

# The Quality of In-Company Training – Perspectives and Effects

(Betriebliche Ausbildungsqualität – Perspektiven und Wirkungen)

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## Abstract

Vocational education and training plays a key role in providing a skilled workforce and in fighting youth unemployment (e.g., Dornmayr, 2016; OECD, 2019). However, vocational training systems throughout the world experience problems with ensuring high quality training and limiting drop-out. Additionally, gaps prevail in research on the impact in-company training quality exerts on the desired outputs, such as high competence levels and low drop-out rates. Resultingly, vocational training is sometimes referred to as a ‘black box’ (e.g., Beicht et al., 2009; Nielsen, 2013). Furthermore, studies suggest there are perceptual differences between different groups of actors, for example between trainees and training personnel. These different perspectives make interpreting the relevant research difficult since previous research has commonly concentrated on the trainee-related mono-perspective. Against this backdrop, further research aiming to overcome both shortcomings, (1) the mono-perspective approach that does not meet the challenges of an interactive training and (2) insufficient insights on the effects of in-company training quality on outputs (e.g., competence, drop-out), would be a good step toward making vocational training an attractive path for young adults and companies.

To contribute to this objective, the four papers of this dissertation follow a two-step approach. Papers 1 and 2 investigate potential differences in the perception of in-company training quality between trainees and trainers. Papers 3 and 4 analyze the role of in-company training quality for specific outputs, namely drop-out intention and vocational competence. As theoretical foundations, this dissertation applies a pedagogical-sociological view on in-company training, mainly resting on and combining two models: Lempert’s (1998) interactionist framework for professional socialization and Tynjälä’s (2013) workplace learning model or, more precisely, Böhn and Deutscher’s (2019) adaption to the in-company training context. Methodologically, a quantitative empirical approach using the survey instrument “VET-LQI” (Böhn & Deutscher, 2021) is applied to two data sets: (1) A bilateral online survey on in-company training quality (papers 1 and 2), involving 311 trainees and 36 trainers from the same commercial companies, and (2) a two-year longitudinal project (papers 3 and 4), involving training quality surveys and competence tests, producing samples from 562 (Paper 3) and 458 (Paper 4) industrial

business management trainees. The data sets are analyzed via, for example, regression and correlation analyses, structural equation modelling, and t-tests using the software R and SPSS.

Paper 1 presents a novel multi-perspective approach to training quality using negative differences in perceptions between trainees and trainers. The analyses indicate that a multi-perspective assessment could be valuable particularly in cases where conflict potential is decisive: an increase of 10.6 percentage points in variance explanation of trainees' drop-out intentions could be demonstrated compared to the conventional mono-perspective approach. Paper 2 complements that comparison by adding the trainer perspective, underlining that the multi-perspective approach shows the highest correlation to drop-out intention. Moreover, the paper reveals significant perceptual differences between trainees and trainers for 10 out of 15 quality criteria for in-company training: While the participants generally considered training quality to be relatively high (except for *Autonomy* and *Involvement in Expert Culture*), possibly due to relatively good training conditions within the sampled occupations from the business management domain, the trainees judged in-company training quality to be significantly lower than did their trainers. The differences in perception originate from different sources: a suboptimal choice of occupation and the year of training seem to increase differences whereas trainees' socio-demographic characteristics and company size show no effect.

Paper 3 operationalizes a four-directional approach to drop-out intention and indicates that the upward, downward, and horizontal (company vs. occupation change) directions of drop-out intention constitute distinct measures. The findings emphasize that in-company training quality appears to play a crucial role in the emergence of drop-out intention, showing a significant relation to all four directions, especially to the horizontal drop-out types. However, the relatively low explanatory power for upwards and downwards drop-out intention ( $R^2 < .1$ ) force the conclusion that other factors might be missing. Additionally, more parsimonious regression models revealed a two-tier scheme with direction-typical factors and *Social Involvement* as overarching influencing factor. Further aspects such as trainees' aspirations and education exert effects as well. Lastly, the findings of Paper 4 indicate that in-company training quality as a whole construct significantly impacts the development of vocational competence in both dimensions: While variance in domain-specific competence development can be explained to 27%,

the model for domain-linked competence explains 86% of the variance (including control variables). Furthermore, the findings suggest that, for the domain studied, vocational competence can develop relatively independently of the individual starting level and background characteristics. The starting points, however, are influenced by the educational level, aspirations, and mathematical interest.

Overall, the findings shed light into the black box of vocational training by yielding insights into perceptual differences of in-company training quality and the impact training quality exerts on key output targets such as drop-out (intention) and competence development. From a pedagogical perspective, the findings underline the importance of implementing a broad training quality assurance. In this regard, a practice of steady exchange between trainees and trainers based on a comprehensive quality conception should be established. Additionally, a socially involving environment as well as the training personnel's professional pedagogical competences appear to be crucial to achieving high trainee competence development and low dropout intentions for in-company training.

*Of science and the human heart*

*There is no limit.*

Paul Hewson

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## Table of Contents

Abstract .....	I
Acknowledgements.....	V
Table of Contents.....	VI
List of Figures .....	VIII
List of Tables.....	IX
1 Introduction .....	1
1.1 The Importance of In-Company Training and Recent Trends .....	1
1.2 Thesis Context and Perspective on Vocational Training.....	4
1.3 Outline and Research Questions .....	5
2 Company-based Vocational Training .....	10
2.1 About the Construct of Training Quality and Trainees' Position in It .....	10
2.1.1 Making Training Quality More 'Tangible' – Towards a Framework Model for In-Company Training Quality.....	10
2.1.2 What Happens to Trainees? – Socialization and Development Processes in Vocational Training .....	16
2.1.3 Research Perspectives on Vocational Training.....	19
2.2 The Drop-Out Phenomenon in Vocational Training.....	23
2.2.1 About the Scope and Consequences of Drop-Out.....	23
2.2.2 Causes for and Perspectives on Drop-out .....	26
2.3 Competence Development in (Company-based) Vocational Training.....	29
2.3.1 Particularities of Learning within the Training Company .....	29
2.3.2 The Construct of Vocational Competence .....	34



3 Methodological Approach.....	40
3.1 Measurement Operationalizations.....	40
3.1.1 In-Company Training Quality.....	40
3.1.2 Drop-out (Intention) .....	43
3.1.3 Vocational Competence.....	44
3.2 Testing Methods.....	47
3.2.1 Papers 1 and 2 (Perceptions of Training Quality) .....	47
3.2.2 Papers 3 and 4 (Effects of Training Quality) .....	50
4 Paper Publications.....	53
4.1 Paper 1: Differences in Perception Matter – How Differences in the Perception of Training Quality of Trainees and Trainers Affect Drop-Out in VET .....	55
4.2 Paper 2: Quality of In-Company Training – A Matter of Perspective?.....	97
4.3 Paper 3: Drop-out in Dual VET: Why We Should Consider the Drop-out Direction When Analysing Drop-out .....	127
4.4 Paper 4: The Power of In-Company Training for Competence Development: Doing One Thing Without Neglecting the Other.....	154
5 Discussion and Outlook .....	187
5.1 Summary of Findings .....	187
5.2 Scientific and Practical Implications.....	190
5.3 Limitations and Research Outlook.....	197
6 References .....	205
Declaration in lieu of oath.....	230
Doctoral Study Program.....	231
Curriculum Vitae .....	232

## List of Figures

Figure 1. Research outline.....	6
Figure 2. 3-P model of workplace learning (Tynjälä, 2013, p. 14; modified from Biggs, 1999).....	12
Figure 3. Model of training quality (Böhn & Deutscher, 2019, p. 66).....	14
Figure 4. Differentiation of drop-out directions (Krötz & Deutscher, 2022, p. 4; extending Feß, 1995).....	25
Figure 5. Model of competence development and its changes (Winther, 2010, p. 259) .....	38
Figure 6. Price calculation as an exemplary domain-specific task from the competence test (Klotz, 2015) .....	45
Figure 7. Currency conversion as an exemplary domain-linked task from the competence test (Klotz, 2015) .....	46
Figure 8. Two-dimensional Rasch model with between-item multidimensionality (Ma et al., in preparation b; adjusted from Hartig & Höhler, 2009).....	46

## List of Tables

Table 1. Paper overview and publication status .....	8
Table 2. Categorization of exemplary views on vocational training .....	20
Table 3. Items to operationalize four directions of drop-out intention.....	43

# 1 Introduction

## 1.1 The Importance of In-Company Training and Recent Trends

In recent years, in Germany alone, about 1.3 million young people have trained in a dual vocational training, with more than half of a school graduate cohort commencing training annually (Bundesinstitut für Berufsbildung [BIBB], 2020, 2021, 2022). The sheer amount of workforce trained through the dual vocational education and training (VET) system<sup>1</sup> makes the quality of its in-company training facet an important object of research. But not only for trainees participating in vocational training is its quality of relevance, also companies and the economy as a whole benefit from high-quality vocational training: Vocational training, especially dual VET, is related to higher competitiveness and innovativeness (Fischer et al., 2011), lower youth unemployment rates and to counteracting the shortage of skilled workers by producing a highly skilled workforce (DGB-Bundesvorstand, 2020; Dornmayr, 2016; Hanushek, 2012; OECD, 2019; Zimmermann et al., 2013). The term ‘producing’ indicates that within vocational training an ‘output’ is generated over a period of, generally, three (two to four) years, and it is easy to conceive that this output might differ depending on the quality of the vocational training.

Furthermore, around the globe, systems of vocational training face similar difficulties in ensuring quality as, for example, many OECD countries report rising drop-out rates, entailing costs for states (e.g., tax revenue, welfare net), companies (e.g., loss of workforce, search for substitute) and affected individuals (e.g., loss of time and income). As Böhn and Deutscher (2022) and Krötz and Deutscher (2022) argued, drop-out rates range from 18.7% in China (Yi et al., 2015) to 58.6% in Australia (NCVER, 2020), although not fully comparable due to different calculation methods (CEDEFOP, 2016). In Germany, the drop-out rate increased for more than a decade and reached an all-time high of 26.9% before the Covid19 pandemic (BIBB, 2021, p. 142). Simultaneously, the share of

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<sup>1</sup> Dual VET comprises a duality of a state vocational schooling and a private company component. Contrastingly, non-dual conventional vocational training solely takes place within either training companies or vocational schools.

untrained young people (aged 20 to 34 years) rose to nearly 15% (BIBB, 2022, p. 286). Additionally, the number of new training contracts dropped to the lowest level in 30 years, presumably affected by the Covid19 pandemic and its containment measures (BIBB, 2021, p. 9).

But even before the pandemic, a downward trend in the number of new contracts was apparent over the previous decade while the number of university entrants rose, indicating vocational training's lower attractiveness for school graduates (BIBB, 2019, 2020). Moreover, changing demographics has meant that "matching supply with demand is becoming increasingly difficult" (Dummert et al., 2019, p. 661) and impeding the provision of a skilled workforce, with the number of vacant training positions now more than triple that of 2009 (BIBB, 2019, 2021).<sup>2</sup> Companies already compete in attracting suitable trainees (Beicht et al., 2009). These developments enhance the necessity to improve training quality, to ultimately make vocational training more attractive to young people and to reduce the number of drop-outs (DGB-Bundesvorstand, 2020; Gow et al., 2008). As argued by Böhn (2020) and by Krötz and Deutscher (2021a), several countries<sup>3</sup> have committed to the goal of strengthening the attractiveness of vocational training and improving the drop-out and labor market situation (see also Le Mouillour, 2018).

As a first step in this direction, more insights are needed into the quality of vocational training: How is training quality evaluated by different actors? Does the quality of training affect outputs such as drop-out or competence development? Relevant research findings show that in-company training quality is generally considered mediocre (e.g., Cully & Curtain, 2001; DGB-Bundesvorstand, 2019; Ebbinghaus et al., 2010; Greilinger, 2013): More than 50% of all trainees are unsatisfied with at least one aspect of in-company training (DGB-Bundesvorstand, 2016). However, such results vary depending on the domains and professions. Despite the importance of fostering learning at the training workplace in light

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<sup>2</sup> For the year 2009 the BIBB (2019, p. 15) stated 17,766 vacant training positions, while for the year 2020 it was nearly 60,000 (BIBB, 2021, p. 19), equating to a 3.37-fold increase.

<sup>3</sup> For instance, Austria (Dornmayr & Löffler, 2018), Denmark (Andersen & Helms, 2019), France (Centre Inffo, 2019), the Netherlands (Smulders et al., 2019), Portugal (DGERT, 2019) and Sweden (Skolverket ReferNet Sweden, 2019); as previously listed in Böhn (2020) and Krötz and Deutscher (2021a).

of our increasingly knowledge-based society (Dehnbostel & Pätzold, 2004; Jantzen, 2009) and of reducing drop-out from training, findings on the relation of training quality to training outputs (e.g., drop-out, competence) are scarce and, if at all, show only small effects for selected criteria (e.g., Dietzen et al., 2014; Negrini et al., 2016; Nickolaus et al., 2009). Consequently, there is still a lack of reliable knowledge about training quality as a broad multi-criteria construct and its effects, especially compared to the state of research on school education (Beck, 2005; Euler, 2005). This lack of knowledge results in vocational training being frequently referred to as a ‘black box’ (e.g., Anbuhl & Gießler, 2013; Beicht et al., 2009; Dietzen et al., 2010; Nielsen, 2013).

One of the key issues impeding research on training quality to enlighten the black box is the lack of involvement of multiple actors and stakeholders in studies: trainees, qualified training personnel, colleagues without official training responsibilities, and, in some systems, teachers as well as external chambers (for, e.g., conducting final examinations). Despite these various actors, most studies on training quality take a mono-perspective approach. Numerous studies exist with a focus either on the training personnel’s perspective (e.g., Cooney & Long, 2008; Jansen & Pineda-Herrero, 2019; Kirpal & Wittig, 2009; Wilson, 2019) or, in case of dual systems, VET-teachers’ perspectives (e.g., Andersson & Köpsén, 2017, 2019; Bouwmans et al., 2019; Gibb, 2003; Wenström et al., 2018). Nevertheless, by far the most research focuses on trainees’ perspectives on training quality (see Böhn & Deutscher, 2019, 2022). However, and not surprisingly, findings on training quality and its effects vary depending on which group of actors is researched (e.g., Cully & Curtain, 2001; Griffin, 2017; Walker et al., 2012) – as will be elaborated extensively in the second paper of this dissertation – ultimately reducing the studies’ comparability (Tynjälä, 2013; Ebbinghaus, 2016).

Despite multiple actors involved and hints of different perceptions regarding training quality, multi-perspective approaches that consider at least two groups of actors in assessing training quality remain the exception. Overall, the analyses of only selected quality criteria, the focus on one actor group, and the research gap regarding causal associations of training quality do not meet the training reality – a multi-faceted, interactional development phase (as will be shown) – and necessitate the research performed within the framework of this dissertation.

## 1.2 Thesis Context and Perspective on Vocational Training

In light of the relevance of vocational training for individuals, companies, and states and of the recent developments in training reality and the prevailing shortcomings in research, the overarching objective of this dissertation is to shed light on training quality by considering different perspectives (papers 1 and 2) and to gain more insights into the influences training quality can exert on relevant outputs, such as drop-out intention and competence development (papers 3 and 4; outlined in detail in Section 1.3).

The focus of this research is set on the company-based part of vocational training in the business management domain, excluding vocational schools. Thus, the theoretical considerations, findings, and implications of this dissertation widely apply to various types of company-based vocational training and are not restricted to any dual VET, such as that in the German system. However, the context of all data on company-based training quality used in this dissertation is the German dual VET system, involving official German training occupations from the business management domain (e.g., industrial business management trainees, banking management trainees, etc.). Therefore, empirical tests are still needed to determine whether the findings of this research might also be relevant and partly applicable to other domains with company-based training (phases), such as industrial-technical professions.

Within this thesis, vocational training is understood as structured training programs aimed at achieving an official qualification degree in a defined occupation. More precisely, the concept of vocational training ultimately aims at “sustainable changes in behavior and cognition so that individuals possess the competencies they need to perform a job” (Salas et al., 2012, p. 77). Such vocational competence comprises more than mere specialist expertise. It requires a set of competences that enable autonomous working and reflection of work and thus also includes methodological, personal, and social competence facets, often referred to as action competence (Frank & Schreiber, 2006; Hensge et al., 2011; Klotz, 2015). To meet the challenges of understanding the complex maturing processes of trainees, this dissertation applies a business pedagogical perspective on company-based vocational training that also takes into account sociological components (socio-demographic background, aspects of socialization processes before and during training, etc.).

Furthermore, responding to these challenges and ensuring vocational competence is attained necessitates that in-company educational work targets the improvement of learning opportunities within the company by designing expedient learning environments and creating new learning concepts (Dehnbostel & Pätzold, 2004, p. 23). Company-based pedagogical work, thus, builds a point of intersection where requirements and objectives of business-related human resource development and organizational development as a whole overlap, aiming to foster trainees' action competence (*ibid.*, p. 23 f.). When designing expedient learning environments, the business pedagogical perspective on training has to incorporate formal and, especially, informal experiential learning processes (Dehnbostel & Pätzold, 2004; Tannenbaum, 1997) and consider the diverse working and learning opportunities within a training company (e.g., Dehnbostel, 1998; Münch, 1981). Designing successful vocational training from the business pedagogical perspective is, thus, a challenging and complex endeavor for which deeper insights into the current state of quality, the perceptions of quality, and the role and effects of concrete, shapeable quality aspects would be extremely useful and necessary foundations.

### 1.3 Outline and Research Questions

To contribute to broadening the state of research and to gaining the needed insights, the four papers included in this dissertation examine training quality in a two-step structure, illustrated in Figure 1. The figure represents the perspectives of the two main actor groups, the individual trainee and the company (training personnel), and depicts a rough visualization of vocational training (resting on a basic model of training quality, which will be elaborated in Chapter 2). As a first step, papers 1 and 2 focus on perceptions of the current state of in-company training quality (Fig. 1, orange circle), thereby elaborating differences in perceptions between trainees and trainers and touching on potential roots and implications of such differences. The overarching research interest is: Does the evaluation of training quality substantially differ depending on who we ask? If yes, is the perceptual difference relevant for research on topics related to training quality? For this purpose, a bilateral dataset of trainees and central training

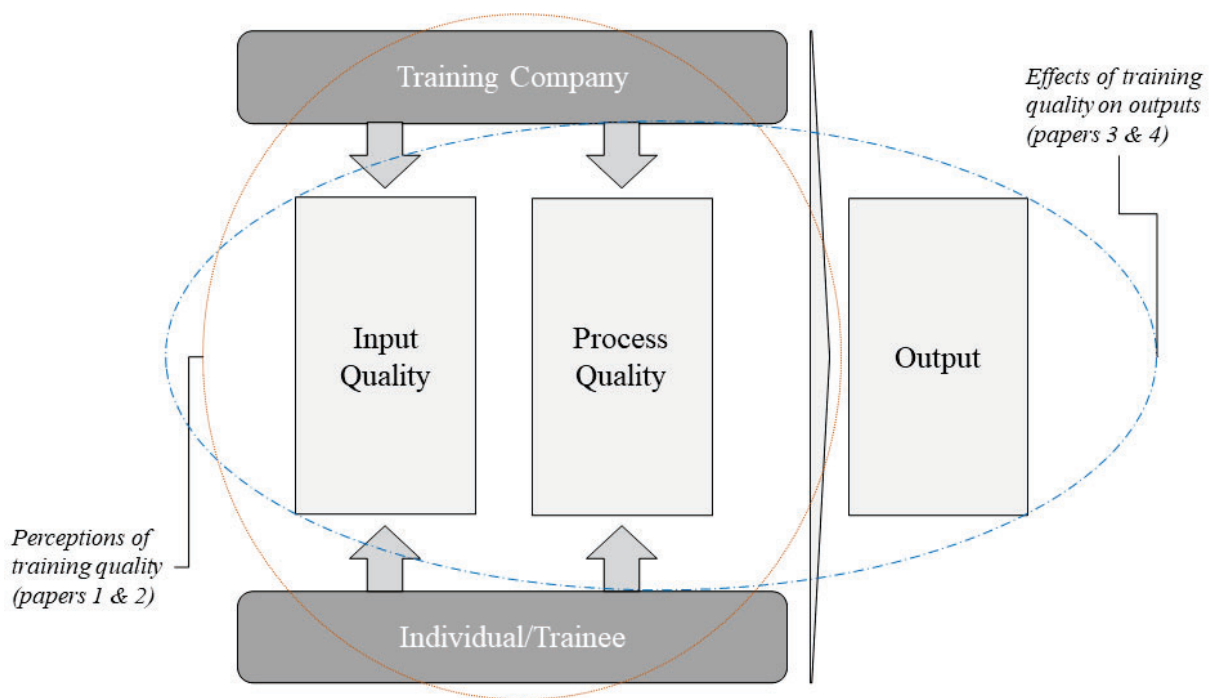


officers<sup>4</sup> was used. Here, training outputs only played an exemplary role in comparing different operationalizations of training quality.

As a second step, papers 3 and 4 cover the effects of in-company training quality on outputs, namely drop-out intention and competence development (Fig. 1, blue ellipse). Here, the overarching research question is: Does the quality of in-company training affect training outputs (drop-out intention and competence development)? If yes, do specific training quality criteria differ in their effect on the respective output? To achieve deeper insights, the research for papers 3 and 4 drew data from an extensive longitudinal dataset, stemming from the project ‘Competence development through enculturation’ (KL 3076/2-1) on vocational training quality funded by the German Research Foundation (DFG).

**Figure 1**

*Research outline*



<sup>4</sup> Management staff responsible at the highest level for in-company training (see Section 3.1.1).

Table 1, below, summarizes more detailed information about the four papers, for instance, regarding their publication status, research questions, data collections, samples, and methods. To answer the specific research questions, Paper 1 expounds the issue of potential differences in the perception of training quality and its consequences (for the example of drop-out intention). Based on that elucidation, the paper explores the possibility of a novel multi-perspective operationalization of training quality (in the form of negative differences in perception) and examines the question whether this new approach would be beneficial, compared to the mono-perspective approach, in explaining the relationship between training quality and outputs. Following that analysis, Paper 2 addresses one of the main weaknesses of the research state – the missing multi-perspective assessment of company-based vocational training quality – and analyses how pronounced these differences in perception between trainees and trainers are in the literature and within the sample. Furthermore, the paper investigates which of the available personal and framework characteristics (inputs) are capable of explaining the differences in the perception of training quality.

As a next step, Paper 3 begins the investigation of in-company training quality's relation to vocational training outputs. With regard to drop-out from vocational training, the paper analyzes whether different directions of drop-out (intention) are measurable, that should be differentiated in research so that the future path trainees' intent to take after dropping out is considered (see Section 2.2). Following that analysis, the paper examines whether training quality is significantly related to drop-out intention and how its effect compares to other influences. Lastly, the paper questions whether the relationship of in-company training quality varies with regard to different directions of drop-out intention. Paper 4 deals with the role training quality plays for trainee competence development over the course of vocational training. More precisely, the effect of training quality on domain-specific and domain-linked competence development is explored while important input characteristics (e.g., education, aspirations, company size) are controlled. Here, an additional question of interest is whether the effect of company-based training quality varies regarding the two competence dimensions.

**Table 1***Paper overview and publication status*

Study	Paper 1	Paper 2	Paper 3	Paper 4
Reference	Krötz, M., & Deutscher, V. (2021). Differences in Perception Matter – How Differences in the Perception of Training Quality of Trainees and Trainers affect Drop-out in VET. <i>Vocations and Learning</i> , 14, 369–409.	Krötz, M., & Deutscher, V. (2021). Betriebliche Ausbildungsqualität – Eine Frage der Perspektive? [Quality of In-Company Training – A Matter of Perspective?]. <i>Zeitschrift für Erziehungswissenschaft</i> 24, 1453–1475.	Krötz, M., & Deutscher, V. (2022). Drop-out in dual VET: Why We should consider the Drop-out Direction when Analysing Drop-out. <i>Empirical Research in Vocational Education and Training</i> , 14, 1–26.	Krötz, M., Ma, B., Deutscher, V., & Winther, E. (under review). The Power of In-Company Training for Competence Development: Doing One Thing Without Neglecting the Other. <i>Journal of Vocational Education &amp; Training</i> .
Research questions	Is a multi-perspective assessment of training quality (using negative differences in perception) possible? Is the multi-perspective approach beneficial compared to the mono-perspective approach (e.g., regarding its explanatory power for outputs)?	How pronounced are the differences in perception between trainees and trainers? Are input criteria of vocational training capable of explaining differences in perception?	Is it possible to measure different directions of drop-out intention? What role does training quality, in comparison to other influences, play for drop-out intention? Does the effect of training quality vary regarding different directions of drop-out intention?	What effect does training quality have on domain-specific and domain-linked competence development, while controlling for relevant input characteristics? Does the effect vary for the two competence dimensions?
Data & Methods	<ul style="list-style-type: none"> <li>• Questionnaire data</li> <li>• Difference accounting multi-perspective (DAM) Scoring</li> <li>• Regression analysis</li> </ul>	<ul style="list-style-type: none"> <li>• Questionnaire data</li> <li>• T-tests</li> <li>• ICC-coefficients</li> <li>• DAM Scoring</li> <li>• Correlation analysis</li> <li>• Regression analysis</li> </ul>	<ul style="list-style-type: none"> <li>• Questionnaire data</li> <li>• Correlation analysis</li> <li>• Regression analysis</li> <li>• Graphical illustrations</li> </ul>	<ul style="list-style-type: none"> <li>• Questionnaire data</li> <li>• Competence tests</li> <li>• Latent growth modelling</li> <li>• Structural equation modelling</li> </ul>
Sample	311 trainees from business management domain, 36 trainers (from 30 companies)	311 trainees from business management domain, 36 trainers (from 30 companies)	562 Industrial business management trainees	458 Industrial business management trainees
Data Collection	Own data collection after direct contact to central training officers by phone and e-mail (online)		Part of the DFG Project ‘Competence development through enculturation’ (paper-pencil and partly online)	

As a framework for all four papers, Chapter 2 of this dissertation expounds the theoretical foundations of the research, including the understanding of and approach to in-company training quality and the individual developments occurring over the course of training (Section 2.1). On this basis, the drop-out

phenomenon is highlighted extensively from different angles (Section 2.2), before the particularities of learning within company-based training and the concept of vocational competence are explained (Section 2.3). Chapter 3 presents the methodological approach, including the operationalization of training quality, drop-out (intention), and vocational competence and the specific statistical methods applied. The fourth chapter represents the main body of this dissertation, giving, initially, an overview of the four papers before all papers are included in their original forms (except paper 4, included as amended manuscript from December 12, originally submitted in June 2022). Chapter 5 then summarizes and discusses the main findings by pointing out scientific and practical implications, limitations, and considerations for future research.

## **2 Company-based Vocational Training**

Vocational training, especially the in-company training section, is sometimes referred to as a black box (e.g., Anbuhl & Gießler, 2013; Beicht et al., 2009; Dietzen et al., 2010; Nielsen, 2013), where trainees experience some kind of personal development and are expected to achieve a working-world-ready stadium. This chapter takes a closer look at that process by expounding the theoretical foundations for the research on training quality within the scope of the four papers in Chapter 4.

As a first step, approaches to the quality of in-company training and the modelling of training quality are presented and transferred into a fundamental framework model of in-company training quality (Section 2.1). To build a basic understanding of the teaching-learning processes occurring within vocational training, the model is then ‘filled with life’ by reference to an interactionist approach and professional socialization theory. Based on this pedagogical-sociological access, Section 2.2 takes a closer look at the phenomenon of drop-out and constitutes the theoretical background to Paper 3. Lastly, Section 2.3 illustrates the specifics of learning at the workplace within vocational training and how vocational competence is developed (foundation for Paper 4).

### **2.1 About the Construct of Training Quality and Trainees’ Position in It**

#### **2.1.1 Making Training Quality More ‘Tangible’ – Towards a Framework Model for In-Company Training Quality**

“Quality lies in the eyes of the beholder” (Garvin, 1984, p. 27).

In everyday life, it is common to use the term ‘quality’ to ascribe ‘high’ quality to certain products or manufacturers, e.g., a specific automobile that is perceived to be of high quality. This usage already includes an individual judgment and constitutes “the result of an evaluation of the object’s characteristics” (Heid, 2000, p. 41; translation by the author). However, following Ebbinghaus et al. (2007, p. 12), the term’s Latin origin (‘qualitas’), meaning properties or characteristics, constitutes a more “value- and content-neutral” approach. In this regard, concrete quality characteristics need to be specified prior to an evaluation, thus enabling a comparison of the specified normative demand and the

actual conditions (e.g., Bülow-Schramm, 2006; Klotz et al., 2017). Since these quality characteristics still lie “in the eyes of the beholder” (Garvin, 1984, p. 27), the quality evaluations remain subjective but are related to transparent characteristics. Especially in the case of training quality, where different stakeholder groups (e.g., trainees, trainers, companies, political institutions) pursue different objectives and diverge in their weighting of the importance of specific quality characteristics, quality evaluations appear to be perspective-dependent expressions of quality realization in terms of attaining normative targets (Harvey & Green, 2000; Heid, 2000; Klotz et al., 2017; Mirbach, 2009).

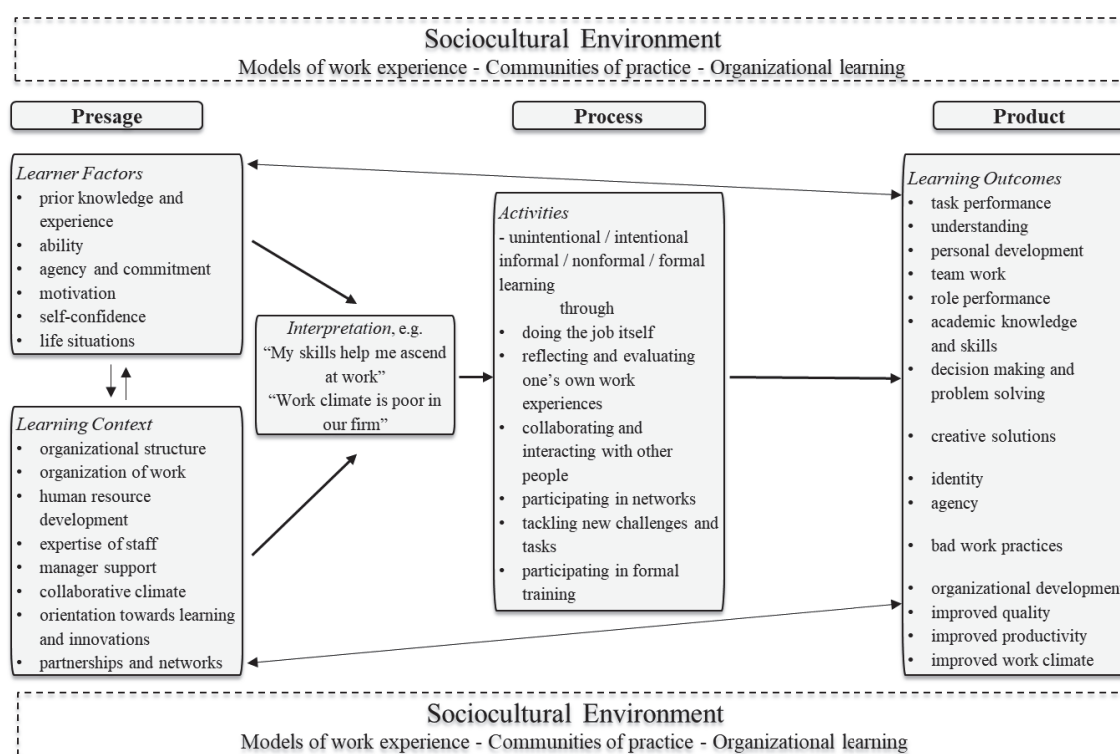
For vocational training, different approaches to specifying training quality have been developed over time, both structural and dynamic models. Structural approaches aim to systematize training quality by distinguishing between different (mostly tiered) levels, which comprise varying scopes of quality (Ebbinghaus et al., 2007, p. 13). Besides other, more complex, approaches (e.g., Bronfenbrenner, 1981; Degen & Walden, 1997; Sloane, 2006), structural approaches most commonly differentiate training quality into micro-, meso- and macro-levels (e.g., Kell, 1989; Kurz, 2005; Schafer & Baeriswyl, 2015). The micro-level generally concerns an individual’s immediate environment, including the learning process at the workplace. The organization constitutes the surrounding meso-level, which is characterized by training companies’ properties and comprises their facilities and personnel. Lastly, the macro-level encompasses more general conditions such as the economy, society, a legal framework, or the educational system. Within such models, the levels are not independent. Instead, one level is mostly in direct contact and exchange with the next higher level (Bronfenbrenner, 1981; Kell, 1989; Klotz et al., 2017; Kurz, 2005; Rausch, 2011; Reetz & Seyd, 2006; Schafer & Baeriswyl, 2015; Tillmann, 1994).

Dynamic approaches operationalize training quality by depicting the training process over several ‘phases’. Over time, such processual approaches have developed to models that generally distinguish between input, process, and output, reflecting a consensus on ‘three-pillar’ models in the workplace learning research community (e.g., Biggs, 1999; Böhn & Deutscher, 2019; Ebbinghaus et al., 2011; Euler, 2005; Fischer et al., 2011; Seyfried et al., 2000; Tynjälä, 2013; Visser, 1994). These approaches share a common understanding of input factors as framework conditions, which exist prior to starting a vocational training. These conditions include, for instance, the organizational structure, the

material equipment, and the characteristics of the individual starting the training (Ebbinghaus et al., 2007; Euler, 2005; Tynjälä, 2013). Quality criteria related to the process dimension provide detailed information about how the training is performed, comprising, e.g., the teaching-learning process, the interaction with colleagues and trainers, and the work tasks (Ebbinghaus et al., 2007; Euler, 2005; Tynjälä, 2013). However, there are differences in the precise classification of certain quality criteria (Ebbinghaus, 2009, p. 36). For instance, the training personnel's competences could be considered as already in existence when commencing the training (input). On the other hand, the personnel's competences are arguably no fixed input as they vary and develop over time and only come into effect when interacting with trainees (process). Lastly, output factors consider the results of the training process, which include, e.g., trainees' developed competences and task performance but also completion rates of training in general (Ebbinghaus et al., 2011; Euler, 2005; Fischer et al., 2011; Tynjälä, 2013). A widely used dynamic approach is represented in Tynjälä's (2013, p. 14) "3-P model of workplace learning", which is based on Biggs (1999) and distinguishes between presage, process, and product (Fig. 2).

**Figure 2**

*3-P model of workplace learning*



*Note.* Figure cited from Tynjälä (2013, p. 14; modified from Biggs, 1999).

Following Ebbinghaus et al. (2011, p. 200), the discussion on the quality of vocational training and which pillar should be focused on more intensely has a long tradition in Germany, going back to 1969, when the German Education Council (1969) published recommendations to improve the vocational training and the Vocational Training Act (BBiG) was enacted. The discussion has, however, shifted over time. The first study on the quality of vocational training ('Costs and Funding of Vocational Education') by an expert commission revealed qualitative differences between distinct training occupations, company sizes, and industry sectors (Sachverständigenkommission Kosten und Finanzierung der beruflichen Bildung, 1974). The focus of that study was input-oriented since it lay on checking the implementation of the newly enacted legal requirements resulting from the Vocational Training Act (Ebbinghaus et al., 2011, p. 200). However, the expert commission introduced two quality models for vocational training: The input model included aspects concerning, e.g., material equipment, training personnel, and coordination, while the output model comprised several different trainee suitability criteria, e.g., regarding the occupation, the working environment, and the final exams (Sachverständigenkommission Kosten und Finanzierung der beruflichen Bildung, 1974, p. 125 ff.).

That study uncovered two important points. First, it indicated the unclear concept of training quality with regard to its scope and modelling, as various conceptualizations and quality objectives could be justified. And second, it laid the ground for later developments of processual quality models for vocational training. Since the turn of this century, the quality discussion has shifted to a process and predominantly output orientation (Ebbinghaus et al., 2011, p. 200 & p. 205; Hensge et al., 2011, p. 133 f.) as, for instance, results of comparative studies such as the PISA surveys have drawn attention to the importance of controlling educational outputs (Ertl, 2006; Kurz, 2005). Additionally, a paradigm shift was induced by efforts of the EU to enable the comparability of different qualifications by increasing transparency (Commission of the European Communities, 2005, p. 4) and measurability of output factors (ibid., p. 33; Ebbinghaus et al., 2011, p. 200; Kurz, 2005, p. 427). Since its reform in 2005, the German Vocational Training Act has also included the political objective of continuously developing the quality of vocational training (Vocational Training Act, 2020, § 79 I, § 83 I). This political refocusing on training quality (and its outputs) and the initially described changing socio-economic framework led

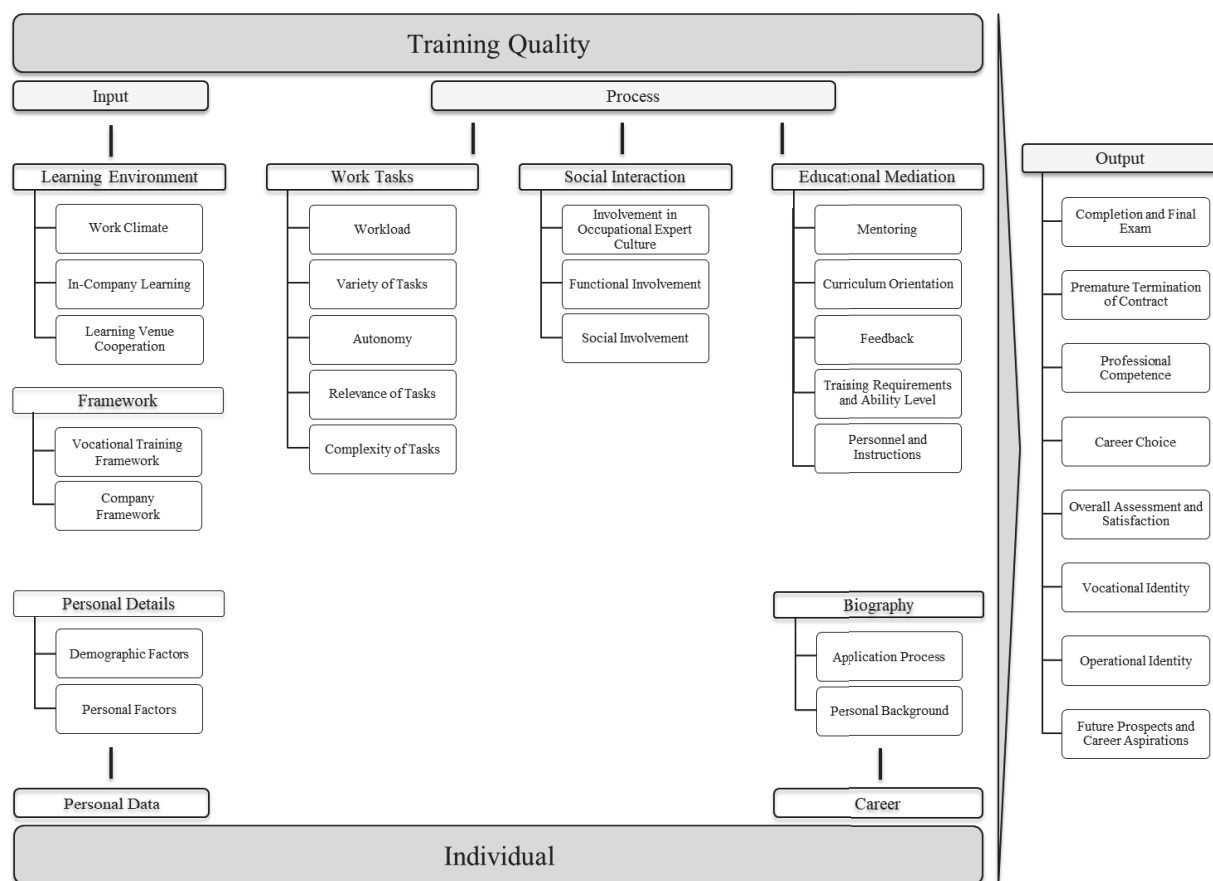


to more recent studies gradually examining how the quality of vocational training needs to be configured to successfully meet challenges (Ebbinghaus et al., 2011, p. 200).

One recent operationalization of the in-company training quality that constitutes the fundament for understanding training quality in this dissertation can be found in Böhn and Deutscher's (2019, p. 66) model of training quality (Fig. 3), which aims to systematize vocational training by combining processual and structural approaches. Following a meta-analysis of 43 survey instruments, comprising more than 3,300 items, those authors formed a 30-category model that comprised pedagogically relevant quality aspects and predominantly built upon Tynjälä's (2013) dynamic approach.

**Figure 3**

*Model of training quality*



*Note.* Figure cited from Böhn and Deutscher (2019, p. 66).

In general, the model distinguishes between the input, process, and output dimensions, on the upper level of the model (see Fig. 3). On the lowest level, the model covers two dimensions of the individual (*Personal data* and *Career*). The graphical separation in Fig. 3 illustrates the interaction of the two main actors, trainees and company representatives, during daily training. The model, therefore, considers

aspects on the micro- and meso-level of vocational training, including the training company and all actions of the main actors of training (trainees, trainers, employees). Influences at the macro-level are excluded to reduce complexity but could still indirectly influence the training quality via the meso-level, for instance, when economic crisis decreased the financial resources and, as a result, certain training facilities were in poor condition or not available.

The input dimension on the company side represents quality criteria initially provided by training companies and is subdivided into the areas *Learning Environment* and *Framework*. The former includes the quality aspects *Work Climate*, *In-Company Learning* (targeting didactic variety in terms of materials, methods, and media) and *Usefulness of Learning Venue Cooperation*, while *Framework* differentiates between the *Vocational Training Framework* and the *Company Framework* (Böhn & Deutscher, 2019, p. 65).

The process dimension in the model's central column comprises three areas with 13 quality criteria that come into effect only during daily in-company training. Within this dimension, *Work Tasks* encompasses different characteristics of trainees' tasks (*Overload*, *Variety of Tasks*, *Autonomy*, *Relevance of Tasks*, *Complexity of Tasks*). As the work tasks trainees face over the course of training differ due to the trainees' advancement and the varying departments they work in, task characteristics are located in the process dimension (ibid., p. 65). The remaining two areas both reflect the interaction between trainees and their colleagues and trainers. In this regard, *Social Interaction* encompasses three aspects of involvement (*Involvement in the Occupational Expert Culture*, *Functional-* and *Social Involvement*), whereas *Educational Mediation* consists of *Mentoring*, *Curriculum Orientation*, *Feedback*, *Training Requirements and Ability Level*, and *Personnel and Instructions* (ibid., p. 66). Overall, the model's input and process dimensions aim to include all aspects that research found relevant for learning at the workplace over the last decades (see also Section 2.3), although different terms are being used (e.g., Beicht et al., 2009; Hackman & Oldham, 1976; Klotz et al., 2017; Rausch & Schley, 2015; Zimmermann et al., 1994). Lastly, the model's output dimension considers all possible short- and long-term results of the preceding input and process dimension of training quality. The dimension contains multiple aspects, including, e.g., *Completion and Final Exams*, *Premature Termination of*

*Contract, Professional Competence, Overall Assessment and Satisfaction, and Vocational Identity* (Böhn & Deutscher, 2019, p. 67).

Referring back to the initially described need for pre-selected quality criteria, the presented model delivers the catalogue of (widely pedagogically influenceable) quality criteria for in-company training used in this dissertation, making the construct of training quality more tangible (for further operationalization see Section 3.1.1). However, training quality stays subjective – depending on who is evaluating – as long as no omniscient observer attends all training processes. To evaluate training quality, researchers predominantly approach trainees (as is shown in Paper 2; Klotz et al., 2017), which may partly be related to the interest in training outputs, which are generally connected to trainees. In this dissertation, the output criteria of interest are restricted to *Premature Termination of Contract* (hereafter shortly referred to as ‘drop-out’) and *Competence*, which will be separately discussed in the next sections (2.2 and 2.3). The remainder of this section takes a closer look at the development processes within company-based training in order to define training quality.

### **2.1.2 What Happens to Trainees? – Socialization and Development Processes in Vocational Training**

The presented framework model for in-company training quality (Fig. 3) helps in structuring quality aspects in vocational training and thereby increases understanding of the training process and the characteristics that play a role on the micro- and meso-levels over the course of training. However, while training companies can change their ‘input’, and trainees vary considerable with regard to their own ‘input characteristics’, there is still the need for a more specific theory to describe how training inputs convert to certain outputs over time – or in other words: What happens to trainees in the process of training?

For this purpose, Lempert’s (1998) interactionist framework theory for professional socialization is presented as the underlying perspective on the training processes and a connecting point for both theoretical considerations on the teaching-learning processes and approaches to competence development and drop-out intentions. By referring to Baethge (1991), Klotz (2015, p. 27) argues that in

this framework theory, professions are not seen solely as an objectified and fixed set of qualifications the individual needs to deliver. Instead, the framework's subjective component leaves room for an individual to interpret its work and professional environment, and thereby for individual development by interaction with the work environment (Klotz, 2015, p. 27). In this regard, socialization means the development of personality structures through interaction with the requirements and conditions of the social environment (Lempert, 2009, p. 2). In this context, personality refers to a bundle of individual characteristics comprising a structure of attitudes, traits, emotions, action competence, and knowledge (Hacker, 1978, p. 54; Tillmann, 1994, p. 11).

Professional socialization concretizes the concept of the development of personality structures by the interaction with the requirements and conditions of the professional work environment (Bammé et al., 1983, p. 413). Within this development, Lempert (1998) distinguishes between the previously described micro-, meso-, and macro-levels (see explanations on structural models, Section 2.1.1.) and considers two causal directions that take place on each of the three levels: First, the individual personality shapes the profession and work environment, and second, the profession and work environment form the individual personality and affect its development (Lempert, 2009, p. 2 & p. 33). Figure 3 incorporates a conjunction of both directions, indicating that trainees and their company-related work environment influence each other reciprocally (Tillmann, 1994, p. 12). Yet, the social environment's effect on an individual can be considered the stronger direction (Lempert, 1998, p. 32).

