Fragen auswendig zu lernen.	①	②	③	④	⑤

B Bitte geben Sie wiederum an, inwieweit die folgenden Aussagen <u>für Ihr Studium insgesamt</u> zutreffen.

Bitte nutzen Sie die Abstufung 3 = „unentschlossen“ nur dann, wenn Sie keine andere Aussage treffen können.

Bitte beachten Sie die Abstufungen der Antwortmöglichkeiten.

		stimme überhaupt nicht zu	stimme weitgehend nicht zu	unentschlossen	stimme weitgehend zu	stimme voll und ganz zu
101	Manches im Studium kann ich ausführen, ohne dabei darüber nachzudenken.	①	②	③	④	⑤
102	Im Studium müssen wir die von den Dozenten gelehrten Begriffe und Konzepte verstehen.	①	②	③	④	⑤
103	Manchmal hinterfrage ich die Art und Weise, wie andere etwas tun, und versuche, einen besseren Weg zu finden.	①	②	③	④	⑤
104	Infolge meines Studiums hat sich mein Selbstbild verändert.	①	②	③	④	⑤
105	Manches im Studium tun wir so oft, dass ich es inzwischen automatisch ausführen kann.	①	②	③	④	⑤
106	Um im Studium zu bestehen, muss man die Inhalte verstehen.	①	②	③	④	⑤
107	Ich denke gern darüber nach, was ich getan habe, und wäge alternative Wege ab.	①	②	③	④	⑤
108	Das Studium hat mich veranlasst, einige meiner festen Überzeugungen infrage zu stellen.	①	②	③	④	⑤
109	Solange ich das ausgegebene Material bei Prüfungen auswendig beherrsche, muss ich nicht zu viel nachdenken.	①	②	③	④	⑤
110	Ich muss die von den Dozenten gelehrten Inhalte verstehen, um sie praktisch anwenden zu können.	①	②	③	④	⑤
111	Ich denke oft über meine Handlungen nach, um zu sehen, ob ich sie hätte besser ausführen können.	①	②	③	④	⑤
112	Infolge meines Studiums hat sich die Art und Weise, wie ich Dinge normalerweise angehe, verändert.	①	②	③	④	⑤
113	Wenn ich den Ausführungen der Dozenten folge, muss ich im Studium nicht allzu viel nachdenken.	①	②	③	④	⑤
114	Im Studium muss man fortlaufend über die Inhalte, die gelehrt werden, nachdenken.	①	②	③	④	⑤
115	Ich überprüfe meine Erfahrungen oft, sodass ich aus ihnen lernen und meine Leistung künftig verbessern kann.	①	②	③	④	⑤
116	Im Verlauf des Studiums habe ich Widersprüche und Unzulänglichkeiten in vormals festen Überzeugungen entdeckt.	①	②	③	④	⑤

Bitte prüfen Sie noch einmal, dass Sie alle Fragen beantwortet haben.

Vielen Dank für das Ausfüllen des Fragebogens!

Post-test 1b (t_1): Perceptions of the learning environment questionnaire, administered in December 2013 (last session in class, end of session)

Befragung der Teilnehmerinnen und Teilnehmer

Mannheim, im Dezember 2013

Werte Kommilitoninnen und Kommilitonen,

wir bitten Sie, uns bei dieser Befragung durch Ihre Mitwirkung zu unterstützen.

Beim Ausfüllen des vorliegenden Fragebogens ist wichtig, dass Sie das **Format der Antwortmöglichkeiten (Abstufungen) beachten, da dieses zwischen den einzelnen Abschnitten wechselt**. Es gibt keine falschen Antworten; grundlegend ist, dass Ihre Antworten **die Realität so zutreffend wie möglich wiedergeben**. Lesen Sie jede Aussage sorgfältig durch; wenn Sie deren Inhalt erfasst haben, **antworten Sie bitte zügig**. Kreuzen Sie nicht an, sondern **füllen Sie den Kreis mit der zutreffenden Ziffer ganz aus**. Nutzen Sie hierzu bitte einen Stift mit einer dunklen, deckenden Farbe.