Consequently, the interactionist theory generally ascribes a fundamental role for personal development during the professional socialization process to the interaction of the individual with the surrounding people and the environment. The interaction process is further specified by social conditions and psychological effects. As social conditions of the interactions, Lempert (1998) distinguishes between three levels that correspond to the common differentiation presented above: The macro-level comprises, e.g., the educational and the economic system as well as the labor market; the meso-level considers organizations, including schools and companies; the micro-level targets the individuals interacting with each other. As psychological effects, Lempert (1998) considers different competences and orientations that, due to the three levels, vary in scope. For the process of mutual interaction,

Lempert (1998, p. 45 f.) describes a three-step proceeding of (1) perception, (2) processing, and (3) reaction. First (1), an individual subjectively perceives and interprets its environment. Then (2), the individual processes the impressions gained on a cognitive and emotional level. The resulting evaluation of the impressions leads to (3) a reaction, either as impulsive and reactive behavior or as a deliberated (targeted) action. This process implies that interactions of individuals with their work environments do not induce homogeneous socialization processes; subjective perception and interpretation of the environment result in individual personality structures developing.

Within the framework theory, Lempert (1998) also differentiates between different phases of socialization: (1) a socialization for the profession prior to working life and (2) a socialization within and through the profession, beginning with entry into working life or, in this case, vocational training. Corresponding to the descriptions above, Heinz (1991, p. 398) defines this second phase as “experiences made in the operational work process that concretize the relationship between workers and their work content, work conditions and work results, and have awareness-raising, personality-promoting or personality-deforming effects in the entire context of life” (translation by the author). While the second phase represents the main interest for vocational training, the prior socialization phase also affects the processes of training indirectly: Mainly induced by the school and family (influenced by, e.g., social class), an adoption and evolution of certain values, ideals, and interests takes place, which result in a specific choice of profession and affect the subjective perceptions during training (Heinz, 1991, p. 398). Simultaneously to professional socialization, the influences of an individual’s public and private environment can be considered as a third socialization area, forming personality structures and thereby affecting an individual’s perceptions, processing, and actions within the vocational training (Bammé et al., 1983; Heinz, 1991; Lempert, 1998).

In line with the underlying model of training quality (Fig. 3), the extensive process dimension and the inclusion of the individual (bottom) and the company (top) aspects highlight the crucial role of interaction for vocational training quality. The individuals’ subjective perceptions of their company-related and professional environments, their emotional and cognitive processing, and their interpretations of those perceptions are considered decisive for personal and professional development

(Lempert, 1998, p. 45 f.). This nature of an ongoing subjective interpretation of the environment (e.g., training quality criteria) is in accordance with the initially described approach on quality and is also incorporated in Tynjälä's (2013) fundamental model of workplace learning (Fig. 2), which rests on a constructivist approach to learning (Steiner, 2006; Thissen, 1997; see also Section 2.3). Therefore, subjective perceptions of training quality, as formed by interaction with the environment and interpretation of it (Jungkunz, 1995, p. 219; Lempert, 1998, p. 45 f.), build the crucial element of assessing training quality. Consequently, in-company training quality is broadly defined as "subjectively perceived characteristics of [...] training situations and processes that potentially affect specified target variables" (Klotz et al., 2017, p. 3; translation by the author). For this reason, in this dissertation, the measurement of training quality, comprising the training environment, interaction processes, and all the above-mentioned quality aspects, relies on subjective perceptions of the training actors (see Chapter 3).

Lastly, to cater for the interactional character of vocational training, the presented theoretical foundations indicate the need for a multi-perspective assessment, where both main group of actors (trainees and training personnel) are considered. Therefore, papers 1 and 2 (Chapter 4) explore differences in the perceptions of both groups and the usefulness of a novel multi-perspective approach (Negative Incongruence Theorem [NIT]). Additionally, to delimit the presented pedagogical-sociological perspective, other potential perspectives on the training process are briefly presented in the following section.

### **2.1.3 Research Perspectives on Vocational Training**

Besides the above presented and theoretically reasoned pedagogical-sociological view this dissertation applies on vocational in-company training, other perspectives on training are possible, entailing different research foci and partially different variables of interest. Especially when complex phenomena such as drop-out or competence development are analyzed, researchers should state their theoretical access to and perspective on vocational training to make their research transparent and to set limits to the analyses. To exemplify possible theoretical accesses to how the processes and developments in training are potentially shaped, four different perspectives on vocational in-company training (economical, psychological, sociological, and pedagogical) are presented in Table 2, again located on the three

common levels: macro-, meso-, micro.<sup>5</sup> The examples mentioned in Table 2 are not restricted to the group of trainees but can also be regarded from the side of the training personnel or company employees in general.

**Table 2**

*Categorization of exemplary views on vocational training*

	<b>Economical View</b>	<b>Psychological View</b>	<b>Sociological View</b>	<b>Pedagogical View</b> (business education view)
<b>Macro-level</b>	Framework conditions on the macroeconomic level, e.g. <ul style="list-style-type: none"> <li>• General or sector-specific economic situation</li> <li>• Labor market</li> </ul>	-	Indirect effects on socialization by the surrounding systems, e.g. <ul style="list-style-type: none"> <li>• Education system</li> <li>• Political system</li> <li>• Economic systems</li> </ul>	Framework conditions in the pedagogical sphere, e.g. <ul style="list-style-type: none"> <li>• Framework curricula</li> <li>• Training regulations</li> <li>• Outline of training professions</li> </ul>
<b>Meso-level</b>	Organizational business figures, e.g. <ul style="list-style-type: none"> <li>• Profitability/efficiency</li> <li>• Cost-benefit analysis</li> </ul>	Dynamics in interaction and communication specific to personality traits, e.g. <ul style="list-style-type: none"> <li>• Specific group status</li> <li>• Group dynamics</li> </ul>	Effects on socialization by organizational characteristics that influence interactional dynamics, e.g. <ul style="list-style-type: none"> <li>• Company size</li> <li>• Hierarchy structure</li> <li>• Number of employees</li> </ul>	Pedagogical conditions within the training company and at the workplace, e.g. <ul style="list-style-type: none"> <li>• Number of pedagogically trained staff</li> <li>• Organizational curriculum</li> <li>• Technical equipment</li> </ul>
<b>Micro-level</b>	Individual economic situation, e.g. <ul style="list-style-type: none"> <li>• Individual utility functions</li> <li>• Disposable income</li> <li>• Action alternatives</li> </ul>	Personality traits 'inherent' to individuals, e.g. <ul style="list-style-type: none"> <li>• 'Big Five' (openness, conscientiousness, extraversion, agreeableness, neuroticism)</li> </ul>	Personality structures influenced by socio-demographic background and interaction with (a) private life environment and (b) occupational environment, e.g. <ul style="list-style-type: none"> <li>• Gender</li> <li>• Occupational identity</li> <li>• Organizational identity</li> </ul>	Learning development influenced by pedagogical interaction, e.g. <ul style="list-style-type: none"> <li>• Pre-knowledge</li> <li>• Learning motivation</li> <li>• Pedagogical methods</li> </ul>

*Note.* The table contents are not restricted to the trainee-side but also include the training personnel (or employees in general).

<sup>5</sup> Table 2 is not designed to be an exclusive list of perspectives, nor as an overview on drop-out reasons or factors for competence development. The four perspectives chosen represent prominent theoretical approaches in research on vocational training, although others might be possible. The concrete variables researched ultimately result from the perspective of interest. Yet, particular variables can play a role in more than one perspective. The table only names examples of each perspective.

First, an economic view would generally study vocational training based on economic considerations. On the micro-level, the individual economic situation, for instance, influences an individual's decisions depending on action alternatives and how training is subjectively valued, in the sense of individual utility considerations (e.g., Yi et al., 2015). On the meso-level, a training company's organizational business figures regarding efficiency (e.g., profit, revenue) or cost-benefit considerations (e.g., Schönfeld et al., 2020) can both lead to saving measures that influence the training process and cause training quality to deteriorate. On the positive side, economically good phases might increase investments in training quality or lead to more training positions due to vacancies (increasing possibilities for trainees). On the macro-level, the economic framework conditions influence the factors on the lower levels: The labor-market situation influences, for example, an individual's action alternatives. A poor economic situation in the industry of the training company can cause a deterioration in the company's market conditions (BIBB, 2021).

As a second perspective, a psychological view on training would focus on the role of relatively "stable individual differences", so-called personality traits (Roccas et al., 2002, p. 789). On the micro-level, such inherent personality traits, predominantly endogenous, influence the way a person thinks, behaves, and acts (e.g., McCrae et al., 2000) and, therefore, impact the training process. While there are various models on personality traits (e.g., Cattell, 1990; Eysenck, 1990), the five-factor model known as 'Big Five' (openness, conscientiousness, extraversion, agreeableness, neuroticism) is the most prominent approach (John et al., 2008, p. 116 f.). Relations of the five factors with, for example, job satisfaction and job changes (John et al., 2008) and with leadership style (Hassan et al., 2016) have been demonstrated. On the meso-level of this view, the inter-individual and environmental effects of such personality traits would be considered. Here, specific dynamics in the interaction of individuals have been documented for a wide range of settings. For instance, personality traits affect the standing and role of an individual within a group, the probability of conflicts, the preferences for networking, and how the direct environment is organized (for an overview, see John et al., 2008). While the role of macro-influences in personality psychology is debatable (e.g., culture; Roccas et al., 2002), they are not



the central subject, and thus the macro-level is left blank to maintain the psychological perspective's focus on intra-personal traits and resulting interactional patterns (meso-level).

As a third perspective, the sociological view takes up the presented assumptions of (professional) socialization, where specific conditions define socialization processes, which, in turn, shape trainees' personality structures (e.g., Lempert, 2009). On the micro-level, individuals' personality structures are formed by their socio-demographic backgrounds (e.g., gender) and interaction with their private-life environment and company environment, leading to individual structures such as an occupational identity. As described in Section 2.1.2, socialization within the private sphere (family and friends) is influenced, for example, by the social class (Heinz, 1991). On the meso-level, organizational characteristics such as company size, number of employees, and the hierarchy structure impact the interactional dynamics and socialization processes within training. Thus, the socialization processes within vocational training happen interconnectedly on the micro- and meso-levels (see Section 2.1.2). Lastly, the surrounding systems on the macro-level, such as the characteristics of the educational, political, scientific, and economic system, influence the socialization processes indirectly via the lower levels.

Finally, the pedagogical perspective, in the sense of a business educational view, focuses on aspects related to pedagogical work that influence the processes of vocational training. On the micro-level, the individual learning development constitutes the perspective's focus as it is shaped by pedagogical interaction. This interaction comprises numerous aspects, for example, the individual pre-knowledge and learning motivation as well as the pedagogical methods applied. On the meso-level, general company-specific and partly also workplace-related pedagogical conditions affect the training process. Here, a role is played by, for instance, the number of pedagogically trained personnel, the organizational training curriculum, and also the general technical equipment. On the macro-level, formal and legal framework conditions such as framework curricula and official outlines of the training profession affect both the pedagogical work of the training personnel and the training reality each individual trainee experiences.

Following this presentation of the dissertation's theoretical access (a pedagogical approach that considers sociological aspects), the next sections theoretically substantiate the output variables analyzed in papers 3 and 4. Section 2.2 targets the drop-out phenomenon in vocational training before Section 2.3 outlines the learning processes within training companies and defines vocational competence.

## **2.2 The Drop-Out Phenomenon in Vocational Training**

The first of two output criteria considered in this dissertation is drop-out from vocational training. Section 2.2.1 emphasizes the scope of the drop-out problem by illuminating interesting figures from the state of research and illustrating the various consequences, which shall be transferred into a four-directional differentiation. Section 2.2.2 then provides an overview of potential drop-out reasons and describes the theoretical approach on drop-out taken in Paper 3.

### **2.2.1 About the Scope and Consequences of Drop-Out**

The drop-out phenomenon is widespread, with many countries showing high drop-out rates, for instance, Australia with a drop-out rate of more than 58% (NCVER, 2020). Since a calculation reform in 2007, the drop-out rate in Germany has increased steadily to an all-time high of 26.9% (BIBB, 2021). However, figures are barely comparable internationally since countries apply different calculation methods (CEDEFOP, 2016). Even within Germany, drop-out rates vary broadly by region but also between different industry sectors and training occupations, with trades' and home economics' professions generally facing the highest drop-out rates (e.g., BIBB, 2021, p. 145 ff.; CEDEFOP, 2016, p. 109; Hensen, 2014, p. 5; Michaelis & Busse, 2021, p. 107; Negrini et al., 2016, p. 363; Rohrbach-Schmid & Uhly, 2015, p. 121).

As argued by Krötz and Deutscher (2022), the consequences of drop-out are manifold and impact specific levels differently. For society and the state, drop-outs generally result in lower tax revenues, greater social welfare expenses, and an increase in the shortage of skilled workers. Companies that lose trainees during vocational training face costs and lost investments, often having to leave the training position vacant (e.g., Autorengruppe Bildungsberichterstattung, 2010; Deuer & Wild, 2017; Hensen, 2014; Schöngen, 2003; Schuster, 2016; Stalder & Schmid, 2006). For the individual, the

consequences depend on the type of drop-out: Leaving VET ultimately could mean working without formal qualifications or even becoming unemployed, leading to a severe cut in the employment biography. In cases where an individual who has dropped out is able to continue vocational training in another company, little time is lost (e.g., Autorengruppe Bildungsberichterstattung, 2010, p. 109; Hensge, 1988, p. 203; Weiß, 1982, p. 283 ff.). However, a longitudinal analysis has shown that, even in such cases, negative effects were evident on satisfaction with the personal standard of living, work, and health in later stages of life (Michaelis & Findeisen, in preparation).

These differences indicate that it is not sufficient to simply label all premature contract terminations as ‘drop-outs’, as different further directions could be intended after termination. While research in Germany tends to differentiate between premature termination and complete drop-out (Schuster, 2016; Uhly, 2015), this dissertation follows the wording of the topic’s international literature, where the term ‘drop-out’ is commonly used to include all types of leaving VET prematurely, regardless of whether a formal qualification is later attained or not. However, in contrast to most research analyzing the phenomenon as a generalized problem, the relevant third paper, which examines the influences of training quality on drop-out intention, considers four different directions of drop-out intention (see Fig. 4 and Krötz & Deutscher, 2022).<sup>6</sup> Following Feß (1995) and Faßmann (1998), upward, downward, and horizontal drop-out are possible. In the first drop-out direction, *upward*, drop-out involves further education outside VET, for example attending university. The second drop-out direction, *downward*, constitutes the permanent withdrawal from VET, potentially leading to unemployment or work in unskilled jobs (Faßmann, 1998; Feß, 1995). The third drop-out direction, *horizontal*, targets vocational reorientation, for example dropping out and beginning a completely new training course (Feß, 1995, p. 29). However, here, differentiation into two aspects is called for: (a) a horizontal change of company, and (b) a horizontal change of occupation (Krötz & Deutscher, 2022). In both types of horizontal drop-out, the individual remains within the VET system while the reasons for and intentions behind changing

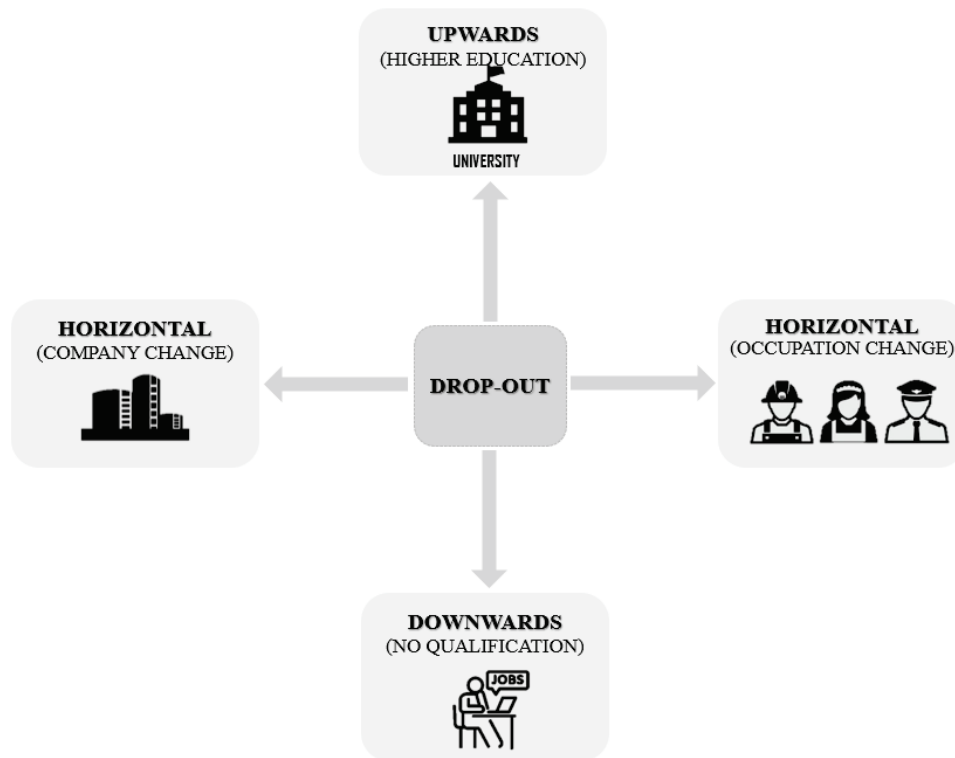
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<sup>6</sup> In papers 1 and 2, drop-out is used as a generalized term for an exemplary output variable since the studies focus on different perspectives on training quality, different measurement operationalizations, and how the perspective-dependency potentially affects outputs of training.

company during training might be different to those related to starting in a different occupation. Additionally, the consequences (e.g., the loss of time) differ considerably between the types of horizontal drop-out.

**Figure 4**

*Differentiation of drop-out directions*



*Note.* Figure cited from Krötz and Deutscher (2022, p. 4; extending Feß, 1995).

Due to the various paths trainees can pursue after terminating a contract, a drop-out is not generally negative. In cases of upward drop-out, for example, a university degree could potentially increase an individual's career opportunities and lifetime income. Despite the initially stated negative consequences, even a horizontal drop-out could still increase a trainee's satisfaction when a prior mismatch was replaced by a more suitable solution (Feß, 1995, p. 29; Schmid & Stalder, 2012, p. 127). However, in most of the cases, dropping out leads to a phase of high uncertainty for trainees: Several studies correspond in their findings that about 50% of trainees who have dropped out have no follow-up plan after two or three months (e.g., Hasler, 2016; Mischler, 2014; Schmid & Stalder, 2012; Weiß, 1982).

Apart from generally missing data about the direction of a drop-out, rising drop-out figures do also, generally, not provide information on reasons for dropping out or who was the initiator of the termination. Only in the minority of cases are contract terminations jointly decided by trainees and

trainers. For example, research found that, in more than half of the cases (approx. 55-60%), contracts are terminated by the trainees themselves, while approximately 30% of terminations are initiated by their companies (Greilinger, 2013; Piening et al., 2010; Schuster, 2016). Such numbers underline the need for multi-perspective approaches on vocational training that consider both actor groups (trainees and training personnel), as their perception might differ considerably.

The highest proportion of drop-out happens during the first year of training, but the large numbers of terminated contracts in the following years are not negligible (BIBB, 2020; Cully & Curtain, 2001; Ernst & Spevacek, 2012; Greilinger, 2013; Lange, 2020; Piening et al., 2010; Schuster, 2016). As argued by Böhn and Deutscher (2022) and by Krötz and Deutscher (2022), the decision to terminate a contract is generally considered to develop over a certain time period instead of being taken due to an isolated event (e.g., Deuer, 2003; Hensge, 1988; Heublein & Wolter, 2011). This argument is based on findings that suggest multiple interrelated reasons are decisive for the decision (Ertelt, 2003; Hensge, 1984; Lamamra & Masdonati, 2008; Rohrbach-Schmid & Uhly, 2015; Schuster, 2016), causes that are examined more closely in the following section.

### **2.2.2 Causes for and Perspectives on Drop-out**

Scholars agree that drop-out most of the time constitutes the result of a longer genesis, including and tangling several causes and influence factors (e.g., Ertelt, 2003; Hensge, 1984, 1988; Lamamra & Masdonati, 2008). Consequently, and due to the long research history on drop-out from vocational training, numerous potential reasons for dropping out have been revealed for various areas.

The quality of the in-company training, including social aspects such as involvement and conflicts, is one of the drop-out reasons often stated (e.g., Alex, 1991; Autorengruppe Bildungsberichterstattung, 2012; Ernst & Spevacek, 2012; Faßmann & Funk, 1997; Findeisen et al., 2022; Greilinger, 2013; Piening et al., 2010, 2012; Quante-Brandt & Grabow, 2008; Rohrbach-Schmidt & Uhly, 2015; Schöngen, 2003; Schuster, 2016; Stalder & Schmid, 2006). Many studies also underline the relevance of reasons from trainees' personal sphere, for example, family or health problems and socio-demographic background, especially their prior education (e.g., Autorengruppe Bildungsberichterstattung, 2012; Bessey & Backes-Gellner, 2015; CEDEFOP, 2016; Dornmayr &

Nowak, 2012; Faßmann & Funk, 1997; Greilinger, 2013; Schuster, 2016). Additionally, inappropriate expectations about the training reality, about the occupation itself, or about own abilities lead to mismatches, sometimes referred to as ‘person-environment fit’, that appear to induce drop-out (e.g., Beicht & Walden, 2013; CEDEFOP, 2016; Michaelis & Findeisen, 2022; Nägele & Neuenschwander, 2015; Quante-Brandt & Grabow, 2008; Schöngen, 2003; Schuster, 2016; Stalder & Schmid, 2006). Where the training takes place (sector, profession, etc.) also influences drop-out, with smaller companies showing higher drop-out rates (Rohrbach-Schmidt & Uhly, 2015). Further areas scholars revealed to be related to drop-out are aspects considering the vocational schools (excluded here) and contextual factors, for example, framework conditions such as the form and duration of training, and action alternatives such as “finding a job even without a formal qualification” (Böhn & Deutscher, 2022, p. 9). In a detailed insight, Böhn and Deutscher’s (2022) meta-synthesis revealed 666 drop-out variables, summarized to 68 categories in six areas. This structuring confirmed that most research focuses on “learner factors”, as 91% of all drop-out studies consider the influencing factors of this area, while the process dimension involving aspects influenceable by pedagogical work is considered relatively seldom (*ibid.*, p. 9).

The presented overview on drop-out reasons and especially the extensive meta-synthesis by Böhn and Deutscher (2022) illustrate the complexity of the phenomenon and the need for scholars to limit their research project to specific areas or drop-out reasons, or at least, to specify the theoretical access to the drop-out phenomenon. Similar to the presented research perspectives in Table 2 (Section 2.1.3), an exploration of the origins of drop-out can take different perspectives that vary regarding their explanatory approach, and, consequently, focus partly on different influencing factors. For instance, the economic view would lead research to regard the drop-out phenomenon as resulting from the market economy. At the micro-level, the individual economic situation could induce financial pressure and lead to contract termination (e.g., Cho et al., 2013; Ernst & Spevacek, 2012), aiming to work in full-time jobs (without completed training), or seizing an offer for an economically better job or training position (wage, travel costs, etc.). On the meso-level, the economic situation of a training company influences a company’s demand for trainees (BIBB, 2021), sometimes involving contract terminations in cases of high financial losses or bankruptcy. The economic macro-level impacts the lower levels as, for example,

the economic situation of a training company's industry would lead to a deterioration in its market conditions and the labor market situation would influence the alternatives available to an individual (e.g., Backes-Gellner & Tour, 2010; Rohrbach-Schmidt & Uhly, 2015).

Relatedly, the psychological view would focus on personality traits since, as mentioned above, relations have been identified between personality traits and job satisfaction, job changes (John et al., 2008), and leadership style (Hassan et al., 2016). For drop-out research, this view could imply that there are common personality traits among the members of a group of either trainees who dropped out or trainers with a higher than average drop-out rate. Furthermore, important interactional dynamics relevant for drop-out decisions could be rooted in trait differences as, for example, conflict potential or networking are affected (John et al., 2008). The sociological view could lead to the conclusion that the individual socio-demographic background and interactions with the company environment (training personnel, colleagues, trainees, etc.) and with family and friends influence an individual's personality structures (e.g., Heinz, 1991; Lempert, 1998). This influence would lead to specific interactional dynamics and decisions relevant to drop-out. With regard to the private sphere, the micro-level, an example of the drop-out relevance of socialization is the development of specific occupational preferences (potentially affecting drop-out behavior) due to values and interests shaped within the family, going back to, e.g., the social class (Heinz, 1991, p. 398). The company's hierarchy structures (meso-level) could influence the relations trainees build with their colleagues and trainers. The surrounding systems (e.g., the educational system) impact socialization indirectly and may be also relevant for drop-out.

Lastly, from the pedagogical perspective, aspects related to the individual learning process (e.g., pedagogical interactions, pre-knowledge) are likely to be connected to drop-out as well (see drop-out reasons above). On the meso-level, drop-out could be affected by the pedagogical conditions within the company, for example, the number of pedagogically trained personnel and the organizational training curriculum (e.g., Laporte & Mueller, 2013). Macro-level framework conditions such as the official training outline for the profession could impact drop-out indirectly by affecting the training contents and structure (e.g., Karmel & Mlotkowski, 2010; Laporte & Mueller, 2013). For the underlying research

interest of Paper 3, analyzing the role of in-company training quality for different drop-out directions (see Table 1), the pedagogical-sociological view of this dissertation (on a micro-meso analysis level) involves considering the following factors: (1) the quality of pedagogical conditions, methods, and interactions within the training companies, (2) individual socio-demographic and learning-relevant characteristics, (3) organizational characteristics. For this reason, Paper 3 considers the quality of pedagogically related criteria (e.g., instructions, mentoring, feedback), including interactive aspects (e.g., social and functional involvement), while also taking socio-demographic background (e.g., gender, language spoken at home) and learning-relevant characteristics (e.g., prior education) into account. The presented quality model (Fig. 3) summarizes the relevant training quality criteria resulting from the literature (for measurement see Chapter 3).

## **2.3 Competence Development in (Company-based) Vocational Training**

Since Paper 4 analyses the relation of training quality and competence development in company-based vocational training, this section takes a closer look at the second important output variable of this dissertation: vocational competence. To link vocational training and competence development, the particularities of learning at the workplace (with respect to training in the business management domain) are presented since the learning process there differs considerably from that of learning in schools. Then, the understanding of the competence development as a two-dimensional construct is elaborated.

### **2.3.1 Particularities of Learning within the Training Company**

“Although learning and training are related, they are not the same.

Some training fails to produce any learning, and a great deal of learning occurs outside of training”

(Salas et al., 2012, p. 77).

By starting the initial vocational training, an individual steps into a new and decisive phase of socialization (e.g., Heinz, 1991; Tillmann, 1994). For most trainees, the training is their first contact to the professional world. As described in Section 2.1.2, this socialization process implies a permanent development of one’s own personality, which comprises structures of attitudes, emotions, knowledge, and action competence (Hacker, 1978, p. 54; Tillmann, 1994, p. 11). Vocational competence is, thus, a



result of this development and is considered a desired output of vocational training. It depends on the interaction with and the influences of the vocational environment (see Fig. 3). It is the objective of vocational training that individuals attain the necessary competence to perform their work tasks (Salas et al., 2012). In Germany, this aim is stated in §1 of the Vocational Training Act (2020), where vocational (action) competence is named as the central goal of VET.

Overall, learning during the working phases within the training company contributes to trainees' personal development and self-realization (Dehnbostel & Pätzold, 2004). This individual development process within the company environment happens 'in passing' rather than fully consciously (Tillmann, 1994, p. 17). The workplace offers learning opportunities but also requires adjustments to the environment (Heinz, 1991, p. 408). As work changes not only the environment but also an individual's personality (Hacker, 1978, p. 54; Kell, 1989, p. 16 f.), Heinz (1991, p. 401) follows Lempert's (1998) interactionist framework and conceptualizes *vocational learning* as an "interaction process between work and personality structures that contributes to developing and modifying action competence" (translation by the author). As Dehnbostel and Pätzold (2004, p. 21) argue, specific work characteristics relevant for learning have been discussed extensively in the literature, at times with varying terms. For instance, the authors give an overview of Franke's (1999, p. 61 ff.; cited from Dehnbostel & Pätzold, 2004, p. 21) learning-relevant work characteristics. That overview exemplarily illustrates the comprehensive nature of the presented fundamental quality model (Fig. 3; Böhn & Deutscher, 2019, 2021) since it also considers the aspects "problem-experience" (included in *Complexity of Tasks*), "scope of action" (*autonomy*), "centered variability" (*Variety of Tasks*), "integrality" (*In-Company Learning*), "social support" (*Mentoring and Feedback*), "individualization" and "rationality" (*Training requirements and ability level* and to follow an advancing *curriculum [orientation]*).

Taking a closer look at the daily learning processes in the company-facet of vocational training requires bearing in mind that the workplace differs both between companies and within companies, as trainees usually have to visit different departments over the course of training. Less frequently, learning within training companies can also take place at company training centers or training workshops, increasing the plurality of learning at the workplace (Dehnbostel, 1998). Within the scope of the latter two, the event as a learning situation might be apparent (Kell, 1989, p. 16 f.). However, for most

vocational training, working and learning at the workplace (in the context of the business management domain, mostly an office) are intertwined and barely separable.

While learning can be generally defined as “a process of acquiring new knowledge and behaviors as a result of practice, study, or experience” (Salas et al., 2012, p. 77), that definition may fall short for learning in the context of in-company training. With regard to a trainee’s daily workplace, there is consensus – despite various terminologies and definitions that are only presented briefly in this section – that most opportunities to learn happen on an informal basis, inducing informal learning (Eraut, 2004; Tannenbaum, 1997; Tynjälä, 2013). There are basic differences between formal and informal learning (see, e.g., Zutavern & Seifried, 2022). In particular, formal learning is highly organized and features defined learning goals as it, for example, takes place in school classrooms or in educational institutions in general (Coombs & Ahmed, 1974; Tannenbaum et al., 2010). Informal learning, on the other hand, stems from “daily experience and exposure to the environment” (Coombs & Ahmed, 1974, p. 8) and can be defined as “predominately learner directed and self-guided” and involving “at least some intent for [...] learning, or improvement” as well as “some action and doing” (Tannenbaum et al., 2010, p. 306; see also Decius et al., 2019; Marsick & Watkins, 2015). The intermediate form, non-formal learning, entails some organized structures but happens outside educational institutions’ formal frameworks (Coombs & Ahmed, 1974). In line with Straka (1999, p. 166; cited from Rausch, 2011, p. 114), the classification of informal, non-formal, and formal learning tends to distinguish between the degree of organization of the learning situation rather than between different types of learning. While within training companies there are also situations of formal learning (Billet, 2002; Tynjälä, 2013), trainees mainly learn in informal learning situations with low degrees of prescribed structures, which, in turn, require higher levels of self-regulation (Dehnbostel, 1998, p. 178; Rausch, 2011, p. 114 f.; Tynjälä, 2013, p. 18).<sup>7</sup>

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<sup>7</sup> See Rausch (2011, p. 115) for a comprehensive overview of different classifications to clarify the relation of working and learning.

More precisely targeting the learning process at the workplace, Eraut's (2004) distinction of deliberative, reactive, and implicit learning (as forms of informal learning) appears appropriate for daily in-company training as it considers an individual's degree of awareness of learning (i.e., planning and concentrating on specific subject matter that should be learned vs. learning without even noticing). In this regard, learning in the training company appears to mostly proceed as reactive or implicit learning. While the former means unplanned learning, which to some degree happens consciously (e.g., being able – at least to some extent – to reflect on past learning progression), implicit learning is part of most learning from experience (e.g., at the workplace) and implies an unconscious learning process, where past memories are unwittingly linked with new experience (Eraut, 2004, p. 250 f.). Even when the individual is aware of specific learned aspects, implicit learning might have simultaneously occurred unconsciously (ibid, p. 250). Similarly, Marsick and Watkins (2015, p. 12) refer to such unconscious, unintended learning, in the sense of a “byproduct” of social interaction or coping with work tasks, as “incidental learning”, which again “almost always takes places” despite trainees being mostly unaware of it. Referring back to the learning definition by Salas et al. (2012), the conclusion can be reached that, in the context of in-company training, besides some organized and formal learning opportunities, learning at the workplace predominantly happens incidentally, unplanned, partly unconsciously, and through experience and social interaction rather than by deliberate studying (Eraut, 2004, p. 248 ff.; Dehnbostel, 1998, p. 178 ff.; Rausch, 2011, p. 111 ff.).

However, even informal learning situations have factors influencing the learning process that pedagogical work can shape. The special nature of learning within the company may even increase the importance of pedagogical efforts, for example, making sure that trainees are socially involved and receive feedback as well as giving work tasks that fit in complexity, variety, relevance, and requirement level so that ultimately trainees can learn and grow during work – even when working initially appears to mean informal learning situations. The influence of pedagogical efforts further underlines the need to analyze the relations of pedagogically shapeable aspects (such as, e.g., those included in the model of training quality, Fig. 3) to outputs such as learning and competence development. The competence test used in this dissertation, thus, does not differentiate between ‘when’ or ‘how’ something was learned

for two reasons: First, all learning situations offer some opportunities for pedagogical work and, second, empirically differentiating between ‘when’ and ‘where’ (in which setting or situation) something was learned is nearly impossible, or at least unfeasible. Instead, it focuses on the contents and competences relevant within the business management domain (see Section 3.1.2).

This understanding of workplace learning in company-based training can be connected to the theoretical view of the constructivist approach on learning, where the individual constructs new knowledge by “interpretative interaction” with the experienced environment, leading to an individual appropriation and “interpretative appraisal” (Billet, 1995, p. 25). The learning process at the workplace depends on both the situation and an individual’s connecting to previous “actions, experiences and reflections”, as learned knowledge is not seen as isolated and closed (Dehnbostel, 1998, p. 179; p. 184). Thus, what is learned by trainees is highly individual and not simply a depiction of what was intended to be learned (Billet, 1995; von Glasersfeld, 1995; Knuth & Cunningham, 1993; Lempert, 1998; Steiner, 2006). For this reason, the role of subjective perceptions was highlighted in Section 2.1.2, and these perceptions also play a crucial role in measuring training quality and the Negative Incongruence Theorem (NIT; papers 1 and 2). In line with the pedagogical-sociological approach of this dissertation, the constructivist view highlights the role of specific work characteristics for learning, for instance, the social involvement, the degrees of autonomy and responsibility, and the authenticity of work tasks (e.g., Heinz, 1991; Reinmann & Mandl, 2006). In this view on learning within the company-facet of vocational training, the trainer can be regarded as a supporter and mentor who accompanies an active learning process, instead of directly imparting knowledge contents (Dehnbostel, 1998, p. 184; Kember, 1997, p. 262; Seifried, 2009, p. 66). All relevant characteristics of the workplace, the work tasks, and the training personnel’s actions are thus considered in the model of in-company training quality (Fig. 3), building the basis of the approach to training quality in this dissertation.

Lastly, learning is seen as a process. However, at the workplace, where learning is often linked to action, the learning process and its output are hardly separable as “the process facilitates the product, which at the same time enhances further processes and so on” (Hager, 2004, p. 426). This understanding fits to the presented interactional framework (Section 2.1), as vocational learning reshapes the

environment in which further learning will occur. An individual's performance can be assessed at all stages of the learning process (Hager, 2004, p. 426 ff.). The resulting vocational competence is, thus, not a completed "once-only acquisition event" (ibid., p. 429) but more a snapshot of the current process state depending on the point in time and chosen performance indicators (see Section 3). It is considered an output of training in the quality model (see Fig. 3) due to its role as target output goal of vocational training and its dependency on the training environment and learning processes prior to its assessment.

### 2.3.2 The Construct of Vocational Competence

The proceeding consideration of the learning processes at the workplace and the personal development over the course of training allows the output goal and variable of interest, vocational competence, to be defined more profoundly. Daily work tasks cannot be successfully performed in the training company, or after completing training, with mere factual knowledge and, thus, a more comprehensive understanding of the term competence has established, albeit in different conceptualizations. The international organization for standardization (2015, 3.10.4 Competence), for instance, defines competence as a "ability to apply knowledge and skills to achieve intended results", indicating a focus on the capability to act. The ongoing transformations in the modern working world (e.g., changes in communication, digital transformation, etc.), the change to a holistic work process orientation, and the end of conventional steady professional careers necessitate the capability to adapt knowledge and to keep learning (Dehnbostel, 1998, p. 178; Sonntag, 2009, p. 249), as it is also highlighted in the constructivist view on learning. Therefore, vocational training's target is to ensure the capacity to act and perform successfully in professional life, as well as in private and societal life (Hensge et al., 2009; Vocational Training Act, 2020, §1 III). Besides specialist competence, this action competence includes facets of methodological, personal (e.g., reflectivity and learning ability), and social competence and can be defined as "the ability to perform tasks independently and on one's own responsibility, taking into account the context and the people acting in it" (Hensge et al., 2009, p. 11; translation by the author).

However, measuring social competence comprehensively is almost impossible in a test situation since, for instance, all interactions between trainees and other people in their work environment would have to be measured in a standardized form (e.g., Hager, 2004). For this reason, the approach in this

dissertation has a cognitive emphasis; it reduces extent by focusing on specialist competence while partly accounting for the methodological, personal, and social facets by including within the written test procedure, for example, business email communication or decision-making on orders after calculating the costs (see Section 3.1.2 for information on the competence test).

Besides, Hensge et al.'s (2009) definition stresses the importance of the capability to perform concrete tasks and indicates the context-dependency of competence. Both aspects are also part of one of the popular definitions by Weinert (2002, p. 27 f.), stating that competence comprises "individually available or learnable cognitive skills and abilities to solve specific problems and the involved motivational, volitional and social dispositions and skills to use these solutions successfully and responsibly in variable situations" (translation by the author). With this definition, Weinert (2002) additionally emphasizes that competence is something the individual can learn and develop over time, presumably influenced by interaction with the environment through training, practice, and experience in relevant situations (Klieme et al., 2008, p. 8).

Weinert (2002), furthermore, points out how motivational and volitional components are involved in developing and using competence. However, with regard to empirical analyses, Weinert (1999, p. 25 f.; 2001, p. 60 f.) argues for separating such motivational attitudes to enable distinct investigations and inferences about the relationships of interest (e.g., the effect of vocational training on competence development) and recommends measuring motivational attitudes discretely to consider their effect (see also Beck, 1989). The competence test used in this research widely ignored attitudinal components (except for the survey variables *Aspired Final Grade* and self-assed *Training Performance*, which involve aspirations and possibly self-perceptions regarding grade achievement, and the survey scale *Professional Commitment* in Paper 3) as they were not part of the project's focus. However, trainees' motivational attitudes are likely to influence their task performance and are, therefore, implicitly measured to a small extent in the competence test.

Based on these considerations, competence as measured in this dissertation is conceptualized as a mainly cognitive disposition that is context-specific, learnable, and focused on a specific action field (Klieme & Leutner, 2006, p. 879 f.), thus ultimately implying the capability to utilize one's skills and

knowledge in successfully performing vocational tasks (Hager, 2004, p. 425 ff.; Mulder et al., 2007, p. 82). The competence concept is also concretized to vocational competence in a field of action limited to the business management domain.

In the last few years, research on vocational competence has focused on conceptualizing and operationalizing competence structures and levels. Regarding the business management domain, research has led to the conceptualization of vocational competence as consisting of action-oriented ‘domain-linked’ and ‘domain-specific’ components (e.g., Lehmann & Seeber, 2007; Rosendahl & Straka, 2011; Winther & Achtenhagen, 2009; Winther & Klotz, 2014), based on Gelman and Greeno’s (1989) distinction. Vocational competence in this dissertation is, thus, theoretically sub-divided into a domain-linked and domain-specific competence dimensions. (1) Domain-linked competence is a construct that connects generic competences to economic content (Winther et al., 2013), entailing general, decontextualized skills and basic knowledge that are relevant for coping with problem-situations in the respective domain (Winther, 2011, p. 226). Within the realms of business management, domain-linked competence includes fundamentals related to solving business tasks such as economic numeracy and economic literacy (Winther & Achtenhagen, 2009; Winther et al., 2013). For instance, a currency conversion would not require any specific knowledge or skills learned during training: a basic domain-linked ability to apply the general mathematical ‘direct or inverse proportion formula’ (potentially known from the non-vocational school background) would be sufficient (Deutscher & Winther, 2018, p. 24). (2) Domain-specific competence is defined as “acting reasonably” in vocational, work-related and job-specific situations of problem-solving (Winther, 2011, p. 234). It comprises knowledge related to the situation, rules, principles, and guidelines that are occupation-specific or even company-specific (Klotz et al., 2015). Within the business management domain, for example, a (forwards) price calculation or preparing a balance sheet would require specific skills and rules trainees learned over the course of vocational training (Deutscher & Winther, 2018).

In contrast to competence conceptualizations, research on developing vocational competence (besides level-models) remains scarce (e.g., Abele, 2014; Gschwendtner et al., 2017; Nickolaus et al., 2011, 2015; Rosendahl & Straka, 2011), especially due to methodological challenges (Atik & Nickolaus,



2016; Michaelis & Seeber, 2019). An approach often referred to is the expert-novice paradigm by Dreyfus and Dreyfus (1980), which describes five stages of development from being a novice to becoming an expert but is still too abstract for analyzing how vocational competence develops (Michaelis & Seeber, 2019). For vocational training, Winther (2010, p. 258 ff.; 2011, p. 222) conceptualized three stages of competence development from beginning training to employment after training is completed (Fig. 5). It is generally assumed that, during training, beginners increasingly expand their general pre-knowledge (mainly domain-linked competence in the sense of economic literacy) by increasingly adding the specific knowledge aspects, heuristics, and skills of the domain (Klotz et al., 2015). To look deeper into this development (stages one and two), the presented competence conceptualization is briefly combined with schema theory<sup>8</sup> within a cognitive load framework.

The model assumes that, at the beginning of vocational training, trainees possess predominantly general economic and domain-linked competence but only little (to no) domain-specific competence. Klotz et al. (2015), drawing on Billet (1994), assume that, in the early stages of vocational training, trainees lack specific knowledge from work experience rather than basic cognitive ability to solve work tasks. This is because beginners lack knowledge about the specific situational problems they will encounter during training and the appropriate reaction or problem-solving approach (Sweller et al., 1998, p. 254). More advanced trainees or colleagues, who may have worked in the respective department or area for years, have already constructed more schemas through practice and experience, storing and organizing numerous interacting elements (*ibid.*, p. 261). They can retrieve the required schema from long-term memory with little cognitive efforts, leaving capacity in the working memory for additional

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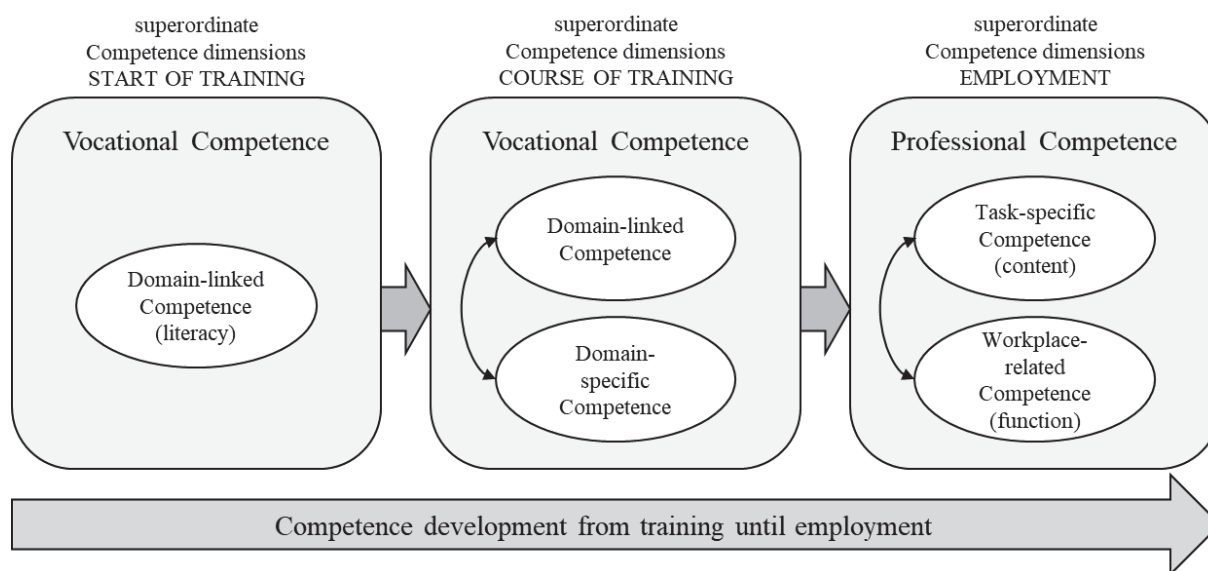
<sup>8</sup> Comparable to mental representations (e.g., Anderson et al., 1996), a schema contains large amounts of interacting knowledge elements, which are stored in the long-term memory and treated as one entity when retrieved to working memory. In schema theory, expertise or “skilled performance” (Sweller et al., 1998, p. 255) develops through constructing more and more schemas and combining them with existing superordinate ones, developing increasingly sophisticated schemas. Thereby, schemas store and organize knowledge, and reduce working memory load as compared to dealing with myriads of elements at one time, which would otherwise overburden the limited capacity of working memory (Anderson et al., 1978; Sweller et al. 1998).



cognitive activity such as a further problem-solving search. Beginners, on the other hand, do not have access to the associated schemas and, therefore, need to process large amounts of new and complex information, at times overburdening their working memory (Sweller et al., 1998).

**Figure 5**

*Model of competence development and its changes*



*Note.* Figure cited from Winther (2010, p. 259). Translation by the author.

In the following stages, an ongoing acquisition of business domain-linked and increasingly domain-specific competence is assumed with the proceeding framework curriculum, due to the emphasis of domain-specific contents within the curricula (Hager, 2004; Ma et al., 2022; Winther, 2010; Winther et al., 2013). The ongoing practice with predominantly domain-specific problems allows more and more schemas with specific situational information to be constructed and connected to superordinate schemas (Sweller et al., 1998, p. 255). Thereby, work tasks become more familiar, and responding to well-known problems becomes more automatic. In later stages of training, automation allows even partly unfamiliar tasks to be more efficiently dealt with since more working memory capacity is available, leading to improved performance (ibid., p. 258). However, vocational training is not expected to lead to full professionalization (see Fig. 5).

The individual cognitive process of linking new, more specific knowledge schemas into existing, more general ones is thereby dependent on trainees existing pre-knowledge: A broader knowledge base not only offers more schemas with more “slots” where new information can be linked

(increasing the chances of being learned) but, in some situations, also directs the individual's attention to additional fitting information deemed important (Klotz, 2015, p. 22, based on Anderson et al., 1978, p. 434 & p. 438; see also Sweller et al., 1998, p. 261).

This process continues over the course of training and, according to Sträßer (1996, cited from Winther et al., 2013, p. 143 f.), it leads to an incipient problem-oriented integration of general skills with specialist concepts, allowing job-typical requirements to be fulfilled (see also Winther et al., 2016). The merging of general skills with domain-specific concepts makes it increasingly difficult to identify the proportion of general abilities in work-related problem-solving, which also becomes apparent through the stronger correlation of the two competence dimensions in later training stages (Klotz & Winther, 2015; Ma et al., 2022; Rosendahl & Straka, 2011; Winther et al., 2013). Recent studies on competence development using domain-linked and domain-specific modelling underline the usefulness of this conceptualization and show that, as theoretically expected, the level of domain-specific competence is clearly less pronounced at the beginning of training than the domain-linked competence but then shows a comparatively larger increase over time (Klotz & Winther, 2016; Ma et al., in preparation a; Rosendahl & Straka, 2011). Since trainees' demonstrated competence, in the sense of test performance, is affected by characteristics of the situation and trainees' interpretations of it (Schnick-Vollmer et al., 2015), a preferably authentic test instrument, close to working reality, is needed to measure vocational competence (Deutscher & Winther, 2022). This instrument is presented in the next chapter.

### 3 Methodological Approach

This dissertation followed a quantitative empirical approach by collecting and statistically analyzing empirical data to answer specific research questions. Coinciding with the papers' focal points, presented in Figure 1, there were two separate data collections: (1) a cross-sectional data collection for papers 1 and 2, and (2) a longitudinal project (involving up to three points in time) for papers 3 and 4 (see Table 1).<sup>9</sup> This chapter presents, first, the operationalizations of training quality, drop-out (intention) and vocational competence to describe how the constructs were measured. It then justifies the statistical test methods applied for the respective research questions.

#### 3.1 Measurement Operationalizations

##### 3.1.1 In-Company Training Quality

The understanding of in-company training quality in this dissertation rested on the quality model by Böhn and Deutscher (2019) presented in Figure 3, which classifies training quality aspects into the dimensions input, process, and output and into more detailed subdimensions. In this research field, data is most commonly collected through survey instruments focusing on trainees' subjective perceptions of training quality (Böhn & Deutscher, 2019). Since the presented quality model was transferred into the survey instrument "VET-LQI" (learning quality inventory) by conducting a qualitative meta-synthesis of 43 test instruments (Böhn & Deutscher, 2021), the already validated instrument could be used in this dissertation research to collect data on in-company training quality. The survey instrument starts with general personal details and biographic data such as educational level and prior academic performance of the participants. For every quality criterion represented in the quality model, the instrument includes a scale consisting of three to eight items, measured on a seven-level Likert scale (1 = strongly disagree;

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<sup>9</sup> All information on the data collections (modalities, time points, location, sample, etc.) is presented in each paper separately and shall not be repeated here.

7 = completely agree).<sup>10</sup> The survey scales targeting in-company training quality are designed as reflective scales, where the items (indicators) “are believed to reflect the unobserved, underlying construct, with the construct giving rise to (or ‘causing’) the observed measures” (Hulland, 1999, p. 201). Thus, the indicators’ correlation and the scale reliabilities must be considered (ibid., p. 201).

As the scales and items used in the final analysis, as well as their descriptive data and respective scale reliabilities, are already included in each of the papers’ appendixes in detail, an extensive presentation of the scales is foregone here.<sup>11</sup> Instead, the first scale *Work Climate* is presented as an example. In that scale, survey participants are asked to express their agreement with the following five statements:

*021 If necessary, the employees in my company support each other.*

*022 There is a personal atmosphere within my company.*

*023 There is a bad working atmosphere within my company. [R]*

*024 There is strong competition between employees in my company. [R]*

*025 Employees in my company are rigorously monitored and controlled. [R]*

(Böhn & Deutscher, 2021, p. 36)

As can be seen, the five items each give additional information about the working atmosphere within the training company, while still being closely related to the same topic. The items thus measure the unobservable quality construct *Work Climate*, which, with regard to the causes of item-related response behavior, changes over time or with interindividual differences (Hulland, 1999). Items 023, 024 and 025

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<sup>10</sup> As can be seen in Table 1, there were two data collections for this dissertation. In the second data collection (DFG Project ‘Competence development through enculturation’), the survey was complemented by further scales by the partnering research team from University of Duisburg-Essen. To reduce the time trainees needed to read and complete the long survey form, the measurement scale was changed to a clear five-level Likert scale.

<sup>11</sup> Cronbach’s Alpha was used to assess scale reliability. The scale’s intercorrelations were checked to ensure sufficient discriminant validity (Hartig et al., 2012). In a few cases with relatively low reliability, trade-offs were needed, which were, in line with Schermelleh-Engel and Werner (2012), mostly made to keep the holistic VET-LQI approach and to achieve broad insights, instead of reducing training quality to a few quality scales. The respective values are reported and discussed within the papers separately.

are reversed items, as indicated by [R], so that responses need to be reversed to correspond to the ‘positive’ statements of items 021 and 022.

In general, and in accordance with the interactive framework theory presented, the survey was designed to measure trainees subjective perceptions of training quality. However, the items can easily be used for other target groups, at times requiring a slight adaption of the wording, which was done for papers 1 and 2, when central training officers (see below) were also asked to evaluate in-company training quality (as can be seen in the presented example: no changes were needed for the *Work Climate* scale). In the longitudinal data collection (papers 3 and 4), further scales were added to serve the project’s overall goals and the research interests of the partnering University Duisburg-Essen. However, these scales were barely used for the research questions of this dissertation.<sup>12</sup>

Additionally, papers 1 and 2 used a novel bilateral operationalization of training quality via “difference accounting multi-perspective scores”, “DAM-Scores” (Krötz & Deutscher, 2021a, p. 379 f.). DAM-Scores calculate the differences in the perception of training quality between a trainee and his/her central training officer, while weighting regarding the absolute rating. The theoretical-rational (NIT) and the calculation procedure are explained and discussed in detail in Paper 1. Central training officers were chosen to participate as a second perspective (besides trainees) since they are responsible for implementing the training curriculum and for monitoring both training quality and trainee satisfaction and progress during training. Involving the central training officers of each participating company appeared a reasonable decision as no detailed information on daily interaction patterns were available or collectable in an economically practical manner and thus any other main interaction partners (e.g., the trainees’ direct supervisors) could not be identified. A survey among central training officers also allowed for a consistent data basis for all trainees.

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<sup>12</sup> Except for Paper 3, where additional items for the scale *Personal Factors* were added and renamed as *Professional Commitment*. Furthermore, two scales from the area of vocational schools were included to serve reviewers’ comments on improving alignment to the study’s context of dual VET.

### 3.1.2 Drop-out (Intention)

With regard to drop-out (which was the exemplary target variable in papers 1 and 2, and the main dependent variable of interest in Paper 3), actual drop-out of survey participants is almost unmeasurable since, in anonymous settings, no notification of termination is supplied and trainees who have dropped-out cannot be reached for further information. Therefore, drop-out intention of survey participants was used as a feasible and useful predictor to analyze the relations of training quality and potential drop-out risks. However, more detailed reasons for using this criterion, as well as its advantages and disadvantages, is extensively expounded within the three papers, especially in Paper 1 (see Krötz & Deutscher, 2021a, p. 376).

Moreover, to enable the analysis of different drop-out directions in Paper 3, four items targeting the four directions of drop-out intentions were newly developed and tested (see Krötz & Deutscher, 2022). The new items were partly inspired by the VET-LQI scale *Premature Termination of Contract*, resulting in a simple and straightforward statement for each of the four directions (Table 3). Similar to the accompanying survey on training quality, the items on drop-out intention were measured on a five-level Likert scale, ranging from 0 ‘strongly disagree’ to 4 ‘completely agree’. In the right-hand column, Table 3 indicates the percentage of trainees who clearly agreed to the statements (between 8.4 and 14.4%).

**Table 3**

*Items to operationalize four directions of drop-out intention*

Direction of drop-out intention	Direction-specific item	M	SD	Percentage of responses $\geq 3$
Upward drop-out intention	<i>“I want to quit training to study at university (including dual university or university of applied sciences).”</i>	.42	1.12	9.5
Horizontal drop-out intention (company change)	<i>“I want to change my training company.”</i>	.63	1.28	14.4
Horizontal drop-out intention (occupation change)	<i>“I want to change my training occupation.”</i>	.63	1.29	14.2
Downward drop-out intention	<i>“I want to work without any training.”</i>	.34	1.02	8.4

*Note.* Table cited from Krötz and Deutscher (2022, p. 6).  $n = 546\text{--}549$ . Response options: 0 ‘strongly disagree’ to 4 ‘completely agree’.

### 3.1.3 Vocational Competence

Vocational competence was measured using a validated test instrument by Klotz (2015; for its development and theoretical reasoning see Klotz, 2015). In that competence test, trainees are presented with an authentic company framework for the ‘Ceraforma Keramik AG’, in which the company background, the business field, and the trainees’ own area of operation is described (see Klotz & Winther, 2017, p. 236). Authentic simulation of the work environment is particularly important in enabling a valid performance measurement for vocational competence (Deutscher & Winther, 2022; Schnick-Vollmer et al., 2015). Likewise, an entire business process orientation is stressed from the beginning of the test as trainees should support the process “from the receipt of orders to the settlement of accounts” (Klotz & Winther, 2017, p. 236). The test comprised eleven tasks (divided into further subtasks), including knowledge and terminology reproduction, but mainly involving action-oriented tasks with realistic initial situations, such as replying to a business email or calculating sales prices (aiming to involve conceptual, procedural, and interpretative competence levels; Greeno et al., 1984). The test items were designed on curricula requirements from both the school- and company-side. Overall, the instrument’s tasks and difficulty level are comparable to the official final examinations by the Chamber of Industry and Commerce (IHK), aiming to measure trainees vocational competence (Deutscher & Winther, 2018; Klotz, 2015).

When the test is used in early stages of training, trainees are not able to solve all tasks since some contents are scheduled for later stages within the curriculum. However, over the course of training, an improvement is observable due to increasing competence levels, as was shown by Klotz (2015, p. 241) and Deutscher and Winther (2018, p. 25 f.). As theoretically substantiated in Section 2.3.2, the test contains domain-linked (11) and domain-specific (13) items. In the following, two exemplary tasks representing domain-specific or domain-linked items are briefly presented.

To maintain the logical order of the business process, the first example (Fig. 6) shows an authentic initial situation and a clear work order related to calculating a bathtub price for a new customer. The right information needs to be processed to calculate the respective subtasks a – d, which can be calculated independently. This task requires domain-specific calculation rules and schemes that trainees

only learn during vocational training. Some trainees might even have had the opportunity to apply the calculation scheme in practice, depending on the time of testing, the departments they were deployed in, and the practices conducted within their training companies.

**Figure 6**

*Price calculation as an exemplary domain-specific task from the competence test*

**Initial situation:**

Mrs. Kenk tells you about successful talks with a new customer from abroad. The American construction company "Miller Ltd." would like to use bathtubs from the series "Star" in new buildings in the future. This is a good opportunity for Ceraforma Ceramics AG to promote exports.

1. Since the last price calculation for the product was more than a year ago and the prices have changed, Mrs. Kenk asks you to use the following values to determine the net sales price for a "Star" corner bath, from Ceraforma's point of view, using the preliminary calculation.

Target for profit	8 %
Administrative overhead rate	13 %
Manufacturing material	1.000 EUR
Material overhead rate	16 %
Manufacturing wages	80 EUR
Sales overhead rate	12,5 %
Manufacturing overhead rate	140 %

**Calculate** the following values:

- a.) Material costs: \_\_\_\_\_
- b.) Manufacturing costs: \_\_\_\_\_
- c.) Cost Price: \_\_\_\_\_
- d.) Net sales price per piece: \_\_\_\_\_

*Note.* Task developed by Klotz (2015). Translation by the author.

The second example (Fig. 7) represents the ensuing step in the business process, where trainees have to conduct a currency conversion of the bathtubs' negotiated sales price, which is needed in the accounting department. The simple conversion of Euro to US-Dollar could be solved through basic economic numeracy, for example, by applying the direct or inverse proportion formula ('rule of three'), with which trainees in Germany are already familiar from prior state schooling. Thus, the task represents an item of domain-linked competence (Deutscher & Winther, 2018, p. 24).





## 3.2 Testing Methods

### 3.2.1 Papers 1 and 2 (Perceptions of Training Quality)

Papers 1 and 2 drew from the same data set, involving a cross-section of trainees and trainers from occupations of the business management domain (see Table 1). The distribution of the data's training quality scales showed that the histograms and Q-Q-diagrams both indicated good or at least acceptable approximate normal distribution for the training quality scales, while the drop-out intention scale was left-skewed (due to only few drop-out intentions; see appendixes of papers 1 and 2). An overall training quality factor showed a good level of normal distribution, the overall DAM-Score only showed an approximate normal distribution due to slight right-skewness.<sup>13</sup> Multicollinearity was checked throughout the analysis using the Variance Inflation Factor (VIF), which stayed below 2.3, wherefore multicollinearity was no concern for either paper (Hair et al., 2014).

The central objective of Paper 1 was to examine a possible multi-perspective operationalization of training quality (DAM-Scores) and *test its potential compared to the conventional mono-perspective approach* (see Table 1). For this reason, multiple regressions were run to compare the two operationalizations in their relation to the exemplary output variable drop-out intention. However, different forms of relation could be possible. First, a linear relation implies that constant improvements in training quality lead to steady improvements on the drop-out intention scale (meaning decreases in drop-out intention).<sup>14</sup> Second, only the left half of the curve appeared plausible if a quadratic relation is being considered: Improvements on the lower scale end only have slight effects, while a medium level of training quality has a high impact. That relation was dismissed since the right half did not seem

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<sup>13</sup> The Shapiro-Wilk and Kolmogorov-Smirnov Test indicated no normal distribution for most quality criteria. When assessed as an overall quality factor, the Kolmogorov-Smirnov Test indicated normal distribution ( $p = .200$ ). However, due to the relatively large sample ( $n = 341$ ), both tests should be treated with caution and normal distribution should be assessed, e.g., graphically since both tests are highly sensitive for larger samples (Field, 2018, p. 248; Kubinger et al., 2009, p. 26).

<sup>14</sup> All scales were adjusted so that higher values imply higher quality. On the drop-out intention scale in papers 1 and 2, higher values also imply higher quality, meaning lower drop-out intention.

plausible: improving training quality from a good to a maximum level would have the biggest impact in reducing drop-out intention. Third, an inverted quadratic effect was already incorporated in the DAM-Scores (see Paper 1, p. 380), meaning that lower quality ratings produce increasingly higher ‘difference scores’, and was therefore also not considered. Fourth, scatter diagrams indicated an approximate linearity for the relation of quality scales and drop-out intention.<sup>15</sup> Thus, ordinary least square (OLS) linear regression models were used as a common and well-traceable basis to compare both approaches.

Furthermore, the need for multilevel analysis was checked since, when DAM-Scores are analyzed, group-effects could affect the results as trainees were nested to their trainers on a higher level. However, the null model and variance explained by the group-level indicated there was almost no group-effect for the dependent variable drop-out intention and, therefore, single-level regression modelling was sufficient (for detailed reporting see Paper 1, p. 380 f.).

The regressions for Paper 1 were run block-wise, starting with personal characteristics (age, gender, education, etc.), then adding training occupation dummies. When the full model was run with all mono-perspective training quality scales as independent variables, all personal and occupational variables were controlled for in a first block. To identify the training quality criteria that show the strongest relation to drop-out intention and achieve the largest variance explanation, stepwise selection was applied in the IBM SPSS statistics software. The procedure was repeated for the multi-perspective approach, including the DAM-Scores instead of mono-perspective quality scales. Both approaches were further compared by conducting fisher tests to analyze the significance of their correlation differences with drop-out intention. Additionally, a third merged regression model considering both types of training quality variables was shortly presented.

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<sup>15</sup> Further possible relations could be, e.g., an s-shaped relation or a limited growth function, where improvements on the lower training quality end have higher impacts than on the higher scale end. However, due to the unclear nature of the relation, indications of approximate linearity, and the objective of comparing two operationalization approaches (not making statements on the specific effects of training quality), the first-time comparison between the two approaches was conducted in a similar and conventional (straightforward) way.

In Paper 2 (using the same sample and quality scales), again a block-wise regression was run to analyze the research question: *Are input criteria of training (personal characteristics, company size, etc.) capable of explaining differences in perception?* To enable such a regression, the DAM-Scores of all training quality scales were combined into one overall DAM-quality factor. The five-step procedure (paper 2, p. 1467 f.), including different groups of independent variables block-wise, facilitated analyzing and comparing the effects of the different areas of variables (e.g., personal vs. company aspects) both independently and as an ensemble. To cover the topic entirely, the analysis also investigated *whether the perspective taken significantly affects the relation to outputs*. For this analysis, an overall training quality factor was built for each mono-perspective quality perception (trainers vs. trainees), in addition to the overall DAM-Score. Pearson correlation analysis (two-sided) was used to compare all three approaches regarding their relation to the exemplary dependent variable drop-out intention. Again, fisher tests were applied to check for the significance of effect strengths.

To examine *how pronounced the differences in perception between trainees and trainers are within the sample*, descriptive data were compared and a conventional t-test for independent samples was conducted for every quality scale. Levene tests showed that variance homogeneity of both groups was only prevalent in four of the 15 quality scales. Thus, the more robust results of the Welch test were reported and interpreted for the remaining eleven scales (Rasch et al., 2011). The effect strengths of the group differences were tested using Hedge's  $g$ , which is similar to the common Cohen's  $d$  corrected for a bias of small group size ( $n_{\text{trainer}} = 30$ ); however, both variants are more commonly referred to as (Cohen's)  $d$  (Ellis, 2010, p. 27). Lastly, the Intraclass Correlation Coefficient (ICC) was used to analyze the concordance of trainees and trainers on an overall level and a scale level. Following recommendations from the literature (Koo & Li, 2016; Shrout & Fleis, 1979), the ICC (3,1) was applied (two-way mixed) since all raters rated all items and the raters were chosen for their respective group membership (justified for systematic errors). ICCs were reported in single-measure form and interpreted based on the 95% confident interval, as classified by Koo and Li (2016, p. 161).

### 3.2.2 Papers 3 and 4 (Effects of Training Quality)

Papers 3 and 4 drew data from the longitudinal project ‘Competence development through enculturation’ (KL 3076/2-1) funded by the German Research Foundation (DFG), as longitudinal data is particularly useful when tracing causal relations and intra-individual developments (Michaelis & Seeber, 2019). Paper 3 used data after two data collections (beginning of vocational training and after one year of training), while Paper 4 additionally used the third data collection (after two years of training). Graphical checks of the histograms and Q-Q-diagrams and the large sample size ( $n_{\text{paper 3}} = 562$ ;  $n_{\text{paper 4}} = 458$ ) allow approximate normal distribution to be assumed (Field, 2018; Kubinger et al., 2009). Scatter diagrams suggested a slight linear relation for some quality scales and drop-out intention. Again, multicollinearity was checked using the VIF and was no issue for either research projects.

To answer Paper 3’s question *whether it is possible to measure different drop-out directions*, descriptive statistics and (Pearson) correlation analysis were used to analyze the four items and their relation. To examine *what role training quality, in comparison to other influence areas, plays for drop-out intention*, encompassing linear regression models were run, one for each of the four directions of drop-out intention, enabling a comparison of the four directions. A block-wise procedure was used, separating four blocks of different areas of influencing factors (socio-demographic aspects, motivational proxies, competence, training quality), which enabled the tracking of changes in variance explanation caused by the different influence areas. For the last research question (*does the effect of training quality vary regarding different directions of drop-out intention?*), four more narrow regression models were formed out of the impressions gained, again each with one of the four directions of drop-out intention as a dependent variable. This step aimed at uncovering the most influential factors for each direction, reaching a maximum variance explanation.

However, due to the large number of variables to be considered, list-wise exclusion of missing values would reduce the sample to about 300 cases. Therefore, pairwise exclusion was applied in all regressions of Paper 3. On the basis of t-tests, the necessary missing completely at random (MCAR) condition was checked, i.e., do trainees who did not respond on a specific item differ significantly from the responding trainees regarding any of the (non-)categorical variables (Baltes-Götz, 2013; Kline,

2016)? However, only 1.4% of the combinations indicated significant differences for the non-responders.<sup>16</sup> For the categorical variables, only trainees speaking further languages ( $n = 9$ ) appeared to have noticeably greater ratios of missing values with respect to *Work Climate*, *Teacher Competency* and *School-Learning Content*. Thus, pairwise exclusion appeared reasonable, still yielding a sample size of  $n \geq 531$  for most scales.<sup>17</sup>

In Paper 4, the main research question was: *What effect does in-company training quality have on domain-specific and domain-linked competence development, controlling for important input characteristics' effect (e.g., socio-demographic aspects, mathematic interest, aspirations, company size)?* Resulting from this question, it was also of interest *whether the effect of training quality varies for the two competence dimensions*. For this reason, structural equation modelling (SEM) was used to model the effects on competence development exerted by the numerous training quality scales (measured by their indicators) simultaneously, while including the effects of the mentioned control variables.<sup>18</sup> The main advantage of SEM is the possibility to model more complex structures, for example, to combine factor analysis and several regressions. This modeling means that latent variables (only indirectly measurable via indicators) can be included in regressions together with their indicators, while measurement errors are considered throughout the analysis, leading to higher reliability of results (Aichholzer, 2017). As a result of existing theories and knowledge regarding the factor structure from the previous studies, the prevalent covariance-based SEM was applied (Hair et al., 2017) as, generally, reflective latent variables were to be used to explain the relation between training quality and the target variable (vocational competence). To answer the research questions, SEM (including the measurement

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<sup>16</sup> Three combinations were related to the competence score ( $T_1$ ,  $n = 536$ ), where also technical issues due to the online data transmission were involved in losing cases. Thus, the amount of significant non-responder effects was acceptable: below 1%.

<sup>17</sup> Three scales still provided 509–519 cases while only *Teacher Competency* showed a smaller sample ( $n = 459$ ) but did not play a significant role in the final analyses.

<sup>18</sup> The analysis was conducted in R (R Core Team, 2022) using the lavaan package (Rosseel, 2012).

model for training quality) was combined with Latent Growth Modelling (LGM), allowing trainee competence development to be considered over three points in time.<sup>19</sup>

LGM extends factor analysis “to the analysis of items across time” (Lin, 2021, Introduction). By including two latent factors, a level factor (intercept) and a growth factor (slope), as well as their variances and covariance, both mean and interindividual trajectories over time can be modelled (Brandtstädter & Lindenberger, 2007, p. 74; Duncan & Duncan, 1995, p. 189 f.). For this purpose, the indicators’ loadings on the two factors are fixed and not freely estimated: All loadings on the intercept must be constant (commonly set to 1) while the loadings on the slope factor must increase, usually starting at zero and increasing by one unit (e.g., 0, 1, 2), representing the measurement points in years (Brandtstädter & Lindenberger, 2007; Duncan & Duncan, 1995; Lin, 2021). Through this process, the intercept mean can be interpreted as the mean of the starting point (Lin, 2021, The latent growth model). The slope’s mean and variance represent an “estimation of the average linear change and interindividual differences within” (Brandtstädter & Lindenberger, 2007, p. 74; translation by the author). The covariance of the intercept and slope indicate the nature of the relation between the starting points and changes over time (ibid, p. 74). In Paper 4, the LGM incorporated in the SEM represented the measurement model of trainee competence development for each dimension separately (domain-linked vs. domain-specific; see Section 2.3.2) since (1) both dimensions are theoretically two distinct competence facets and (2) the literature (Klotz & Winther, 2016; Rosendahl & Straka, 2011) and the data (see Paper 4, Table A2) have shown that domain-specific competence increased two- to threefold, requiring two distinct models and slope factors (see Paper 4, figs. 1 and 2 for illustrations of the models).

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<sup>19</sup> Prerequisites of SEM, such as multivariate normal distribution, as well as factor loadings and model fit indices were checked and reported within Paper 4. Moreover, Mahalanobis distance indicated only one “potential model fit outlier” (Aguinis et al., 2013, p. 289) for the dependent variables ( $p > .001$ ), with neglectable impact on the distribution.

## 4 Paper Publications

Before the next four subsections (4.1 – 4.4) present the original published papers (except paper 4 as partly amended manuscript from December 12, submitted in June 2022), a short overview on the paper contents is presented (see also Table 1).

As was outlined earlier in Figure 1, papers 1 and 2 deal with the perceptions (and perceptual differences) of vocational training quality in companies, whereas papers 3 and 4 focus on the impacts in-company training quality can exert on output aspects such as drop-out intention and vocational competence. Papers 1 and 2 draw data from an online survey on in-company training quality with 30 companies from the business management domain (311 trainees and 36 central trainers). Papers 3 and 4 use data from the longitudinal DFG project ‘Competence development through enculturation’, which was conducted in vocational schools, partly in paper-pencil style and partly online (see methods sections in papers 3 and 4), yielding samples of 562 (Paper 3) and 458 (Paper 4) trainees from the business management domain.

Paper 1 concerns potential differences in perception regarding in-company training quality. A novel multi-perspective approach to operationalizing training quality, using negative differences in perception between trainees and trainers (DAM-Scores) is presented and compared to the conventional mono-perspective approach of trainee perception. As a potential negative consequence of such perceptual differences, drop-out intention is taken as an exemplary output variable for the comparison of both approaches in multiple linear regression models.

Paper 2 assesses in-company training quality, taking into account both trainee and trainer evaluations, and examines whether the perceptions of both groups differ concerning specific quality criteria (e.g., by using t-tests). In addition, correlations of the trainee perspective, trainer perspective, and the DAM-Scores with the exemplary output variable drop-out intention are compared. Using regression analysis, potential origins of the perceptual differences within the sample are analyzed.

Paper 3 examines whether the four-directional approach to drop-out intention (upwards, downwards, company change, occupation change) works with regard to the sample of industrial business



management trainees. Subsequently, the effect of in-company training quality on drop-out intention is analyzed and compared via multiple regression models to other influencing factors such as competence scores or socio-demographic aspects. Moreover, each direction of drop-out intention is analyzed separately regarding its most relevant influencing factors.

Paper 4 uses LGM to assess trainee competence development over two years of vocational training. The paper's core question is whether the quality of in-company training influences the development of vocational competence. In structural equation models, the domain-linked and domain-specific dimension of vocational competence are considered separately, enabling a more detailed analysis of training quality's role. Furthermore, the influences of several input characteristics (e.g., educational level, aspirations, mathematic interest, company size) are controlled, giving insights into the effects of such characteristics compared to training quality.

#### **4.1 Paper 1: Differences in Perception Matter – How Differences in the Perception of Training Quality of Trainees and Trainers Affect Drop-Out in VET**

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Krötz, M., & Deutscher, V. (2021). Differences in Perception Matter – How Differences in the Perception of Training Quality of Trainees and Trainers affect Drop-out in VET. *Vocations and Learning*, 14, 369–409. <https://doi.org/10.1007/s12186-021-09263-7>



# Differences in Perception Matter – How Differences in the Perception of Training Quality of Trainees and Trainers Affect Drop-Out in VET

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## Abstract

The dual system of vocational education and training (VET) and its quality have recently been receiving scientific attention, partly due to high drop-out rates and to politically-motivated efforts to increase participation in the system (Le Mouillour, 2018). However, it remains controversial as to how quality within training companies should be measured, and from whose perspective, and how the quality of training affects drop-out. Empirical studies mostly target the quality perceptions of trainees or of trainers in isolation. The extent to which output factors such as drop-out rates are influenced by variations in perceptions of quality between both these parties has to this point not been tested. The object of the present study was to present a novel bilateral approach to assessing training quality. For this reason, the effects on drop-out intention of differences in the perception of in-company training quality (incongruences) between trainees and trainers from the same company were examined. An online survey was conducted involving 311 commercial trainees and training officers from 30 German companies. A framework model of workplace learning (Tynjälä, *Vocations and Learning*, 6(1), 11–36, 2013) and a short questionnaire “VET-LQI” (Böhn and Deutscher, *Zeitschrift für pädagogische Psychologie: ZfPP*, 33, 49–70, 2020) served as the theoretical basis and test instrument respectively. Responses from trainees were matched to those of their corresponding trainers, in order to determine possible differences for every item and scale. Following a weighting method regarding the absolute rating level, 15 input- and process-quality factors of divergence, so called “difference accounting multi-perspective scores” were used as independent variables in multiple regression analyses. The results show that differences in perception of quality not only have a significant effect on

## Highlights for Review

- A novel bilateral approach to analyse training quality and outcomes is presented
- Negative differences in perception integrate perspectives of trainees and their respective trainers
- Data from an online survey with 311 trainees and their trainers (30 companies)
- Effects of training quality on drop-out intentions vary depending on the approach
- Bilateral approach shows significantly greater explanatory power than unilateral view

Extended author information available on the last page of the article

drop-out intentions, but also explain drop-out intentions more generally, and with a higher predictive power than the conventional method of merely focusing on the quality perceptions of trainees (adjusted  $R^2 = .439 > .333$ ).

**Keywords** Training quality · Vocational education and training · Multiple perspectives · Difference score · Drop-out intention

In-company training is often referred to as a crucial component of vocational education and training (VET) that contributes to low youth unemployment rates, as the entry into employment is facilitated. Moreover, competitive advantages for companies and industries are provided by securing a practically highly qualified workforce (Dornmayr 2016; Hanushek 2012; EU 2018; OECD 2019). In recent decades, many countries<sup>1</sup> around the globe have adopted a dual vocational education and training structure by combining company-based training programs provided by the private sector, with a school-based component, usually provided by the public sector, leading to qualifications in nationally recognized occupations. However, despite their perceived importance for education and economic policy, VET actors internationally struggle with issues of quality assurance and quality improvement (Le Mouillour 2017, 2018). Therefore, training quality must be taken seriously in order to achieve the claimed advantages of such systems. For example, in Germany, decreasing enrolment rates and increasing drop-out rates (26%) are becoming a concern (Bundesinstitut für Berufsbildung (BIBB) 2020).<sup>2</sup> Also, governments in Austria (Dornmayr and Löffler 2018), Denmark (Andersen and Helms 2019), France (Centre Inffo 2019), the Netherlands (Smulders et al. 2019), Portugal (DGERT 2019) and Sweden (Skolverket ReferNet Sweden 2019) aim to strengthen VET's attractiveness for young people, in order to reduce the number of early leavers from VET and to improve the labour market situation. These efforts could be supported by an increase in the quality of dual educational programmes (Gow et al. 2008).

However, there are two major scientific obstacles to VET quality research, which are – as we will show – interrelated: First, findings on workplace training quality differ widely due to the diverse perspectives on and ideas about quality, which reduces the comparability of studies (Tynjälä 2013; Ebbinghaus 2016). While numerous studies focused on unilateral perception of training quality are available, “multi-perspective” explorations that interrelate quality perceptions by different actors are rare (Ebbinghaus et al. 2011, p. 203 ff.). This is problematic, since the few existing multi-perspective explorations show that the expectations and perceptions of training quality diverge considerably between trainees and trainers (Ebbinghaus et al. 2010; Griffin 2017; Filliettaz 2010; Negrini et al. 2016; van der Sluis et al. 2014). Second, unilateral studies looking into training quality usually find no or rather small effect sizes with regard to the influence of most quality aspects in the

<sup>1</sup> E.g. Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Ireland, the Netherlands, Portugal, Sweden, Switzerland.

<sup>2</sup> Drop-out rates vary widely across the numerous training occupations. This is exemplified with the occupations included in this study in Appendix Table 6.

process category, on vocational quality outputs (e.g. vocational competence, vocational identity, vocational drop-out, etc.). This could either be the result of adopting an incomplete measurement approach (leaving out important factors of variance explained) or may suggest that quality as a concept is likely to be less of an explanatory factor for successful VETs than theoretical models and political agendas tend to suggest.

We believe that these two conundrums of VET quality research (the paucity of multi-perspective insights and the unexpectedly low effect-sizes) are intertwined, in the sense that the integration of multiple perspectives allows for a more full explanatory approach to illuminating the genesis of VET output categories (e.g. drop-outs). In support of this assumption, we wished to explore how the different perceptions of company-based training held by trainees and trainers, impact the explanatory power of output factors. For this study, we focused on the output category drop-out, as measured by drop-out intention. Data from a conducted online survey, involving 311 commercial trainees and training officers from 30 German companies, served as a basis.

In the following sections, the challenges around training quality are briefly discussed, before the underlying quality framework for the study (Tynjälä 2013; Böhn and Deutscher 2019) is presented. Subsequently, our methodological approach is introduced: one that integrates the different perspectives on in-company training between commercial trainees and trainers, in order to objectify experiences to a certain extent. We then analyse the impact on drop-out intention through regression analysis and compare the results with those results of a mono-perspective approach (considering only the trainees' perceptions). We finally report the results and discuss the findings, also considering the respective limitations of the general study design.

## Approaches to Training Quality in VET

### Theoretical Basis of In-Company Training Quality Assessment

Two challenges complicate the assessment of training quality: The first challenge is to define what training quality exactly is. In spite of a longstanding research tradition, there is still no generally accepted definition of VET quality, nor a catalogue of criteria that could be applied to determine the actual quality of training (Ebbinghaus 2009). Secondly, there are various actors involved in company-based VET (e.g. trainees, trainers, program organizers, official regulators). In research studies to date, the “mono-perspective” approach is most frequently applied, where only one group of VET actors is considered, and where trainees are by far the most common subject of investigation (see Böhn & Deutscher 2019). However, there are also numerous studies focused on the perceptions held by training companies or trainers (e.g. Cooney and Long 2008; Jansen and Pineda-Herrero 2019; Kirpal and Wittig 2009; NCVER 2001; Wilson 2019). However, multi-perspective approaches to training quality that include both trainees and trainers are still rare (e.g. Rausch and Schley 2011; Rönnlund et al. 2019; Wisshak and Hochholdinger 2018). Several of these do underline that trainees and trainers perceive training quality differently (e.g.

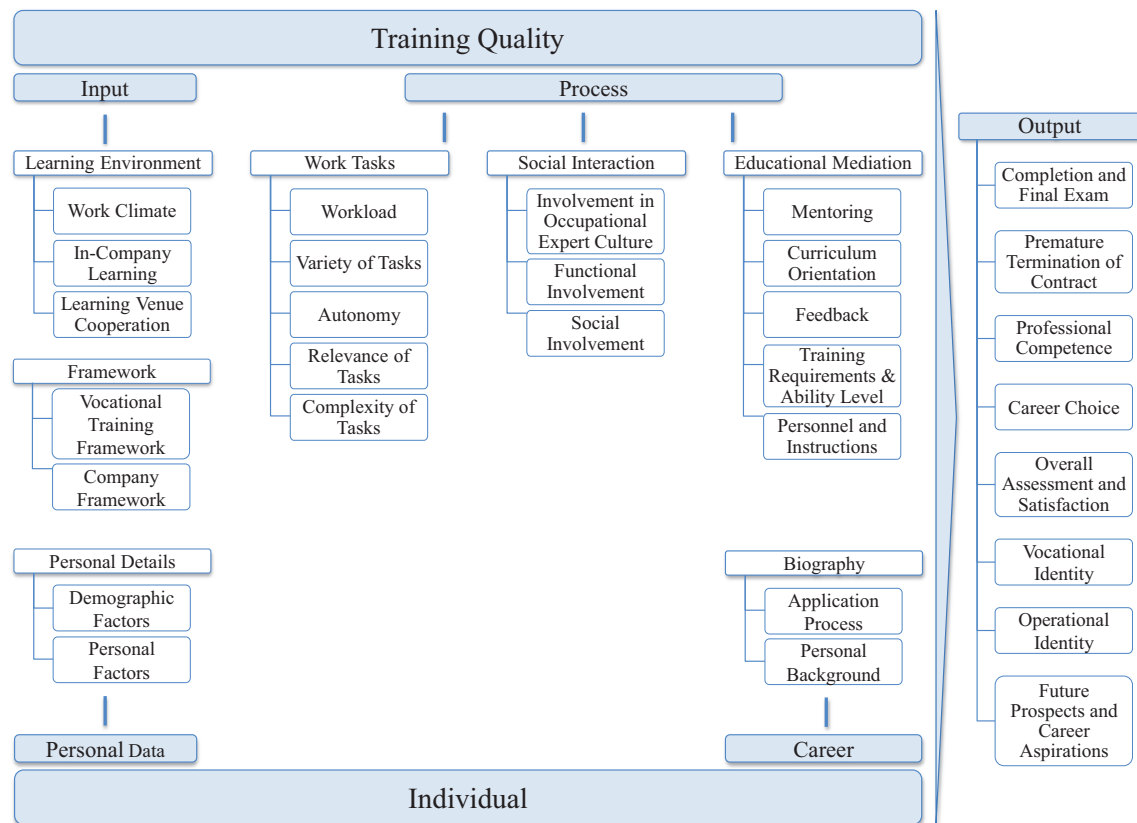
Cully and Curtain 2001; Ebbinghaus et al. 2010; Griffin 2017; Negrini et al. 2016; van der Sluis et al. 2014; Walker et al. 2012; Wandeler et al. 2011). Differences were found regarding numerous quality aspects, e.g. feedback and monitoring (Cully and Curtain 2001; Ebbinghaus et al. 2010; Negrini et al. 2016), Self-regulation (Negrini et al. 2016; Wandeler et al. 2011), variety of experiences, time for training (Walker et al. 2012) and learning material (Ebbinghaus et al. 2010).<sup>3</sup> Therefore, a multi-perspective approach that interrelates the perceptions by trainees and trainers, is needed in order to give a more coherent picture of VET training quality.

In contrast to most research, both actors – trainees and trainers – are addressed equally in this study. For this reason, a broad and perspective-independent definition of VET quality and quality framework model was taken as the basis. In this respect, quality is generally defined as the individual perception of characteristics of vocational training that are conducive to certain outcomes (Klotz et al. 2017). Ebbinghaus et al. (2010) have shown that the quality demands of both actors (trainers and trainees) are largely identical. Thus, a multi-perspective comparison of both perceptions seems plausible, as they basically value similar dimensions of quality. A framework of VET quality that reflects broad consensus in the workplace learning community, using a ‘three pillar approach’ (e.g. Seyfried et al. 2000; Visser 1994), can be found in the adapted 3-P Model of Tynjälä (2013) which, following Biggs (1999), distinguishes presage, process and product factors. This quality framework was further operationalized by Böhn and Deutscher (2019) through a qualitative meta-synthesis of existing measurement instruments for VET quality aspects (see Fig. 1) and was condensed into a survey instrument (VET-learning quality inventory; presented in "Survey Instrument" Section). Therefore, the categories represent commonly used quality aspects in the research literature but shall not be seen as exhaustive, since further criteria could plausibly be involved. This means, that the framework by Tynjälä (2013) is predominantly used as a categorization scheme.

As can be seen in Fig. 1, the quality framework comprises a dynamic view of quality. The different quality dimensions are arranged in their chronological order and in causal direction from left to right. However, because of our specific research interest in the effects of differences in perception of in-company training quality, further macro-influences, e.g. the labour market or economic situation, are ignored and only aspects regarding the company are considered. The Input dimension comprises aspects initially provided by companies as well as personal details such as e.g. gender or prior school career (Böhn and Deutscher 2019, p. 65). Input factors on the company side are further subdivided into the areas *Learning Environment* and *Framework*. This latter further distinguishes between *Vocational Training Framework* and *Company Framework*, while *Learning Environment* comprises the aspects *Work Climate*, *In-company Learning* and *Usefulness of Learning Venue Cooperation*. The centre of the model is formed by the Process dimension, which encompasses the following three areas of quality criteria that only come into effect over the course of training. The first, *Work Tasks*, comprises aspects that define the characteristics of tasks, such as *Overload*, *Variety of Tasks*, *Autonomy*, *Relevance of Tasks*

<sup>3</sup> As mentioned above, different items and scales were used to measure quality, which reduces comparability.





**Fig. 1** Operationalisation of training quality (Böhn and Deutscher 2019, p. 66)

and *Complexity of Tasks*. The second area, *Social Interaction*, consists of *Involvement in Occupational Expert Culture*, *Functional Involvement* and *Social Involvement*. The third process area, *Educational Mediation*, comprises the aspects *Mentoring*, *Curriculum Orientation*, *Feedback*, *Training Requirements and Ability Level*, as well as *Personnel and Instructions*. Social Interaction and Educational Mediation both describe the interaction processes between trainees and their company (ibid., p. 65 f.). Finally, the Output dimension reflects the results of all the preceding quality criteria in the short- or long-term effects of training (ibid., p. 67). Therefore, various areas like *Professional Competence*, *Vocational Identity* or *Overall Assessment and Satisfaction* are included. However, this study concentrated on drop-out intentions (a part of *Premature Termination of Contract*) as the main Output aspect.

Within this view, evaluations of training quality are in accordance with Lempert's (1998) interactionist theory, which assumes that the roots of vocational developments lie in the interaction of the individual with its direct environment and other people.<sup>4</sup> Measurement of the environment, of interactional processes and their results relies on the subjective perceptions of different actors (Böhn and Deutscher 2019; Klotz et al. 2017; Tynjälä 2013). Therefore, prevalent training quality is captured through the aggregated perspective of individuals in a specific group of actors.

<sup>4</sup> Lempert (1998) also includes influences by the surrounding macro-level (e.g. job market, legal regulations). However, due to the interest in differences in perception, this study focuses on the micro-meso-level.

However, against the backdrop of these initially stated challenges in VET, special attention must be paid to potential systematic differences in quality perceptions between both parties, which are still largely unexplored (Negrini et al. 2016, p. 366). Considering these aspects and in line with the interactionist theory (Lempert 1998), it is consequently more plausible that drop-outs, and especially drop-out intentions, evolve from the interaction between an individual and its environment and therefore dependent on multiple subjective perceptions coming together rather than an isolated view.

### Negative Deviations in Quality Perceptions

The finding that the existing multi-perspective explorations consistently reveal large divergences in the perceptions of training quality by trainees and trainers, can be interpreted as verification that human observation is a highly unstable, imprecise and biased form of observation that hinders universally acceptable recognition (Beck 1987, p. 181). One way to deal with this issue would be to eliminate human observation from the research process, as suggested by Beck (1987) or at least to substitute personally involved individuals with neutral observers. However, many variables of the construct of training quality are hardly operationalized through clearly observable behaviour (such as e.g. vocational identity). And even if a construct is operationalized carefully by actual behavioural indicators, it would be very costly and possibly also unethical due to privacy reasons to observe a sufficiently large group of learners and trainers in such detail.

Another way of dealing with subjective bias might lie in the perspective-crossing objectivation of subjective perception by the integration of several perspectives. The measurement approach is then of course still subjective (with many of the associated insufficiencies therefore), but could to a certain extent be adjusted for the specific subjective bias of a single focus group. In order to implement a perspective-crossing approach, differences in perceptions between trainees and their trainers are calculated. It is expected that especially negative differences (incongruent perceptions) from trainee to trainer will affect output factors like satisfaction, and even drop-out, while in the case of rather similar evaluations of, for instance “too much overtime”, both actors are aware of a problem that should be avoided in training. In such cases a complaining trainee will face a training officer who is of the same opinion and therefore will try to mitigate the trainee’s frustration and explain the situation. Trainers’ objective would be to prevent a severe conflict and maintain a good relationship by showing the necessary understanding (Rüttinger and Sauer 2016). A rather soft style of communication can be expected in future overtime announcements, as they are aware of the unfavourable training condition. Having the same (negative) perception of training quality, trainers are likely to show the necessary sensitivity in order to prevent negative consequences.

Otherwise, in cases where the trainees perceive a quality aspect more negatively than do their trainers, even if it is still rated better (in absolute terms) than in the first case, more negative consequences are to be expected. Trainees who try to complain may face training officers with a dismissive attitude. Statements like



“overtime is a part of your training” may irritate trainees and suggest that the whole company accepts the lack of enforcement of legal standards as a normal condition. This example shows that even in a legally regulated context and despite legal options to complain, differences in perception and tacit conflicts may occur, making trainees experience powerlessness and dependency. Future communications, like the announcement of further overtime working, can be expected to be more rigorous and considerably less “soft” than in the first case. Consequently, the differences in perception between both parties could lead to a harsh climate, a more severe communication and deteriorating relationships, which entails higher potential for conflicts also. In such conditions, trainees’ needs for affiliation and autonomy will hardly be met (Deci and Ryan 2000). The repeated experience that the training company is not aware of and/or not reacting to such problems could reduce trainees’ motivation and self-determination over time (ibid., p. 243), and finally create discomfort and frustration (ibid., p. 248 & p. 251). Not all conflicts emerge openly and become “manifest”, as many differences in perception are likely to result in “latent conflicts” (Lempert 1993, p. 7) that are not declared to the counterpart. Nevertheless, this distinction is not necessarily related to the severity of a conflict. It is again dependent on the subjective perception as to whether a latent conflict is severe or not (Lempert 1993).