Ihre Angaben werden unter Verwendung eines Teilnehmercodes erhoben, **streng vertraulich** behandelt und **ausschließlich zu wissenschaftlichen Zwecken und zur Veranstaltungsoptimierung** verwendet.

Bei Fragen zur Untersuchung wenden Sie sich bitte an mich. Für Ihre Unterstützung danke ich Ihnen.

StR Georg Matthias Schneider

Ihr persönlicher Teilnehmercode

Ihr persönlicher Teilnehmercode (acht Buchstaben) setzt sich zusammen aus

- Den **ersten beiden** Buchstaben des Vornamens Ihrer Großmutter mütterlicherseits (Bsp.: Elisabeth = EL)
- Den **ersten beiden** Buchstaben des Vornamens Ihres Großvaters mütterlicherseits (Bsp.: Thomas = TH)
- Den **ersten beiden** Buchstaben des Vornamens Ihrer Großmutter väterlicherseits (Bsp.: Adelheid = AD)
- Den **ersten beiden** Buchstaben des Vornamens Ihres Großvaters väterlicherseits (Bsp.: Johannes = JO)

Es ergibt sich im Beispiel der Teilnehmercode ELTHADJO.

Ihr Teilnehmercode

A Bitte geben Sie an, inwieweit die folgenden Aussagen aus Ihrer Sicht <u>speziell für die Lehrveranstaltung SPS 1</u> zutreffen.

Bitte beachten Sie die Abstufungen der Antwortmöglichkeiten.		stimme gar nicht zu	stimme eher nicht zu	stimme eher zu	stimme völlig zu
101	Bei den SPS 1 konnte ich mein Lerntempo selbst bestimmen.	①	②	③	④
102	Ich konnte die Aufgaben, die bei den SPS 1 zu bearbeiten waren, frei wählen.	①	②	③	④
103	Der Dozent hat es den Studierenden ermöglicht, Aufgaben und Inhalte selbstständig zu erarbeiten.	①	②	③	④
104	Ich konnte entscheiden, wie ich bei den SPS 1 lerne und arbeite.	①	②	③	④
105	Ich fühlte mich imstande, die Inhalte der SPS 1 gut zu erarbeiten.	①	②	③	④
106	Bei den SPS 1 konnte ich meine Fähigkeiten zeigen.	①	②	③	④
107	Ich habe mich den Herausforderungen und Aufgaben bei den SPS 1 gewachsen gefühlt.	①	②	③	④
108	Ich war imstande, bei den SPS 1 neue und interessante Fähigkeiten und Fertigkeiten zu erlernen.	①	②	③	④
109	Der Dozent bestärkte mich, sodass ich alles offen fragen konnte.	①	②	③	④
110	Der Dozent war freundlich.	①	②	③	④
111	Ich hatte den Eindruck, dass der Dozent mich unterstützen wollte.	①	②	③	④
112	Der Dozent zeigte für Fragen und Anliegen der Studierenden viel Verständnis.	①	②	③	④
113	In meiner Gruppe gibt es ein starkes Gefühl der Zusammengehörigkeit.	①	②	③	④
114	Ich habe mich in dieser Gruppe wohlgefühlt.	①	②	③	④
115	In meiner Gruppe fühle ich mich wie in einer großen Familie.	①	②	③	④
116	Bei den SPS 1 habe ich das Gefühl, dass wir alle in einem großen Team arbeiten.	①	②	③	④
117	Ich werde auch künftig positive Erinnerungen an die Mitglieder meiner Gruppe haben.	①	②	③	④

B Bitte geben Sie an, inwieweit die folgenden Aussagen aus Ihrer Sicht <u>speziell für die Lehrveranstaltung SPS 1</u> zutreffen.

Bitte beachten Sie die Abstufungen der Antwortmöglichkeiten.