In these simple cases of high and low divergence the potential for negative consequences becomes clear. Therefore, it is expected that negative differences in perception between trainees and their trainers impact the perception of quality output aspects – in our case drop-out intentions – negatively. We call this theoretical rationale the Negative Incongruence Theorem (NIT): The higher that trainees deviate negatively from their trainer’s perception, the higher the drop-out intentions should be. The difference between both perspectives will be calculated as difference accounting multi-perspective scores (“[Methodological Integration of Different Perspectives via Difference Accounting Multi-perspective Scores](#)” Section).

## The Construct of Drop-Out Intentions

As initially noted, in-company training, as part of the dual system of VET, is of great importance for individual workers but also for companies and for society as a whole. Therefore, much research focuses on causes and prevention of drop-outs. As main reasons for dropping out, previous studies mostly stress trainees’ socio-demographic characteristics, such as the educational level (e.g. Autorengruppe Bildungsberichterstattung 2012; Bessey and Backes-Gellner 2015; CEDEFOP 2016; Dornmayr and Nowak 2012; Faßmann and Funk 1997; Greilinger 2013), as well as company-related characteristics and conflicts (e.g. Autorengruppe Bildungsberichterstattung 2012; Faßmann and Funk 1997; Greilinger 2013; Rohrbach-Schmidt and Uhly 2015; Schöngen 2003; Stalder and Schmid 2006; Quante-Brandt and Grabow 2008). Also, mismatches between training reality and trainees’ previous expectations or desired occupations are commonly cited (Beicht and Walden 2013; CEDEFOP 2016; Nägele and Neuenschwander 2015; Schöngen 2003; Stalder and

Schmid 2006; Quante-Brandt and Grabow 2008).<sup>5</sup> It is noteworthy that drop-outs can also bring positive developments for trainees, as some may find a training place that better fits their abilities or even drop-out “upwards” (Feß 1995, p. 29), e.g. attaining an university degree.

In this study, however, we focus on drop-out intentions rather than actual drop-outs as the dependent variable, for several reasons. Firstly, most of the time drop-outs do not emerge suddenly but rather develop in a longer process (Deuer 2003, p. 21; Heublein and Wolter 2011, p. 223). By measuring drop-out intentions, it is possible to detect cases of drop-out potential, which enables trainers to intervene in time and eventually to reduce drop-outs (Aarkrog et al. 2018, p. 127; Deuer 2003). Secondly, by analysing the interdependencies of training quality and drop-out intentions, we can increase knowledge about the actual processes and relations in current training that foster drop-outs, already in the early stages of intentions (Vallerand et al. 1997, p. 1169). Lastly, retrospective surveys of actual dropouts could lead to biased statements about causes and their reasons for terminating the contracts, as trainees might not be able to summarize their experiences of several situations in valid answers (Aarkrog et al. 2018, p. 126; Rausch 2013, p. 56). Therefore, measuring intentions during the process enables the tracking of decisive factors more validly. On the other hand, not every thought of termination leads to actual drop-out. However, intentions to drop out have served as a viable predictor of actual drop-outs in several studies with respect to different types of university students (Bean and Metzner 1985, p. 527). Webb and Cotton (2018, p. 840) for instance have shown a strong relation between intentions and actual drop-outs by using a closely related construct: “contemplation of withdrawal”. They found that 21.5% of respondents contemplating withdrawal actually dropped out later. In relation to high schools, Vallerand et al. (1997, p. 1168) demonstrated that drop-out intentions and real drop-outs correlate positively ( $\beta=0.24$ ) as well. However, conversely, these findings also clarify that drop-out intentions are not yet a drop-out decision and therefore do as predictors greatly overestimate the final occurrence of drop-out. Therefore, we argue, they should be seen as a self-reliant construct that however, and at a maximum, can (1) viably serve as an early alert system for an increased drop-out probability during the training process and (2) can serve as a strong indicator for dissatisfaction with training conditions.<sup>6</sup>

“Drop-out Intention” in the VET-LQI is originally operationalized in a highly differentiated way: The scale comprises drop-out intention stemming from either the training company, from the school, personal problems or general occupational reasons, in order to allow for targeted causal analysis. Since the study presented here focuses on perceptions of training quality within the company, the scale was shortened accordingly to three items focusing on company-based drop-out intentions (see items 105, 106, 111 in Appendix Table 4). On this more informative short-scale,

<sup>5</sup> See also “Dropout from initial vocational training– a meta-synthesis of reasons from the apprentice’s point of view” by Böhn and Deutscher (submitted).

<sup>6</sup> Satisfaction in the context of job-training-satisfaction means the extent of positive or negative feelings about a training (Schmidt, 2007, p. 483). Since satisfaction in our survey was only addressed in a positive manner, drop-out intentions can be seen as its negative form, comprising only negative feelings or dislike towards training.

the effect of trainer-trainee differences in perceptions of quality on company-related drop-out intentions should become more valid, in terms of precision.

## Data Collection and Methodological Procedure

### Survey Instrument

The German version of the above-mentioned “VET-LQI” by Böhn and Deutscher (2020) was used as a validated survey instrument operationalising VET training quality. The survey instrument was compiled by an integrative content analysis of existing research instruments for VET quality (Böhn and Deutscher 2020). The survey was shortened to focus only on quality criteria in respect of the company, in order to limit the expenditure of time for these volunteering companies. 16 quality categories remained to be measured. Trainees and trainers had to answer 89 questions, aiming at identical quality criteria. The data of trainees were matched to their corresponding trainers by stating the company name.

Both survey versions for trainees and for trainers were rebuilt online with the free tool “Google forms” and sent via email (with instructions and retrieval links) to training officers of the voluntarily participating companies. The survey was presented as a quality tool for pedagogical quality management, as part of a larger research project. Trainees were made aware that neither their trainers nor unknown third parties received their data and thus, they were able to answer without any pressure or fear of negative consequences. The response options regarding quality-related questions were designed as a seven-level Likert scale (1 = strongly disagree; 7 = completely agree). The participants were able to leave out questions at any time. However, this was done rarely (83 missing values = 0.44%).

To verify the collected data’s reliability, internal consistency was addressed using Cronbach’s Alpha, with which, principally, high alpha values ( $\geq 0.7$ ) are preferable. The “Vocational Training Framework” scale was excluded from the analysis, since it does not comprise a “reflexive theoretical concept” (Böhn and Deutscher 2020, p. 12 f.). Cronbach’s Alphas (see Appendix Table 4) of the remaining scales turned out to be broadly good or at least acceptable ( $0.694 < \text{Cronbach’s Alpha} < 0.857$ ). The scales “Work Climate” (0.632) and “Training Requirements and Ability Level” (0.659) showed lower internal consistencies, but both were kept, in order to preserve a more comprehensive picture of training quality. Highly problematic, in contrast, was the internal consistency of the scale “Relevance of Tasks” (0.443).

Furthermore, Table 4 sets out the discriminatory power of items, which turned out to be mostly good or at least satisfying (Ebel and Frisbie 1991, p. 232), with the exception of item 061 ( $< 0.3$ ). Despite this shortcoming, the respective item was not deleted, in order to prevent further restriction of the scales and their capability to cover the constructs in a valid range (see above). Discriminant validity was determined by checking the intercorrelations of different scales. Such scales can be considered as independent tests of the respective quality aspect, and thus should correlate only to a limited extent (Hartig et al. 2012, p. 158). Appendix Table 5 presents the intercorrelations of all 16 quality criteria that were included. As the correlations

were generally low and kept below 0.5, with only three minor exceptions, the measured different scales seem to indeed measure distinct quality criteria. Only “work climate” and “overload” correlated slightly more highly (0.525), while “social involvement” correlated with “feedback” (0.530) and “personnel and instructions” (0.507), indicating that these are not completely separable social aspects.

## Survey Procedure

Initially, 90 regional companies in Germany that had commercial trainees were chosen via Google Maps and were contacted by telephone. In a few cases, where no contact person in the personnel department was available, a request was sent via e-mail. The survey period was 4 weeks. In all, 30 confirmations were received. Half-way through the period, responding companies were informed about their participatory status via e-mail, whereas non-responding companies were phoned again in an attempt to persuade them to participate within the set time. The final participation rate was 33.3% of all companies contacted. Most banks named security blockings or time restrictions as a reason to resign from the study.

## Description of the Sample

Consequently, the final numbers of participation amounted to 30 German companies, with responses by 36 trainers (3 companies having more than one trainer) and 352 trainees. There were some further responses by trainers and trainees where unfortunately the respective other party was missing; these cases could not be considered. Another 41 responses by trainees had to be excluded, since they did not state their corresponding company unambiguously and hence could not be matched. The final sample therefore amounted to 311 trainees and 36 trainers from the 30 companies. Predominantly they were bank trainees of all kinds (85%), but also e.g. Office Management Assistants, Industrial Management Assistants and Management Assistants in Wholesale and Foreign Trade were included (see Appendix Table 6). However, all of them were commercial trainees within the German dual VET system, facing relatively similar tasks during their training, for instance profitability analyses or the management of operational processes.

42.1% of the trainees were still in their first year of training. Another third (33.4%) were in their second year, and 24.4%<sup>7</sup> in the third year. The majority of 58.8% were female. This corresponds to the general tendency within the commercial occupations under study, where women constitute a slight majority (BIBB 2014). Furthermore, nearly three quarters of the trainees spoke only German at home. All other trainees spoke additional languages, except for five, who spoke only foreign languages at home. With regard to prior education level, there was a tendency towards possessing the higher school leaving certificate (66.2%), as only 33% had the intermediate

<sup>7</sup> Serving to account for this lower number is the fact that many trainees (around one third) shorten their training to two or two and a half years.

school-leaving certificate as their highest qualification. As Appendix Table 7 indicates, the weighted values for the included training occupations do not differ widely from the weighted statistical population. Chi<sup>2</sup>-tests showed no significant difference for both groups, regarding gender ( $p=0.209$ ) and first year of training ( $p=0.117$ ). Only with regard to the educational level ( $p=0.018$ ), the sample differs from the statistical population. Therefore, this is a rather representative distribution of the relevant background characteristics for German trainees in the respective occupations.

The participating trainers are official training officers in the personnel departments of their companies, often owning a qualification according to the trainer certification regulation (AEVO) (Bahl 2012). They may not in all companies interact with trainees on a daily basis, mostly as daily interaction contacts usually change with the departments a trainee has to visit during training. However, they are responsible for obligatory training consultation (Döring and Severing 2000) and all kinds of issues and questions by trainees. The training officers are, moreover, responsible for the training structure and implementation of the curriculum (§14 German Vocational Training Act) and meet regularly with the trainees in order to monitor the training. They coordinate the training as well as further internal training activities and face relatively similar activities compared to employees in the different training-relevant departments, due to the specifics of commercial activities (Bahl 2012, p. 26). Among training officers in this sample, two thirds were female, which is a typical tendency for the commercial sector (Bahl 2012).

### **Methodological Integration of Different Perspectives via Difference Accounting Multi-perspective Scores**

Firstly, all items were adjusted to point in the same direction, so that in each case higher responses by participants (maximum=7) indicated higher quality. Then, for each single answer from a trainee, the individual difference from his/her trainer was calculated. In the three companies where more than one trainer was involved in training, the responses by training officers were weighted to a mean value. As a result, trainees' responses were contrasted with either the responses of their own trainer or against the mean of both trainers. Trainee responses were subtracted from the respective trainer response. Therefore, the differences on a seven-point Likert scale can reach a maximum of 6, in cases where a trainer answered 7 and a trainee answered 1.

As our theoretical outline clearly assumes conflicts and a higher drop-out rate only for lower quality perceptions of the trainee compared to the trainer, only negative deviations (trainee perception < trainer perception) were considered. This means that if a trainee answered a single question more positively than did his/her trainer, the difference was set to zero, since there was no negative deviation on this particular item. Cases of positive deviation were not offset against negative ones, as this method would eliminate existent negative deviations in perceptions in our data (regarding the respective item, trainee and company). Possible negative consequences would be completely overlooked, whereas it was exactly the object of this study to measure the consequences of a lower trainee perception of training quality



compared to the trainer. It is theoretically implausible to assume that real conflict potential in one aspect is cancelled out by a positive deviation in another aspect. Consequently, item-wise differences ranged from 0 (=no negative deviation) to 6 (=maximum negative deviation).

As any difference between both parties might have more negative consequences when it arises on a low quality level, rather than on the upper end of the scale (e.g. 3–2 vs. 7–6), the item-wise differences are weighted by multiplying them with the inverse absolute rating (7 becomes 1, 6 becomes 2, 5 becomes 3, etc.). Consequently, this method leads to higher difference values in cases of low absolute ratings. Since we have cases of no difference (0) and a distortion due to the weighting shall be avoided, we previously shifted all differences by one unit. Item-wise differences then range from 1 to 7 (which makes no difference for their relation to the dependent variable). This means, in the case of a trainer rating of 6 and a trainee response of 5, the difference of 1 is added up by one unit (2) and then multiplied by 3 (inverse trainee rating), which results in a value of 6. We call the result of this integrative procedure difference accounting multi-perspective scoring (DAM scoring).

In the next step, the DAM scores were calculated for each quality scale per trainee. It is also noteworthy that only in the minority of cases did trainees rate quality aspects more positively than their trainers (30.9%). This supports the findings of bilateral studies (e.g. Ebbinghaus et al. 2010; Negrini et al. 2016), where in general trainers tended to rate training quality substantially better than did trainees. In cases where either the trainee or the trainer didn't answer a specific item, no difference could be calculated in regard to this item. The DAM score for the whole scale then consisted only of those items where both sides responded, and differences could be computed. However, both sides, especially trainees, rarely left out questions. Only in five cases (0.1%)<sup>8</sup> could no DAM score for a scale be calculated. In conclusion, there were 15 individual DAM scores for every trainee, addressing 15 different aspects of training quality.

## Calculation of Regression Analysis

Before the links between training quality criteria and drop-out intentions can be analysed, by using the novel bilateral approach and comparing it to the “conventional” unilateral approach, the data has to be checked for possible group-effects. Since the trainees are nested in companies, there are 30 groups of trainees matched to one trainer each. Therefore, the first step in multilevel modelling is to test a null model, without predictors, in order to identify the extent to which the variance in the dependent variable “Drop-out Intentions” ( $SD = 1.032$ ) stems from between-trainer differences on a second level (Heck et al. 2014). The results, however, show that the intercepts do not vary on a significant level (Wald  $Z = 0.613$ ,  $p = 0.540$ ). Additionally, the intraclass correlation (ICC) displays the proportion of variance in “Drop-out Intentions” that is explained by group-effects (Hox 2010), which amounts to 1.46%. This means, there is negligible amount of variation in the dependent variable

<sup>8</sup> There are 4665 deviations in total, calculated from 15 quality criteria for each of 311 trainees.

between the second level groups and therefore, the modelling of complex hierarchical regressions is not necessary for further analyses. Instead, single-level linear regression models are sufficient for the data.

## Results

### Prediction of Drop-Out Intentions by Trainee Perception of VET Quality

Before we take a look at the results of the “conventional” approach, which considers unilateral trainee perceptions of training, the effects of personal background information and the various training occupations on drop-out intentions were checked. Regarding personal aspects, trainees’ gender, their highest school-leaving qualification and average grade, the languages spoken at home, their self-assessed performance during training in the form of a grade as well as their year of training were included in a regression on drop-out intentions (for coding and descriptive data see Appendix Table 8). The resulting model ( $F[10, 288]=2.06$ ,  $p=0.028$ ) only explained 3.4% of the dependent variable’s variance (see Appendix). Two variables appeared to have a significant relation to drop-out intentions: The worse a trainee rated his/her performance during training, the higher the drop-out intentions plausibly were ( $p=0.009$ ). Also, intentions to drop-out appeared higher in the third year of training ( $p=0.009$ ). In another regression only dummy variables for the course of training were included, while the biggest group “bank clerks” served as reference. However, the model and its variables were not significant ( $F[5, 299]=1.40$ ,  $p=0.226$ ), indicating that being a bank clerk or an industrial management assistant etc. does not play a decisive role regarding drop-out intentions in this sample.

While analysing which quality criteria were related to drop-out intentions, all personal background and training course variables were included in the first block of the regression, since they exert a slight influence on the results and therefore should be controlled for. Then, all input- and process-quality scales were added into the linear regression model, still with the “Drop-out Intentions” scale the dependent variable. At first all quality criteria were included, then stepwise selection was applied in order to identify the most instructive model, which increased the adjusted  $R^2$ . The results in Table 1 are later compared to the differences approach (“[Prediction of Drop-Out Intentions by Negative Differences in Perception](#)” Section).<sup>9</sup>

Regarding the personal background variables in Table 1, again “Training Performance” was shown to be significantly related to drop-out intentions ( $p=0.017$ ), while “Year of Training” did not appear significant in a combined model with quality criteria. In contrast, the dummy for “Office Management Assistant” was shown significant on the  $\alpha=0.05$  level ( $p=0.014$ ), indicating less drop-out intentions by trainees of this course. Considering the quality aspects, trainee perceptions of “Overload”, “Work Climate”, “Curriculum Orientation” as well as “Social Involvement” were shown to be significantly related to drop-out intentions ( $F[19,$

<sup>9</sup> Since one trainee did not respond to the three drop-out items, the regression data comprised 310 trainees.

**Table 1** Model 1: Multiple regression model on drop-out intentions with trainee perception scores

Predictors	B	SE	Beta	Sig
(constant)	−4.104	.482		.000
Gender	−.099	.105	−.047	.350
Grade (in school leaving certificate)	−.002	.050	−.002	.964
Training Performance	−.148	.062	−.130	.017
Language (more than German)	−.081	.125	−.033	.516
Language (other than German)	.149	.506	.015	.769
Year of Training = 2	−.002	.119	−.001	.988
Year of Training = 3	−.163	.131	−.068	.215
Advanced technical college certif.*	.139	.165	.047	.398
Subject-related entrance certif.*	.092	.221	.022	.677
General higher education certif.*	.041	.129	.020	.752
Office Management Assistant	.580	.235	.128	.014
Industrial Management Assistant	−.287	.360	.039	.425
Management Assistant in Wholesale and Foreign Trade	.300	.499	.029	.548
Dual students of Business Administration and Commerce	.246	.283	.043	.386
Management Assistant Informatics	.008	.390	.001	.983
Overload	.260	.058	.274	.000
Work Climate	.218	.071	.191	.002
Curriculum Orientation	.158	.056	.149	.005
Social Involvement	.140	.066	.126	.036

*B* regression coefficient, *SE* standard error

Adjusted  $R^2 = .333$ . \* Reference category is ‘Secondary school certificate or less’. Reference category for training occupations is ‘Bank Clerk’

$n = 311$

274] = 8.70,  $p < 0.001$ ). All four aspects showed a small standardized effect size (Cohen 1988, p. 80), with “Overload” having the highest effect (0.274). The model shows a high level<sup>10</sup> of variance explanation, with an adjusted  $R^2$  of 0.333 (Cohen 1988, p. 414). The coefficients in Table 1 show that trainees who perceived those criteria to be of higher quality in their company, showed less intention to drop out of training, as they gave more positive responses on the scale “Drop-out Intentions”.<sup>11</sup> Thus, from the perspective of trainees, an appropriate workload in particular, but also more curriculum-orientated training, better social involvement as well as a pleasant working atmosphere, contributed to the reduction in drop-out intentions.<sup>12</sup>

<sup>10</sup> Classification according to Cohen (1988, p. 413 ff.):  $R^2 \geq .02$  = small effect;  $R^2 \geq .13$  = medium effect;  $R^2 \geq .26$  = large effect of variance explanation.

<sup>11</sup> The maximum of 7 would indicate trainees have no drop-out intentions at all.

<sup>12</sup> Multicollinearity was checked by assessing the Variance Inflation Factor (VIF), which remained  $< 1.71$  in all models. Therefore, multicollinearity is no issue in the presented models (Hair et al. 2014).



**Table 2** Model 2: Multiple regression model on drop-out intentions with DAM scores

Predictors	B	SE	Beta	Sig
(constant)	1.188	.189		.000
Gender	−.082	.096	−.039	.393
Grade (in school leaving certificate)	.024	.046	.024	.611
Training Performance	−.149	.057	−.130	.009
Language (more than German)	−.055	.114	−.022	.631
Language (other than German)	.130	.464	.013	.780
Year of Training = 2	.077	.108	.035	.481
Year of Training = 3	−.134	.120	−.056	.269
Advanced technical college certif.*	.108	.151	.037	.477
Subject-related entrance certif.*	.111	.201	.026	.583
General higher education certif.*	.040	.117	.020	.731
Office Management Assistant	.327	.210	.072	.121
Industrial Management Assistant	.214	.331	.029	.519
Management Assistant in Wholesale and Foreign Trade	.561	.462	.055	.226
Dual students of Business Administration and Commerce	.006	.258	.001	.981
Management Assistant Informatics	.057	.356	.007	.873
DAM Overload	−.057	.009	−.337	.000
DAM Work Climate	−.057	.013	−.229	.000
DAM Personnel and Instructions	−.027	.013	−.113	.034
DAM Curriculum Orientation	−.025	.011	−.115	.018
DAM Variety of Tasks	−.019	.009	−.105	.030

*B* regression coefficient, *SE* standard error, *DAM* Difference accounting multi-perspective score

Adjusted  $R^2 = .439$ . \* reference category is 'Secondary school certificate or less'. Reference category for training occupations is 'Bank Clerk'

### Prediction of Drop-Out Intentions by Negative Differences in Perception

Another possibility for gaining insights into how drop-out intentions emerge, is the following new approach that focuses on differences in perception. In contrast to the regression model of “[Prediction of Drop-Out Intentions by Trainee Perception of VET Quality](#)” Section, the individual quality DAM scores of trainees were put into the model as independent variables this time. The higher the DAM scores, the higher the intentions to drop out should be, as displayed in a lower rating on the scale “Drop-out Intentions”. Again, a stepwise selection of variables was applied in the regression model, in order to identify the most instructive model. The resulting model ( $F[20, 273] = 12.47$ ,  $p < 0.001$ ) showed a variance explanation of adjusted  $R^2 = 0.439$  (Table 2). Again, regarding trainees’ characteristics, only “Training Performance” is significant ( $p = 0.009$ ) and none of the different training occupations appear to have a significant effect on drop-out intentions.

Five quality criteria in the form of DAM scores are significantly related to drop-out intentions ( $F[6, 298] = 43.24$ ,  $p < 0.001$ ). The DAM scores in the categories

**Table 3** Changes in predictors by usage of DAM scores: Comparison of regression models 1 and 2

Predictors	$\Delta B_{\text{etal}}$	in%
DAM Overload	.063	+ 23.0
DAM Work Climate	.038	+ 19.9
DAM Curriculum Orientation	.034	−22.8

*DAM* Difference accounting multi-perspective score

$n = 311$

“Work Climate”, “Personnel and Instructions”, “Curriculum Orientation” and “Variety of Tasks”, show a small effect size (Cohen 1988, p. 80 f.). The quality criteria “Overload” shows a medium effect (−0.337).<sup>13</sup> The hypothesis that negative differences in perception between trainees and their trainer increase drop-out intentions is therefore supported. If trainees perceive the quality of these criteria worse than their trainers do, they show a stronger intention to drop out, as indicated by a lower rating on the “Drop-out Intention” scale.

Apart from this, there are three interesting points in comparison to model 1 (trainee perception scores only) that should be emphasized. First, the model’s adjusted  $R^2$  is 0.439 and thus, the difference-approach now explains an additional 10.6 percentage points variance in drop-out intentions, which equals a growth of explained variance from model 1 to model 2 of almost 32%. However, it must be noted that the two models are not completely comparable, since different quality aspects were included, but the increase of explanatory power from using DAM scores needs to be accounted for nonetheless. Second, two additional training quality criteria come into focus in the second model, as the “Variety of Tasks” and “Personnel and Instructions” scales did not play a role in the first approach. Furthermore, “Social Involvement” is not significantly related to drop-out intentions when considered as DAM score. Third, the categories “Overload”, “Work Climate” and “Curriculum Orientation” were significantly related to drop-out intentions in both models, with partly growing beta-coefficients in the second model. The differences in these approaches are presented in Table 3.

The first column of Table 3 shows the absolute change in beta per quality criterion, in comparison to Table 2. The second column presents the coefficients’ percentage change. The effects of “Overload” and “Work Climate” increased considerably with the use of DAM scores. However, the beta coefficient of “Curriculum Orientation” decreased by 0.034. Considering the percentage growth of beta coefficients, the effect of “Overload” increased by 23%, that of “Work Climate” by almost 20%.

<sup>13</sup> The minus signs in Table 2 are caused by an inverse logic of the DAM scores (see [Methodological Integration of Different Perspectives via Difference Accounting Multi-perspective Scores](#) and [Prediction of Drop-Out Intentions by Negative Differences in Perception](#) Sections). The coefficients represent a decrease on the scale “Drop-out Intentions”, which means a lower rating by trainees and higher drop-out intention, where differences from their trainers are higher. Table 1 on the other hand indicates that higher quality criteria are related to an increase in the “Drop-out Intentions” scale, which in turn means there is less intention to drop out. Therefore, absolute beta values were compared.

Additionally, Fisher tests for dependent samples were conducted, in order to check whether the differences between both approaches were significant. Therefore, the intercorrelations of a given quality criterion in the conventional style (“[Prediction of Drop-Out Intentions by Trainee Perception of VET Quality](#)” Section) with those in the DAM style (“[Prediction of Drop-Out Intentions by Negative Differences in Perception](#)” Section) on “Drop-out Intentions” were used (correlations are presented in the Appendix Table 9). Considering “Overload”, both types of variables showed a significant difference in their relation to drop-out intentions ( $z = 3.407$ ;  $p < 0.001$ ). The two variable types for “Work Climate” as well showed statistically significant differences ( $z = 3.498$ ;  $p < 0.001$ ). For “Curriculum orientation” a significant difference on the  $\alpha = 0.05$  level appeared ( $z = 2.244$ ;  $p = 0.012$ ). Again, this means that it makes a difference whether simply trainee perceptions or on the other hand the perspective-crossing approach of differences, is applied in VET quality research. Moreover, the difference-approach seems fruitful, since two more quality criteria came into focus, and the explanatory power of the model increased considerably (see Table 2).

### Prediction of Drop-Out Intentions Using a Merged Model

Lastly, to check the impressions from the results above, a multiple linear regression was run by using both types of variables but only allowing each quality criteria once. The resulting model ( $F[7, 297] = 38.19$ ,  $p < 0.001$ ), which best explains drop-out intentions in the sample, contains all five quality DAM scores from Table 2 and none of the criteria, in the form of one-sided trainee perceptions from Table 1.<sup>14</sup> This means, even by using both types of variables, the bilateral difference approach appears to be advantageous, as the final and most instructive model is equivalent to Table 2. The DAM scores appear significant on higher levels than the unilateral variables in the model. Additionally, when including both variables, the adjusted  $R^2$  is similarly to the DAM score model (0.439), while using trainee perceptions only yielded an adjusted  $R^2$  of 0.333. Therefore, the results underline the previous impressions and indicate that DAM scores are not only significantly related to drop-out intentions but are capable of explaining them more adequately than do mere trainee perceptions.

### Discussion and Limitations

Conventional unilateral quality research in VET is certainly expedient, but can only be a starting point, since there are at least two important groups of actors involved. On the basis of Lempert’s interactionist theory (1998) it is plausible that drop-out

<sup>14</sup> Initially “Overload” was the only variable in unilateral form that appeared significant, increasing the adjusted  $R^2$  by one percentage point. However, since each quality criteria shall only be included once, it was deleted for its higher p-value (.016) and smaller effect size than the DAM score “DAM Overload” ( $p < .001$ ). In the following model (stepwise selection), no other unilateral or bilateral quality criteria took its place and the resulting final model was equivalent to Table 2.

intentions form more out of the interactions of both parties, as influenced by their perceptions of the environment, than from isolated perceptions. Thus, by using multi-perspective approaches, it would be possible to gain more insights into professional socialization processes within VET training, which in turn could help to prevent drop-outs from VET more effectively. Empirically, the presented bilateral approach of considering differences in quality perception between trainees and trainers from the same company proved to add significantly to the overall explanatory power of research on drop-out intentions. Moreover, integrating different perceptions into the model leads to the consideration of additional (and different) quality aspects and to increased effect sizes also. This underlines that it is worthwhile to expand the research in order to adequately integrate multiple perspectives into the analysis of VET quality characteristics and their impact on output categories (in our case drop-out intentions). The findings could possibly explain the low or absent influences of training quality on output criteria when using a mono-perspective approach based on trainees' perceptions only (e.g. Nickolaus et al. 2009). A methodological approach of how to integrate these different perspectives, while paying attention to the absolute level of quality assessment as well, is given via the difference accounting multi-perspective scoring (DAM) as a possible blueprint.

The presented approach should be tested further in future research. Within such research, the sample should be chosen more broadly with respect to the occupational groups included, since our analyses were limited to commercial apprenticeships, with a focus on banking. Nevertheless, we believe our findings to be relatively robust with respect to the commercial field, since we used a relatively representative sample with respect to most variables compared with the statistical population. Furthermore, by including dummy variables, it could be demonstrated that the different occupations in our sample do only play a minor role for the tested Negative Incongruence Theorem (NIT) – at least for the commercial sample that was analysed. Theoretically, it can be expected that the multi-perspective approach explains even higher proportions of variance in other occupations, where the drop-out rates, and likewise the drop-out intentions, are reported to be higher than in the commercial and banking sector.

Regarding further limitations of the study, besides the general background factors that were considered, omitted factors like trainees' socio-economic background, but also their motivation and interests, that were not assessed in our study, may have an influence on the perception of training quality, drop-out intentions, as well as on the interrelation of these two variables. An integration of such variables might further increase the explained variance by the models presented and thereby explain the phenomenon of drop-out intentions more fully. Moreover, a more thorough collection of individual background information on the side of the trainees and their trainers might also serve to gain more pronounced insights into the genesis of differences in perception, explaining the actual causes of disagreements and thereby opening up further room for practice intervention.

By focusing on inter-individual differences, we intended to close a prevailing research gap regarding the importance of the perception of interactional

micro-processes during in-company training and their influence on important output variables. This was demonstrated for the output variable of drop-out intentions. However, we acknowledge that the complexity of the actual drop-out process resides on different levels with multiple interacting factors. Particularly, the study presented here left out influencing factors, that may work on the macro-level, like the regional job market or the general economic situation, which are known to be involved in the process of actual drop-out (e.g. Rohrbach-Schmidt and Uhly 2015) and could also add to the explanation of drop-out intentions.

Furthermore, the validity of trainer perceptions is imperfect, since only official training officers were asked to participate. It has to be noted that official training officers are not always the main source of interaction for a trainee. There might be several persons periodically interacting with trainees (e.g. close colleagues). Nevertheless, this was a conscious choice in the present research, as the perceptions of training officers are particularly important, since they are in charge of the training and responsible for planning and directing future training. If more detailed information on the interactional processes within each participating company were available, the main interaction partner among the training personnel could be identified, which could increase the explained variance of drop-out intentions further by a higher accuracy. Another limitation lies in the unsatisfactory reliability values, especially for the included variable “Relevance of Tasks”. This stems from the survey instrument used (VET-LQI), which was originally developed to measure trainee perceptions, and which was only tested within the group of trainees. Some of the items thus are as yet untested for use in the trainer side of bilateral surveys. Further research into this, and the development of some extra items for these scales should be conducted, for a use in future multi-perspective studies. Such studies do not necessarily have to be limited to commercial apprenticeships or the company side only. The DAM approach could also be applied in the school-context, using a teacher-versus-learner research design.

With respect to the implications of the findings for vocational practice, multi-perspective approaches to training quality seem to be a promising tool in order to meet the challenges of a complex and interactive training reality. In practice, by using the presented DAM approach in monitoring training quality, the largely subjective quality criteria could be complemented by a second perspective. It could therefore serve as a complementary – and more balanced – tool in the quality assurance of in-company training. Moreover, such a multi-perspective tool could function as an early-alert-system for growing dissent before factual negative developments start to kick in. Here, if differences in perception increase, negative consequences can still be avoided by identifying potential causes, initiating dialogue (between trainees, trainers and possibly other actors) and taking reconciling actions at an early stage. Ideally, in order for this multi-perspective approach to take full effect, a system of steady interchange between trainees and trainers guided by multi-perspective instruments would be installed.

## Appendix

**Table 4** Item statistics

Scale	Item	Cronbach's $\alpha$ (if item deleted)	Mean value	Standard devia- tion	Discrimi- natory power
<b>Learning Environment</b>					
Work Climate ( $\alpha$ .632)	022 There is a personal atmosphere within my company	.581	5.60	1.12	.387
	023 There is a bad working atmosphere in my company. [R]	.461	5.48	1.36	.538
	024 There is strong competition between employees in my company. [R]	.586	5.37	1.30	.379
	025 Employees in my company are rigorously monitored and controlled. [R]	.606	4.60	1.36	.354
In-company Learning ( $\alpha$ .805)	026 Workplace learning in my company is characterized by different teaching methods		4.81	1.46	.675
	027 Workplace learning in my company is characterized by the usage of different materials and media		5.09	1.41	.675
<b>Work Tasks</b>					
Overload ( $\alpha$ .795)	045 In my company I feel under time pressure at work. [*]	.784	5.39	1.27	.483
	048 In my company others interfere with my work. [*]	.806	6.14	1.10	.390
	049 I have problems recharging my energy in my spare time after work. [*]	.727	5.63	1.62	.662
	050 Because of the daily demands in my company I feel totally exhausted, tired and drained. [*]	.707	5.01	1.58	.716
Variety of Tasks ( $\alpha$ .799)	051 I often think 'I can't go on any longer'. [*]	.735	5.87	1.50	.639
	052 In my company I deal with a variety of work tasks	.847	5.20	1.23	.522
	053 In my company I work on new tasks every now and then	.658	5.52	1.21	.709
	054 In my company work tasks are highly diversified	.651	5.25	1.28	.712



**Table 4** (continued)

Scale	Item	Cronbach's $\alpha$ (if item deleted)	Mean value	Standard devia- tion	Discrimi- natory power
Autonomy ( $\alpha$ .857)	056 In my company I am given flexibility in the timing of work tasks	.840	3.99	1.43	.692
	057 In my company I am able to decide what means to take to reach a goal	.795	4.06	1.43	.736
	058 In my company I am given an enormous amount of freedom in doing my job	.758	4.07	1.46	.778
Relevance of Tasks ( $\alpha$ .443)	059 In my company I am given responsible tasks	.216	5.30	1.22	.347
	060 In my company I work on 'real tasks'	.064	5.95	1.08	.463
	061 In my company I have to deal with several tasks that are not part of my vocational training program (e.g. make coffee, copying, etc.). [R]	.751	5.19	1.60	.089
Complexity of tasks ( $\alpha$ .754)	063 In my company work tasks are characterized by considering a wide range of information	.620	5.24	1.15	.635
	064 In my company work tasks are characterized by considering a wide range of objectives. [*]	.640	4.72	1.25	.609
	065 In my company work tasks are characterized by considering changes over time	.757	5.12	1.38	.517
Training Requirements and Ability level ( $\alpha$ .659)	067 In my company I am confronted with tasks that are too complicated. [*]	.232	5.47	1.20	.503
	068 In my company I am confronted with tasks I am insufficiently trained and prepared for. [*]	.478	5.24	1.49	.503

Social Interaction

**Table 4** (continued)

Scale	Item	Cronbach's $\alpha$ (if item deleted)	Mean value	Standard devia- tion	Discrimi- natory power
Involvement in Occupational Expert Culture ( $\alpha$ .842)	072 I am involved in the improvement of work processes in my company	.778	4.49	1.69	.713
	073 My ideas and proposals are considered in my company	.764	4.72	1.46	.732
	074 I am involved in the discussion of technical and professional issues in my company	.802	4.11	1.61	.686
	075 Continuous collaboration is part of the daily work in my company	.678	5.93	1.05	.492
Functional Involvement ( $\alpha$ .723)	076 My work tasks are characterized by close cooperation with other employees in my company	.724	5.03	1.29	.354
	077 I am involved in all work tasks in my department	.645	4.72	1.54	.557
	078 Basically, my work tasks play a crucial role for my department	.674	4.43	1.47	.492
	079 I am well integrated into the operational working procedures	.651	5.48	1.08	.569
Social Involvement ( $\alpha$ .779)	080 Employees in my company are interested in me	.640	5.72	1.17	.744
	081 Employees in my company are interested in my private well-being	.769	5.02	1.51	.556
	083 Employees in my company seem disturbed by my presence. [R]	.758	6.38	1.06	.517
Educational Mediation	084 Employees in my company ignore me. [R]	.730	6.56	.91	.603



**Table 4** (continued)

Scale	Item	Cronbach's $\alpha$ (if item deleted)	Mean value	Standard devia- tion	Discrimi- natory power
Mentoring ( $\alpha$ .710)	085 In my company nobody feels responsible for me. [R]	.531	6.23	1.30	.597
	086 In my company I am completely left alone to myself. [R]	.536	6.19	1.15	.595
	088 When I ask training personnel or colleagues for help, they immediately support	.745	6.13	1.03	.414
Curriculum Orientation ( $\alpha$ .694)	089 I do know my in-company training plan	.564	6.12	1.24	.538
	090 The arrangements of my in-company training plan are observed	.541	5.85	1.21	.556
	091 My in-company training program is implemented without a formal training plan. [R]	.689	6.47	1.17	.437
Feedback ( $\alpha$ .757)	092 In my company good performances are not praised. [R]	.777	5.75	1.45	.419
	093 Normally I do know whether I perform work tasks satisfactorily or not	.683	5.51	1.27	.590
	094 I find it hard to figure out whether I perform work tasks satisfactorily or not. [R]	.690	5.57	1.47	.574
Personnel and Instructions ( $\alpha$ .850)	095 The training personnel and my colleagues let me know whether I perform work tasks satisfactorily or not	.646	5.54	1.23	.665
	097 Those who train me on the job are able to answer difficult technical questions	.810	5.88	1.20	.688
	098 Those who train me on the job can explain well	.777	5.78	1.08	.769
	100 Those who train me on the job show that they enjoy their work	.855	5.22	1.35	.614
	101 Those who train me on the job are technically competent	.798	6.16	.92	.747

**Table 4** (continued)

Scale	Item	Cronbach's $\alpha$ (if item deleted)	Mean value	Standard devia- tion	Discrimi- natory power
Output					
Drop-out Intentions (selected from "Premature Termination of Con- tract") ( $\alpha$ .766)	105 I often think about terminating my training program prematurely. [*]	.558	6.34	1.22	.705
	106 I think about terminating my training program prema- turely because of company-related reasons (e.g. working hours, quarrels with colleagues, etc.). [*]	.582	6.55	1.06	.688
	111 I am already searching for an alternative training com- pany. [*]	.836	6.68	.91	.443

[R] = reversed items. [\*] = items reverse-scored for the analysis in order to facilitate understanding of the results. 7 represents maximum quality. Original response options:  
 1 = strongly disagree, 2 = mostly disagree, 3 = slightly disagree, 4 = partly agree, 5 = slightly agree, 6 = mostly agree, 7 = completely agree  
 n = 341

**Table 5** Intercorrelations of quality scales

	Work Climate	In-Company Learning	Overload	Variety of Tasks	Autonomy	Relevance of Tasks	Complexity of Tasks	Training Requirements and Ability Level
Work Climate	1							
	Correlation (Pearson)							
	Significance (2-sided)							
	<i>N</i>							
In-Company Learning	341	1						
	Correlation (Pearson)							
	Significance (2-sided)							
	<i>N</i>							
Overload	340	340	1					
	Correlation (Pearson)	.254**						
	Significance (2-sided)	0.000						
	<i>N</i>							
Variety of Tasks	341	340	341	1				
	Correlation (Pearson)	.221**	.206**					
	Significance (2-sided)	0.000	0.000					
	<i>N</i>							
Autonomy	341	340	341	341	1			
	Correlation (Pearson)	.221**	.298**	.207**				
	Significance (2-sided)	0.000	0.000	0.000				
	<i>N</i>							

Table 5 (continued)

	Work Climate	In-Company Learning	Overload	Variety of Tasks	Autonomy	Relevance of Tasks	Complexity of Tasks	Training Requirements and Ability Level
Relevance of Tasks	.414**	.162**	.384**	.376**	.352**	1		
Correlation (Pearson)								
Significance (2-sided)	0.000	0.003	0.000	0.000	0.000			
N	341	340	341	341	341	341		
Complexity of Tasks	-0.081	.233**	-.148**	.256**	.188**	.156**	1	
Correlation (Pearson)								
Significance (2-sided)	0.135	0.000	0.006	0.000	0.000	0.004		
N	340	339	340	340	340	340	340	
Training Requirements and Ability Level	.296**	.117*	.443**	0.043	.111*	.156**	-.165**	1
Correlation (Pearson)								
Significance (2-sided)	0.000	0.031	0.000	0.429	0.040	0.004	0.002	
N	341	340	341	341	341	341	340	341
Involvement in Occupational Culture	.322**	.361**	.307**	.300**	.437**	.373**	.141**	0.048
Correlation (Pearson)								
Significance (2-sided)	0.000	0.000	0.000	0.000	0.000	0.000	0.009	0.378
N	339	338	339	339	339	339	338	339

**Table 5** (continued)

	Work Climate	In-Company Learning	Overload	Variety of Tasks	Autonomy	Relevance of Tasks	Complexity of Tasks	Training Requirements and Ability Level
Functional Involvement	.289**	.348**	.300**	.420**	.356**	.498**	.299**	.146**
	Correlation (Pearson)							
	Significance (2-sided)	0.000	0.000	0.000	0.000	0.000	0.000	0.007
	N	340	341	341	341	341	340	341
Social Involvement	.445**	.210**	.458**	.202**	.197**	.385**	0.053	.291**
	Correlation (Pearson)							
	Significance (2-sided)	0.000	0.000	0.000	0.000	0.000	0.328	0.000
	N	341	341	341	341	341	340	341
Mentoring	.407**	.221**	.439**	.245**	.186**	.331**	0.003	.288**
	Correlation (Pearson)							
	Significance (2-sided)	0.000	0.000	0.000	0.001	0.000	0.961	0.000
	N	341	341	341	341	341	340	341
Curriculum Orientation	.278**	.396**	.270**	.241**	0.088	.300**	.168**	.214**
	Correlation (Pearson)							
	Significance (2-sided)	0.000	0.000	0.000	0.104	0.000	0.002	0.000
	N	341	341	341	341	341	340	341

Table 5 (continued)

	Work Climate	In-Company Learning	Overload	Variety of Tasks	Autonomy	Relevance of Tasks	Complexity of Tasks	Training Requirements and Ability Level
Feedback	.372**	.321**	.470**	.307**	.204**	.368**	0.038	.322**
	Correlation (Pearson)							
	Significance (2-sided)	0.000	0.000	0.000	0.000	0.000	0.486	0.000
	N	341	341	341	341	341	340	341
Personnel and Instructions	.448**	.289**	.387**	.267**	.240**	.424**	.153**	.201**
	Correlation (Pearson)							
	Significance (2-sided)	0.000	0.000	0.000	0.000	0.000	0.005	0.000
	N	340	340	340	340	340	339	340
Drop-out Intentions	.387**	.157**	.467**	.200**	.186**	.324**	0.008	.350**
	Correlation (Pearson)							
	Significance (2-sided)	0.000	0.004	0.000	0.000	0.000	0.880	0.000
	N	340	339	340	340	340	339	340
Involvement in Occupational Culture	1	Involvement in Occupational Culture	Functional Involvement	Mentoring	Curriculum Orientation	Feedback	Personnel and Instructions	Drop-out Intentions
	Correlation (Pearson)							
	Significance (2-sided)							
	N	339	339	340	340	340	339	340

**Table 5** (continued)

		Work Climate	In-Company Learning	Overload	Variety of Tasks	Autonomy	Relevance of Tasks	Complexity of Tasks	Training Requirements and Ability Level
Functional Involvement	Correlation (Pearson)	.484**	1						
	Significance (2-sided)	0.000							
	N	339	341						
Social Involvement	Correlation (Pearson)	.328**	.359**	1					
	Significance (2-sided)	0.000	0.000						
	N	339	341	341					
Mentoring	Correlation (Pearson)	.290**	.347**	.486**	1				
	Significance (2-sided)	0.000	0.000	0.000					
	N	339	341	341	341				
Curriculum Orientation	Correlation (Pearson)	.261**	.341**	.334**	.434**	1			
	Significance (2-sided)	0.000	0.000	0.000	0.000				
	N	339	341	341	341	341			

Table 5 (continued)

	Work Climate	In-Company Learning	Overload	Variety of Tasks	Autonomy	Relevance of Tasks	Complexity of Tasks	Training Requirements and Ability Level
Feedback	.338**	.353**	.530**	.472**	.388**	1		
	Correlation (Pearson)							
	Significance (2-sided)	0.000	0.000	0.000	0.000			
Personnel and Instructions	339	341	341	341	341	341		
	.338**	.418**	.507**	.497**	.439**	.422**	1	
	Correlation (Pearson)							
	Significance (2-sided)	0.000	0.000	0.000	0.000	0.000		
Drop-out Intentions	338	340	340	340	340	340	340	
	.162**	.236**	.379**	.308**	.256**	.262**	.363**	1
	Correlation (Pearson)							
	Significance (2-sided)	0.003	0.000	0.000	0.000	0.000	0.000	
	N	338	340	340	340	340	339	340

\*\*Correlation is significant at  $\alpha = .01$  (two-sided). \*Correlation is significant at  $\alpha = .05$  (two-sided)



**Table 6** Sample composition (trainees) and drop-out rates

Skilled occupation	N	Percentage	Drop-out rate (BIBB)
Bank Clerk ('Bankkaufmann/ – frau; Finanzassistent/-in'; duales Studium BWL Bank)	266	85.5	9.2%
Industrial Management Assistant ('Industriekaufmann/ – frau')	7	2.3	8.9%
Management Assistant in Informatics ('Informatikkaufmann/ – frau')	6	1.9	14.4%
Office Management Assistant ('Kaufmann/ – frau für Büromanagement')	17	5.5	24.4%
Management Assistant in Wholesale and Foreign Trade ('Kaufmann/ – frau im Groß und Außenhandel')	4	1.3	16.6%
Dual Students of Business Administration and Commerce ('Duales Studium BWL Fachrichtung Handel')	11	3.5	6.9%*

Drop-out rates by December 31, 2018, retrieved from the Federal Institute for Vocational Education and Training (BIBB). \* Result from a survey on drop-out rates of dual students, reported by Kupfer et al. (2014), on behalf of the BIBB. It is presented as approximate information, since no statistical information was available

**Table 7** Sample representativeness

	Gender	Year of Training	Education (Percentage of trainees)	
	Percentage female	Percentage in the first year of training	Secondary school certificate (or lower)	Higher school certificate
Sample	58.8	42.1	33.4	66.2
Statistical population	52.3	36.6	27.7	70.4

Statistical population refers to all trainees being in an apprenticeship in one of the included occupations by December 31, 2018. Data for the statistical population was available by the Federal Institute for Vocational Education and Training (BIBB). All values are weighted by the share of the different occupations in the sample

**Table 8** Personal background characteristics of trainees

Aspect	Coding	Frequency	Percentage	Valid Percentage	Cumulated Percentage
Year of Training <i>n</i> = 311	1	131	42,1	42,1	42,1
	2	104	33,4	33,4	75,6
	3	76	24,4	24,4	100,0
Gender <i>n</i> = 311	Male	128	41,2	41,2	41,2
	Female	183	58,8	58,8	100,0
Education (highest school leaving certificate) <i>n</i> = 311	Lower secondary school certificate (Hauptschule)	1	0,3	0,3	0,3
	Secondary school certificate (Mittlere Reife)	104	33,4	33,4	33,8
	Advanced technical college (Fachhochschule)	43	13,8	13,8	47,6
	Subject-related entrance qualification (fachgebundene Hochschulreife)	19	6,1	6,1	53,7
Grade (average grade in school leaving certificate) <i>n</i> = 306	General higher education certificate (allgemeine Hochschulreife/Abitur)	144	46,3	46,3	100,0
	1,0–1,5	17	5,5	5,6	5,6
	1,6–2,0	67	21,5	21,9	27,5
	2,1–2,5	112	36,0	36,6	64,1
	2,6–3,0	86	27,7	28,1	92,2
	3,1–3,5	21	6,8	6,9	99,0
	3,6–4,0	3	1,0	1,0	100,0
	1,0–1,5	31	10,0	10,1	10,1
	1,6–2,0	121	38,9	39,5	49,7
	2,1–2,5	114	36,7	37,3	86,9
Training Performance (self-assessed grade) <i>n</i> = 306	2,6–3,0	32	10,3	10,5	97,4
	3,1–3,5	8	2,6	2,6	100,0

Table 8 (continued)

Aspect	Coding	Frequency	Percentage	Valid Percentage	Cumulated Percentage
Language(s) (spoken at home) <i>n</i> = 309	Only German	236	75,9	76,4	76,4
	More than German	70	22,5	22,7	99,0
	Only other than German	3	1,0	1,0	100,0

N maximum = 311

**Table 9** Intercorrelations of significant variables in both types

	Work Climate	DAM Work Climate	Overload	DAM Overload	Curriculum Orientation	DAM Curriculum Orientation	Drop-out Intentions
Work Climate	Correlation (Pearson) Significance (2-sided) <i>N</i>	1 311					
DAM Work Climate	Correlation (Pearson) Significance (2-sided) <i>N</i>	-.902** .000 311	1 311				
Overload	Correlation (Pearson) Significance (2-sided) <i>N</i>	.516** .000 311	1 311	1 311			
DAM Overload	Correlation (Pearson) Significance (2-sided) <i>N</i>	-.454** .000 311	.512** .000 311	-.912** .000 311	1 311		
Curriculum Orientation	Correlation (Pearson) Significance (2-sided) <i>N</i>	.279** .000 311	-.287** .000 311	.259** .000 311	1 311	1 311	
DAM Curriculum Orientation	Correlation (Pearson) Significance (2-sided) <i>N</i>	-.268** .000 311	.317** .000 311	-.267** .000 311	-.906** .000 311	1 311	
Drop-out Intentions	Correlation (Pearson) Significance (2-sided) <i>N</i>	.456** .000 310	-.532** .000 310	.521** .000 310	.312** .000 310	-.364** .000 310	1 310

*DAM* = Difference accounting multi-perspective score

\*\*Correlation is significant on a .01 level (two-sided)

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## Declarations

**Competing Interest** The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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## 4.2 Paper 2: Quality of In-Company Training – A Matter of Perspective?

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Krötz, M., & Deutscher, V. (2021). Betriebliche Ausbildungsqualität – Eine Frage der Perspektive? [Quality of In-Company Training – A Matter of Perspective?]. *Zeitschrift für Erziehungswissenschaft*, 24, 1453–1475. <https://doi.org/10.1007/s11618-021-01041-4>

## Betriebliche Ausbildungsqualität – Eine Frage der Perspektive?

Maximilian Krötz  · Viola Deutscher 

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**Zusammenfassung** Trotz der Bedeutung der dualen Berufsausbildung für die Biografien der Absolventen sowie für die Deckung des wachsenden Fachkräftebedarfs mangelt es an multiperspektivischen Untersuchungen zur betrieblichen Ausbildungsqualität. Bisherige Studien gehen zumeist nicht über deskriptive Analysen einzelner Akteursgruppen, mehrheitlich Auszubildende, hinaus. Die wenigen multiperspektivischen Befunde indizieren dagegen, dass Qualitätseinschätzungen von Auszubildenden und Ausbildenden teils weit auseinanderliegen. Dieser Befund wird im vorliegenden Beitrag anhand von Umfragedaten (311 Auszubildende, 30 Ausbildende) auf Gruppenebene bestätigt. Zudem wird die potenzielle Bedeutung der eingenommenen Perspektive für die Modellierung von Zusammenhängen verschiedener Qualitätsdimensionen überprüft. Hierbei korreliert eine bilaterale Modellierung von Ausbildungsqualität, welche Wahrnehmungsunterschiede zwischen Auszubildenden und Ausbildenden betrachtet, signifikant stärker mit Abbruchgedanken der Auszubildenden als deren unilaterale Qualitätseinschätzung. Zudem wird gezeigt, dass bestimmte Merkmale der Auszubildenden Wahrnehmungsunterschiede der Ausbildungsqualität zwischen verschiedenen Akteuren in Teilen erklären können. Insgesamt unterstreichen die Befunde damit die Relevanz multiperspektivischer Ansätze in der Betrachtung der Ausbildungsqualität.

**Schlüsselwörter** Abbruchneigung · Vorzeitige Vertragslösung · Ausbildungsqualität · Duale Berufsausbildung · Wahrnehmungsunterschiede

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## Quality of in-company training—A matter of perspective?

**Abstract** Despite the importance of dual vocational training for the biographies of its graduates and for meeting the growing demand for skilled workers, there is a lack of multi-perspective studies on the quality of in-company training. Previous studies commonly do not go beyond descriptive analyzes of a single group of actors, mostly trainees. The few multi-perspective findings indicate that quality assessments by trainees and trainers sometimes differ widely. In this article, this finding is confirmed at the group level by using survey data (311 trainees, 30 trainers). In addition, the potential significance of the perspective taken for the modeling of links between different quality dimensions is checked. Here, bilateral modeling of training quality, which considers differences in perception between trainees and trainers, correlates significantly more strongly with trainees' drop-out intentions than their unilateral quality assessment. Additionally, it is shown that certain trainee characteristics can partly explain differences in the assessment of training quality by different actors. Overall, the findings underline the relevance of multi-perspective approaches when considering the quality of training.

**Keywords** Differences in perception · Drop-out · Drop-out intention · Dual vocational education and training (VET) · Training quality

### 1 Problemstellung

Jedes Jahr beginnt in Deutschland etwa die Hälfte eines Jahrgangs eine Lehre im dualen System (Bundesinstitut für Berufsbildung [BIBB] 2020, S. 9). Mehr als die Hälfte der insgesamt 1,3 Mio. Auszubildenden zeigt sich jedoch mit mindestens einem Qualitätsaspekt der Ausbildung unzufrieden (DGB-Bundesvorstand 2016). Diese Unzufriedenheit spiegelt sich u. a. auch im Anteil vorzeitig aufgelöster Ausbildungsverträge, welcher in der letzten Dekade deutlich angestiegen ist und mittlerweile bei über einem Viertel (26,5 %) der abgeschlossenen Ausbildungsverträge liegt (BIBB 2020, S. 146). Demgegenüber stieg die Zahl der Studierenden stetig an, was auf die sinkende Attraktivität der Ausbildung aus der Sicht heutiger Jugendlicher hindeutet. So wuchs die Anzahl unbesetzter Ausbildungsstellen seit 2009 um 200 % auf über 53.000 Stellen an (BIBB 2019, 2020). Unbesetzte Ausbildungsplätze stellen ungenutztes Potenzial dar und gefährden in diesem Ausmaß künftiges Wirtschaftswachstum (Deutscher Industrie- und Handelskammertag 2017). Die Verbesserung der betrieblichen Ausbildungsqualität, die in empirischen Studien durchweg als durchwachsen beschrieben wird (DGB-Bundesvorstand 2019; Ebbinghaus et al. 2010a; Rohrbach-Schmidt und Uhly 2015), ist neben einer angemessenen Entlohnung (Beicht und Krewerth 2010) sowie einer verbesserten Durchlässigkeit ein wesentlicher Baustein zur Steigerung der Attraktivität des dualen Berufsbildungssystems, sodass die Deckung des Fachkräftebedarfs zukünftig gesichert werden kann.

Erkenntnisse über den Zusammenhang der Ausbildungsqualität zu vorzeitigen Vertragslösungen sind allerdings weiterhin defizitär, was sowohl auf das komplexe Konstrukt der Ausbildungsqualität als auch auf eine stark einseitige Betrachtungs-

weise zurückzuführen ist. Insbesondere zeigt ein Vergleich mit dem Forschungsstand zur schulischen Bildung, dass es weiterhin an belastbaren Erkenntnissen zur Ausbildungsqualität mangelt (Beck 2005; Euler 2005; Rausch 2009). Eine zentrale Hürde stellen dabei seit jeher die verschiedenen Perspektiven der am Ausbildungsgeschehen beteiligten Gruppen und die damit verbundenen verschiedenen Qualitätseinschätzungen dar (Ebbinghaus 2016; Tynjälä 2013). In dieser Hinsicht konzentriert sich der Großteil der Studien lediglich auf eine Akteursgruppe, zumeist Auszubildende (Böhn und Deutscher 2019). Bilaterale oder „multiperspektivische“ Untersuchungen, welche Wahrnehmungen mehrerer Gruppen aufeinander beziehen, bleiben die Ausnahme (Ebbinghaus et al. 2011, S. 203 ff.). Häufig weisen derartige Studien jedoch darauf hin, dass sich die Qualitätswahrnehmungen der Akteure deutlich voneinander unterscheiden (z.B. Ebbinghaus et al. 2010b; Filliettaz 2010; Griffin 2017; Negrini et al. 2016; van der Sluis et al. 2014).

In diesem Zusammenhang sollen in diesem Beitrag erstmalig die Auswirkungen und Ursachen von perspektivbedingten Wahrnehmungsunterschieden tiefer ergründet werden. Hierfür soll vorab eine Übersicht bisheriger multiperspektivischer Arbeiten geboten werden, bevor die Wahrnehmungen von Auszubildenden und Ausbildenden anhand von T-Tests und dem Intraklassen-Korrelationskoeffizienten (ICC 3) auf Unterschiede hin untersucht werden. Im Anschluss werden Zusammenhänge der Ausbildungsqualität zur Abbruchneigung anhand eines multiperspektivischen Ansatzes exemplarisch betrachtet und mit der konventionellen, einseitigen Herangehensweise verglichen. Abschließend soll der Einfluss von Eingangsvoraussetzungen der Auszubildenden sowie von betrieblichen Rahmenbedingungen auf vorhandene Wahrnehmungsunterschiede der Ausbildungsqualität analysiert werden. Grundlage bilden Daten aus einer Onlineumfrage mit 311 Auszubildenden sowie deren 30 Ausbildungsleiterinnen und Ausbildungsleitern.

## 2 Wahrnehmungsunterschiede in der betrieblichen Ausbildung

### 2.1 Forschungsstand

Bisherige Studien zur betrieblichen Ausbildungsqualität nehmen in der großen Mehrzahl eine einseitige Fokussierung auf Auszubildende vor (Böhn und Deutscher 2019). Trotz der Beteiligung von mindestens zwei zentralen Akteursgruppen in der betrieblichen Ausbildung (Auszubildende und Ausbildende) stellen multiperspektivische Untersuchungen der betrieblichen Ausbildungsqualität weiterhin die Ausnahme dar. Tab. 1 zeigt eine Übersicht jüngerer multiperspektivischer Umfragestudien (1) zur betrieblichen Facette der dualen Ausbildung (2) in deutscher oder englischer Sprache (3), bei welchen sowohl Auszubildende (bzw. Lernende) als auch betriebliche Vertreterinnen oder Vertreter befragt wurden (4).

Zunächst lässt sich konstatieren, dass nur in Ausnahmefällen (Cully und Curtain 2001; Wandeler et al. 2011) beide Stichprobengruppen, Auszubildende und Ausbildende, aus den gleichen Betrieben stammen. Zumeist stammen die Auszubildenden zwar aus den gleichen Betrieben wie die befragten Ausbilderinnen und Ausbilder, jedoch ist darüber hinaus eine erhebliche Anzahl von Betrieben ohne zu-

**Tab. 1** Multiperspektivische Umfragestudien zur betrieblichen Ausbildung

Lfd. Nr.	Autoren	Titel	Stichprobe	Auszubildende Lernende	Ausbildende (Betriebe)	Stichproben zusammengehörig	Anzahl deckungs- gleicher Skalen	Vorgehen/Ergebnisse
1	Cully und Curtain (2001)	Reasons for new apprentices' non-completions	797	462	Ja	5 <sup>a</sup>		Vergleich prozentualer Angaben
2	Ebbinghaus et al. (2010b)	Ein Gegenstand – Zwei Perspektiven. Wie Auszubildenden und Betriebe die Ausbildungsqualität einschätzen	5901	1362	Nein	5		Mittelwertvergleiche
3	Greilinger (2013)	Analyse der Ursachen und Entwicklung von Lösungsansätzen zur Verhinderung von Ausbildungsabbrüchen in Handwerksbetrieben	560	841	Teilweise Auszubildende aus 560 Betrieben	2 <sup>a</sup>		Vergleich prozentualer Angaben
4	Griffin (2017)	Are we all speaking the same language? Understanding quality in the VET-sector	43.945 (1254)	8022	Nein	2 <sup>a</sup>		Vergleich prozentualer Angaben
5	Negrini et al. (2016)	Is There a Relationship between Training Quality and Premature Contract Terminations in VET?	225	335	Teilweise Auszubildende aus 157 Betrieben	4		T-Tests: Signifikante Unterschiede der Einschätzung von „Ausbildungsplanung“, „Unterstützung“ und „Feedback“. Cluster mit guter Qualität zeigt wenige Abbrüche
6	Piening et al. (2012)	Hintergründe vorzeitiger Lösungen von Ausbildungsverträgen aus der Sicht von Auszubildenden und Betrieben in der Region Leipzig	254	312	Teilweise	1 <sup>a</sup>		Mittelwertvergleiche zu Abbruchgründen
7	Van der Sluis et al. (2014)	Quantifying Stakeholder Values of VET Provision in the Netherlands	334	77	Teilweise	7 <sup>a</sup>		Darstellung der Bedeutsamkeit diverser Qualitätsaspekte für beide Gruppen anhand Ranking und statistischer Methoden



Tab. 1 (Fortsetzung)

Lfd. Nr.	Autoren	Titel	Stichprobe	Auszubildende Lernende	Ausbildende (Betriebe)	Stichproben zusammengehörig	Anzahl deckungs- gleicher Skalen	Vorgehen/Ergebnisse
8	Stalder und Schmid (2006)	Lehrvertragsauflösungen, ihre Ursachen und Konsequenzen: Ergebnisse aus dem Projekt LEVA	1329	1262	Teilweise 975 beidseitig	7 <sup>a</sup>		Vergleich von prozentualen Angaben und Mittelwerten
9	Walker et al. (2012)	The psychological contract in apprenticeships and traineeships: comparing the perceptions of employees and employers	219	262	Nein	3		T-Tests: Signifikante Unterschiede hinsichtlich der Bedeutung und Erfüllung diverser Verpflichtungen beider Gruppen sowie allgemeiner Ausbildungskriterien
10	Wandeler et al. (2011)	Hope, self-determination and workplace learning: A multilevel study in vocational training	450	58 (49)	Ja 49 Betriebe	2		Korrelationen beider Gruppen: „Verbundenheit“ 0,21***, „Autonomie“ 0,08, t-Test bestätigt Unterschied. Regressionsmodelle bzgl. Hoffnung (unilateral)
11	Westdeutscher Handwerkskammertag (2002)	Gründe für Ausbildungsabbrüche. Ergebnisse einer repräsentativen EMNID-Befragung von Jugendlichen, Auszubildern u. Berufskollegen lehren	400	300	Nein	5 <sup>a</sup>		Vergleich prozentualer Angaben
12	Wisshak und Hochholdinger (2019)	Trainers' knowledge and skills from the perspective of trainers, trainees and human resource development practitioners	253	200+93	Nein	41 <sup>a</sup>		Mittelwerte aus 3 Sichtweisen zu Bedeutsamkeit von Trainereigenschaften

<sup>a</sup>Es wurden keine aus mehreren Items bestehenden Skalen verwendet, stattdessen Einzelfragen/-items

gehörige Auszubildende im Datensatz beinhaltet. Auch können die Auszubildenden, selbst wenn sie sich im gleichen Betrieb wie die Ausbildenden befinden, nur selten ihren Ausbildenden direkt zugeordnet werden, was dazu führt, dass Vergleiche der Einschätzung der betrieblichen Ausbildungsqualität zwischen beiden Gruppen nur auf Gruppen- und nicht auf Individualebene möglich sind. Betrachtet man das Vorgehen innerhalb der Datenauswertung jener Studien, so fällt zudem auf, dass für Gruppenvergleiche tendenziell deskriptive Verfahren eingesetzt werden. Mittelwerts- und Häufigkeitsbeschreibungen bilden die übliche Darstellungsform (z. B. Cully und Curtain 2001; Ebbinghaus et al. 2010b; Greilinger 2013; Griffin 2017; Piening et al. 2012; Stalder und Schmid 2006; Westdeutscher Handwerkskammertag 2002; Wissihak und Hochholdingner 2019). Lediglich in vier Studien werden Zusammenhänge anhand signifikanzstatistischer Verfahren analysiert (Negrini et al. 2016; van der Sluis et al. 2014; Walker et al. 2012; Wandeler et al. 2011), die Rückschlüsse auf die Grundgesamtheit erlauben.

Im Ergebnis der Betrachtungen kommen die Studien insgesamt für eine Reihe einbezogener Qualitätskategorien sowie deren Gewichtung zu dem Schluss, dass die Zielvorstellungen beider Gruppen grundsätzlich sehr ähnlich sind (Ebbinghaus et al. 2010b; Walker et al. 2012; Wissihak und Hochholdingner 2019). Demnach betrachten beide Gruppen dieselben Qualitätskategorien als relevant. Bei der Einschätzung der Ausprägung von Kriterien der betrieblichen Ausbildungsqualität kommt es jedoch häufig zu erheblichen Unterschieden. So fällt auf Gruppenebene die Bewertung des Ist-Zustandes der betrieblichen Ausbildungsqualität durch die Auszubildenden i. d. R. deutlich geringer aus als die Bewertung durch die Gruppe der Ausbilderinnen und Ausbilder (Cully und Curtain 2001; Ebbinghaus et al. 2010b; Griffin 2017; Negrini et al. 2016; Stalder und Schmid 2006; Wandeler et al. 2011; Walker et al. 2012). Weitgehend unerforscht ist dagegen die Frage, wie sich diese unterschiedlichen Bewertungen auf die Entwicklung bestimmter Outputs, z. B. Kompetenz, Identität oder vorzeitige Vertragslösungen, auswirken. Die bisher vorliegenden Zusammenhangsanalysen beziehen sich, mit Ausnahme von Negrini et al. (2016), die keine Effekte vermuten lassen, ausschließlich auf die Zusammenhänge von Auszubildendeneinschätzungen der Input- und Prozessqualität zur Outputqualität und finden hier in der Tendenz keine bis geringe Effekte (z. B. Dietzen et al. 2014; Nickolaus et al. 2009; Rausch et al. 2014).

Auch blieb bisher im Dunkeln, wovon jene Wahrnehmungsunterschiede abhängen bzw. wodurch sie erzeugt werden. Grundsätzlich ist anzunehmen, dass die Akteursgruppen mit der Berufsausbildung unterschiedliche Zielsetzungen verfolgen und sich daher auch ihre Bedarfe und Ansprüche unterscheiden (Fretwell 2003, S. 178; van der Sluis et al. 2014, S. 2). Zudem kann die Ausbildung bei der Bewertung von unterschiedlichen Ebenen (z. B. System-, Anbieter-, Qualifikations-Ebene) aus betrachtet werden (Griffin 2017, S. 43). Ein weiterer Grund könnte die eigene Rolle in der Ausbildung sein. So stellen die Einschätzungen des Ausbildungspersonals eine Selbstevaluation dar, welche i. d. R. höher ausfällt als eine Fremdevaluation (Clausen 2002, S. 65; Ebbinghaus et al. 2010b, S. 28). Auf der anderen Seite überschätzen einige Auszubildende womöglich ihr eigenes Zutun für eine gelungene Ausbildung und könnten sich selbst stärker einbringen. Diese ungenutzten Potenziale würden vor allem die Bewertung der sozialen Interaktion, der Autonomie und des Arbeits-

klimas betreffen. Außerdem zeigen Auszubildende innerhalb ihrer Gruppe sowie auf individueller Ebene hohe Schwankungen in ihren Einschätzungen und scheinen eher inkonsistente Bewertungen abzugeben (van der Sluis et al. 2014, S. 15). Van der Sluis et al. (2014, S. 17) hypothetisieren daher, dass es Auszubildenden aufgrund ihrer direkteren Betroffenheit von Qualitätskriterien schwerer fällt, ihre Präferenzen klar auszudrücken. Hinzu kommen falsche bzw. nicht erfüllte Vorstellungen über den Ausbildungsberuf (Stichwort Wunschberuf), die zu niedrigeren Zufriedenheitsbekundungen seitens der Auszubildenden führen könnten (Cully und Curtain 2001, S. 33; Uhly 2015, S. 73). Denkbar sind auch Einflüsse diverser Hintergrundmerkmale auf Seiten der Auszubildenden und Ausbildenden. Den Forschungsstand weiterführend sollen daher im Folgenden die nachstehenden Hypothesen anhand eines Datensatzes, der sich individuell zuordnen lässt (Auszubildende mit jeweiligen Ausbildern/Ausbilderinnen), geprüft werden:

**H1** Es existieren Wahrnehmungsunterschiede zwischen Auszubildenden und Ausbildenden.

**H2** Der Zusammenhang zwischen Ausbildungsqualität und Abbruchneigung unterscheidet sich je nach verwendeter Betrachtungsperspektive.

**H3** Wahrnehmungsunterschiede sind durch Hintergrundmerkmale erklärbar.

## 2.2 Theoretischer Ansatz

Der interaktionistischen Rahmentheorie nach Lempert (1998) zufolge spielen die subjektive Wahrnehmung des beruflichen und betrieblichen Umfelds sowie die Verarbeitung und Interpretation dieser Wahrnehmung die entscheidende Rolle in der beruflichen Entwicklung (Lempert 1998, S. 45 f.). Die Sozialisationsprozesse innerhalb der Ausbildung sind dabei von wechselseitigem Einfluss. Dies bedeutet, dass sowohl stetige Persönlichkeitsentwicklungen aufgrund der Einflüsse des Arbeitsumfeldes als auch Veränderungen des Umfelds durch die Akteure selbst stattfinden (Lempert 2009). Der Einfluss des sozialen Umfelds auf die Individuen stellt die stärkere Wirkungsrichtung innerhalb dieser Interaktion dar (Lempert 1998, S. 32). Subjektive Wahrnehmungen sind also letztlich das Ergebnis der wechselseitigen Beziehungen eines Individuums mit dessen Umwelt (Jungkunz 1995; Lempert 1998). Diese grundlegende Rahmenkonzeption ist auch (inter)national mit diversen prozessualen 3-Säulen-Modellen beruflichen Lernens (Input, Prozess, Output) kompatibel, welche in der Forschungs-Community mittlerweile einen breiten Konsens zu bilden scheinen (z. B. Jungkunz 1995; Seyfried et al. 2000; Tynjälä 2013; Visser 1994). Soziodemografische und betriebliche Charakteristika gelten für das Lösungsgeschehen von Ausbildungsverträgen als einflussreich (z. B. Autorengruppe Bildungsberichterstattung 2012; Bessey und Backes-Gellner 2015; CEDEFOP 2016; Dornmayr und Nowak 2012; Ebbinghaus et al. 2011; Faßmann und Funk 1997; Piening et al. 2012; Rohrbach-Schmidt und Uhly 2015) und können als relativ stabile Eingangsvoraussetzungen (Inputs) betrachtet werden. Solche persönlichen sowie betrieblichen bzw. ausbildungsspezifischen Charakteristika wirken jedoch zunächst auf die subjektivi-

ven Wahrnehmungen der Akteure, welche wie oben beschrieben zudem von der Interaktion mit der direkten Umwelt beeinflusst werden (Prozess-Dimension der Ausbildung).

Dieses Wirkungsgefüge stellt auch Tynjälä (2013) in ihrem Modell zum Lernen am Arbeitsplatz dar und betont dabei, mit Bezug auf von Glasersfeld (1995) sowie Prosser und Trigwell (1999), die Interpretation der Lernumweltbedingungen. Tynjäläs Modell bildete die Ausgangsbasis für eine umfassende Modellierung der Ausbildungsqualität, welche mittels einer qualitativen Meta-Analyse bestehender Messinstrumente der Ausbildungsqualität erarbeitet wurde (Böhn und Deutscher 2019). Die induktiv gebildeten Qualitätskategorien wurden im resultierenden Modell (Böhn und Deutscher, S. 66) anhand der drei Grundsäulen (Input, Prozess, Output) angeordnet und sollen als Kategorienschema zur Orientierung dienen (siehe auch Tab. A4). In diesem Ansatz wird Ausbildungsqualität verstanden als die „subjektiv wahrgenommene Beschaffenheit und Ausprägung schulischer und betrieblicher Ausbildungssituationen und -prozesse, die sich bezogen auf zu definierende Zielvariablen (z.B. berufliche Kompetenz oder berufliche Identität) auswirken können“ (Klotz et al. 2017, S. 3). Für die weiteren Analysen wird theoretisch von diesem Grundmodell, mit Eingrenzung auf die betriebliche Facette, ausgegangen.

Daneben wird gemäß dem „Negativen-Inkongruenz-Theorem“ (NIT; Krötz und Deutscher 2021) hypothetisiert, dass nicht nur die absoluten Ausprägungen von Qualitätseinschätzungen problematisch sind, sondern vielmehr noch Wahrnehmungsunterschiede, bei denen Auszubildende einen bestimmten Sachverhalt negativer wahrnehmen als deren Ausbilderin oder Ausbilder, da diese unterschiedlichen Wahrnehmungen der Akteure das Konfliktpotenzial erheblich steigern: Treffen Auszubildende auf Vorgesetzte, die ihre Einschätzung, beispielsweise zum Ausmaß an Überstunden, nicht teilen, werden Vorgesetzte weniger Verständnis zeigen als im Falle kongruenter Wahrnehmungen beider Beteiligten. Es ist also eine weniger „weiche“ Kommunikation und auch keine Bereitschaft zur Handlungsanpassung beider Akteure zu erwarten, sodass es bei der weiteren Kommunikation, z. B. bei Anordnungen weiterer Überstunden, vermutlich eher zu Konflikten kommt (vgl. Krötz und Deutscher 2021). Gerade bei einer stärker ausgeprägten oder länger anhaltenden Differenz der Wahrnehmungen werden damit negative Auswirkungen auf Output-Faktoren wahrscheinlicher, wie etwa sinkende Zufriedenheit oder vermehrte Vertragslösungen.

Monoperspektivische Betrachtungen der Ausbildungsqualität könnten vor dem Hintergrund dieser theoretischen Überlegungen Gefahr laufen, ein nur unvollständiges Bild des gesamten Interaktionsgeschehens zu zeichnen. Insbesondere deuten qualitative und quantitative Befunde auf die hohe Bedeutung des Konfliktgeschehens zwischen Auszubildenden und Ausbildenden im Zusammenhang mit vorzeitigen Vertragslösungen hin (Cully und Curtain 2001; Piening et al. 2012; Schöngen 2003; Stalder und Schmid 2006; Westdeutscher Handwerkskammertag 2002). Auch sind monoperspektivische Studien zur Verbesserung der Ausbildungsqualität ggf. nur begrenzt hilfreich, da sie in methodischen und interpretativen Problemen resultieren: Zum einen stellt sich die einfache Frage, wie die Einschätzungen zusammengeführt werden können bzw. welche Perspektive die Referenz für weitergehende Analysen bildet. Zum anderen bleibt unklar, an welcher Perspektive zur Verbesserung der Ausbildung angesetzt werden soll – bei jenen, die durch die Ausbildung bestimmte

Kompetenzen und Fähigkeiten erhalten sollen, oder bei jenen, die für die Ausgestaltung der Ausbildung tatsächlich zuständig sind? Eine multiperspektivische Betrachtung würde nicht nur das Problem von Verzerrungen durch einseitige Messungen überwinden, sondern würde auch differenziertere Möglichkeiten bei der Analyse der Zusammenhänge der Ausbildungsqualität zu Output-Kriterien der Ausbildung (z. B. berufliche Identität, Zufriedenheit, vorzeitige Vertragslösungen) eröffnen. Zudem könnten auf einer pädagogischen Mikroebene multiperspektivische Instrumente auch innerhalb der Ausbildungspraxis zur Einschätzung von Wahrnehmungsdifferenzen als Basis für eine konstruktive Auseinandersetzung zwischen verschiedenen Akteuren, in Form von Qualitätssicherungs- und Mediationsgesprächen, dienen. Bisweilen fehlen jedoch perspektivübergreifende methodische Ansätze, um die Ausbildungsqualität multiperspektivisch zu analysieren und auf dieser Basis geeignete Maßnahmen einzuleiten.

Eine methodische Zusammenführung der Perspektiven über Mittelwerte erscheint theoretisch wenig sinnvoll, da hiermit eine Einigung methodisch erzwungen wird, die inhaltlich nicht vorliegen muss. Gemäß den obigen theoretischen Überlegungen sind nicht nur die absoluten Einschätzungen der Ausbildungsqualität entscheidend, sondern auch die Wahrnehmungsunterschiede zwischen Auszubildenden und Ausbildenden leisten einen eigenen Erklärungsbeitrag, da diese zusätzlich das Konfliktpotenzial zwischen den Ausbildungsakteuren indizieren. Zudem ist davon auszugehen, dass dieser Zusammenhang zu vorzeitigen Vertragslösungen nicht linear ist, sondern dass starke Abweichungen auf besonders hohe Risiken für ein Zerwürfnis hindeuten.

Unter anderem um solche Risiken zu berücksichtigen, ist es sinnvoll, die Abbruchneigungen der Auszubildenden als zu untersuchende Zielvariable in den Blick zu nehmen, welche in diesem Beitrag exemplarisch als zentrale Zielgröße dualer Ausbildung auf Zusammenhänge zu Input- und Prozessmerkmalen analysiert wird. So sind gerade Passungsprobleme zwischen den Erwartungen der Auszubildenden und der erlebten Ausbildungswirklichkeit hinsichtlich des Lösungsgeschehens relevant (Beicht und Walden 2013; CEDEFOP 2016; Nägele und Neuenschwander 2015; Schöngen 2003; Stalder und Schmid 2006; Quante-Brandt und Grabow 2008). Hinzu kommen soziodemografische Faktoren auf Seiten der Auszubildenden (z. B. Autorengruppe Bildungsberichterstattung 2012; Bessey und Backes-Gellner 2015; CEDEFOP 2016; Dornmayr und Nowak 2012; Faßmann und Funk 1997; Greilinger 2013). Zudem werden in zahlreichen Studien der Einfluss betrieblicher Charakteristika sowie die Rolle von Konflikten mit Vorgesetzten oder Kolleginnen und Kollegen betont (z. B. Autorengruppe Bildungsberichterstattung 2012; Cully und Curtain 2001; Faßmann und Funk 1997; Greilinger 2013; Rohrbach-Schmidt und Uhly 2015; Schöngen 2003; Stalder und Schmid 2006; Quante-Brandt und Grabow 2008; Westdeutscher Handwerkskammertag 2002). Jedoch gilt es zu beachten, dass eine Vertragslösung kein ausschließlich negatives Phänomen darstellt, sondern für manche Auszubildende auch positive Folgen haben kann. Dies ist bspw. der Fall, wenn ein „Abbruch nach oben“ (Feß 1995, S. 29) zum Abschluss eines Studiums führt. Da Entscheidungen zu einer vorzeitigen Vertragslösung meist allmählich in einem längeren Prozess entstehen (Deuer 2003; Heublein und Wolter 2011), können durch die Betrachtung von Abbruchgedanken Zusammenhänge der Ausbildungsqualität zu den Ursprüngen des Lösungsgeschehens besser nachvollzogen werden



(Vallerand et al. 1997). Außerdem besteht die Möglichkeit für ein rechtzeitiges Eingreifen zur Prävention von vorzeitigen Vertragslösungen (Aarkrog et al. 2018; Deuer 2003). Demgegenüber führt nicht jede Abbruchneigung zu einer Vertragslösung, weshalb das tatsächliche Lösungsgeschehen überschätzt wird. Jedoch hat sich die Abbruchneigung bereits mehrfach als geeigneter Prädiktor herausgestellt (z. B. Bean und Metzner 1985, S. 527; Vallerand et al. 1997; Webb und Cotton 2018). Zur Messung wird eine Kurzsкала „betriebliche Abbruchgedanken“ verwendet, welche sich konkret auf betrieblich bedingte Abbruchneigungen beschränkt (siehe Anhang Tab. A3). Durch diese Fokussierung können mögliche Zusammenhänge der betrieblichen Ausbildungsqualität (und damit auch der Wahrnehmungsunterschiede) zu aufkommenden Abbruchgedanken der Auszubildenden präziser sichtbar gemacht werden.

### 3 Methodisches Vorgehen

Die Datengrundlage aller Analysen bilden die Ergebnisse einer Onlineumfrage zur Ausbildungsqualität mit 311 kaufmännischen Auszubildenden sowie deren leitenden Ausbilderinnen und Ausbildern aus 30 Betrieben<sup>1</sup>, welche überwiegend dem Bankensektor angehören. Die Ausbildungsleiterinnen und Ausbildungsleiter wurden direkt (per Mail und Telefon) kontaktiert und über das Vorhaben, beide Ausbildungsparteien zu befragen, informiert. Sie haben daraufhin einen Link zum Fragebogen an ihre Auszubildenden weitergeleitet sowie selbst die Auszubildenden-Version ausgefüllt. Die Rückmeldungen beider Parteien konnten über den erfragten Betriebsnamen einander zugeordnet werden. Verwendet wurden Teile des Fragebogeninstruments „VET-LQI“ (Böhn und Deutscher 2020), welches aus dem zuvor beschriebenen Qualitätsmodell hervorging und anhand von Kurzsкаlen ermöglicht, die betriebliche Ausbildungsqualität möglichst breit zu erfassen. Inhalt der Erhebung waren 51 Fragen zu 15 Skalen der Input- und Prozessdimension der betrieblichen Ausbildung, 3 Fragen zu betrieblichen Abbruchgedanken sowie weitere Fragen zu demografischen, persönlichen und betrieblichen Rahmendaten (siehe Tab. A1–A4 im Anhang).<sup>2</sup>

Teil der Befragung waren 15 verschiedene Sparkassen, 11 Genossenschaftsbanken sowie 4 weitere Industrie- und Handelsunternehmen. Berücksichtigt wurden ausschließlich kaufmännische Auszubildende, was überwiegend Bankauszubildende (85,5 %) und Industriekaufleute, Kaufleute für Büromanagement sowie für Groß- und Außenhandel (9 %) umfasste. Angaben zu den Charakteristika der Stichprobe sowie den betrieblichen Rahmendaten können Tab. A1 im Anhang entnommen werden.

In einem ersten Schritt werden, analog zu Negrini et al. (2016) und Walker et al. (2012), die Ausprägungen der Wahrnehmungsunterschiede auf Gruppenebene

<sup>1</sup> Dies entspricht durchschnittlich 10,4 Auszubildenden pro Betrieb, wobei die Range von Minimum=1 bis Maximum=35 verläuft.

<sup>2</sup> Eine ausführliche Aufarbeitung der Reliabilitäts- und Validitätsanalysen für das Fragebogeninstrument VET-LQI findet sich bei Böhn und Deutscher (2021).

anhand von Mittelwerten und t-Tests untersucht. Der Intraklassen-Korrelationskoeffizient (ICC) soll als weiteres Maß Auskunft über den Grad der Übereinstimmung geben. In einem zweiten Schritt soll dann mittels Korrelationsanalysen betrachtet werden, inwieweit der Zusammenhang zwischen Ausbildungsqualität und Abbruchneigung von der Perspektive abhängig ist. Hierbei wird jeweils die einseitige Wahrnehmung der Auszubildenden sowie der Ausbildenden mit dem multiperspektivischen Ansatz der negativen Wahrnehmungsunterschiede (Krötz und Deutscher 2021) verglichen. Entsprechend wurden für die Berechnung der multiperspektivischen Betrachtung die negativen Wahrnehmungsunterschiede zwischen Auszubildenden und Ausbildenden anhand von Differenz-Scores gebildet, welche je nach absoluter Bewertungshöhe gewichtet wurden. Hierzu wurde für jede(n) Auszubildende(n) die individuelle negative Abweichung zum jeweils eigenen Ausbildenden je Item errechnet.<sup>3</sup> Diese Differenzen können aufgrund der siebenstufigen Likert-Skala maximal den Wert 6 erreichen, wenn eine Ausbilderin oder ein Ausbilder mit 7 und ein(e) Auszubildende(r) mit 1 geantwortet hat. Lag dabei hinsichtlich eines Items keine negative Abweichung vor, wurde dies mit einer Abweichung von null gewertet. Positive Abweichungen wurden nicht mit negativen verrechnet, da diese Verfahrensweise vorhandene negative Wahrnehmungsunterschiede hinsichtlich bestimmter Items beseitigen oder zumindest verzerren würde. Mögliche negative Konsequenzen würden folglich übersehen. Zudem ist es theoretisch nicht plausibel, dass vorhandenes Konfliktpotenzial in einem Aspekt durch eine positive Abweichung in einem anderen Aspekt aufgehoben wird.

Da eine bestimmte Differenz zwischen beiden Parteien eher mit negativen Folgen zusammenhängen könnte, wenn diese auf einem niedrigen Qualitätsniveau und nicht am oberen Ende der Skala auftritt (z. B. 3–2 vs. 7–6), werden die Item-Differenzen anhand einer Multiplikation mit der inversen absoluten Bewertung (7 wird 1, 6 wird 2, 5 wird 3 usw.) entsprechend gewichtet. Diese Verfahrensweise führt folglich bei niedrigen absoluten Bewertungen zu höheren Differenzwerten. Da Fälle ohne Unterschied (0) vorhanden sind und eine Verzerrung aufgrund der Gewichtung vermieden werden soll, wurden zuvor alle Differenzen um eine Einheit erhöht. Die Item-Differenzen liegen daher zwischen 1 und 7 (was deren Zusammenhang zur abhängigen Variablen nicht beeinflusst). Es resultieren sogenannte DAM-Scores (difference accounting multi-perspective scores).

Abschließend wurden die DAM-Scores inhaltlich zusammengehöriger Items in einem DAM-Score je Qualitätskriterium angegeben. Somit resultieren für alle Auszubildenden individuelle DAM-Scores in den 15 betrachteten Qualitätsaspekten der betrieblichen Ausbildung. Für die Korrelationsanalyse (H2) wird die betriebliche Ausbildungsqualität als Gesamtfaktor zusammengefasst, welcher die 15 Qualitätskriterien der betrieblichen Ausbildung (siehe Tab. 2) umfasst.

Schließlich wird im dritten Schritt anhand von Regressionsmodellen untersucht, welche Rolle Eingangsvoraussetzungen seitens der Auszubildenden sowie betriebli-

<sup>3</sup> Die verwendeten Daten lagen aufgrund der siebenstufigen Likert-Skala (1 = trifft überhaupt nicht zu; 7 = trifft voll und ganz zu) intervallskaliert vor. Zudem wurden alle Items so recodiert, dass höhere Werte entsprechend höhere Qualität bedeuten.

che Rahmenbedingungen hinsichtlich der Erklärung von Wahrnehmungsunterschieden spielen (siehe Tab. A1 im Anhang für stichprobenspezifische Charakteristika).

## 4 Ergebnisse

### 4.1 Wahrnehmungsunterschiede auf Gruppenebene

Zunächst können, auf die im Literaturstand konventionelle Weise, die Mittelwerte (M) der 15 Qualitätskriterien je Gruppe verglichen werden. Tab. 2 zeigt, dass die Wahrnehmungen der Auszubildenden zwischen  $M = 4,06$  (Autonomie) und  $M = 6,15$  (Betreuung), also über zwei Einheiten der siebenstufigen Skala, schwanken. Die Spannweite der Einschätzungen der Auszubildenden ist dagegen mit  $M = 3,84$  (Autonomie) und  $M = 6,51$  (Betreuung) größer. Sichtbar wird außerdem, dass sich beide Gruppen offensichtlich über die jeweils am schwächsten (Autonomie und Einbindung in die Expertenkultur) und am besten (Betreuung und Curriculum-Orientierung) umgesetzten Qualitätsaspekte der Ausbildung einig sind. Jedoch liegen die Einschätzungen der Auszubildenden hinsichtlich 13 der 15 Kriterien unterhalb der Wahrnehmung ihrer Auszubildenden.

**Tab. 2** Wahrnehmungen der Ausbildungsqualität

	Auszubildende		Ausbildende		T-Test		ICC (3)	DAM-S
	M	SD	M	SD	T-Wert	<i>d</i>		M
Arbeitsklima	5,25	0,91	5,49	0,62	1,44	0,276	0,86	5,59
Lern- und Beschäftigungsangebote	4,88	1,32	5,74	1,03	3,47***	0,664	0,00	8,76
Arbeitsbelastung	5,58	1,08	5,97	0,64	2,94**	0,370	0,08	5,85
Aufgabenvielfalt	5,26	1,06	5,92	0,70	4,68***	0,641	0,11	6,64
Autonomie	4,06	1,30	3,84	0,84	-1,32	-0,176	0,00	7,52
Aufgabenbedeutsamkeit	5,46	0,93	5,71	0,59	2,07*	0,395	0,63	5,59
Aufgabenkomplexität	5,00	1,05	5,22	0,92	1,16	0,221	0,70	6,47
Passung Fähigkeits- & Anforderungsniveau	5,37	1,19	5,30	0,87	-0,30	-0,057	0,00	5,27
Einbindung in die Expertenkultur	4,36	1,40	5,13	0,95	4,08***	0,569	0,32	9,84
Funktionale Einbindung	5,09	0,92	5,38	0,59	2,40*	0,319	0,78	6,59
Soziale Einbindung	5,90	0,95	6,12	0,44	2,27*	0,240	0,94	4,48
Betreuung	6,15	0,96	6,51	0,29	4,79***	0,392	0,04	4,20
Curriculum-Orientierung	6,11	0,98	6,39	0,63	2,21*	0,294	0,74	3,99
Feedback	5,54	1,05	6,18	0,50	5,90***	0,633	0,05	6,17
Personal und Instruktionen	5,75	0,99	5,81	0,48	0,57	0,061	0,85	4,32

Auszubildende  $n = 309$ – $311$ . Auszubildende  $n = 30$ . Siebenstufige Likert-Skala, 7 = optimale Qualität  
*d* Effektstärke unter Einbezug eines Gruppengrößen-Bias, DAM-S difference accounting multi-perspective score

\*Signifikant  $p < 0,05$ ; \*\*signifikant  $p < 0,01$ ; \*\*\*signifikant  $p < 0,001$



Für 10 der 15 Qualitätskriterien ergeben sich signifikante Unterschiede der Gruppenmittelwerte, von welchen fünf sogar hochsignifikant ( $p < 0,001$ ) ausfallen.<sup>4</sup> Verglichen mit den Auszubildenden, nehmen die Ausbilderinnen und Ausbilder die Qualität innerhalb dieser zehn Aspekte durchweg als signifikant höherwertiger wahr. Betrachtet man zudem die Effektstärke (Cohens  $d$ ) der Unterschiede, korrigiert um einen Bias der unterschiedlichen Gruppengrößen, so zeigen sich für 12 Qualitätskriterien nennenswerte ( $>0,2$ ) Unterschiedseffekte (Cohen 1988, S. 25 f.).<sup>5</sup> Darunter weisen vier Qualitätskategorien einen mittleren Effekt des Unterschiedes der Einschätzung zwischen Auszubildenden und Ausbildenden auf ( $>0,5$ ): Lern- und Beschäftigungsangebote (0,664), Aufgabenvielfalt (0,641), Feedback (0,633) sowie Einbindung in die Expertenkultur (0,569). Hinsichtlich der verbleibenden Kriterien liegen zwar ebenfalls Unterschiede vor, diese sind hinsichtlich ihrer Effektstärke jedoch nicht groß genug, um von einer Überzufälligkeit im Sinne einer Übertragbarkeit der Befunde auf die Gesamtpopulation auszugehen.