Bei der Lehrveranstaltung SPS 1 war es mir wichtig, …

			stimme gar nicht zu	stimme eher nicht zu	stimme eher zu	stimme völlig zu
101	…	mein Lerntempo selbst bestimmen zu können.	①	②	③	④
102	…	die Aufgaben, die zu bearbeiten waren, frei wählen zu können.	①	②	③	④
103	…	dass der Dozent es den Studierenden ermöglichte, Aufgaben und Inhalte selbstständig zu erarbeiten.	①	②	③	④
104	…	entscheiden zu können, wie ich lerne und arbeite.	①	②	③	④
105	…	mich imstande zu fühlen, die Inhalte gut zu erarbeiten.	①	②	③	④
106	…	meine Fähigkeiten zeigen zu können.	①	②	③	④
107	…	mich den Herausforderungen und Aufgaben gewachsen zu fühlen.	①	②	③	④
108	…	imstande zu sein, neue und interessante Fähigkeiten und Fertigkeiten zu erlernen.	①	②	③	④
109	…	dass der Dozent mich bestärkte, sodass ich alles offen fragen konnte.	①	②	③	④
110	…	dass der Dozent freundlich war.	①	②	③	④
111	…	den Eindruck zu haben, dass der Dozent mich unterstützen will.	①	②	③	④
112	…	dass der Dozent für Fragen und Anliegen der Studierenden viel Verständnis zeigte.	①	②	③	④
113	…	dass es in meiner Gruppe ein starkes Gefühl der Zusammengehörigkeit gibt.	①	②	③	④
114	…	dass ich mich in der Gruppe wohlfühle.	①	②	③	④
115	…	dass ich mich in meiner Gruppe wie in einer großen Familie fühle.	①	②	③	④
116	…	das Gefühl zu haben, dass wir alle in einem großen Team arbeiten.	①	②	③	④
117	…	positive Erinnerungen an meine Gruppe mitzunehmen und zu bewahren.	①	②	③	④
118		Meine Gruppe bei den SPS 1: (Di B4 = 1; Mi B2 = 2; Mi B3 = 3; Do B2 = 4; Do B3 = 5; Fr B1 = 6)	☐			

Vielen Dank für das Ausfüllen des Fragebogens!

Post-test 2 (t_2): Task processing questionnaire, administered in February 2014

SPS 1 – Befragung der Teilnehmerinnen und Teilnehmer

Mannheim, im Februar 2014

Werte Kommilitoninnen und Kommilitonen,

im HWS 2013 haben Sie an den „Schulpraktischen Studien 1“ (SPS 1) teilgenommen. Diese umfassten die universitäre Begleitveranstaltung, in der wir gemeinsam mit Ihnen Ihren Schulaufenthalt vorbereitet haben, einen zweiwöchigen Aufenthalt an einer Praktikumsschule und die selbständige Arbeit an Ihrem Portfolio.

Im Rahmen der SPS 1 führen wir mehrere Befragungen durch mit dem Ziel,

- die Effekte der SPS 1 und deren Beitrag zu Ihrer individuellen Ausbildung festzustellen und
- – aufbauend auf den Ergebnissen der Befragung – eine kontinuierliche Optimierung der Inhalte und des Lehr-Lern-Arrangements der SPS 1 vorzunehmen.

Wir bitten Sie, uns hierbei durch Ihre Mitwirkung zu unterstützen.

Abschnitt A des Fragebogens bezieht sich auf die SPS 1 insgesamt (Lehrveranstaltung, Schulaufenthalt und Portfolioarbeit), die Abschnitte B und C beziehen sich speziell auf die Portfolioarbeit. Es gibt keine falschen Antworten; grundlegend ist, dass Ihre Antworten die Realität so zutreffend wie möglich wiedergeben. Lesen Sie jede Aussage sorgfältig durch; wenn Sie deren Inhalt erfasst haben, antworten Sie bitte zügig. Kreuzen Sie nicht an, sondern füllen Sie den Kreis mit der zutreffenden Ziffer ganz aus. Nutzen Sie hierzu bitte einen Stift mit einer dunklen, deckenden Farbe.

Ihre Angaben werden unter Verwendung eines Teilnehmercodes erhoben, streng vertraulich behandelt und ausschließlich zu wissenschaftlichen Zwecken und zur Veranstaltungsoptimierung verwendet.