Als weiteres Maß der Übereinstimmung kann außerdem der ICC (3) herangezogen werden. Dieser bildet den Übereinstimmungsgrad der aggregierten Mittelwerte aller Auszubildenden mit den aggregierten Mittelwerten aller Ausbildenden, über alle Items hinweg, ab (Shrout und Fleiss 1979).<sup>6</sup> Der ICC (3,1)<sub>just</sub> fällt für Einzelmaße mit 0,77 (95 %-CI [0,28, 0,90]) zunächst signifikant aus ( $p < 0,001$ ).<sup>7</sup> Berechnet man diesen Wert differenzierter auf Ebene der einzelnen Qualitätskriterien, zeigen vier Kriterien eine mindestens gute Übereinstimmung ( $>0,75$ ) und drei weitere Kriterien eine moderate Übereinstimmung (0,5 bis 0,75). Für die Mehrheit der Qualitätskriterien ergibt sich jedoch nur eine schwache ( $<0,5$ ) oder gar keine Übereinstimmung beider Parteien (Koo und Li 2016, S. 161). Die Ergebnisse decken sich weitestgehend mit den Befunden der t-Tests.

In Kombination aller Befunde aus Tab. 2 können die Schlüsse gezogen werden, dass sich die Wahrnehmungen in Form von Gruppenwerten für den Großteil aller Qualitätskriterien signifikant unterscheiden (H1), dass in jenen Kriterien die Auszubildenden die Qualität höher einschätzen und dass die Beurteilungen je nach Qualitätskriterium deutlich variieren, wobei es ein gemeinsames, moderates „Schwanken“ der beiden Gruppen bei einem Teil der Qualitätskriterien zu geben scheint, wie die zusätzlichen ICC-Analysen nahelegen.

<sup>4</sup> Da für einen t-Test Varianzhomogenität vorliegen muss, wurde diese vorab durch Levene-Tests überprüft. Fällt der Levene-Test signifikant aus, wird die Nullhypothese gleicher Varianzen abgelehnt und von Varianzheterogenität ausgegangen. Innerhalb der Teststatistik müssen deshalb die entsprechenden Werte (Welch-Test) interpretiert werden. Aus Gründen der Übersichtlichkeit zeigt Tab. 2 nur den relevanten t-Wert sowie das Signifikanzniveau.

<sup>5</sup> Effektstärke Cohens  $d$  für Mittelwertunterschiede bei unabhängigen t-Tests: klein  $\geq 0,2$ ; mittel  $\geq 0,5$ ; groß  $\geq 0,8$  (Cohen 1988, S. 25 f.). Um einen Bias der unterschiedlichen Gruppengrößen zu vermeiden, wurde die korrigierte Hedges- $g$ -Variante verwendet, welche dennoch gängig als Cohens  $d$  bezeichnet wird (Ellis 2010, S. 27).

<sup>6</sup> Der ICC (3) setzt voraus, dass alle Rater jeweils alle Items bewerten sowie dass die Rater nicht zufällig aus einer Grundgesamtheit gezogen, sondern bestimmt wurden (Koo und Li 2016; Shrout und Fleiss 1979). Dabei wurde die konservative Form der absoluten Übereinstimmung (justiert) gewählt, welche systematische Fehler berücksichtigt, und die Einzelmaß-Variante interpretiert.

<sup>7</sup> Das Ergebnis der Durchschnichtsmaße liegt wie erwartet etwas höher mit ICC (3,  $k$ )<sub>just</sub> = 0,87 (95 %-CI [0,44, 0,95]),  $p < 0,001$ .

## 4.2 Zusammenhang der Ausbildungsqualität zu Output-Kriterien nach Perspektive

Im nächsten Schritt soll nun der Zusammenhang zwischen Ausbildungsqualität und Abbruchneigung in Abhängigkeit der Perspektive untersucht werden. Tab. A3 im Anhang zeigt zunächst die Ausprägung der Abbruchgedanken innerhalb der Stichprobe, welche relativ gering ausfallen. Im Folgenden wird die Korrelation der betrieblich bedingten Abbruchgedanken von Auszubildenden mit drei verschiedenen Perspektiv-Varianten der Ausbildungsqualität betrachtet: der einseitigen Wahrnehmung der Auszubildenden, der einseitigen Wahrnehmung der Ausbildenden und dem multiperspektivischen Ansatz der Wahrnehmungsunterschiede (DAM-Scores). Tab. 3 zeigt für zwei Perspektiven signifikante Korrelationen ( $p < 0,001$ ) mit den Abbruchgedanken der Auszubildenden. Die Qualitätswahrnehmung der Auszubildenden steht in keinem statistisch relevanten Zusammenhang zu den Abbruchgedanken ihrer Auszubildenden. Dagegen zeigt sich, dass die Korrelation der multiperspektivischen DAM-Scores ( $-0,608$ ) wie erwartet höher ausfällt als die der einseitigen Auszubildenden-Perspektive ( $0,536$ ).<sup>8</sup> Der Unterschied der beiden Perspektiven in ihrer Korrelation zu Abbruchgedanken fällt dabei speziell für das erste Lehrjahr am deutlichsten aus ( $-0,728$  bzw.  $0,621$ ).

Analysiert man die Korrelationsunterschiede aus Tab. 3 anhand des Fisher-Tests für abhängige Stichproben genauer, so ergibt sich gemäß Cohen (1988, S. 109) zwischen der einseitigen Auszubildenden-Perspektive und der DAM-Score-Variante ein signifikanter Effektunterschied ( $q = 0,107$ ;  $z = 4,21$ ;  $p < 0,001$ ). Diese Befunde bestätigen Hypothese (H2) und indizieren die Abhängigkeit der Zusammenhänge zwi-

**Tab. 3** Korrelation von Abbruchgedanken mit der Ausbildungsqualität in Abhängigkeit der Perspektive

		Betriebliche Abbruchgedanken
Ausbildungsqualität aus Sicht der Ausbildenden (einseitig)	Korrelation nach Pearson	$-0,080$
	Signifikanz (2-seitig)	$0,161$
	<i>N</i>	310
Ausbildungsqualität aus Sicht der Auszubildenden (einseitig)	Korrelation nach Pearson	$0,536^{***}$
	Signifikanz (2-seitig)	$0,000$
	<i>N</i>	305
DAM-Score der Ausbildungsqualität	Korrelation nach Pearson	$-0,608^{***}$
	Signifikanz (2-seitig)	$0,000$
	<i>N</i>	305

*DAM-Score* difference accounting multi-perspective score

\*\*\*Signifikant  $p < 0,001$

<sup>8</sup> Das negative Vorzeichen indiziert, je niedriger die Differenzen ausfallen, desto höher die Bewertung der Skala „Abbruchgedanken“, was wenigen Abbruchgedanken entspricht. Der positive Koeffizient der einseitigen Qualitätseinschätzung steht folglich für eine höhere Bewertung der Skala „Abbruchgedanken“ (weniger Abbruchgedanken) mit steigender Qualitätseinschätzung.

schen Ausbildungsqualität und Abbruchneigungen vom jeweils verwendeten Ansatz bzw. von der eingenommenen Perspektive.<sup>9</sup>

### 4.3 Einfluss von Inputfaktoren auf Wahrnehmungsunterschiede

Wie eingangs beschrieben könnten individuelle Eingangsvoraussetzungen sowie Rahmenbedingungen der betrieblichen Ausbildung Einfluss auf die Wahrnehmung der Akteure ausüben (Jungkunz 1995; Lempert 1998; Tynjälä 2013) und damit die im Literaturstand beschriebenen Wahrnehmungsunterschiede erklären. Neun solcher typischen Kriterien sollen daher auf ihren Einfluss untersucht werden (deskriptive Statistik siehe Anhang Tab. A1–A2).

Zur Analyse wurden neun Hintergrund- und Rahmenmerkmale in fünf thematisch zusammengehörige Blöcke gruppiert, die nacheinander als unabhängige Variablen in ein Regressionsmodell eingeschlossen werden. Den ersten Block bilden das Geschlecht sowie die daheim gesprochenen Sprachen (0 = nur Deutsch; 1 = Deutsch plus weitere Sprachen; 2 = nur weitere Sprachen) der Auszubildenden. Im zweiten Block befinden sich Dummy-Variablen für den höchsten Schulabschluss sowie den dortigen Notendurchschnitt (0 = 1,0–1,5; 1 = 1,6–2,0; 2 = 2,1–2,5 etc.). Wie sehr der gewählte Ausbildungsgang vor Beginn der Ausbildung dem Wunschberuf entsprach (1 = trifft überhaupt nicht zu; 7 = trifft voll und ganz zu), bildet den dritten Block. Der vierte Block beinhaltet einerseits eine Selbsteinschätzungsskala zur Leistung innerhalb der Ausbildung, analog der obigen Notenskala, sowie andererseits das jeweilige Lehrjahr. Letztlich beinhaltet der fünfte Block Dummy-Variablen für die Betriebsgröße in Form der Beschäftigtenanzahl (0 = <50; 1 = 50–500; 2 = 501–1000; 3 = >1000)<sup>10</sup> sowie die Gesamtanzahl an Auszubildenden (0 = 6–20; 1 = 21–50; 2 = >50), welche von den Auszubildenden erfragt wurden. Die abhängige Variable bildet der Gesamtfaktor der Ausbildungsqualität aus Tab. 3, welcher aus den 15 Qualitätskriterien in Form von DAM-Scores erstellt wurde.<sup>11</sup>

Modell 1 (Geschlecht und Sprache) sowie Modell 2 (Block 1 ergänzt um Schulabschluss und Notendurchschnitt) zeigen keinen statistisch signifikanten Zusammenhang zu den Wahrnehmungsunterschieden der Ausbildungsqualität.<sup>12</sup> Modell 3 (Block 1 und 2 ergänzt um „Wunschberuf“) zeigt dagegen einen signifikanten Zusammenhang zu Wahrnehmungsunterschieden ( $F[8, 283] = 4,79, p < 0,001$ ). Die dabei zusätzlich berücksichtigte Variable „Wunschberuf“ weist einen standardisierten

<sup>9</sup> In diesem Abschnitt sollen verschiedene Perspektiv-Ansätze anschaulich gegenübergestellt werden, weshalb die Ausbildungsqualität in einem Faktor zusammengefasst wurde. Eine Analyse des Zusammenhangs einzelner Qualitätsaspekte zu Abbruchgedanken der Auszubildenden ist in Krötz und Deutscher (2021) zu finden.

<sup>10</sup> Die kleinste Ausprägung wurde nur selten gewählt ( $n = 7$ ). Hier konnte das Problem der Multikollinearität gelöst werden, indem die am häufigsten gewählte Ausprägung (50–500 Beschäftigte;  $n = 159$ ) als Referenzkategorie, im Sinne einer „gewöhnlichen“ Betriebsgröße innerhalb der Stichprobe, gewählt wurde.

<sup>11</sup> In einer ersten Analyse der fünf resultierenden Modelle je Qualitätskriterium wurde die Modellstruktur und Multikollinearität überprüft. In den im Folgenden präsentierten Ergebnissen spielte Multikollinearität, mit  $VIF < 3,1$ , keine ausschlaggebende Rolle (Hair et al. 2014).

<sup>12</sup> Modell 1:  $F(3, 288) = 0,34, p = 0,798$ . Modell 2:  $F(7, 284) = 0,58, p = 0,776$ .

**Tab. 4** Regressionsmodell zur Erklärung von Wahrnehmungsunterschieden der Ausbildungsqualität

Modell		Regressions- koeffizient B	Std.- Fehler	Beta	T	Sig.
5	(Konstante)	0,705	0,323	–	2,181	0,030
	Geschlecht	0,034	0,115	0,017	0,299	0,765
	Sprache (Deutsch+ Weitere)	0,142	0,137	0,059	0,032	0,303
	Sprache (Nur Weitere)	–0,186	0,559	–0,019	–0,333	0,739
	Fachhochschulreife	–0,029	0,184	–0,010	–0,156	0,876
	Fachgebundene Hochschulr	0,160	0,240	0,040	0,665	0,507
	Allgemeine Hochschulreife/ Abitur	–0,043	0,142	–0,022	–0,301	0,763
	Durchschnittsnote im Ab- schlusszeugnis	0,076	0,055	0,081	1,383	0,168
	Wunschberuf zum Zeitpunkt des Ausbildungsbeginns	–0,207	0,038	–0,315	–5,513	0,000
	Leistungen innerhalb der Berufsausbildung	0,017	0,070	0,015	0,236	0,814
	2. Lehrjahr	0,180	0,130	0,087	1,381	0,168
	3. Lehrjahr	0,315	0,145	0,138	2,179	0,030
	<50 Beschäftigte	–0,389	0,437	–0,052	–0,891	0,374
	501–1000 Beschäftigte	–0,017	0,142	–0,008	–0,119	0,905
	>1000 Beschäftigte	–0,368	0,283	–0,118	–1,303	0,194
	21–50 Auszubildende	0,042	0,144	0,021	0,291	0,771
	>50 Auszubildende	0,142	0,241	0,058	0,590	0,556

Abhängige Variable = Gesamtfaktor Ausbildungsqualität als DAM-Score (difference accounting multi-perspective score). Referenzkategorie für Schulabschlüsse = Mittlere Reife und niedriger

Beta-Koeffizienten von  $-0,328$  ( $p < 0,001$ ) auf. Dies bedeutet, je stärker die Ausbildung vor Beginn dem Wunschberuf entsprach, desto geringer fallen Wahrnehmungsdifferenzen zum Auszubildenden während der Ausbildung aus. Das Modell erklärt einen Varianzanteil der Wahrnehmungsunterschiede von 9,4 % (korrigiertes  $R^2$ ).

Im vierten Block wird jenes Modell um die Leistung innerhalb der Berufsausbildung sowie das Lehrjahr ergänzt. Modell 4 bleibt signifikant ( $F[11, 280] = 3,94$ ,  $p < 0,001$ ), das korrigierte  $R^2$  erhöht sich auf 0,100 und eine der neu ergänzten Variablen (3. Lehrjahr) zeigt einen signifikanten Einfluss von  $Beta = 0,129$  ( $p = 0,037$ ). Demnach steigen die Wahrnehmungsunterschiede im dritten Lehrjahr, verglichen zum ersten Lehrjahr, signifikant an. Letztlich werden in Modell 5 (Tab. 4) zusätzlich die Beschäftigtenanzahl sowie die Anzahl an Auszubildenden berücksichtigt. Auch diese Rahmendaten zeigen keinen signifikanten Einfluss auf Wahrnehmungsunterschiede. Der F-Wert des Modells ( $F[16, 275] = 2,90$ ,  $p < 0,001$ ) sowie der Anteil erklärter Varianz (korrigiertes  $R^2 = 0,095$ ) sinken leicht.

Zusammenfassend deuten die Analysen somit darauf hin, dass soziodemografische Merkmale für die Entstehung von Wahrnehmungsunterschieden der Ausbildungsqualität keine besonders zentrale Rolle zu spielen scheinen. Jedoch zeigt das dritte Lehrjahr einen Effekt (0,138) auf die Bewertungs-Differenz und weist damit auf ein über den Ausbildungsverlauf steigendes Konfliktpotenzial hin. Einen deutlichen Effekt ( $-0,315$ ) auf die Wahrnehmungsunterschiede üben motivationa-

le Ressourcen (Wunschberuf) der Auszubildenden aus. Dieser Befund kann durch weitere Alternativmodelle gestützt werden, in welchen nur einzelne Merkmale analysiert wurden. So erklärt die Variable Wunschberuf allein etwa 9,8 % der Varianz der Wahrnehmungsunterschiede ( $F[1, 302] = 33,79, p < 0,001$ ). Dagegen sind betriebliche Rahmendaten wie die Betriebsgröße und die Anzahl an Auszubildenden für die Erklärung von Wahrnehmungsunterschieden unwesentlich. Ein Modell aller weiteren in Tab. 4 berücksichtigten Variablen (außer Wunschberuf) steht dagegen in keiner signifikanten Verbindung zu Wahrnehmungsunterschieden. Werden soziodemografische und betriebliche Merkmale separat betrachtet, zeigen auch jene schlankeren Modellierungen keine signifikanten Zusammenhänge zu Wahrnehmungsunterschieden der Ausbildungsqualität, mit Ausnahme des dritten Lehrjahres.

## 5 Diskussion und Limitationen

Trotz des hohen Stellenwerts der dualen Ausbildung sowie der eingangs beschriebenen Herausforderungen mangelt es bisher an bilateralen Untersuchungen, die über Mittelwertvergleiche der Auszubildenden und des Ausbildungspersonals hinausgehen und auch Wahrnehmungsunterschiede zwischen verschiedenen Ausbildungsakteuren mit einbeziehen. In der hier verwendeten Stichprobe konnten die erwarteten signifikanten Unterschiede in der Wahrnehmung der betrieblichen Ausbildungsqualität auf der Gruppenebene für den Großteil aller Qualitätsaspekte bestätigt werden (H1). Dieser Befund reiht sich damit widerspruchsfrei in den Forschungsstand zu Wahrnehmungsdifferenzen auf Gruppenebene ein, bestehend aus den Studien von Ebbinghaus et al. (2010b), Negrini et al. (2016) sowie Walker et al. (2012). Das Ausbildungspersonal schätzt die Qualität weitestgehend besser ein, wobei ein gemeinsames Schwanken der Gruppen je nach Qualitätskriterium durchaus erkennbar ist, wie die zusätzlichen ICC-Analysen nahelegen.

Darüber hinaus konnte als neuartiger Befund – anhand eines Datensatzes, bei welchem Auszubildende und Ausbildende einander zugeordnet werden konnten – die potenzielle Bedeutsamkeit der eingenommenen Perspektive für die Berechnung etwaiger Zusammenhänge zwischen verschiedenen Input- und Prozessmerkmalen zu Outputvariablen beruflicher Ausbildung nachgewiesen werden (H2). Exemplarisch wurde dies anhand der betrieblichen Abbruchneigung dargelegt, wobei sich zeigte, dass Wahrnehmungsunterschiede zwischen Auszubildenden und deren Ausbildenden in deutlichem Zusammenhang zu betrieblich begründeten Abbruchgedanken stehen. Anhand einer multiperspektivischen Analyse, welche beide Perspektiven integriert (DAM-Scores), lassen sich demnach vertiefte Erkenntnisse gewinnen, die einem interaktiven Ausbildungsgeschehen gerecht werden. Jedoch weist Hofer (1986, S. 109) darauf hin, dass Wahrnehmungen auf das individuell Bedeutsame gerichtet sind, weshalb auch unilaterale Perspektiven ihrerseits Validität beanspruchen können. Der zusätzliche Erklärungsgehalt des vorgestellten Ansatzes zur Modellierung von Wahrnehmungsunterschieden kann zudem je nach Zielvariable variieren. So kann es je nach theoretischem Zielkonstrukt der Ausbildungsqualität (z. B. Zufriedenheit der Auszubildenden, Arbeitsproduktivität, Kompetenz etc.) durchaus auch sinnvoll sein, nur Auszubildende oder nur Ausbildende zu befragen oder bevorzugt



objektive Bezugskriterien zur Ermittlung der Ausbildungsqualität zu suchen (s. hierzu auch Beck 1987). Gerade dort, wo jedoch Differenzen in der Wahrnehmung und hieraus resultierend Konflikte theoretisch zu erwarten sind, welche bestimmte Outcomes begünstigen, ist mit zusätzlichen Erklärungsbeiträgen multiperspektivischer Ansätze zu rechnen.

In Bezug auf die dritte Fragestellung des Beitrags, die Frage nach den Ursachen von Wahrnehmungsunterschieden, können diese theoretisch zum einen durch Selbst- bzw. Fremdevaluationseffekte erklärt werden, da die Antworten des Ausbildungspersonals einer Selbstevaluation gleichkommen, welche häufig höher ausfällt als eine Fremdevaluation (Clausen 2002, S. 65). Zudem konnte hinsichtlich der Entstehung von Wahrnehmungsunterschieden zwischen verschiedenen Akteuren der dualen Ausbildung gezeigt werden, dass soziodemografische sowie betriebliche Rahmendaten (Inputs) keine wesentliche Rolle einnehmen, während kognitive Merkmale sowie das Lehrjahr kleinere Effekte ausüben. Letztlich scheinen motivationale Aspekte auf Seiten der Auszubildenden den deutlichsten Einfluss auf Wahrnehmungsunterschiede zu nehmen.

Aufgrund des begrenzten Stichprobenumfangs ist jedoch zu beachten, dass kleine Effekte innerhalb der Studie nicht inferenzstatistisch abgesichert werden konnten. Auch handelt es sich um eine auf kaufmännische Ausbildungsberufe fokussierte Stichprobe mit überwiegend Bankauszubildenden, was die Generalisierbarkeit der Ergebnisse einschränkt. Zukünftige Forschung sollte demnach auf die Untersuchung der gefundenen Zusammenhänge für andere Branchen oder Berufsgruppen abzielen. In diesem Zusammenhang sollte auch berücksichtigt werden, dass durchschnittlich etwa zehn Auszubildende den Einschätzungen ihres jeweiligen Ausbilders bzw. ihrer jeweiligen Ausbilderin zugeordnet wurden. Den Bewertungen der Ausbildenden kommt somit eine besonders große Bedeutung zu, da sie als ausschlaggebende Referenzwerte zur Differenzbildung herangezogen wurden. Nichtsdestotrotz absolvieren die zugeordneten Auszubildenden ihre Ausbildung im jeweils gleichen Betrieb und erleben (subjektive Einschätzung der Auszubildenden) folglich dieselben Ausbildungsbedingungen (subjektive, aber für alle Auszubildenden eines Betriebes konstante Einschätzung der Ausbildenden).

Daran anknüpfend stellt eine weitere Limitation die noch unbeleuchtete Seite der Ausbilderinnen und Ausbilder dar. Hier wurden bislang keine Einflüsse von Hintergrundmerkmalen auf Auszubildende oder die Ausbildungsqualität untersucht. Es ist jedoch durchaus möglich, dass auch soziodemografische oder motivationale Aspekte der Ausbildenden Einfluss auf Wahrnehmungsunterschiede zwischen beiden Akteursgruppen ausüben. Hierbei könnte auch entscheidend sein, ob direkte Kolleginnen und Kollegen, vor Ort mit Ausbildungsaufgaben betraute Beschäftigte oder zentrale Ausbildungsleitende einbezogen werden. In dieser Stichprobe wurden zentrale Ausbildungsleiterinnen und Ausbildungsleiter befragt, da diese die Verantwortung für die derzeitigen Abläufe tragen sowie auch die rechtlichen und curricularen Vorgaben kennen. Zudem ist deren Wahrnehmung der Ausbildungsqualität für Veränderungsprozesse maßgeblich. Als alternatives Design könnten die täglichen Kontakte der Auszubildenden, insbesondere die mit Ausbildungsaufgaben betrauten Beschäftigten der Betriebe, befragt werden. Jedoch sind es häufig mehrere Kolleginnen und Kollegen, die z. B. auch fachinhaltlich betreuen, wodurch es methodisch

unklar wäre, wer auf betrieblicher Seite den Referenzwert für die Einschätzungswerte bildet oder alternativ mit welcher Gewichtung eine Zusammenführung zu einem betrieblichen Referenzwert stattfinden müsste. In künftigen Untersuchungen könnten zudem die Qualitätsansprüche beider Parteien einbezogen werden, um auch den Zusammenhang von Wahrnehmungsunterschieden (DAM-Scores) zur individuellen Relevanz des jeweiligen Qualitätsaspekts zu betrachten sowie mögliche Auswirkungen von Erwartungsdifferenzen zu berücksichtigen.

Die in dieser Stichprobe recht hoch ausfallenden Qualitätsbeurteilungen resultieren durch die weitestgehend „guten“ Ausbildungsbedingungen im Bankensektor. Jedoch konnte auch für vergleichsweise gute Bedingungen ein Einfluss von Wahrnehmungsunterschieden beider Ausbildungsparteien auf Abbruchgedanken verdeutlicht werden (Krötz und Deutscher 2021). Die Befunde dieses Beitrags unterstreichen insgesamt die Relevanz integrativer, multiperspektivischer Ansätze zur Betrachtung der Ausbildungsqualität. Forschungsbezogen lässt sich festhalten, dass multiperspektivische Modellierungsansätze der Ausbildungsqualität nützlich sind, um dem interaktiven Ausbildungsgeschehen gerecht zu werden und insbesondere Zusammenhänge der verschiedenen Dimensionen präziser zu modellieren. Außerdem bietet der vorgestellte Ansatz die Möglichkeit, die Problematik der nur schwer objektivierbaren Qualitätskriterien in Teilen abzuschwächen, indem Ausbildungsqualität ergänzend hinsichtlich möglicher Wahrnehmungsdifferenzen zwischen Auszubildenden und Ausbildenden betrachtet wird. In diesem Zusammenhang birgt die multiperspektivische Einschätzung von Ausbildungsqualität ebenso für die Praxis Potenzial. So könnte eine simultane Beurteilung von Qualitätsmerkmalen durch alle Ausbildungsakteure als Frühwarnsystem für Fehlentwicklungen dienen sowie im Rahmen der Qualitätssicherung eingesetzt werden. Gehen die Wahrnehmungsdifferenzen auf Basis des hier vorgestellten Einschätzungsinstruments (VET-LQI) auseinander, könnten durch frühzeitige Gespräche mögliche Ursachen ergründet und ggf. negative Folgen verhindert werden.

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## Original Appendix to Paper 2

Originally provided as additional online material.

**Tab. A1** Sample characteristics

Aspect	Coding	Frequency	Percentage	Valid Percentage	Cumulated Percentage
<b>Company Size</b> (number of employees) n = 311	< 50	7	2.3	2.3	2.3
	50–500	159	51.1	51.1	53.4
	501–1000	110	35.4	35.4	88.7
	> 1000	35	11.3	11.3	100.0
<b>Number of Trainees</b> n = 311	6–20	109	35.0	35.0	35.0
	21–50	138	44.4	44.4	79.4
	> 50	64	20.6	20.6	100.0
<b>Year of Training</b> n = 311	1	131	42.1	42.1	42.1
	2	104	33.4	33.4	75.6
	3	76	24.4	24.4	100.0
<b>Gender</b> n = 311	Male	128	41.2	41.2	41.2
	Female	183	58.8	58.8	100.0
<b>Educational Level</b> n = 311	Lower secondary school certificate (Hauptschule)	1	0.3	0.3	0.3
	Secondary school certificate (Mittlere Reife)	104	33.4	33.4	33.8
	Advanced technical college (Fachhochschule)	43	13.8	13.8	47.6
	Subject-related higher-education entrance qualification (fachgebundene Hochschulreife)	19	6.1	6.1	53.7
	General higher-education certificate (allgemeine Hochschulreife/Abitur)	144	46.3	46.3	100.0
<b>Final Grade</b> n = 306	1.0 – 1.5	17	5.5	5.6	5.6
	1.6 – 2.0	67	21.5	21.9	27.5
	2.1 – 2.5	112	36.0	36.6	64.1
	2.6 – 3.0	86	27.7	28.1	92.2
	3.1 – 3.5	21	6.8	6.9	99.0
	3.6 – 4.0	3	1.0	1.0	100.0
<b>Training Performance</b> (self-assessed) n = 306	1.0 – 1.5	31	10.0	10.1	10.1
	1.6 – 2.0	121	38.9	39.5	49.7
	2.1 – 2.5	114	36.7	37.3	86.9
	2.6 – 3.0	32	10.3	10.5	97.4
	3.1 – 3.5	8	2.6	2.6	100.0
<b>Language</b> (spoken at home) n = 309	Only German	236	75.9	76.4	76.4
	More than German	70	22.5	22.7	99.0
	Only other than German	3	1.0	1.0	100.0

Note. N sample = 311.

**Tab. A2** Descriptive statistics on the variable Desired Occupation (Wunschberuf)

Aspect	N	Minimum	Maximum	Mean value	Standard deviation
Desired occupation when starting of training	309	1	7	5.13	1.475

*Note.* N sample = 311. Seven-level Likert scale, 7 = maximum quality.

**Tab. A3** Descriptive statistics on Drop-out Intentions

Item	Min.	Max.	M	SD
105 I often think about terminating my training program prematurely.	1.0	7.0	6.35	1.27
106 I think about terminating my training program prematurely because of company-related reasons (e.g., working hours, quarrels with colleagues, etc.).	1.0	7.0	6.55	1.09
111 I am already searching for an alternative training company.	1.0	7.0	6.70	.93
Scale Drop-out Intentions	2.3	7.0	6.54	.91

*Note.* Items were inverted to enable a coherent direction of all items (7 = maximum quality, implying the absence of drop-out intentions). Items taken from VET-LQI (Böhn & Deutscher, 2021).

**Tab. A4 – Part 1 Item statistics**

Scale	Item	Cronbach's $\alpha$ (if item deleted)	Mean value	Standard deviation	Discriminatory power
<b>Learning Environment</b>					
Work Climate  ( $\alpha$ .632)	022 There is a personal atmosphere within my company.	.581	5.60	1.12	.387
	023 There is a bad working atmosphere in my company. [R]	.461	5.48	1.36	.538
	024 There is strong competition between employees in my company. [R]	.586	5.37	1.30	.379
	025 Employees in my company are rigorously monitored and controlled. [R]	.606	4.60	1.36	.354
In-company Learning  ( $\alpha$ .805)	026 Workplace learning in my company is characterized by different teaching methods.		4.81	1.46	.675
	027 Workplace learning in my company is characterized by the usage of different materials and media.		5.09	1.41	.675
<b>Work Tasks</b>					
Overload  ( $\alpha$ .795)	045 In my company I feel under time pressure at work. [*]	.784	5.39	1.27	.483
	048 In my company others interfere with my work. [*]	.806	6.14	1.10	.390
	049 I have problems recharging my energy in my spare time after work. [*]	.727	5.63	1.62	.662
	050 Because of the daily demands in my company I feel totally exhausted, tired and drained. [*]	.707	5.01	1.58	.716
	051 I often think 'I can't go on any longer'. [*]	.735	5.87	1.50	.639
Variety of Tasks  ( $\alpha$ .799)	052 In my company I deal with a variety of work tasks.	.847	5.20	1.23	.522
	053 In my company I work on new tasks every now and then.	.658	5.52	1.21	.709
	054 In my company work tasks are highly diversified.	.651	5.25	1.28	.712
Autonomy  ( $\alpha$ .857)	056 In my company I am given flexibility in the timing of work tasks.	.840	3.99	1.43	.692
	057 In my company I am able to decide what means to take to reach a goal.	.795	4.06	1.43	.736
	058 In my company I am given an enormous amount of freedom in doing my job.	.758	4.07	1.46	.778

**Tab. A4 – Part 2 Item statistics**

Scale	Item	Cronbach's $\alpha$ (if item deleted)	Mean value	Standard deviation	Discriminatory power
Relevance of Tasks  ( $\alpha$ .443)	059 In my company I am given responsible tasks.	.216	5.30	1.22	.347
	060 In my company I work on 'real tasks'.	.064	5.95	1.08	.463
	061 In my company I have to deal with several tasks that are not part of my vocational training program (e.g. make coffee, copying, etc.). [R]	.751	5.19	1.60	.089
Complexity of tasks  ( $\alpha$ .754)	063 In my company work tasks are characterized by considering a wide range of information.	.620	5.24	1.15	.635
	064 In my company work tasks are characterized by considering a wide range of objectives. [*]	.640	4.72	1.25	.609
	065 In my company work tasks are characterized by considering changes over time.	.757	5.12	1.38	.517
Training Requirements and Ability level  ( $\alpha$ .659)	067 In my company I am confronted with tasks that are too complicated. [*]	.232	5.47	1.20	.503
	068 In my company I am confronted with tasks I am insufficiently trained and prepared for. [*]	.478	5.24	1.49	.503
<b>Social Interaction</b>					
Involvement in Occupational Expert Culture  ( $\alpha$ .842)	072 I am involved in the improvement of work processes in my company.	.778	4.49	1.69	.713
	073 My ideas and proposals are considered in my company.	.764	4.72	1.46	.732
	074 I am involved in the discussion of technical and professional issues in my company.	.802	4.11	1.61	.686
Functional Involvement  ( $\alpha$ .723)	075 Continuous collaboration is part of the daily work in my company.	.678	5.93	1.05	.492
	076 My work tasks are characterized by close cooperation with other employees in my company.	.724	5.03	1.29	.354
	077 I am involved in all work tasks in my department.	.645	4.72	1.54	.557
	078 Basically, my work tasks play a crucial role for my department.	.674	4.43	1.47	.492
	079 I am well integrated into the operational working procedures.	.651	5.48	1.08	.569

**Tab. A4** – Part 3 Item statistics

Scale	Item	Cronbach's $\alpha$ (if item deleted)	Mean value	Standard deviation	Discriminatory power
Social Involvement  ( $\alpha$ .779)	080 Employees in my company are interested in me.	.640	5.72	1.17	.744
	081 Employees in my company are interested in my private well-being.	.769	5.02	1.51	.556
	083 Employees in my company seem disturbed by my presence. [R]	.758	6.38	1.06	.517
	084 Employees in my company ignore me. [R]	.730	6.56	.91	.603
<b>Educational Mediation</b>					
Mentoring  ( $\alpha$ .710)	085 In my company nobody feels responsible for me. [R]	.531	6.23	1.30	.597
	086 In my company I am completely left alone to myself. [R]	.536	6.19	1.15	.595
	088 When I ask training personnel or colleagues for help, they immediately support.	.745	6.13	1.03	.414
Curriculum Orientation  ( $\alpha$ .694)	089 I do know my in-company training plan.	.564	6.12	1.24	.538
	090 The arrangements of my in-company training plan are observed.	.541	5.85	1.21	.556
	091 My in-company training program is implemented without a formal training plan. [R]	.689	6.47	1.17	.437
Feedback  ( $\alpha$ .757)	092 In my company good performances are not praised. [R]	.777	5.75	1.45	.419
	093 Normally I do know whether I perform work tasks satisfactorily or not.	.683	5.51	1.27	.590
	094 I find it hard to figure out whether I perform work tasks satisfactorily or not. [R]	.690	5.57	1.47	.574
	095 The training personnel and my colleagues let me know whether I perform work tasks satisfactorily or not.	.646	5.54	1.23	.665



**Tab. A4** – Part 4 Item statistics

Scale	Item	Cronbach's $\alpha$ (if item deleted)	Mean value	Standard deviation	Discriminatory power
Personnel and Instructions  ( $\alpha$ .850)	097 Those who train me on the job are able to answer difficult technical questions.	.810	5.88	1.20	.688
	098 Those who train me on the job can explain well.	.777	5.78	1.08	.769
	100 Those who train me on the job show that they enjoy their work.	.855	5.22	1.35	.614
	101 Those who train me on the job are technically competent.	.798	6.16	.92	.747
<b>Output</b>					
Drop-out Intentions	105 I often think about terminating my training program prematurely. [*]	.558	6.34	1.22	.705
(selected from “Premature Termination of Contract”)	106 I think about terminating my training program prematurely because of operational reasons (e.g. working hours, quarrels with colleagues, etc.). [*]	.582	6.55	1.06	.688
( $\alpha$ .766)	111 I am already searching for an alternative training company. [*]	.836	6.68	.91	.443

*Note.* n = 341. [R] = reversed items. [\*] = items reversed for the analysis to facilitate understanding of the results. 7 represents maximum quality. Original response options: 1 = strongly disagree, 2 = mostly disagree, 3 = slightly disagree, 4 = partly agree, 5 = slightly agree, 6 = mostly agree, 7 = completely agree. Scales taken from the survey instrument VET-LQI (Böhn & Deutscher, 2021).

### **4.3 Paper 3: Drop-out in Dual VET: Why We Should Consider the Drop-out Direction When Analysing Drop-out**

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RESEARCH

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# Drop-out in dual VET: why we should consider the drop-out direction when analysing drop-out

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## Abstract

Despite high drop-out rates from vocational education and training (VET) throughout most countries and a long research tradition on potential drop-out reasons, little is known about the effects exerted on drop-out intentions by the quality of training. Furthermore, only rarely do scholars distinguish between different drop-out directions, and systematic insights on possibly differing causes are scarce. This study explores the factors influencing four directions of drop-out intention ('upwards', 'downwards', 'company change', 'occupation change'). Linear regression modelling is used to analyse survey data on the motivation, socio-demographic aspects and competency of 562 trainees as industrial management assistants in Germany and on how they perceived the training quality. The results show that different directions of drop-out intention stem from various factors, with training quality in general having the largest effect. Additionally, the findings indicate a two-tier-scheme of influence factors, 'core' and 'direction-typical' factors.

**Keywords:** Vocational education and training, Drop-out, Intention, Training quality, Downward, Upward, Direction

## Introduction

Drop-out rates in Vocational Education and Training (VET) are high throughout most countries,<sup>1</sup> despite a long tradition in researching drop-out reasons (e.g. Barocci 1972; Grieger 1981; Weiß 1982). Two research factors could be contributing to the inability to substantially reduce those numbers. First, the effect of training quality on drop-out is underexplored, with most of the research focusing on learner factors (Böhn and Deutscher 2021). Second, scholars have rarely distinguished between different types of drop-out although the differing potential consequences of different dropout types are obvious. At the personal level, leaving vocational education completely, becoming unemployed or working without any qualification, constitutes a substantial cut in the

<sup>1</sup> Due to different calculation methods, drop-out rates in different countries are hardly comparable (see e.g. CEDEFOP 2016). However, OECD countries report rising drop-out rates (see also Böhn and Deutscher in press), varying between 18.7% in China (Yi et al. 2015) and 58.6% in Australia (NCVER 2020).

individual's biography, whereas continuing training in another company only results in a small, if any, loss of time (Autorengruppe Bildungsberichterstattung 2010, p. 109; Hensge 1988, p. 203; Weiß 1982, p. 283 ff.). A change in training occupation is associated with starting from scratch again while dropping out to attain a university degree could even increase future income. Impacts at the state level (e.g. tax revenue) or for society as a whole (e.g. shortage of skilled workers, expenses for the welfare-net) also differ depending on the drop-out directions. For training companies, however, a dropped-out trainee always causes increased costs (Autorengruppe Bildungsberichterstattung 2010; Deuer and Wild 2017; Hensen 2014; Schöngen 2003).

Not only are these two factors themselves interesting directions for future research, their interplay is also relevant as the different drop-out directions could stem from different causes. Therefore, greater knowledge about potential differences in the roots of distinct drop-out types could help practitioners to intervene more precisely and reduce drop-out rates in the future. We, thus, measure four types of drop-out intentions via a differentiated assessment ('upwards', 'downwards', 'company change' and 'occupation change'). The objective of this study is to explore whether the widely applied general approach to drop-out intention (in the sense of an overall scale) is sufficient or whether a differentiation into different directions of drop-out intention leads to distinct results relevant for identifying potential causes for intentions to terminate training contracts prematurely. We examine this research question with data on the perceived training quality and competency of 562 individuals, training as industrial management assistants at the beginning and after the first year of training.

In the following, the underlying model of training quality, the concept of drop-out intention and a suitable measurement approach are presented. Moreover, an overview of the current state of research on the most frequent types of drop-out reasons is provided. In the main part, we introduce a differentiated assessment approach for drop-out directions consisting of four items and analyse whether the four directions of drop-out intention measure different facets of drop-out intention. We then regress training quality, competency and socio-demographic data on each direction of drop-out intention. Subsequently, results are presented and limitations and practical implications discussed.

## **Premature terminations of contracts in VET**

### **In-company training quality**

The theoretical basis for the meaning and content of training quality is provided by the quality model from Böhn and Deutscher (2019, p. 66) (Appendix Fig. 4). Developed from Tynjälä's (2013) 3-p-model and Biggs (1999), the model distinguishes input, process and output dimensions of training quality. While the Input dimension includes all company and individual trainee characteristics existent prior to training (e.g. Work Climate, Learning Venue Cooperation and Demographic Factors), the process dimension comprises various training quality criteria that come into play in daily in-company training (Böhn and Deutscher 2019, p. 65 ff.). The Process dimension can be subdivided into three different areas (Work Tasks, Social Interaction and Educational Mediation), each covering three to five more detailed quality criteria (see Appendix Fig. 4). Work Tasks comprises Overload, Variety of Tasks, Autonomy, Relevance of Tasks and Complexity of Tasks, which focus on covering different task characteristics of daily in-company

training. Social Interaction and Educational Mediation reflect different areas of the interaction processes between trainees and trainers. Lastly, the Output dimension includes short- and long-term outcomes of vocational training and therefore comprises various aspects, e.g. Future Prospects and Career Aspirations or Operational Identity. This study, however, only focuses on drop-out intentions (Premature Termination of Contract) as an output variable. In line with the dynamic approach of the quality model, training quality is defined as the 'subjectively perceived characteristics of training situations and processes that possibly affect target variables' (Klotz et al. 2017, p. 3) such as drop-out intention.

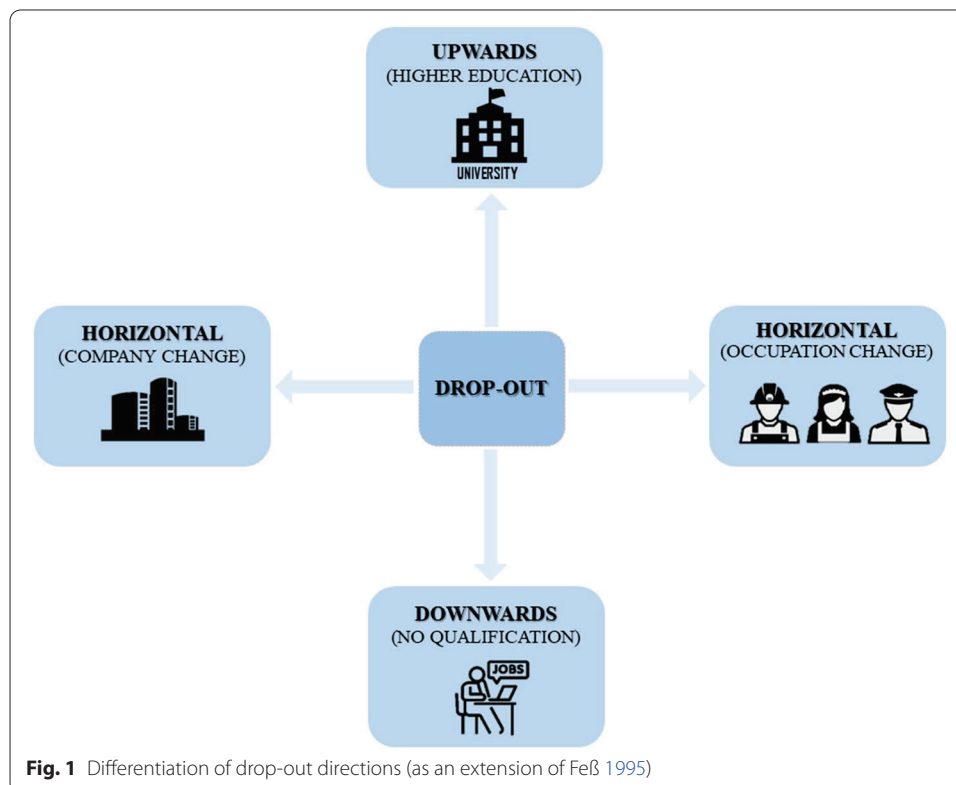
### Reasons for dropping out

Much qualitative and quantitative research has been performed on why trainees drop out of VET, resulting in a long list of potential drop-out reasons. In a systematic overview, Böhn and Deutscher (in press) grouped drop-out causes into six different types: learner factors, professional factors, school factors, company factors, activity factors and context factors. The first four of those types belong to the Input dimension in the quality model (Appendix Fig. 4): learner factors (e.g. socioeconomic status), professional factors (e.g. expectations and decision making), school factors (e.g. school learning conditions) and company factors (e.g. work climate). The activity factors (e.g. requirements level and task characteristics) are part of the process dimension. The context factors include aspects regarding framework conditions (e.g. form or duration of training) and alternatives to training (e.g. finding a job without a qualification).

The overview showed that the research predominantly focused on Input factors, especially 'learner factors' (91% of analysed studies). Such inputs are already present, even before a trainee begins an apprenticeship. Surprisingly, aspects of the actual training process have rarely been considered. Therefore, the role of a vocational training's process quality remains unclear, and only a few studies find effects on drop-out for process criteria (e.g. Cho et al. 2013; Hasler 2016; Krötz and Deutscher 2021; Negrini et al. 2016). Additionally, most studies ignore the direction of drop-out, i.e. the further course of education, if any, taken by trainees who terminate their original training contract. This omission leads to research pooling e.g. dropped-out trainees who aim to attain a university degree with those who become long-term unemployed. A few studies (e.g. Barocci 1972; Hasler 2016; Hensge 1988; Mischler 2014; Molgat et al. 2011; Schmid and Stalder 2012; Stalder and Schmidt 2006) consider the drop-out direction, but they do not systematically analyse different potential drop-out causes. Only Bessey and Backes-Gellner (2015, p. 548) differentiate between dropping-out and 'upgrading', as opposed to staying within the apprenticeship system. They find that the educational level, the financial situation and gender and ethnicity affect both groups differently. However, that study did not consider any aspects of training quality. In order to gain more knowledge about the drop-out causes during the training process, we believe considering both different drop-out directions and training quality criteria to be crucial.