Bei Fragen zur Untersuchung wenden Sie sich bitte an mich. Für Ihre Unterstützung danke ich Ihnen.

StR Georg Matthias Schneider

Ihr persönlicher Teilnehmercode

Ihr persönlicher Teilnehmercode (acht Buchstaben) setzt sich zusammen aus

- Den **ersten beiden** Buchstaben des Vornamens Ihrer Großmutter mütterlicherseits (Bsp.: Elisabeth = EL)
- Den **ersten beiden** Buchstaben des Vornamens Ihres Großvaters mütterlicherseits (Bsp.: Thomas = TH)
- Den **ersten beiden** Buchstaben des Vornamens Ihrer Großmutter väterlicherseits (Bsp.: Adelheid = AD)
- Den **ersten beiden** Buchstaben des Vornamens Ihres Großvaters väterlicherseits (Bsp.: Johannes = JO)

Es ergibt sich im Beispiel der Teilnehmercode ELTHADJO.

Ihr Teilnehmercode

A **Bitte beurteilen Sie, inwieweit die folgenden Aussagen <u>für die SPS 1 insgesamt – Lehrveranstaltung, Schulaufenthalt und Portfolioarbeit –</u> zutreffen.**

		traf niemals/ nur selten zu				traf immer/ fast immer zu
201	Bei den SPS 1 erfüllte mich Lernen manchmal mit einem Gefühl tiefer persönlicher Befriedigung.	①	②	③	④	⑤
202	Bei den SPS 1 musste ich an einem Thema oder einer Aufgabenstellung so lange arbeiten, bis ich zu eigenen Ergebnissen kam. Vorher war ich nicht zufrieden.	①	②	③	④	⑤
203	Mein Ziel war es, die SPS 1 mit so wenig Aufwand wie möglich zu absolvieren.	①	②	③	④	⑤
204	Bei den SPS 1 beschäftigte ich mich nur mit denjenigen Inhalten ernsthaft, die besprochen oder in der Veranstaltungsübersicht genannt wurden.	①	②	③	④	⑤
205	Bei den SPS 1 war ich der Ansicht, dass so gut wie jedes Thema hochinteressant sein konnte, sobald ich mich darauf einließ und mich näher damit beschäftigte.	①	②	③	④	⑤
206	Bei den SPS 1 fand ich die meisten neuen Themen interessant und verbrachte oft zusätzliche Zeit damit, weitere Informationen dazu zu erhalten.	①	②	③	④	⑤
207	Ich fand die SPS 1 nicht sonderlich interessant, sodass ich meine Arbeit auf das Minimum beschränkte.	①	②	③	④	⑤
208	Bei den SPS 1 lernte ich manches auswendig, indem ich es ständig wiederholte, bis ich es flüssig wiedergeben konnte, auch wenn ich es nicht verstanden hatte.	①	②	③	④	⑤
209	Bei den SPS 1 war ich der Ansicht, dass das Studium wissenschaftlicher Themen und Fragestellungen manchmal so fesselnd und spannend sein konnte wie ein guter Roman oder Film.	①	②	③	④	⑤
210	Bei den SPS 1 prüfte ich mich bei wichtigen Themen selbst, bis ich sie vollständig verstanden hatte.	①	②	③	④	⑤
211	Bei den SPS 1 war ich der Ansicht, dass ich bei der Prüfung durchkomme, indem ich zentrale Lektionen auswendig beherrsche – auch ohne den Versuch, sie zu verstehen.	①	②	③	④	⑤
212	Bei den SPS 1 beschränkte ich mein Lernen auf das, was ausdrücklich gefordert wurde, da ich Zusatzarbeit für unnötig hielt.	①	②	③	④	⑤
213	Für die SPS 1 arbeitete ich viel, da ich die Themen und Materialien interessant fand.	①	②	③	④	⑤
214	Bei den SPS 1 verbrachte ich einen großen Teil meiner Freizeit damit, mehr über interessante Themen zu erfahren, die besprochen wurden.	①	②	③	④	⑤
215	Bei den SPS 1 fand ich es nicht hilfreich, Themen tiefer gehend zu studieren. Es verwirrte und kostete unnötig Zeit, wenn allein die oberflächliche Kenntnis der Themen erforderlich war.	①	②	③	④	⑤
216	Bei den SPS 1 war ich der Ansicht, dass der Dozent von Studierenden nicht erwarten sollte, ein beträchtliches Maß an Zeit auf das Studium von Themen oder Materialen zu verwenden, von denen jeder wusste, dass sie nicht Gegenstand der Prüfung sein würden.	①	②	③	④	⑤
217	Zu den SPS 1 kam ich mit Fragen, auf die ich eine Antwort haben wollte.	①	②	③	④	⑤
218	Bei den SPS 1 legte ich Wert darauf, die überwiegende Zahl der Texte, die als begleitende Literatur empfohlen wurden, zu lesen.	①	②	③	④	⑤
219	Bei den SPS 1 sah ich keinen Sinn darin, Inhalte zu erlernen, die voraussichtlich nicht Teil der Prüfung sein würden.	①	②	③	④	⑤
220	Bei den SPS 1 war ich der Ansicht, dass der beste Weg zum Bestehen der Prüfung darin bestand, Antworten auf wahrscheinliche Prüfungsfragen auswendig zu lernen.	①	②	③	④	⑤

B **Bitte beurteilen Sie, inwieweit die folgenden Aussagen <u>speziell für die Portfolioarbeit bei den SPS 1</u> zutreffen.**

	Im Rahmen der Portfolioarbeit …	**traf niemals/ nur selten zu**				**traf immer/ fast immer zu**
201	… bearbeitete ich die einzelnen Portfoliobereiche nacheinander, ohne Zusammenhänge zwischen den Inhalten zu suchen oder entdeckte Zusammenhänge weiter zu verfolgen.	①	②	③	④	⑤
202	… überprüfte ich die Angemessenheit und Tragfähigkeit meiner beruflichen Orientierung anhand meiner Erfahrungen und Erkenntnisse bei den SPS 1.	①	②	③	④	⑤
203	… stellte ich die Erfahrungen und Erkenntnisse bei den SPS 1 meinem Wissen über meine Stärken und meine Lernbedarfe gegenüber und passte dieses aufgrund der Erfahrungen und Erkenntnisse bei den SPS 1 an.	①	②	③	④	⑤
204	… notierte ich Abweichungen und Übereinstimmungen in dem Feedback, das ich erhielt, ohne mögliche Erklärungen dafür zu suchen.	①	②	③	④	⑤
205	… entwickelte ich auf der Grundlage meiner Erfahrungen und Erkenntnisse bei den SPS 1 eigene Pläne zur weiteren Arbeit an meinen Stärken und meinen Lernbedarfen.	①	②	③	④	⑤
206	… merkte ich mir Wege zur Erreichung meines persönlichen Ziels, die mir vorgeschlagen wurden, ohne diese kritisch auf deren Tauglichkeit oder Passung für meine Person zu überprüfen.	①	②	③	④	⑤
207	… strukturierte ich die Aufgaben von Lehrerinnen und Lehrern und verglich diese mit meinen Vorstellungen, wobei ich ein differenziertes Bild des Lehrerberufs entwickelte.	①	②	③	④	⑤
208	… setzte ich mich damit auseinander, was für mich persönlich guten Unterricht ausmacht, und dachte über Gründe und persönliche Erfahrungen nach, die meine Ansicht stützten.	①	②	③	④	⑤
209	… übertrug ich das in der Lehrveranstaltung Gelernte auf den Unterricht an der Praktikumsschule und stellte Zusammenhänge her.	①	②	③	④	⑤
210	… beschränkte ich mich bei Tipps und Hinweisen zu gutem Unterricht weitgehend darauf, sie zur Kenntnis zu nehmen und sie mir zu notieren.	①	②	③	④	⑤
211	… beschränkte ich mich auf die Erfüllung der Anforderungen, ohne darüber hinausgehende Zusammenhänge zu hinterfragen.	①	②	③	④	⑤
212	… entwickelte ich eigene Ideen, die mit den zu bearbeitenden Aufgaben und Inhalten zusammenhingen.	①	②	③	④	⑤
213	… beschränkte ich meine Lernaktivitäten auf das vorgegebene Basismaterial, ohne sie auf das angebotene Zusatzmaterial zu erweitern.	①	②	③	④	⑤
214	… beschränkte ich mich darauf, die dargebotenen Inhalte zur Kenntnis zu nehmen, ohne über mögliche Zusammenhänge nachzudenken.	①	②	③	④	⑤
215	… beschränkte ich mich darauf, die dargebotenen Inhalte zur Kenntnis zu nehmen, ohne über kritische Einwände nachzudenken.	①	②	③	④	⑤
216	… suchte ich eigenständig Antworten auf Fragen, die bei der Beschäftigung mit den Inhalten auftraten.	①	②	③	④	⑤