### Operationalising drop-out and drop-out intention

The concept of drop-out, which is often measured via the premature termination of training contracts, constitutes a certain discontinuity in a VET path but does not



necessarily imply a final withdrawal from VET. Training could be continued in another company or another occupation (CEDEFOP 2016; Schmid and Stalder 2012). Furthermore, drop-out figures do not generally indicate who (trainees or training companies) terminated a contract. When dealing with drop-out rates, the training sector and occupation also have to be considered, as differences are well documented (e.g. CEDEFOP 2016, p. 109; Hensen 2014, p. 5; Negrini et al. 2016, p. 363; Rohrbach-Schmid and Uhly 2015, p. 121). Also, most drop-outs seem to happen during the first year of training (Bundesinstitut für Berufsbildung 2020a; Cully and Curtain 2001; Lange 2020; Piening et al. 2010). Drop-out research scholars generally agree that the genesis of drop-out decisions covers a long period, rather than arising from a single event (e.g. Deuer 2003; Hensge 1988; Heublein and Wolter 2011) and that it is caused by multiple interrelated factors rather than a single, isolated reason (e.g. Ertelt 2003; Hensge 1984; Lamamra and Masdonati 2008; Rohrbach-Schmid and Uhly 2015). Therefore, in this study, drop-out is seen as a multifactorial process and operationalized as an output factor of training quality, in accordance with the quality model (Appendix Fig. 4).

For the purpose of our research, we distinguish four different drop-out directions (see Fig. 1). Feß (1995, p. 29) differentiated three different types of drop-outs: upwards, horizontal and downwards. While dropping out upwards means attending further education outside of dual VET, e.g. attaining a university degree, a drop-out downwards represents the final withdrawal from VET, remaining unemployed or working in unskilled jobs. Lastly, a horizontal drop-out stands for vocational reorientation, such as starting an apprenticeship in a different occupation (Feß 1995; Faßmann 1998). We use this

categorization but further differentiate between two types of horizontal drop-out: first, a horizontal change of training occupation and, second, a horizontal change of training company. A change in training company during an apprenticeship might allow the training process to continue relatively fluently and this path could have few negative consequences for an apprentice. Switching to a whole new occupation, in contrast, generally requires starting the apprenticeship from scratch. In both horizontal types of drop-out, trainees remain within the VET system.

Consequently, drop-out is defined as prematurely leaving the VET-system (upwards or downwards), the training company or the occupation as a result of the interplay of various input- and process-factors over a certain period of time, which are subjectively perceived and interpreted by each individual. Each of these four possible drop-out paths could conceivably be caused by different influencing factors. For instance, a trainee who wants to change the training company might be dissatisfied with certain quality aspects of the in-company training while someone who wants to switch the occupation might have had false expectations regarding vocational working life, and actual training quality might not be the central issue. Trainees who quit to go to university, might be under-challenged by the complexity of tasks or learning contents, whereas others who drop-out downwards might perceive these aspects inversely or have faced conflicts with colleagues or trainers. However, as mentioned above, quantitative studies on drop-out rarely consider these fundamental differences in drop-out directions on a methodological level. Therefore, almost no systematic findings on possible different causes are known to date.

An exception can be found in Weiß (1982, p. 286), who indicated an overrepresentation of trainees who dropped-out due to misbehaviour or for financial reasons in the group of downward drop-outs. Additionally, Mischler (2014, p. 47) showed on a descriptive level that a higher educational level increases the chance for a direct follow-up contract in the dual system or further higher education, whereas a higher age reduces the probability. Out of 175 trainees who terminated their contracts in a crafts business, 14.3% had no vocational perspectives after 4 to 12 weeks. Another 35.4% had only planned to start a new training, making it about 50% without a follow-up plan. Similar proportions (42–58%) are reported by e.g. Hasler (2016), Schmid and Stalder (2012) and Weiß (1982). These figures underline the great uncertainty a drop-out entails for young adults.<sup>2</sup> The lack of systematic research on causes for different drop-out types is again surprising as findings on this question would provide a more solid fundament for more precise interventions and possibly preventing dropping out.

To gain insights into possible different causes of the four drop-out types, this study uses drop-out intention as a predictor of actual drop-out. Although used rarely, drop-out intention has been used as a practical alternative that bears relation to actual drop-out (see Bean and Metzner 1985; Deuer and Ertelt 2001, quoted from: Ertelt 2003; Deuer and Wild 2017; Gow et al. 2008; Quante-Brandt and Grabow 2008; Vallerand et al. 1997; Webb and Cotton 2018). While largely overestimating actual drop-outs, it entails substantial advantages for this research. Since dropping out is understood as a result of a

<sup>2</sup> However, in some cases, higher satisfaction of the drop-outs themselves is possible when a prior mismatch was dissolved (Schmid and Stalder 2012, p. 127).



**Table 1** Operationalisation of drop-out intention considering four directions

Drop-out direction	Item
Upwards	I want to quit training to study at university (including dual university or university of applied sciences).
Horizontal (company)	I want to change my training company.
Horizontal (occupation)	I want to change my training occupation.
Downwards	I want to work without any training.

Measured on a five-level Likert scale (0 = strongly disagree; 4 = completely agree)

process, measuring the intention to drop-out during training (and which variables inter-relate with it) sharply increases insights into this process. This procedure may to some extent uncover the underlying influencing factors, which otherwise often become biased and abbreviated in retrospective approaches with actual dropouts (Aarkrog et al. 2018, p. 126; Rausch 2013, p. 56). Additionally, knowledge on drop-out intentions, as a sort of early alert signal, enables trainers and experts to intervene and prevent actual drop-outs and is therefore of highly practical use (Aarkrog et al. 2018; Deuer 2003). For each type of drop-out, a different item was used in the survey (see [Survey instrument](#)) according to our drop-out model in Fig. 1. Table 1 shows the four different questions used to operationalise drop-out intention in consideration of its direction (for descriptive results see Appendix Tables 9, 10).

Concluding from the presented state of research, we expect that the four directions of drop-out intention in fact measure different facets and therefore should be analysed separately (H1). We then expect to find a significant relation between training quality and each drop-out intention (H2 a-d). However, in line with the findings of Bessey and Backes-Gellner (2015) and due to H1, we also expect each direction of drop-out intention to show partly different influencing factors (H3).

## Methodological procedure

### Data collection and sample

Data were collected as part of the project ‘Competence development through enculturation’ (KL 3076/2-1) funded by the German Research Foundation (DFG). The project involved surveys of industrial management assistants at the beginning of their training ( $T_0$ : autumn of 2019) and after one year of training ( $T_1$ : autumn of 2020). At  $T_1$ , trainees’ evaluations of training quality in companies and schools and their drop-out intentions were measured. At both points in time, competency tests were conducted, comparable to official final exams by the responsible Chamber of Industry and Commerce (IHK). The validated test instrument involved action-oriented tasks (e.g. writing a business mail, profitability and price calculations) embedded in an authentic, simulated company framework (see Appendix Fig. 5), measuring knowledge and practical skills (Deutscher and Winther 2018; Klotz 2015). Trainees’ socio-demographic background information and motivational-proxies were also collected at both stages. The first survey and test were conducted as a paper–pencil-format in randomly chosen vocational schools. The second data collection (in the same schools) was partly conducted online, due to

the restrictions of the COVID-19 pandemic, but was kept identical in its content and presentation.

Both datasets were matched by an anonymous individual code that each trainee created. Because of the various socio-demographic variables considered, only cases where  $T_0$  and  $T_1$  data could be matched were considered in this study, leading to a potential sample of 610 trainees. To avoid biased results, all trainees who had already completed an apprenticeship were excluded from the analysis since their drop-out behaviour might differ considerably from trainees in their initial dual VET, given the security of already owning a qualification. The final sample amounted to 562 industrial management assistant trainees, 63.5% female. This proportion is near the typical distribution within the statistical population (latest three-year average 58.4% female, Bundesinstitut für Berufsbildung, 2020b). The average age at  $T_1$  was 20.6 years, ranging from 16 to 43 years, which is nearly identical to the average age (20.7 years) of the statistical population after one year of training (Bundesinstitut für Berufsbildung, 2020b). Most trainees only spoke German at home (77.8%), another 20.6% spoke German and additional languages, while less than 2% solely spoke foreign languages at home. Descriptive data regarding further sample characteristics is presented in Tables 7, 8 in the Appendix.

### Survey instrument

The survey on training quality mainly consisted of items and scales from the VET-learning quality inventory (VET-LQI) by Böhn and Deutscher (2021),<sup>3</sup> which were supplemented with items on drop-out intention. In this survey instrument, all items and scales were formed on the basis of the quality model (Appendix Fig. 4). Therefore, all input- and process criteria included in the quality model (except for the area Framework) are used as training quality scales in the analysis. Additionally, scales on Professional Commitment, Teacher Competency and School Learning Content were included. All items and descriptive information for the scales are shown in the Appendix, Table 10. A satisfying Cronbach's Alpha resulted for most of the 19 scales ( $0.73 \leq \alpha \leq 0.91$ ). Functional Involvement (0.67), Curriculum Orientation (0.65), Training Requirements and Ability Level (0.65) and Involvement in Occupational Expert Culture (0.63) showed slightly lower consistencies but, since they are important constructs in research on training quality, the scales were included in the analysis in order to represent training quality in a valid range (Schmitt 1996). All scales on training quality (as well as Desired Occupation) were measured on a five-level Likert scale (0 = strongly disagree; 4 = completely agree). Discriminant validity was checked by the intercorrelations of all quality scales (Appendix Table 11), which, if at all, correlated  $< 0.5$ . Only Social Involvement correlated slightly higher with Work Climate (0.555) and Feedback (0.523), which still satisfactorily indicates that the 'social' scales measure different quality constructs.

For socio-demographic, motivational and competency measures (see Appendix Tables 7, 8), most of the variables were collected in the first survey ( $T_0$ ). Only Age, the Aspired Final Grade and a self-assessment of Training Performance (in form of a grade) were used from the second survey. Also, Competency Scores at  $T_0$  and  $T_1$  were included.

<sup>3</sup> For a validation of this instrument see Böhn and Deutscher (2021) and Krötz and Deutscher (2021).

**Table 2** Intercorrelation of the four drop-out directions

Drop-out direction		Upwards	Horizontal (company)	Horizontal (occupation)	Downwards
Upwards	Correlation (Pearson)	1			
	Significance				
	N	547			
Horizontal (company)	Correlation (Pearson)	0.411**	1		
	Significance	0.000			
	N	546	549		
Horizontal (occupation)	Correlation (Pearson)	0.503**	0.478**	1	
	Significance	0.000	0.000		
	N	545	547	548	
Downwards	Correlation (Pearson)	0.276**	0.374**	0.387**	1
	Significance	0.000	0.000	0.000	
	N	543	546	545	546

\*\*Correlation is significant at 0.01 (two-sided)

\*Correlation is significant at 0.05 (two-sided)

## Analysis

For H1, descriptive data and correlations of the four drop-out intention items were analysed. Since the relation between training quality and the four different types of drop-out intention (H2) and also differences in their potential causes (H3) were being analysed, we conducted linear regression models and included socio-demographic and motivational variables, the competency scores and training quality scales as independent variables (see Appendix Table 10). For the complete sample, only one type of drop-out intention served as the dependent variable in each analysis. For missing values, pairwise exclusion was applied,<sup>4</sup> still providing a sample size of  $531 \leq n \leq 562$  for most of the variables.

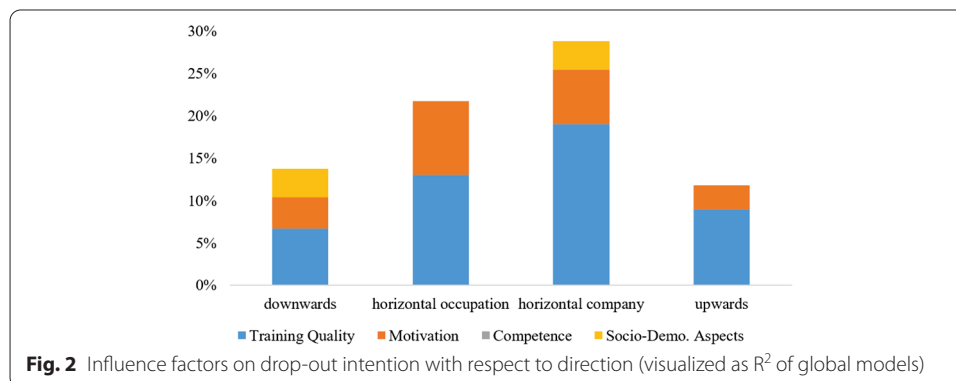
## Results

### Distinguishing four directions of drop-out intention

As Table 2 shows, the four directions of drop-out intention<sup>5</sup> mostly correlate moderately ( $0.3 \leq r \leq 0.5$ ; Cohen 1988, p. 79 f.). While the intentions to drop-out upwards and downwards show a small correlation coefficient (0.276), the intentions to drop-out upwards and change the occupation show a coefficient right on the edge of a medium effect (0.503). Therefore, we further analysed the group of trainees who clearly wanted to change their training occupation (responding with  $\geq 3$ ;  $n=78$ ;  $M=3.59$ ). Within this group, the average agreement for the intention to drop-out upwards increased ( $M=1.71$ ), as the constructs correlate to some extent, but stayed far below the intention to change the occupation. Furthermore, the ratio of the different intentions stayed the same, with company change being related relatively similarly ( $M=1.96$ ) and downwards showing the lowest relation ( $M=1.29$ ). Both analyses show that the four items sufficiently measure different directional intentions, confirming H1 and, therefore, implying

<sup>4</sup> Using t-tests, we checked whether the group of non-responders on a certain variable differed significantly from the group of responders, with regard to any non-categorical variable: Only 1.4% of all cases showed significant differences between both groups.

<sup>5</sup> For descriptive information of the four drop-out items see Tables 9, 10 in the Appendix.



the need to analyse the relation of training quality and drop-out intention in a differentiated approach.

### General overview of influencing factors on different drop-out directions

As a first step, for each type of drop-out intention, a global model with four different blocks of variables was estimated. Block one contained basic socio-demographic variables, such as Age, Gender, Language (as dummies), the Educational Level, the corresponding Final Grade and a dummy for previously having Terminated Training elsewhere. The second block comprised the Aspired Final Grade in the current training (at  $T_0$  and  $T_1$ ), an item asking if it was the Desired Occupation before starting the training (0 = 'strongly disagree'; 4 = 'completely agree') and the Professional Commitment scale, all as proxies for trainees' overall motivation. The third block considered competency in the form of a subjective self-assessed Training Performance at  $T_1$  (as a grade) and the objective Competency Scores ( $T_0$  and  $T_1$ ). The final block included all 19 training quality scales plus an item (098) regarding Non-Training Tasks. Through this comprehensive block-wise procedure, it was possible to observe the changes in significance and  $R^2$ , which we summarize in Fig. 2.<sup>6</sup>

Figure 2 visualizes how different areas contribute to explaining variance in the dependent variables.<sup>7</sup> The graphical summary of which areas of influence factors exert a significant impact in the drop-out intention clearly shows the differences between the four types of drop-out intention. Here, the intentions to drop-out downwards and upwards could only be explained to a smaller extent by the independent variables while our survey-approach seems to be better suited for measurement of horizontal drop-out intentions. Particularly, training quality appears to play an immense role with respect to company change. Furthermore, motivational aspects seem to be involved in every type of drop-out direction, whereas socio-demographic aspects show mixed impacts. Competency, however, does not appear to be significant for any of the drop-out directions. At a first glance, the results shown in Fig. 2 seem to support our hypotheses 2 and 3. To

<sup>6</sup> Despite the number of variables considered, with the Variance Inflation Factor (VIF) remaining  $< 2.27$ , multicollinearity was no issue in the analysis (Hair et al. 2014).

<sup>7</sup> Due to the large number of variables included in the global models, we consider changes in standard  $R^2$  in order to get a sense of the underlying processes. However, we avoid overemphasizing its meaning and interpret only the adjusted  $R^2$  of the narrow models in the further procedure.

**Table 3** Narrow model 1: regression model on drop-out intention downwards

Predictors	B	SE	Beta	Sig.
(constant)	0.120	0.111		0.283
Social involvement	− 0.221	0.049	− 0.209	0.000
Training requirements and ability level	− 0.139	0.047	− 0.138	0.003
Final grade	0.101	0.042	0.111	0.018
Curriculum orientation	0.109	0.047	0.108	0.021

B regression coefficient, SE standard error.  $R^2 = 0.095$ , adjusted  $R^2 = 0.086$

**Table 4** Narrow model 2: regression model on horizontal drop-out intention (occupation)

Predictors	B	SE	Beta	Sig.
(constant)	0.830	0.202		0.000
Training performance (T1)	0.162	0.055	0.129	0.004
Desired occupation	− 0.145	0.058	− 0.112	0.012
Social involvement	− 0.352	0.064	− 0.264	0.000
Overload	− 0.238	0.065	− 0.180	0.000
Curriculum orientation	0.127	0.056	0.099	0.025
Complexity of tasks	0.122	0.056	0.094	0.032

B regression coefficient, SE standard error.  $R^2 = 0.210$ , adjusted  $R^2 = 0.199$

examine the role of training quality and the potential differences between the directions in more detail, we formed narrow models out of the initial impressions gained, aiming at a maximum of variance explained, to find the most crucial predictors for each direction of drop-out intention.

#### Predictors of downward drop-out intention

The most instructive model (Table 3), which includes only the relevant variables, comprises three training aspects and one socio-demographic aspect: A high Social Involvement and a good fit of the Training Requirements to the individual ability level reduce the intention to drop-out downwards.<sup>8</sup> Also a lower Final Grade in the highest school leaving qualification (representing a better grade) is significantly related to lower drop-out intention. Conversely, the higher the Curriculum Orientation in training, the higher the intention to drop-out seems to be. This finding could indicate that a too stringent way of working along the curriculum may discourage some trainees. The model, however, only achieves a low level of variance explanation<sup>9</sup> with an adjusted  $R^2$  of 0.086 ( $F[4, 423] = 11.06$ ,  $p < 0.001$ ).

#### Predictors of horizontal drop-out intention (change of occupation)

Table 4 shows a narrower approach to the intention to change one's training occupation ( $F[6, 421] = 18.69$ ,  $p < 0.001$ ). Responsible for a change in adjusted  $R^2$  of 0.136 alone, four

<sup>8</sup> All quality criteria were adjusted in the same direction, meaning a higher response represents higher training quality.

<sup>9</sup> Classification of variance explanation according to Cohen (1988, p. 413 ff.):  $R^2 \geq .02$  = small effect;  $R^2 \geq .13$  = medium effect;  $R^2 \geq .26$  = large effect of variance explanation.

**Table 5** Narrow model 3: regression model on horizontal drop-out intention (company)

Predictors	B	SE	Beta	Sig.
(constant)	1.126	0.161		0.000
Feedback	− 0.193	0.069	− 0.148	0.006
Mentoring	− 0.215	0.061	− 0.167	0.001
Overload	− 0.181	0.065	− 0.139	0.005
Non-training tasks	− 0.162	0.054	− 0.143	0.003
Social involvement	− 0.159	0.068	− 0.121	0.020

B regression coefficient, SE standard error.  $R^2=0.261$ , adjusted  $R^2=0.252$

**Table 6** Narrow model 4: regression model on drop-out intention upwards

Predictors	B	SE	Beta	Sig.
(constant)	0.079	0.158		0.616
Social involvement	− 0.206	0.059	− 0.179	0.001
Complexity of tasks	0.143	0.052	0.128	0.006
Overload	− 0.167	0.059	− 0.146	0.005
Educational level	0.157	0.066	0.111	0.017

B regression coefficient, SE standard error.  $R^2=0.097$ , adjusted  $R^2=0.088$

training quality aspects appear to be especially important. A better Social Involvement and a more fitting level of Overload reduce the intention to drop-out. Again, a stronger Curriculum Orientation, but also higher Complexity of Tasks, significantly increase drop-out intentions. Moreover, the better the self-assessed Training Performance and the more the training corresponds to the Desired Occupation, the lower the intention to change one's occupation.<sup>10</sup> The model shows a medium-level variance explanation (adjusted  $R^2=0.199$ ).

#### Predictors of horizontal drop-out intention (change of company)

In the stepwise selected and more instructive model shown in Table 5, only training quality aspects appear significant ( $F[5, 422]=29.83$ ,  $p<0.001$ ). The five criteria alone account for an adjusted  $R^2$  of 0.252, which is even higher than the results for the intention to change the occupation (Table 4). A higher quality, from the trainees' perspective, regarding Feedback, Mentoring, Social Involvement, Overload and Non-Training Tasks lowers the intention to change the company during training. For the latter two aspects, reducing the workload and the number of tasks that do not contribute to training objectives appear important. With an  $R^2$  of 0.261 (adjusted  $R^2=0.252$ ), the model is right on the edge of a high variance explanation.

<sup>10</sup> An alternative model, including *Professional Commitment* instead of *Desired Occupation*, delivers the nearly same results, but 'loses' *Curriculum Orientation*. This indicates that both *Professional Commitment* and *Curriculum Orientation* might play a smaller role than the other variables in Table 3.

### Predictors of upward drop-out intention

The final narrow model of upward drop-out intention (Table 6) includes the Educational Level and three training quality criteria ( $F[4, 423] = 11.32, p < 0.001$ ). A higher Social Involvement and a better workload level reduce the drop-out intention significantly. Moreover, trainees who perceive the Complexity of Tasks to be high are more likely to drop-out upwards, which is also the case for trainees with a higher school leaving qualification. However, only 8.8% of variance in drop-out intention can be explained via the variables included in our study.

### Comparing the predictors of different drop-out directions

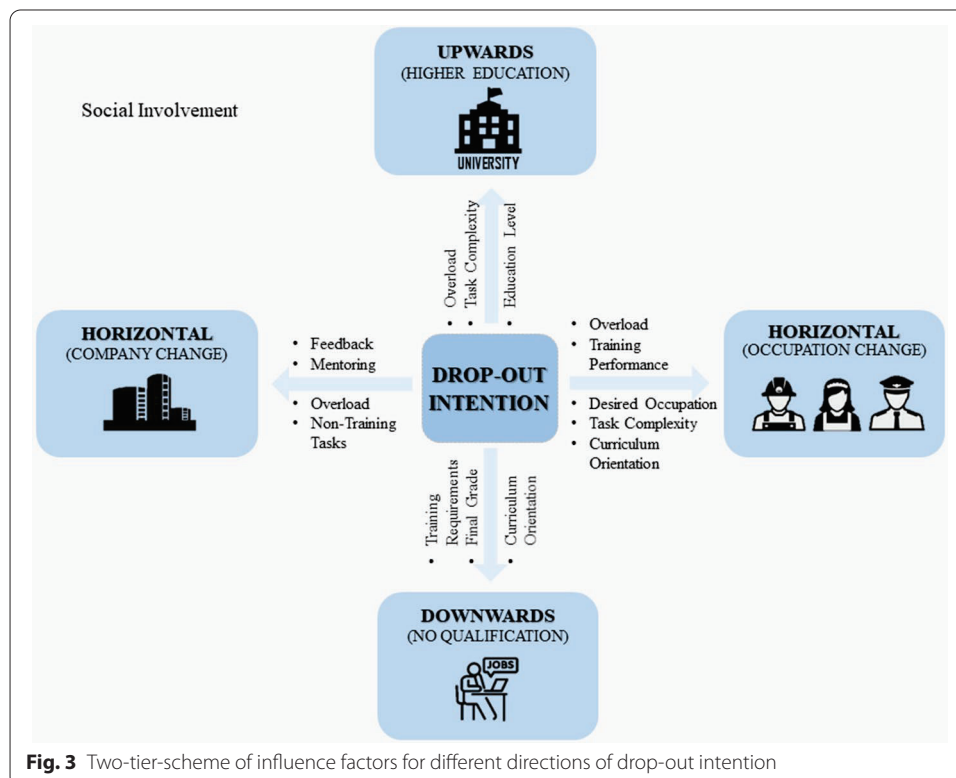
The results above can be summarized in that different directions of drop-out intentions are partly influenced by different factors. To verify the impressions, we compare the areas of influence factors based on the narrow models. Overall, the results look relatively identical to Fig. 2, where the horizontal drop-out intentions could be explained more extensively than the other intentions. Training quality is the area that shows, by far, the strongest relation to drop-out intentions. Variables stemming from other areas (Final Grade, Training Performance, Desired Occupation, Educational Level) play a minor role. A trainee's intention to drop-out in order to change the training company can even be explained to a large extent (25.2%) by training quality alone. The findings underline the outstanding role of training quality for all directions of drop-out intention and, therefore, confirm H2 a-d.

For H3, several aspects indicate that, for drop-out research, it is worthwhile distinguishing between different types of drop-out intention. First of all, 12 different variables were identified as predominantly responsible for drop-out intention, with only two of them (Social Involvement and Overload) being significant for at least three (out of four) drop-out types. Both, Social Involvement and Overload could be working as a sort of 'core' influence on drop-out intentions for all types.<sup>11</sup> However, in order to not ascribe Overload a core role, as it has not been fully identified, only Social Involvement is referred to as a core influence in the following.

Apart from Social Involvement, the downwards drop-out intention is mainly driven by too high Requirements, too stringent Curriculum Orientation and lower prior success or performance (in terms of a Final Grade). The intention to change the training occupation is mainly related to Training Performance, the degree to which trainees found their Desired Occupation, Overload, Complexity of Tasks and Curriculum Orientation. In contrast, the intention to change the training company is mainly related to bad Mentoring and little Feedback and to being charged with high workload (Overload) and Non-Training Tasks too often. Lastly, a drop-out upwards is mainly considered by trainees who perceive a high Overload, high Complexity of Tasks and who have a suitable

<sup>11</sup> Drop-out intention downwards is the only type where *Overload* does not appear significant. However, the fit of *Training Requirements and Ability Level* could be the stronger requirements-related factor here, overlapping the aspect of *Overload*.





Educational Level (as a necessary requirement to join a university) and therefore have the opportunity for an upward movement in their educational path.

Aside from those factors, identified as crucial for drop-out intentions, 11 training quality aspects did not play a role for any drop-out direction. This finding could indicate a two-tier scheme (Fig. 3) with regard to the importance of different training quality aspects: (1) Social Involvement could be working as a core factor, and (2) one to four different quality criteria could be acting as ‘direction-typical’ factors. When we try to summarize the quality criteria on a more abstract level, the differences between the drop-out directions seem rooted in the extent to which Work Tasks (Workload, Non-Training Tasks, Complexity of Tasks) and Educational Mediation (Feedback, Mentoring, Curriculum Orientation, Training Requirements) is perceived (see Appendix Fig. 4). The more the Work Tasks are linked to the intention to drop-out, the more the occupation itself is consequently perceived by trainees as being suboptimal, leading to an intent to change occupation or to take a different path on a higher level (upwards). Contrastingly, changing the company or leaving the vocational path downwards seem to be more related to Educational Mediation. The insights gained allow the conclusion that H3 can be partly confirmed as there are several direction-typical factors and only few commonalities for the different drop-out intentions.

## Conclusion and discussion

Within this study, four directions of drop-out intention were analysed systematically and contrasted regarding their predictive factors for the first time. The analyses reveal diverse influencing factors for different directions of drop-out intention in vocational training. More precisely, the results, firstly, underline the complexity of the process, as stated in the literature (e.g. Ertelt 2003; Lamamra and Masdonati 2008; Rohrbach-Schmidt and Uhly 2015), with multiple factors being involved. The results, secondly, allow detailed insights into differences between various directions of drop-out intention and thereby shed light on the often referred to 'black box' of training. Training quality, especially social involvement during training, is key for all drop-out directions but particularly crucial regarding horizontal drop-out intentions. Upward and downward drop-out intention, however, can only be explained to a smaller extent by training quality. Here, also the educational level (including the Final Grade) plays a decisive role, corresponding to the results from Bessey and Backes-Gellner (2015).

Some of the findings should be interpreted with caution since the scales' consistencies were not always satisfying. This is especially the case for Curriculum Orientation (Cronbach's  $\alpha = 0.65$ ) and Training Requirements and Ability Level (Cronbach's  $\alpha = 0.65$ ), which appeared significant in some models. However, the scales were kept in the analysis in order to secure a broad measurement of training quality in terms of construct validity. Moreover, it has to be noted that, with analysing data at  $T_1$ , there is a certain amount of actual drop-out that had already taken place and could not be considered in any results. This difference could (partly) account for the relatively low drop-out intentions in the sample. Nevertheless, using the training quality measured at  $T_1$  was a conscious decision since the prior  $T_0$ -survey was conducted very early, in some cases after 4 to 5 weeks of training (in which time a vocational school had also been attended), resulting in trainees who had little familiarity with the training companies' qualities. A future design, where drop-out intention might be captured e.g. after 9–12 weeks, might further increase effect sizes due to more critical cases. With respect to the rather small explanatory power of the upward and downward models, other important aspects could be missing in our data, such as trainees' general personal (life) situation or extrinsic motivation in terms of wage and prestige. Bessey and Backes-Gellner (2015) and Neuber-Pohl (2021) showed that factors such as the financial situation or income prospects can be decisive for (downward) drop-out. Such variables could be analysed in greater depth regarding their influences on different drop-out directions in advanced future research designs.

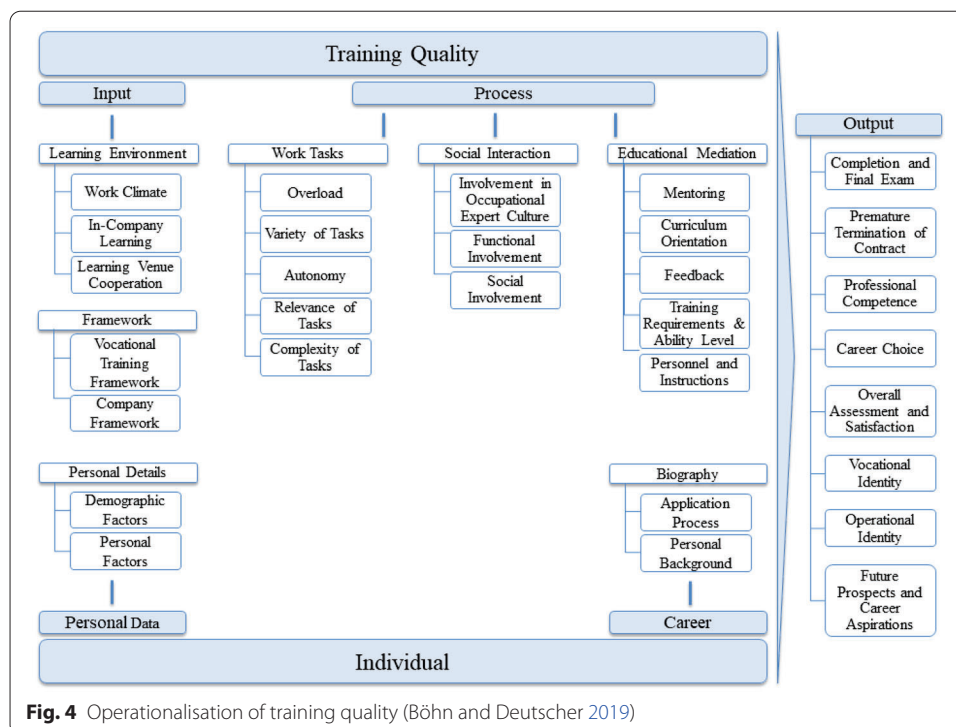
With regard to the model of training quality (Böhn and Deutscher 2019), the findings confirm the processual structure, with drop-out intention being a result of the Input (e.g. educational level) and Process dimensions (training quality). Furthermore, the multidirectional approach to drop-out intention proved useful. Other classifications of drop-out types might be possible, as a vocational reorientation (horizontal directions) can also imply an upgrade with regard to the level of requirements or reputation. As a conclusion for future research, we recommend operationalising drop-out (intention) as a multidirectional concept as outlined in Fig. 1 if the complex causal nature of the concept is

to be captured. As a conclusion for educational practice, a differentiation into different types of drop-out intention seems similarly important for training companies and trainers, especially if they are to intervene more precisely and prevent drop-outs in VET. For companies, a practical implication of the derived two-tier-scheme of influence categories is to lay focus on the social interaction with and involvement of trainees in all cases and then emphasize further direction-typical factors for the drop-out type where the individual company had experienced problems.

However, the findings for drop-out intentions cannot simply be transferred to real drop-outs, as, for instance, certain access barriers might impede the realisation of an intention to change occupation or attend university (e.g. due to qualification requirements). Additionally, not every drop-out has to be labelled negative, as a dissolution of a prior mismatch could lead to a more fitting career path in the future (Schmid and Stalder 2012). Nevertheless, many studies show that most dropped-out trainees remain for longer periods without a follow-up plan (Hasler 2016; Mischler 2014; Schmid and Stalder 2012; Weiß 1982). To impede the loss of time and the related costs, drop-out intention could serve as a useful tool in practice for gaining insights into the reasons behind drop-outs and as an early alert system, thereby helping to reduce drop-out in VET.

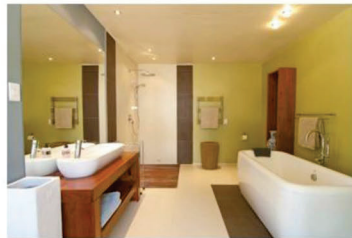
## Appendix

See Figs. 4, 5 and Tables 7, 8, 9, 10 and 11.



**Fig. 4** Operationalisation of training quality (Böhn and Deutscher 2019)

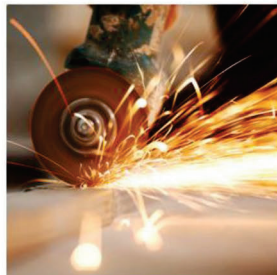
# Ceraforma Keramik AG



Since its foundation in 1982, the Ceraforma Keramik AG has developed into an expanding and globally active industrial enterprise having their head office in Aachen, Germany. The company is involved in the production of ceramic goods, such as china and porcelain for tableware and vases or sanitary ware.

In the past, the management of Ceraforma Keramik realized that the four divisions – procurement logistics, production, human resource management as well as marketing and sales – used to operate too independently from each other, which caused disturbances in the performance process and led to customer complaints. In response to these problems, so-called *horizontal teams* were established consisting of work members from different company divisions.

You have been employed with Ceraforma Keramik in such a horizontal team since the beginning of this year. Here the allocated customer orders are being handled in all business processes ranging from the receipt of orders to the settlement of accounts. Ms Kenk, the team leader, Mr Friebe and Ms Hoffmann, the new trainee, are your colleagues in the horizontal team.



**Business Process 1**

## **Situation:**

Your team just received a new customer enquiry. Your colleague, Mr Friebe, shows you the following e-mail which arrived on 30 March 20... at 10:17.

**Fig. 5** Exemplary company framework from the competency test (Deutscher and Winther 2018)

**Table 7** Personal background characteristics of trainees

Aspect	Coding	Frequency	Percentage	Valid percentage	Cumulated percentage
Gender n = 561	Female	356	63.3	63.5	63.5
	Male	205	36.5	36.5	100.0
Educational level (highest school leaving certificate) n = 562	Secondary school certificate (Mittlere Reife)	119	21.2	21.2	21.2
	Advanced technical college (Fachhochschulreife)	168	29.9	29.9	51.1
	General higher education certificate (allgemeine Hochschulreife/Abitur)	275	48.9	48.9	100.0
Grade (average grade in school leaving certificate) n = 555	1.0–1.5	39	6.9	7.0	7.0
	1.6–2.0	74	13.2	13.3	20.4
	2.1–2.5	175	31.1	31.5	51.9
	2.6–3.0	184	32.7	33.2	85.0
	3.1–3.5	77	13.7	13.9	98.9
	3.6–4.0	6	1.1	1.1	100.0
Training performance T <sub>1</sub> (self-assessed grade) n = 548	1.0–1.5	62	11.0	11.3	11.3
	1.6–2.0	239	42.5	43.6	54.9
	2.1–2.5	160	28.5	29.2	84.1
	2.6–3.0	60	10.7	10.9	95.1
	3.1–3.5	23	4.1	4.2	99.3
	3.6–4.0	2	0.4	0.4	99.6
Aspired final grade T <sub>0</sub> n = 540	> 4.0	2	0.4	0.4	100.0
	1.0–1.5	147	26.2	27.2	27.2
	1.6–2.0	285	50.7	52.8	80.0
	2.1–2.5	99	17.6	18.3	98.3
Aspired final grade T <sub>1</sub> n = 553	2.6–3.0	8	1.4	1.5	99.8
	1.0–1.5	151	26.9	27.3	27.3
	1.6–2.0	245	43.6	44.3	71.6
	2.1–2.5	123	21.9	22.2	93.9
	2.6–3.0	29	5.2	5.2	99.1
	3.1–3.5	3	0.5	0.5	99.6
	3.6–4.0	1	0.2	0.2	99.8
Language(s) (spoken at home) n = 559	> 4.0	1	0.2	0.2	100.0
	Only German	435	77.4	77.8	77.8
	More than German	115	20.5	20.6	98.4
Terminated Training before n = 561	Only other than German	9	1.6	1.6	100.0
	No	524	93.2	93.4	93.4
	Yes	37	6.6	6.6	100.0

N maximum = 562

**Table 8** Descriptive statistics on further trainee scales

Scale	N	Min	Max	M	SD
Age	561	16	43	20.57	2.504
Desired occupation*	558	0	4	3.01	0.994
Competency score T <sub>0</sub>	562	0	19	7.48	3.541
Competency score T <sub>1</sub>	536	0	24	10.92	4.779

N Maximum = 562. \*Measured on a five-level Likert scale (0–4). Maximum Competency Score = 30

**Table 9** Response frequency for different drop-out intentions

	Upwards		Company change		Occupation change		Downwards	
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
0	468	85.6	423	77.0	427	77.9	481	88.1
1	15	2.7	29	5.3	22	4.0	15	2.7
2	12	2.2	18	3.3	21	3.8	4	0.7
3	17	3.1	37	6.7	32	5.8	19	3.5
4	35	6.4	42	7.7	46	8.4	27	4.9
Total	547	100.0	549	100.0	548	100.0	546	100.0

0 = strongly disagree, 1 = mostly disagree, 2 = partly agree, 3 = mostly agree, 4 = completely agree

**Table 10** Item statistics

Scale	Item	Cronbach's $\alpha$ (if item deleted)	Mean value	Standard deviation	Discriminatory power
<i>Personal factors</i>					
(Professional commitment) ( $\alpha$ 0.77)	008 I am motivated, no matter what kind of task I am confronted with	0.742	2.63	0.870	0.486
	009 I am reliable, no matter what kind of task I am confronted with	0.741	3.58	0.602	0.465
	010 I am willing to put all my effort into my job	0.727	3.34	0.710	0.526
	xxx I finish every activity I have started	0.749	3.54	0.591	0.419
	xxx I am diligent at work	0.716	3.53	0.619	0.592
	xxx I am persevering at work	0.742	3.22	0.623	0.457
	xxx I work hard to achieve my professional goals	0.737	3.24	0.734	0.484
<i>Learning environment</i>					
(Work climate) ( $\alpha$ 0.76)	021 If necessary the employees in my company support each other	0.710	3.08	0.832	0.558
	022 There is a personal atmosphere within my company	0.724	2.98	0.854	0.514
	023 There is a bad working atmosphere in my company. [R]	0.666	2.95	0.897	0.670
	024 There is strong competition between employees in my company. [R]	0.730	2.91	0.885	0.497
	025 Employees in my company are rigorously monitored and controlled. [R]	0.758	2.74	0.973	0.428
(In-company learning) ( $\alpha$ 0.84)	026 Workplace learning in my company is characterized by different teaching methods		1.86	1.053	0.723
	027 Workplace learning in my company is characterized by the usage of different materials and media		2.11	1.052	0.723
(Usefulness of learning venue cooperation) ( $\alpha$ 0.74)	030 What I learn at vocational school is important for the daily work in my company	0.576	1.75	0.912	0.627
	031 When managing work tasks in the company, I benefit from knowledge I accumulated during vocational school sessions	0.558	1.89	0.926	0.640

**Table 10** (continued)

Scale	Item	Cronbach's $\alpha$ (if item deleted)	Mean value	Standard deviation	Discriminatory power
	033 The in-company vocational training and the vocational school are well coordinated	0.810	1.39	1.051	0.436
<i>Work tasks</i>					
Overload	045 In my company I feel under pressure of time at work. [*]	0.796	2.81	0.878	0.538
( $\alpha$ 0.82)	048 In my company others interfere with my work. [*]	0.814	3.29	0.783	0.433
	049 I have problems recharging my energy in my spare time after work. [*]	0.767	2.76	1.185	0.661
	050 Because of the daily demands in my company I feel totally exhausted, tired and drained. [*]	0.751	2.45	1.123	0.723
	051 I often think 'I can't go on any longer'. [*]	0.770	3.06	1.084	0.650
	xxx I have to do a lot of activities at once. [*]	0.808	2.19	1.080	0.480
Variety of tasks	052 In my company I deal with a variety of work tasks	0.831	2.45	0.899	0.424
( $\alpha$ 0.75)	053 In my company I work on new tasks every now and then	0.551	2.34	0.973	0.680
	054 In my company work tasks are highly diversified	0.572	2.40	1.019	0.662
Variety of tasks	052 In my company I deal with a variety of work tasks	0.831	2.45	0.899	0.424
( $\alpha$ 0.75)	053 In my company I work on new tasks every now and then	0.551	2.34	0.973	0.680
	054 In my company work tasks are highly diversified	0.572	2.40	1.019	0.662
Variety of tasks	052 In my company I deal with a variety of work tasks	0.831	2.45	0.899	0.424
( $\alpha$ 0.75)	053 In my company I work on new tasks every now and then	0.551	2.34	0.973	0.680
	054 In my company work tasks are highly diversified	0.572	2.40	1.019	0.662
Autonomy	056 In my company I am given flexibility in the timing of work tasks	0.795	2.35	0.956	0.376
( $\alpha$ 0.76)	xxx In my company, I can make many decisions myself in my work	0.693	2.64	1.071	0.585
	057 In my company I am able to decide what means to take to reach a goal	0.662	2.52	1.030	0.639
Autonomy	056 In my company I am given flexibility in the timing of work tasks	0.795	2.35	0.956	0.376
( $\alpha$ 0.76)	xxx In my company, I can make many decisions myself in my work	0.693	2.64	1.071	0.585
	057 In my company I am able to decide what means to take to reach a goal	0.662	2.52	1.030	0.639



**Table 10** (continued)

Scale	Item	Cronbach's $\alpha$ (if item deleted)	Mean value	Standard deviation	Discriminatory power
Relevance of tasks ( $\alpha$ 0.79)	058 In my company I am given an enormous amount of freedom in doing my job	0.653	2.50	1.014	0.656
	059 In my company I am given responsible tasks		2.71	0.955	0.661
	060 In my company I work on 'real tasks'		3.17	0.881	0.661
Non-training tasks	061 In my company I have to deal with several tasks that are not part of my vocational training program (e.g. make coffee, copying, etc.). [R]		2.87	1.131	
Complexity of tasks ( $\alpha$ 0.74)	063 In my company work tasks are characterized by considering a wide range of information	0.587	2.52	0.850	0.623
	064 In my company work tasks are characterized by considering a wide range of objectives. [*]	0.671	2.63	0.899	0.551
	065 In my company work tasks are characterized by considering changes over time	0.703	2.54	0.886	0.523
Training requirements and ability level ( $\alpha$ 0.65)	067 In my company I am confronted with tasks that are too complicated. [*]		1.54	1.635	0.482
	068 In my company I am confronted with tasks I am insufficiently trained and prepared for. [*]		1.66	1.610	0.482
<i>Social interaction</i>					
Involvement in occupational expert culture ( $\alpha$ 0.63)	072 I am involved in the improvement of work processes in my company	0.535	2.06	1.122	0.432
	073 My ideas and proposals are considered in my company	0.529	2.05	1.058	0.437
	074 I am involved in the discussion of technical and professional issues in my company	0.522	1.88	1.137	0.441
Functional involvement ( $\alpha$ 0.67)	078 Basically, my work tasks play a crucial role for my department		2.33	0.991	0.511
	079 I am well integrated into the operational working procedures		2.30	0.893	0.511
Social involvement ( $\alpha$ 0.80)	080 Employees in my company are interested in me	0.676	2.85	0.870	0.743
	081 Employees in my company are interested in my private well-being	0.788	2.42	1.061	0.573
	083 Employees in my company seem disturbed by my presence. [R]	0.762	3.60	0.719	0.585
	084 Employees in my company ignore me. [R]	0.757	3.64	0.709	0.601
<i>Educational mediation</i>					
Mentoring	085 In my company nobody feels responsible for me. [R]		2.54	1.681	0.588