C **Bitte geben Sie wiederum an, inwieweit die folgenden Aussagen <u>speziell für die Portfolioarbeit bei den SPS 1</u> zutreffen.**

	Im Rahmen der Portfolioarbeit …	**traf niemals/ nur selten zu**				**traf immer/ fast immer zu**
201	… führte ich manche Aufgaben aus, ohne dabei darüber nachzudenken.	①	②	③	④	⑤
202	… befasste ich mich mit den in der Lehrveranstaltung thematisierten Begriffen und Konzepten solange, bis ich sie verstanden hatte.	①	②	③	④	⑤
203	… überlegte ich bei der Analyse der Hospitationsstunden, wie die beobachtete Lehrperson den Unterricht hätte weiter verbessern können.	①	②	③	④	⑤
204	… prüfte ich mein Selbstbild (Stärken, Lernbedarfe, Interessen, Motive) kritisch und verglich es kontinuierlich mit meinen Erfahrungen und Erkenntnissen bei den SPS 1.	①	②	③	④	⑤
205	… führte ich manche Aufgaben rein routinemäßig aus.	①	②	③	④	⑤
206	… befasste ich mich mit den Inhalten solange, bis ich diese verstanden hatte.	①	②	③	④	⑤
207	… überlegte ich bei der Vor- und Nachbereitung meiner Unterrichtsversuche alternative Möglichkeiten der Unterrichtsgestaltung.	①	②	③	④	⑤
208	… stellte ich aufgrund der Erfahrungen und Erkenntnisse im Rahmen der SPS 1 einige meiner festen Überzeugungen infrage.	①	②	③	④	⑤
209	… gab ich dargebotene Inhalte einfach wieder, wobei nicht zu viel eigenes Nachdenken erforderlich war.	①	②	③	④	⑤
210	… befasste ich mich mit den in der Lehrveranstaltung besprochenen Inhalten solange, bis ich sie praktisch anwenden konnte.	①	②	③	④	⑤
211	… dachte ich bei der Analyse und Bewertung meiner Unterrichtsversuche häufig darüber nach, ob ich sie hätte besser ausführen können.	①	②	③	④	⑤
212	… überprüfte ich die Art und Weise, wie ich Dinge normalerweise angehe, kritisch und veränderte diese, wo es mir angebracht erschien.	①	②	③	④	⑤
213	… hielt ich mich einfach an die Ausführungen des Dozenten, wobei ich über die Inhalte nicht allzu viel nachdenken musste.	①	②	③	④	⑤
214	… dachte ich fortlaufend über die Inhalte nach, um sie zu verstehen.	①	②	③	④	⑤
215	… durchleuchtete ich die Erfahrungen zu meinen Unterrichtsversuchen mehrfach, um aus ihnen zu lernen und meine Leistung künftig zu verbessern.	①	②	③	④	⑤
216	… prüfte ich Widersprüche und Unzulänglichkeiten in vormals festen Überzeugungen, die mir bei den SPS 1 aufgefallen waren, und versuchte, meine Ansichten auf Basis der neuen Erfahrungen und Erkenntnisse zu modifizieren.	①	②	③	④	⑤

Bitte überprüfen Sie noch einmal, dass Sie alle Fragen beantwortet haben.

Vielen Dank für das Ausfüllen des Fragebogens!

Post-test 2 (t_2): Disposition questionnaire, administered in February 2014 (third week of semester)

Befragung der Teilnehmerinnen und Teilnehmer

Mannheim, im Februar 2014

Werte Kommilitoninnen und Kommilitonen,

wir bitten Sie, uns bei dieser Befragung durch Ihre Mitwirkung zu unterstützen.

Beim Ausfüllen des vorliegenden Fragebogens ist wichtig, dass Sie das **Format der Antwortmöglichkeiten (Abstufungen) beachten, da dieses zwischen den einzelnen Abschnitten wechselt**. Es gibt keine falschen Antworten; grundlegend ist, dass Ihre Antworten **die Realität so zutreffend wie möglich wiedergeben**. Lesen Sie jede Aussage sorgfältig durch; wenn Sie deren Inhalt erfasst haben, **antworten Sie bitte zügig**. Kreuzen Sie nicht an, sondern **füllen Sie den Kreis mit der zutreffenden Ziffer ganz aus**. Nutzen Sie hierzu bitte einen Stift mit einer dunklen, deckenden Farbe.

Ihre Angaben werden unter Verwendung eines Teilnehmercodes erhoben, **streng vertraulich** behandelt und **ausschließlich zu wissenschaftlichen Zwecken und zur Veranstaltungsoptimierung** verwendet.

Bei Fragen zur Untersuchung wenden Sie sich bitte an mich. Für Ihre Unterstützung danke ich Ihnen.

StR Georg Matthias Schneider

Ihr persönlicher Teilnehmercode

Ihr persönlicher Teilnehmercode (acht Buchstaben) setzt sich zusammen aus

- Den **ersten beiden** Buchstaben des Vornamens Ihrer Großmutter mütterlicherseits (Bsp.: Elisabeth = EL)
- Den **ersten beiden** Buchstaben des Vornamens Ihres Großvaters mütterlicherseits (Bsp.: Thomas = TH)
- Den **ersten beiden** Buchstaben des Vornamens Ihrer Großmutter väterlicherseits (Bsp.: Adelheid = AD)
- Den **ersten beiden** Buchstaben des Vornamens Ihres Großvaters väterlicherseits (Bsp.: Johannes = JO)

Es ergibt sich im Beispiel der Teilnehmercode ELTHADJO.

Ihr Teilnehmercode

A Bitte beurteilen Sie, inwieweit die folgenden Aussagen <u>für Ihr Studium insgesamt</u> zutreffen.

Falls eine Antwort davon abhängt, an welche der von Ihnen studierten Inhalte Sie denken, beziehen Sie sich bitte auf die Inhalte, die Ihnen am meisten bedeuten.

Bitte beachten Sie die Abstufungen der Antwortmöglichkeiten.

		trifft niemals/nur selten zu				trifft immer/fast immer zu
201	Manchmal erfüllt mich Lernen mit einem Gefühl tiefer persönlicher Befriedigung.	①	②	③	④	⑤
202	Ich finde die meisten neuen Themen interessant und verbringe oft zusätzliche Zeit damit, weitere Informationen dazu zu erhalten.	①	②	③	④	⑤
203	Ich lerne manches auswendig, indem ich es ständig wiederhole, bis ich es flüssig wiedergeben kann, auch wenn ich es nicht verstanden habe.	①	②	③	④	⑤
204	Ich bin der Ansicht, dass das Studium wissenschaftlicher Themen und Fragestellungen manchmal so fesselnd und spannend sein kann wie ein guter Roman oder Film.	①	②	③	④	⑤
205	Ich bin der Ansicht, dass ich bei den meisten Prüfungen durchkomme, indem ich zentrale Lektionen auswendig beherrsche – auch ohne den Versuch, sie zu verstehen.	①	②	③	④	⑤
206	Im Allgemeinen beschränke ich mein Lernen auf das, was ausdrücklich gefordert wird, da ich Zusatzarbeit für unnötig halte.	①	②	③	④	⑤
207	Für mein Studium arbeite ich viel, da ich die Themen und Materialien interessant finde.	①	②	③	④	⑤
208	Ich verbringe einen großen Teil meiner Freizeit damit, mehr über interessante Themen zu erfahren, die in verschiedenen Lehrveranstaltungen besprochen wurden.	①	②	③	④	⑤
209	Ich bin der Ansicht, dass Lehrende von Studierenden nicht erwarten sollten, ein beträchtliches Maß an Zeit auf das Studium von Themen oder Materialen zu verwenden, von denen jeder weiß, dass sie nicht Gegenstand einer Prüfung sein werden.	①	②	③	④	⑤
210	Zu den meisten Lehrveranstaltungen komme ich mit Fragen, auf die ich eine Antwort möchte.	①	②	③	④	⑤
211	Ich sehe keinen Sinn darin, Inhalte zu erlernen, die voraussichtlich nicht Teil der Prüfung sein werden.	①	②	③	④	⑤
212	Ich bin der Ansicht, dass der beste Weg zum Bestehen von Prüfungen darin besteht, Antworten auf wahrscheinliche Fragen auswendig zu lernen.	①	②	③	④	⑤

B Bitte geben Sie wiederum an, inwieweit die folgenden Aussagen <u>für Ihr Studium insgesamt</u> zutreffen.

Bitte nutzen Sie die Abstufung 3 = „unentschlossen“ nur dann, wenn Sie keine andere Aussage treffen können.

Bitte beachten Sie die Abstufungen der Antwortmöglichkeiten.

		stimme überhaupt nicht zu	stimme weitgehend nicht zu	unentschlossen	stimme weitgehend zu	stimme voll und ganz zu
201	Manches im Studium kann ich ausführen, ohne dabei darüber nachzudenken.	①	②	③	④	⑤
202	Im Studium müssen wir die von den Dozenten gelehrten Begriffe und Konzepte verstehen.	①	②	③	④	⑤
203	Manchmal hinterfrage ich die Art und Weise, wie andere etwas tun, und versuche, einen besseren Weg zu finden.	①	②	③	④	⑤
204	Infolge meines Studiums hat sich mein Selbstbild verändert.	①	②	③	④	⑤
205	Manches im Studium tun wir so oft, dass ich es inzwischen automatisch ausführen kann.	①	②	③	④	⑤
206	Um im Studium zu bestehen, muss man die Inhalte verstehen.	①	②	③	④	⑤
207	Ich denke gern darüber nach, was ich getan habe, und wäge alternative Wege ab.	①	②	③	④	⑤
208	Das Studium hat mich veranlasst, einige meiner festen Überzeugungen infrage zu stellen.	①	②	③	④	⑤
209	Solange ich das ausgegebene Material bei Prüfungen auswendig beherrsche, muss ich nicht zu viel nachdenken.	①	②	③	④	⑤
210	Ich muss die von den Dozenten gelehrten Inhalte verstehen, um sie praktisch anwenden zu können.	①	②	③	④	⑤
211	Ich denke oft über meine Handlungen nach, um zu sehen, ob ich sie hätte besser ausführen können.	①	②	③	④	⑤
212	Infolge meines Studiums hat sich die Art und Weise, wie ich Dinge normalerweise angehe, verändert.	①	②	③	④	⑤
213	Wenn ich den Ausführungen der Dozenten folge, muss ich im Studium nicht allzu viel nachdenken.	①	②	③	④	⑤
214	Im Studium muss man fortlaufend über die Inhalte, die gelehrt werden, nachdenken.	①	②	③	④	⑤
215	Ich überprüfe meine Erfahrungen oft, sodass ich aus ihnen lernen und meine Leistung künftig verbessern kann.	①	②	③	④	⑤
216	Im Verlauf des Studiums habe ich Widersprüche und Unzulänglichkeiten in vormals festen Überzeugungen entdeckt.	①	②	③	④	⑤

Bitte prüfen Sie noch einmal, dass Sie alle Fragen beantwortet haben.

Vielen Dank für das Ausfüllen des Fragebogens!