**Table 10** (continued)

Scale	Item	Cronbach's $\alpha$ (if item deleted)	Mean value	Standard deviation	Discriminatory power
( $\alpha$ 0.74)	086 In my company I am completely left alone to myself. [R]		2.58	1.714	0.588
Curriculum orientation	089 I do know my in-company training plan		2.56	1.075	0.485
( $\alpha$ 0.65)	090 The arrangements of my in-company training plan are observed		2.56	1.137	0.485
Feedback	092 In my company good performances are praised	0.836	2.86	1.073	0.622
( $\alpha$ 0.86)	093 Normally I do know whether I perform work tasks satisfactorily or not	0.827	2.92	0.850	0.673
	094 I find it hard to figure out whether I perform work tasks satisfactorily or not. [R]	0.845	2.93	0.896	0.560
	095 The training personnel and my colleagues let me know whether I perform work tasks satisfactorily or not	0.814	2.77	0.969	0.732
	xxx The training personnel always give clear and convincing reasons for the assessment of my performance	0.819	2.61	0.973	0.706
	xxx The training personnel check my work results and give me factual feedback	0.843	2.65	0.972	0.578
Personnel and instructions	097 Those who train me on the job are able to answer difficult technical questions	0.853	2.15	0.926	0.745
( $\alpha$ 0.89)	098 Those who train me on the job can explain well	0.872	2.26	0.853	0.696
	99 There is a lot I can learn from those who train me on the job	0.849	2.13	0.940	0.756
	101 Those who train me on the job are technically competent	0.831	2.15	0.923	0.801
<i>Vocational school</i>					
Teacher competency	xxx My teachers explain well	0.895	2.36	0.872	0.724
( $\alpha$ 0.91)	xxx I like my teachers	0.891	2.64	0.858	0.756
	xxx My teachers want the best for me	0.886	2.62	0.911	0.789
	xxx My teachers always support me	0.884	2.54	0.894	0.801
	xxx I can ask my teachers anything	0.895	2.64	0.991	0.723
	xxx I feel supported by my teachers when I have personal problems as well	0.900	1.96	1.149	0.719
School learning content	xxx All of the important commercial foundations are taught in the classroom	0.736	2.32	0.830	0.349
( $\alpha$ 0.73)	xxx The school also teaches specialist knowledge that I need in the company	0.740	2.57	1.230	0.406
	xxx At school, my practical work from the company was consolidated through background information	0.631	2.61	1.018	0.632

**Table 10** (continued)

Scale	Item	Cronbach's $\alpha$ (if item deleted)	Mean value	Standard deviation	Discriminatory power
	xxx In the course of learning in vocational school, I can network knowledge from different subjects	0.662	2.39	0.877	0.573
	xxx In class I understand how the content relates to operational practice	0.660	2.47	0.912	0.572
Output: drop-out intention					
Upwards	xxx I want to quit training to study at university (including dual university or university of applied sciences)		0.42	1.116	
Horizontal (company)	xxx I want to change my training company		0.63	1.276	
Horizontal (occupation)	xxx I want to change my training occupation		0.63	1.294	
Downwards	xxx I want to work without any training		0.34	1.023	

n = 562. [R] = reversed items. [\*] = items reverse-scored for the analysis in order to facilitate understanding of the results. 4 represents maximum quality. Original response options: 0 = strongly disagree, 1 = mostly disagree, 2 = partly agree, 3 = mostly agree, 4 = completely agree

**Table 11** Intercorrelations of training quality scales*Intercorrelations of training quality scales*

		Work Climate	In-Comp. Learning	Learning Venue Cooperation	Overload	Variety of Tasks	Autonomy	Relevance of Tasks	Non-Training Tasks	Complexity of Tasks	Training Requir. and Ability Level
Work Climate	Correlation (Pearson)	1									
	Significance										
	N	534									
In-Company Learning	Correlation (Pearson)	.406**	1								
	Significance	.000									
	N	514	532								
Learning Venue Cooperation	Correlation (Pearson)	.189**	.314**	1							
	Significance	.000	.000								
	N	524	523	545							
Overload	Correlation (Pearson)	.413**	.397**	.250**	1						
	Significance	.000	.000	.000							
	N	527	525	538	549						
Variety of Tasks	Correlation (Pearson)	-.119**	-.198**	-.019	-.096*	1					
	Significance	.006	.000	.663	.025						
	N	530	528	540	545	552					
Autonomy	Correlation (Pearson)	-.115**	-.050	.002	-.132**	.224**	1				
	Significance	.008	.251	.955	.002	.000					
	N	528	523	535	542	543	547				
Relevance of Tasks	Correlation (Pearson)	.309**	.229**	.229**	.175**	-.169**	-.142**	1			
	Significance	.000	.000	.000	.000	.000	.001				
	N	531	529	540	546	548	544	552			
Non-Training Tasks	Correlation (Pearson)	.328**	.345**	.173**	.376**	-.083	-.086*	.321**	1		
	Significance	.000	.000	.000	.000	.052	.044	.000			
	N	532	530	543	547	550	545	551	555		
Complexity of Tasks	Correlation (Pearson)	-.006	-.076	-.031	.057	.212**	.188**	-.100*	-.066	1	
	Significance	.891	.092	.492	.198	.000	.000	.024	.137		
	N	491	490	501	504	506	504	507	508	510	
Training Requir. and Ability Level	Correlation (Pearson)	.106*	.015	.042	.221**	.001	-.172**	.010	.143**	-.238**	1
	Significance	.014	.724	.325	.000	.983	.000	.812	.001	.000	
	N	533	531	543	548	551	546	551	553	509	555

**Table 11** (continued)*Intercorrelations of training quality scales*

		Work Climate	In-Comp. Learning	Learning Venue Cooperation	Overload	Variety of Tasks	Autonomy	Relevance of Tasks	Non-Training Tasks	Complexity of Tasks	Training Requir. and Ability Level
Involvement in Occup. Expert Culture	Correlation (Pearson)	.157**	.173**	.159**	.116**	.054	.129*	.200**	.225**	.147**	.051
	Significance	.000	.000	.000	.008	.225	.003	.000	.000	.001	.244
	N	504	501	513	512	515	510	515	518	483	519
Functional Involvement	Correlation (Pearson)	-.136**	-.115**	.029	-.143**	.402**	.204**	-.232**	-.111**	.216**	-.018
	Significance	.002	.008	.498	.001	.000	.000	.000	.009	.000	.667
	N	526	525	537	542	544	541	544	547	504	548
Social Involvement	Correlation (Pearson)	.555**	.390**	.246**	.426**	-.151**	-.031	.348**	.289**	.069	.123**
	Significance	.000	.000	.000	.000	.000	.476	.000	.000	.124	.004
	N	519	514	526	532	533	529	534	536	493	537
Mentoring	Correlation (Pearson)	.346**	.364**	.198**	.330**	-.165**	-.137**	.264**	.315**	-.104*	.306**
	Significance	.000	.000	.000	.000	.001	.000	.000	.000	.020	.000
	N	530	528	540	546	548	544	549	550	507	552
Curriculum Orientation	Correlation (Pearson)	.081	-.138**	.169**	.120**	.166**	.073	-.049	.116**	.111*	.036
	Significance	.066	.002	.000	.006	.000	.092	.256	.007	.013	.403
	N	516	514	526	529	532	528	533	536	494	536
Feedback	Correlation (Pearson)	.439**	.490**	.223**	.422**	-.198**	-.113**	.358**	.390**	-.011	.129**
	Significance	.000	.000	.000	.000	.000	.010	.000	.000	.806	.003
	N	513	510	524	528	529	526	531	532	492	533
Personnel and Instructions	Correlation (Pearson)	-.147**	-.189**	.007	-.118**	.467**	.086*	-.153**	-.080	.021	.198**
	Significance	.001	.000	.880	.006	.000	.047	.000	.062	.644	.000
	N	517	517	530	533	535	531	536	539	496	539
Professional Commitment	Correlation (Pearson)	-.147**	-.189**	.007	-.118**	.467**	.086*	-.153**	-.080	-.074	.139**
	Significance	.001	.000	.880	.006	.000	.047	.000	.062	.101	.001
	N	517	517	530	533	535	531	536	539	492	537
Teacher Competency	Correlation (Pearson)	.151**	.191**	.338**	.251**	-.113*	-.091	.087	.043	-.033	.065
	Significance	.001	.000	.000	.000	.015	.052	.063	.362	.496	.164
	N	447	442	451	452	456	452	458	459	429	458
School Learning Content	Correlation (Pearson)	-.062	-.098*	-.036	-.095*	.210**	.127**	-.048	-.015	.128**	-.111*
	Significance	.168	.030	.418	.032	.000	.004	.280	.736	.005	.011
	N	496	494	510	509	512	508	512	515	480	515

*Intercorrelations of training quality scales*

		Involvement in Occupational Expert Culture	Functional Involvement	Social Involvement	Mentoring	Curriculum Orientation	Feedback	Personnel and Instructions	Professional Commitment	Teacher Competency	School Learning Content
Involvement in Occup. Expert Culture	Correlation (Pearson)	1									
	Significance										
	N	520									
Functional Involvement	Correlation (Pearson)	.159**	1								
	Significance	.000									
	N	514	549								
Social Involvement	Correlation (Pearson)	.228**	-.114**	1							
	Significance	.000	.009								
	N	506	531	537							
Mentoring	Correlation (Pearson)	.101*	-.109*	.388**	1						
	Significance	.021	.011	.000							
	N	516	545	534	552						
Curriculum Orientation	Correlation (Pearson)	.128**	.167**	.073	.071	1					
	Significance	.004	.000	.097	.102						
	N	503	530	521	534	537					
Feedback	Correlation (Pearson)	.267**	-.149**	.523**	.393**	.110*	1				
	Significance	.000	.001	.000	.000	.013					
	N	500	527	518	532	518	533				
Personnel and Instructions	Correlation (Pearson)	.033	.458**	-.157**	-.079	.253**	-.233**	1			
	Significance	.462	.000	.000	.069	.000	.000				
	N	505	535	523	537	525	522	540			
Professional Commitment	Correlation (Pearson)	.052	-.115**	.374**	.199**	-.025	.309**	-.090*	1		
	Significance	.246	.008	.000	.000	.566	.000	.039			
	N	501	530	521	534	520	517	521	539		
Teacher Competency	Correlation (Pearson)	.092	-.028	.280*	.107	-.001	.256*	-.094*	.171**	1	
	Significance	.055	.557	.000	.022	.982	.000	.046	.000		
	N	440	455	450	456	446	445	449	443	460	
School Learning Content	Correlation (Pearson)	-.101*	.229**	-.074	-.140**	.116**	-.093*	.240**	-.094*	-.135**	1
	Significance	.026	.000	.102	.001	.010	.039	.000	.035	.004	
	N	486	511	497	513	503	499	505	499	443	518

Note. \*\*Correlation is significant at 0.01 (two-sided). \*Correlation is significant at 0.05 (two-sided).

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#### **4.4 Paper 4: The Power of In-Company Training for Competence Development: Doing One Thing Without Neglecting the Other**

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## Abstract

Despite vocational competence representing the main goal of Vocational Education and Training (VET), findings on the role of in-company training quality on competence development during VET are limited and inconsistent. Therefore, training personnel remain unsure about which aspects of VET should be focused on. To explore this issue, our study uses a 14-factor approach to in-company training quality and analyses its influence on trainee development of domain-linked and domain-specific competence by combining structural equation modeling with latent growth modeling. Data was gathered in a longitudinal survey with competence tests of 458 trainees at three points in time. The results indicate that training quality as a whole concept, rather than as isolated aspects, considerably affects competence development. Explaining 43% of the variance, training quality seems more related to a domain-linked than to a domain-specific competence development (18%). Personal characteristics (education, aspirations, math interest) tend to affect trainees' starting points for (domain-specific) competence more than they affect competence development. The findings suggest that organisations should consider a wide range of quality criteria rather than focus on selected aspects. Furthermore, to ensure a valid monitoring of training quality and outcomes in VET, the findings demonstrate the need to consider domain-specific and domain-linked competence.

*Keywords:* vocational education and training (VET); training quality, competence development, in-company training, domain-linked, domain-specific competence

## Introduction

Dual vocational education and training (VET) systems, consisting of state schooling and a private company component, are being adopted in many countries worldwide and present a key component for providing qualified workers to the labour market (EU 2018; Hanushek 2012; OECD 2019; Zimmermann et al. 2013). They provide employees with good practical skills and their companies with qualified staff. Although the development of vocational competence represents the main VET goal (Deutscher and Winther 2018), findings on competence development over the course of training are limited and inconsistent.

Most studies focus on influence factors arising from the schooling or personal characteristics (e.g., Abele 2014; Atik & Nickolaus 2016; Frank, Härtig, and Neumann 2017; Lindmeier et al. 2013). Even though the formal and informal learning activities at workplaces are assumed to play a big role for competence development, only few studies have researched the impact of in-company training quality on trainee competence development (e.g., Baethge-Kinsky, Baethge, and Lischewski 2016; Dietzen et al. 2014; Nickolaus, Gschwendtner, and Geißel 2009; Pineda-Herrero et al. 2015). In relation to training quality, the studies focused mostly on a few selected quality criteria that differ over the studies, which not only impedes a reliable comparison of statistical results but also makes a valid synthesis of results almost impossible as the omission of certain quality aspects possibly biases the findings for the remaining criteria. Thus, for training personnel and human resource management in general, it remains unclear which aspects of vocational training foster or impede trainee competence development and where exactly human resource managers and in-company trainers should increase their efforts towards improving training quality. Additionally, the ongoing discussion on international comparative studies of VET systems requires valid quality monitoring and insights on how training quality relates to competence development (Winther and Achtenhagen 2009).

In this regard, this study aims to provide helpful insights into the process of competence development at the training workplace by applying an encompassing approach to training quality. It does this by using a survey instrument with 14 criteria for in-company training quality. Survey data on training quality, socio-demographic information, and motivational proxies of 458 industrial business

management trainees were used to explore the influence of in-company training quality on trainee competence development over 2 years of training. To measure trainee competence, a validated test instrument by Klotz (2015) was used, modelling vocational competence on two dimensions: domain-linked and domain-specific (Gelman and Greeno 1989). Latent growth modeling (LGM) is used to analyze competence development and is embedded into a structural equation model (SEM) to explore the influence of in-company training on competence development holistically.

### ***The Role of Vocational Training for Competence Development***

Trainees themselves underline the role of vocational training for competence development as they consider they learn more in their vocational company than during the VET schooling (Rauner, Piening, and Frenzel 2015). However, in the last two decades, not many studies have explored the effects of in-company training quality on trainee competence development (Winther et al. 2013).<sup>1</sup> The majority of those studies focused on one or a few aspects of training quality, yielding inconsistent findings on the effect of in-company training quality on competence development, which are described below.

In a study including various training courses, Rausch, Seifried, and Harteis (2014) could not confirm that pedagogical professionalisation of in-company trainers affected trainee competence. Likewise, Kirkpatrick, and Hoque (2022) found no effect of personnel professionalisation on several individual and organisational outcomes. Baethge-Kinsky et al. (2016, 288 f.), however, state that the professional training personnel affects the competence of industrial business management trainees as does the training tasks' structural quality. Despite several correlations, individual aspects such as education and migration background exerted a stronger influence on the competence level measured at one point in time. The mentoring by the company's tutors also played a significant role in Pineda-Herrero et al.'s (2015, 616 f.) approach. They used the related concept of workplace learning efficacy, operationalised as competence development as reported by Spanish trainees in various occupations. The strongest effect on self-reported learning efficacy was found for the coherence of school training with

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<sup>1</sup> An overview of older studies can be found in Nickolaus et al. (2009).

workplace learning, i.e., the coherence of skills taught in school and skills required at the workplace. The (social) integration into the company and a framework factor (including materials and mentoring) showed small effects (Pineda-Herrero et al. 2015, 615 ff.). Rausch (2011) likewise used self-reports (diary-based) by trainees (management assistants in retail business) about their most learning enhancing task of a day. The analysis revealed that the trainees perceived tasks that are challenging, involve interaction with colleagues and pose an interesting experience as learning enhancing (ibid., 319).

In a comprehensive analysis, Schafer and Baeriswyl (2015) predominantly found personal characteristics to be predictive of the developed competence of commercial trainees, measured as the final grade achieved within the company. However, they did not consider differentiated quality criteria except the satisfaction with the company as an overall evaluation, which stayed non-significant. Despite many predictors, the variance of company-related competence could only be explained to half the extent as compared to the variance of the school-related competence. These findings indicate that omitted variables such as more specific training quality criteria could play a role and that predictors from school-related research might not simply be transferable to the company setting, as, e.g., the prior educational path was only relevant for the school grade (Schafer and Baeriswyl 2015, 154 f.). Siegfried et al. (2019, 1006) found that temporal autonomy, interaction climate, instruction and structural task quality were only weakly correlated with commercial trainees' knowledge application (.10 – .16). However, in more holistic SEMs, training quality played no significant role while person-related aspects, such as cognitive dispositions, impacted knowledge application most (ibid., 1010).

Dietzen et al. (2014) used a broader measurement approach via the MIZEBA<sup>2</sup> to measure the training quality for mechatronics and IT-specialists. An SEM showed that none of the eight extracted factors<sup>3</sup> had an effect on competence. However, all factors correlated significantly with trainees' company-related training motivation, which in turn showed a small effect (.13) on competence, hinting

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<sup>2</sup> Mannheimer Inventar zur Erfassung betrieblicher Ausbildungssituationen (Zimmermann, Müller, and Wild 1994).

<sup>3</sup> Learning enhancing tasks, scope of action, relevance of tasks, feedback, overload, trainer competence, solicitude of the trainer, support by colleagues (Dietzen et al. 2014, 27).

at a potential indirect effect of training quality. For electronic technician trainees, some authors (Geißel 2008; Knöll 2007; Nickolaus 2006; Nickolaus et al. 2011) find that trainees taking part in dual VET showed partly higher competence after one year of training than trainees in a full-time school-based form of training, indicating an effect of the company training. Furthermore, Nickolaus et al. (2009), who also used the MIZEBA to measure the in-company training quality in automotive mechatronics, found correlations between three factors, overload, social involvement and complexity, and trainees' procedural knowledge (*ibid.*, 8). However, these were only small correlations (.17 – .2), and the majority of quality criteria (work climate, transparency, expert culture, variety of tasks, autonomy, relevance of tasks) stayed non-significant. Another study by Nickolaus et al. (2015, 347) showed similarly small correlations (.10 – .18) for work tasks, feedback, trainer competence and overload with an intermediate knowledge test of mechatronics, while towards the end of training only correlations with the relevance of tasks and overload were found (.09 – .13). When controlling for other influences such as mathematic competence or intelligence (IQ), SEMs showed that none of the MIZEBA training quality criteria exert a significant effect on knowledge (Nickolaus et al. 2009, 2015).

More generally, such mathematic skills were found to be a predictor of competence development in several studies (e.g., Abele 2014; Dietzen et al. 2014; Frank et al. 2017; Nickolaus et al. 2009; Seeber 2008, 2014). Additionally, the prior knowledge or the educational level (e.g., school-leaving qualification, final grade) can be stated as a confirmed predictor of competence scores (e.g., Atik & Nickolaus 2016; Baethge-Kinsky et al. 2016; Schafer and Baeriswyl 2015; Seeber 2014; Siegfried et al. 2019; Velten and Schnitzler 2011). In research into in-company training quality, effects were found for about a dozen quality criteria but seem to be inconsistent for most aspects, making it impossible for human resource management and trainers to establish a well-focused training quality assurance, even if several studies are available for one vocational domain. The findings seem to deviate depending on their respective competence measurement (self-reports versus grades versus competence tests) but also depending on the broadness of the independent variables included.

The findings indicate that most likely criteria that could play a role are the pedagogical quality of the personnel, the interaction quality and work tasks characteristics. Yet only small effects can be

expected, as they seem to appear only when particularly these quality aspects are correlated or regressed on competence development and other potentially relevant quality criteria are neglected. We believe that this might be the case since, when only selected quality variables are included in a causal design, such variables could contain omitted unobserved quality criteria that correlate with the included quality aspects, so that the actual impacts of those quality aspects are over estimated. On the contrary, more holistic approaches (e.g., Dietzen et al. 2014; Nickolaus et al. 2009, 2015) including a range of independent variables found no significant effects of training quality criteria on competence development.

### ***Competence in Vocational Training***

Since, in VET, factual knowledge alone cannot be sufficient for daily work tasks to be successfully performed in the training company (and after completing training), vocational competence is the general outcome variable investigated in vocational assessments (Deutscher and Winther 2018, 23). The competence concept used in this study builds upon the definitions by Mulder, Weigel and Collins (2007, 82) and Klieme and Leutner (2006, 879 f.), regarding competence as a context-specific, learnable, cognitive disposition that is focused on a specific field of action, thus implying the capability to utilise one's skills and knowledge when performing vocational tasks.

We used a validated competence test where, in an authentic company framework, business management trainees must solve several action-oriented tasks, for example, profitability calculations and writing a business mail (Deutscher and Winther 2018; Klotz 2015; see Appendix Fig. A1). The test items were designed on the basis of curricula requirements from the school- and company-side. The test, comparable to the official written final examinations, aims to examine whether trainees develop vocational competence over the course of training in terms of starting the training with predominantly general pre-knowledge and adding increasingly specific abilities and skills needed for specific work tasks of the business management domain (Klotz, Winther, and Festner 2015). It is assumed that in the early stages of vocational training, trainees tend to lack knowledge that stems from specific work experiences rather than fundamental cognitive skills to solve daily work tasks (Billet 1994; Klotz et al. 2015). Then, following the framework curriculum, domain-linked and increasingly domain-specific



competence of the business management domain is assumed to be acquired over time (Ma et al. 2022; Winther et al. 2013). Winther (2010, 259) illustrates this development from commencing vocational training to full professionalization in employment after completing training. The competence understanding and analyses in this paper rest on the conceptualization of stages one and two (Winther 2010, 258 ff.).

The competence test was, thus, theoretically subdivided into two dimensions: domain-linked (dl) and domain-specific (ds) competences (Gelman and Greeno 1989). Domain-linked competence includes basic decontextualized skills and knowledge such as economic numeracy and literacy, which are fundamentals to solving business tasks (Winther and Achtenhagen 2009; Winther 2011). For example, a currency translation in the competence test could be solved with basic knowledge already gained during non-vocational schooling. Domain-specific competence entails knowledge, rules, and guidelines that are work- and job-specific and needed for reasonable acting in work-related problem-solving (Winther 2011). In the test, trainees' specific skills, learned over the course of training, needed to be applied in, e.g., a profitability calculation (Deutscher and Winther 2018). In addition to the theoretical rationale and the original validation, a related study used a multidimensional Rasch model and the same dataset to validate the competence structure of the two dimensions statistically for the second time (Ma et al. 2022; in preparation).

The original validation of the instrument showed that both competence dimensions grow over the course of training (Klotz and Winther 2016), which was also shown by Rosendahl and Straka (2011) for comparable models. The domain-specific competence grew about twice as much as the domain-linked dimension (Klotz and Winther 2016). In the second validation, using the same dataset as this study, the increase in domain-specific competence was nearly three times higher than that in the domain-linked dimension (see Appendix Table A2). Deutscher and Winther (2018, 27) underlined the instructional sensitivity of competence tests in dual VET, as significant competence development occurs during vocational training. However, it remained unclear which specific aspects of dual VET induced the competence development on the two dimensions.

This study aims to gain more insights into the role of in-company training quality. Despite inconsistent findings in the literature presented, we conclude and assume that in-company training quality will considerably impact trainee competence development (H1) and that social involvement/interaction, personnel quality and work task characteristics are most likely to exert a significant effect. Additionally, we expect to confirm the findings regarding the effects of the educational level (H2), mathematic interest/skills (H3) and motivation<sup>4</sup> (H4), which should all be related to greater competence development over the course of training. However, at present there are no findings on the extent to which the hypothesised relationships could differ regarding the domain-specific and domain-linked competence dimensions.

### ***In-Company Training Quality***

The quality model by Böhn and Deutscher (2019) forms the fundament for our understanding of training quality (Appendix Fig. A2). The model comprises a wide range of training quality criteria, grouped by different content areas and arranged on three dimensions: input, process and output. The processual outline of the model goes back to Biggs (1999) and Tynjälä (2013) and constitutes a common approach in research on vocational training (e.g., Jungkunz 1995; Seyfried, Kohlmeyer, and Furth-Riedesser 2000; Visser 1994). Consistent with the model's structure, in-company training quality is defined as 'subjectively perceived characteristics of [...] training situations and processes that potentially affect target variables' (Klotz et al. 2017, 3). This study focuses on the target variable of vocational competence, separated into domain-linked and domain-specific competence.

The model's input dimension (Appendix Fig. A2) comprises all factors on the company side and trainee characteristics that exist prior to training (e.g., Demographic Factors, Work Climate etc.). The process dimension subsumes daily activities during training and is divided into the areas Work Tasks, Social Interaction and Educational Mediation. While the area Work Tasks includes task

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<sup>4</sup> However, as only motivation-related aspects such as trainees' aspirations regarding the finale grade were considered in the measurement approach of the respective research project, only such aspirations could be considered in the analyses.

characteristics such as Overload, Autonomy, the Variety-, Relevance and Complexity of Tasks, Social Interaction focuses on different types of trainee involvement. Educational Mediation reflects more pedagogical aspects, such as, e.g., Mentoring, Feedback, and Instructions. As short- and long-term outcomes, the output dimension comprises several results of vocational training such as Satisfaction, Vocational Identity or Competence, whereby only the latter is relevant for this study.

## Materials and Methods

### *Data Collection and Sample*

As part of the project ‘Competence development through enculturation’ (funded by DFG), data on training quality and competence was gathered in vocational schools as paper-pencil tests, complemented by an online version due to the COVID19-restrictions, in autumn 2019 ( $T_0$ ), autumn 2020 ( $T_1$ ) and autumn 2021 ( $T_2$ ). The data set comprises longitudinal information from 458 trainees becoming industrial business management trainees that completed the survey and the competence test (see section *Competence in vocational training*) at all three points of time and thereby enables the analysis of individual developments and presumed causal relations over time (Michaelis & Seeber 2019).

Trainees were asked to evaluate the training quality, mainly using the survey instrument ‘VET-LQI’ (Böhn and Deutscher 2021). The chosen scales (15 scales with 58 items) represent the quality criteria from the quality model (Appendix Fig. A2) that focus on the in-company training quality (Appendix Table A3). All scales on training quality (as well as the items *Desired Occupation* and *Maths Interest*) were measured on a five-level Likert scale (0 = strongly disagree; 4 = completely agree) after one year of training ( $T_1$ ). The prior educational level was measured by the *highest school leaving certificate*, while the *aspired final grade* was measured from a range of grades (see Table A1). Also, trainees’ age, gender and the language spoken at home, as well as the number of employees in the companies were collected as useful control variables. Competence at all three stages was modelled on the domain-linked and domain-specific dimensions.

In the sample, 64 % of the trainees were female, which is the ordinary tendency in the statistical population (58.4% female; Bundesinstitut für Berufsbildung [BIBB] 2020). The average age at the

beginning of training, 19.66 years (ranging from 15 to 31 years), corresponds to the average age (19.7 years) of the relevant population (BIBB 2020). Most trainees live in families where only German is spoken (75.9 %). Full descriptive information on the sample is supplied in the Appendix Table A1.

### ***Structural Equation Modelling***

After checking for all necessary prerequisites,<sup>5</sup> the measurement structure of the training quality constructs was checked. In the initial model, indicators 46, 55, 76 and 91 showed loadings  $< .4$  and were therefore excluded (Hair et al. 2014, 136), while all other indicators loaded significantly on the respective factor ( $p < .001$ ).<sup>6</sup> For most of the remaining 14 scales, Cronbach's Alpha indicated satisfying reliability ( $.73 \leq \alpha \leq .88$ ). *Training Requirements and Ability Level* (.65), *Involvement in Expert Culture* (.66), *Relevance of Tasks* (.68) and *Functional Involvement* (.69) showed slightly lower consistencies but were kept in the SEM to measure training quality validly in its broad range (Schmitt 1996). The resulting model represents the training quality measurement model, comprising 14 factors of training quality with 54 indicators (Table A3).

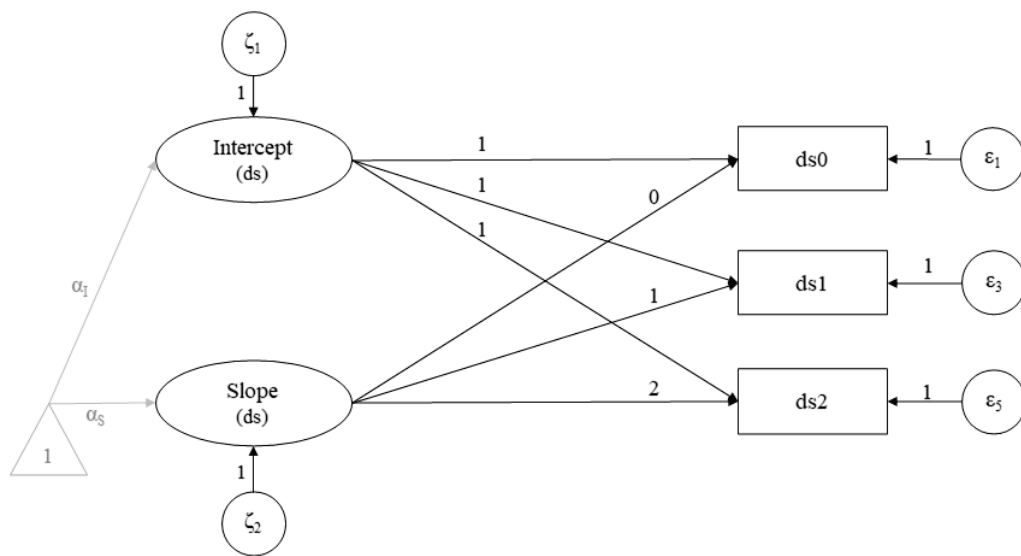
To model competence development over three points in time, an LGM was formed with the factors *Intercept* and *Slope* (see Fig. 1). However, since the domain-specific and the domain-linked

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<sup>5</sup> Missing value analysis of the training quality data revealed only three items (64, 65 and 73) that showed missingness slightly above the five percent level (6.3 – 6.8 %). On the construct level, missing values stayed below 4.2 %. Thus, the necessary MCAR (missing completely at random) condition is met. To check multivariate normal distribution skewness, kurtosis, and the Q-Q-Diagrams of the constructs were analysed, and indicated that only approximate (multivariate) normal distribution can be assumed for all constructs. Therefore, as the sample is relatively large, MLM is used as estimator in the SEM since it is the more robust version of Maximum Likelihood (Curran, West, and Finch 1996; Schermelleh-Engel, Moosbrugger, and Müller 2003). Furthermore, the need for multilevel modelling was checked, as the data was collected in 25 vocational schools. Since, for the one-tailed probability, the significance level of the Wald test should be  $p = .025$  (Heck, Thomas, and Tabata 2010, 80), the null model revealed that the intercepts do not vary significantly for the ds (Wald  $Z = 1.785$ ,  $p = .074$ ) or the dl competences (Wald  $Z = 1.985$ ,  $p = .047$ ). Also, the intraclass correlation coefficient (ICC) confirms that only 5 % (ds) and 6 % (dl) of the variance in the competence dimensions stems from group-effects; therefore, a single level approach is sufficient (Heck et al. 2010; Hox 2010).

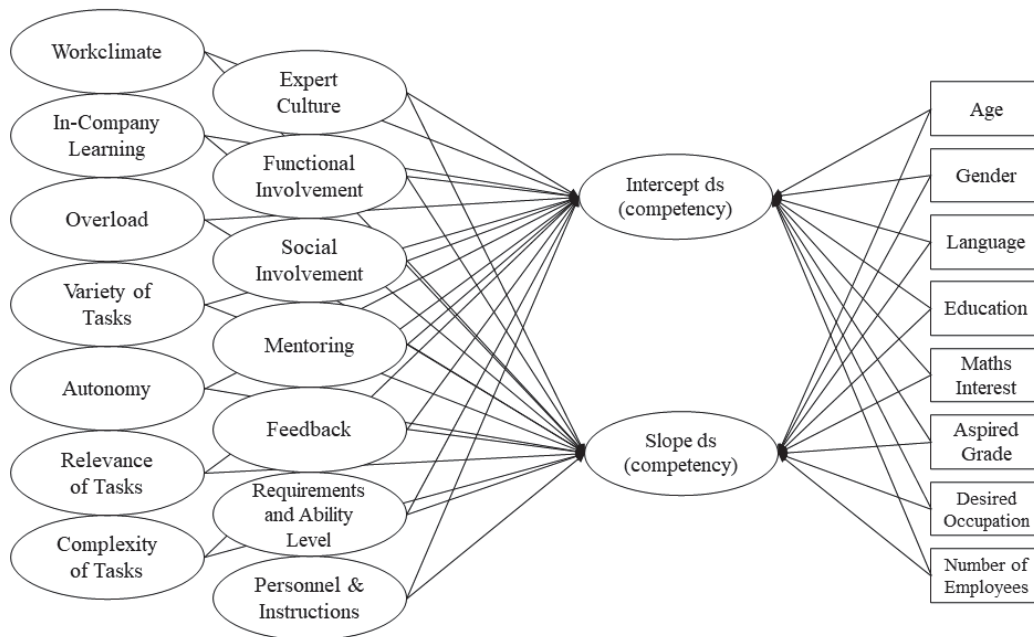
<sup>6</sup> The remaining two indicators of the scale *Curriculum Orientation* only showed low internal consistency (Cronbach's Alpha = .596); the scale was therefore excluded.

dimensions are two separate facets of competence and the domain-specific increases to a different extent over time (nearly three times sharper, see Table A2), it is not reasonable to force both dimensions into one slope parameter (correlation of the competence items:  $.062 < r < .297$ ). Instead, ds and dl are inspected in separate SEMs. Exemplary for domain-specific competence, Figure 1 illustrates simplified the usual LGM-design, with the *Slope* factor representing the rate of change over time (e.g., Kline 2016; Lin 2021; Wolf and Best 2010). The model is used as the measurement model of the dependent variables (ds and dl) throughout the following models.



**Fig. 1.** Latent growth model as measurement model of domain-specific competence development

In the next steps, three models were compared for each competence dimension: First, we ran the SEM only with control variables as influences on ds competence (M1). Second, only the influence of the training quality factors was analysed (M2). Lastly, the full SEM with training quality and control variables was run (M3. Fig. 2).



**Fig. 2.** Simplified illustration of full structural equation model (M3)

The same procedure was repeated for the dl dimension. Table 1 shows the global fit indices for the respective models. The fit indices for both procedures (ds and dl) are nearly identical and slightly deteriorate from M1 to M3, due to the increasing amount of complexity (e.g., Matsunaga 2010; Schermelleh-Engel et al. 2003). Following Byrne (1991), the full models (M3) still show acceptable  $\chi^2/df$  ratios  $< 2$ . CFI and TLI only reached good and acceptable fits for the first models, which is, however, not surprising since the indices decline with increasing model complexity (Bentler 1990). Unbiased by complexity, RMSEA and SRMR are the more useful indices for our models (Bentler 1995; Schermelleh-Engel et al. 2003). With regard to SRMR, the full models (M3) reached an acceptable fit ( $< .10$ ; Hu and Bentler 1995). RMSEA indicated good fits even for the full models ( $< .05$ ; Browne and Cudeck 1993). Therefore, the models seem to be acceptable for analysing competence development and the results of the three-step approach are presented in the next section.

**Tab. 1.** Global fit indices

Model	Exact fit indices		Approximate fit index	Residual based fit index	Comparative fit indices	
	Chi <sup>2</sup> /df ratio	p value	RMSEA	SRMR	CFI	TLI
<i>Ds</i> M1 <sub>C</sub>	1.53	.130	.036	.018	.981	.942
M2 <sub>TQ</sub>	1.61	.000	.042	.060	.859	.842
M3 <sub>full</sub>	1.58	.000	.043	.068	.825	.807
<i>Dl</i> M1 <sub>C</sub>	1.39	.184	.031	.020	.963	.889
M2 <sub>TQ</sub>	1.60	.000	.042	.060	.858	.841
M3 <sub>full</sub>	1.56	.000	.043	.068	.825	.807

*Ds* = Domain-specific competence; *Dl* = Domain-linked competence; *C* = Control variables; *TQ* = Training quality

## Results

Table 2 shows the results of the regressions for domain-specific competence. In the three-step procedure (M1 to M3), we generally focused on the results for the slope as our main interest. As can be seen, the control variables (M1<sub>C</sub>) only account for 6.4 % of the variance in ds competence development (slope), with higher *Age* corresponding to a lower increase ( $\beta = -.185^*$ ). On the contrary, the control variables better explain the starting point at T<sub>0</sub> (intercept) with about 33 % of variance being explained. Here, a higher *educational level*, higher *interest in math*, higher *aspirations* (aspiring a better final grade at the end of training) and being *male* correspond to a higher ds competence initial position.

How trainees perceive the in-company training quality in the middle of their training explains 18 % of the slope variance (M2<sub>TQ</sub>). Therefore, training quality seems to be more crucial for the development of ds competence than the control variables, yet none of the 14 factors stands out as a significantly influencing quality criterion (*In-Company Learning Methods* being the closest:  $p = .08$ ). In the full model (M3), about 27 % of the variance in ds competence development can be explained. *In-company Learning Methods* (didactical skills regarding the usage of different teaching methods, different materials and media) shows a significant moderate effect<sup>7</sup> on the competence slope ( $\beta = .396$ ),

<sup>7</sup> Effect size classification following Acock (2014, 272): standardised beta < .2 weak effect; .2–.5 moderate effect; > .5 strong effect.



while older trainees (*Age*) show less development in ds competence over the course of training (Tab. 2).<sup>8</sup>

**Tab. 2.** Results for standardized regression coefficients ( $\beta$ ) of SEM on domain-specific competence

	Slope			Intercept		
	M1 <sub>C</sub>	M2 <sub>TQ</sub>	M3 <sub>full</sub>	M1 <sub>C</sub>	M2 <sub>TQ</sub>	M3 <sub>full</sub>
Work Climate		.218	.100		.021	.246
In-Comp. Learning Methods		.312 <sup>p</sup>	.396*		-.293	-.294
Overload		.135	-.015		.087	.124
Variety of Tasks		-.057	-.187		-.094	-.006
Autonomy		-.062	-.056		.175	.199 <sup>p</sup>
Relevance of Tasks		.026	.042		-.005	-.047
Complexity		.173	.244		-.182	-.223
Requirements and Ability Level		.143	.215		-.0052	-.095
Expert Culture		-.035	-.265		-.020	.084
Functional Involvement		.167	.340		-.246	-.213
Social Involvement		-.180	.101		.111	-.057
Mentoring		-.123	-.283		-.020	.085
Feedback		-.037	-.092		.111	.024
Personnel & Instructions		-.066	-.042		.201	.141
Age	-.185*		-.210*	.001		.072
Gender	.028		.029	.275***		.322***
Language	.012		.003	-.077		-.049
Educational level	.152 <sup>p</sup>		.143	.215**		.191*
Maths interest	-.103		-.096	.264**		.219*
Aspired final grade	-.068		.078	-.299***		-.314**
Desired occupation	.101		.134	-.052		-.105
Number of employees	.032		.086	.027		.020
R <sup>2</sup>	.064	.181	.272	.332	.156	.522

\*\*\*significant < .001; \*\* significant < .01; \* significant < .05; <sup>p</sup> p-value < .10; *C* = Control variables; *TQ* = Training quality.

The same three-step SEM procedure was performed for domain-linked competence development. Table 3 shows the regression results for the dl models. First, the control variables explain 19.8 % of the slope variance (M1<sub>C</sub>). However, no control variable appears significant. Regarding the intercept, the control variables explain roughly the same amount of variance (18.3 %) as in the slope. *Aspirations* (aspiring to a better final grade at the end of training) shows a significant effect on the starting point for dl competence (i.e., trainees with greater aspirations in fact show higher initial positions). The *educational*

<sup>8</sup> Control tests showed that multicollinearity was no issue for the models.

level ( $p = .072$ ) comes close to the alpha .05-level. In model 2, in-company training quality alone explains more than 43 % of the variance in dl competence development. *Mentoring* (feeling as being left alone in the company; see Tab. A3) is significant on the alpha .10 level ( $p = .063$ ), indicating a strong effect ( $\beta = .787$ ). With regard to the slope variance, the full model delivers an  $R^2$  of .863, suggesting that the model is able to explain dl competence development very broadly (Tab. 3). However, none of the factors appears significant, with *Mentoring* still being the closest ( $p = .078$ ).

**Tab. 3.** Results for standardized regression coefficients ( $\beta$ ) of SEM on domain-linked competence

	Slope			Intercept		
	M1 <sub>C</sub>	M2 <sub>TQ</sub>	M3 <sub>full</sub>	M1 <sub>C</sub>	M2 <sub>TQ</sub>	M3 <sub>full</sub>
Work Climate		-.006	.054		-.067	.045
In-Comp. Learning Methods		-.213	-.184		-.050	.100
Overload		-.032	-.030		-.009	-.027
Variety of Tasks		.381	.455		-.280	-.303
Autonomy		-.061	-.059		.147	.133
Relevance of Tasks		-.140	.000		.166	.102
Complexity		-.022	-.047		-.011	-.101
Requirements and Ability Level		-.422	-.578		.202	.314
Expert Culture		-.291	-.426		-.146	-.094
Functional Involvement		-.442	-.485		.095	.285
Social Involvement		-.128	-.132		.007	.033
Mentoring		.787 <sup>p</sup>	.830 <sup>p</sup>		-.136	-.232
Feedback		.316	.290		.093	-.058
Personnel & Instructions		.304	.380		.082	-.069
Age	.220		.285	.009		.049
Gender	-.252		-.248	.067		.091
Language	-.230		-.056	-.016		-.050
Educational level	.121		-.019	.188 <sup>p</sup>		.223
Maths interest	.075		.113	.102		.075
Aspired final grade	-.083		-.046	-.260**		-.262*
Desired occupation	-.020		-.200	-.093		.091
Number of employees	.080		.088	.156 <sup>p</sup>		.173
R <sup>2</sup>	.198	.434	.863	.183	.104	.362

\*\*\*significant < .001; \*\* significant < .01; \* significant < .05; <sup>p</sup> p-value < .10; C = Control variables; TQ = Training quality.

## Conclusion and Discussion

We conclude that in-company training quality as a whole plays a considerable role in competence development on both measured competence dimensions (H1). Therefore, the findings of this study underline the importance of in-company training quality as a whole and its influence on trainee competence development as a major target of VET. Here, using a broad quality approach, encompassing 14 dimensions, we find that each quality dimension slightly adds to trainee competence development, while there are no apparent “major” predictors that statistically dominate the models. Thus, it seems that training quality should rather be seen as a formative and additive construct, instead of a group of competing quality variables.

For measurement approaches, this finding means that, instead of searching and accounting for particularly relevant variables, a broad range of quality criteria – ideally based on a broad theoretical conception – should be checked for in an initial analysis. For human resource management, the results indicate that trainers and training supervision should not focus too much on single aspects, but that they have to adhere to selected quality criteria while not neglecting others. This finding underlines the need to establish an encompassing quality assurance in training companies, where various quality aspects (e.g., Fig. A2) are to be considered, so that ongoing formative quality management ensures an expedient competence development of trainees. In this process, fostering the didactical skills of the training personnel (factor *In-Company Learning Methods*) appeared to be of particular importance for competence development, as is ensuring their constant care and support for the trainees (variable *Mentoring*). This finding is largely in line with the recommendation by Seeber (2014), who calls for adapted didactical approaches of the training personnel to meet the needs of trainees with different entrance abilities.

For VET research, the validated approach of separating the two vocational competence dimensions (ds and dl) seems promising when aiming to identify different effect sizes of training quality on vocational competence development. Also, regarding international comparative studies, the findings demonstrate the need to consider a domain-specific versus a domain-linked competence dimension to ensure a valid monitoring of training quality and outcomes in VET. However, in light of the different

extents of variance explanations, training quality appears to be more connected to domain-linked than to domain-specific competence development.

A closer comparison of the different models shows several interesting findings that should be further investigated. Domain-specific competence development seems to be relatively independent of trainees' background characteristics (gender, language, education, interest), aspirations and company size, and training quality also plays a smaller role there than for dl competence development: The development of domain-linked competence over the course of training can be explained to a greater extent by training quality and background characteristics. Despite measuring job-specific requirements from both company- and school-curricula, domain-specific competence is less related to training quality (than domain-linked), suggesting that trainees could, to a larger part, develop domain-specific competence in vocational schools, where such job-specific rules and guidelines (e.g., specific calculation schemes) are not only taught but also practically implemented and graded in exams. Vice-versa, in-company training quality shows a stronger effect on the development of more general knowledge and basic skills (domain-linked competence). Yet, both competence dimensions are strongly affected by the in-company training quality. Moreover, in-company training quality might also play a major role in conveying company-specific knowledge and implicit knowledge. However, our study-design did not include company-specific and implicit knowledge aspects since such aspects are impossible to measure in a standardised company-independent test. Here, an experimental intervention design, varying company training conditions, might be an expedient approach to measuring effects on company-specific and implicit competence aspects, whereas we focused on the general, official curriculum for schools and companies.

The control variables, mainly trainees' socio-demographic characteristics, math interest and aspirations, do not relate to vocational competence development in the way it was expected from the available literature but do significantly affect trainees' starting point for competence growth. This finding could indicate that, regardless of personal background characteristics, every trainee in the

starting group is able to develop domain-specific competence over the course of training.<sup>9</sup> This means that our hypotheses 2 and 3, trainees' educational level and interest in math impact their competence development, can only be partly confirmed with the restriction that both aspects only impact the starting point for competence development. Additionally, we can confirm H4 with the restriction that higher aspirations are related to a better initial position on both competence dimensions. Neither trainees' language, nor whether the VET was for their most desired occupation before commencing the training, nor the company size appear to be of significant relevance. However, regarding trainees' most desired occupation, this finding might well be related to the high agreement on the scale and the high educational level, indicating that in this sample most trainees had a free vocational choice.

When interpreting the results, several points should be considered. First, industrial business management trainee is one of the most popular (Destatis 2022) and best-rated training courses in Germany, predominantly chosen by trainees with a high educational level (DGB-Bundesvorstand 2019). It is possible that the relation between poor/high training quality and low/high competence development is stronger in occupations currently providing a generally lower training quality level, e.g., trainees in hotel and hospitality or in craftsman training. Second, we only used trainees' evaluations of training quality and omitted the perception of trainers. Third, due to the research project's focus, a trait motivation was initially not planned to be measured and could thus not be included. Statements on motivational effects are therefore restricted to trainee aspirations (regarding the final grade). Fourth, the sample representativeness can be limited due to selection effects as only trainees who participated in all three data collections are considered and trainees who missed the data collection or who have dropped-out of training would presumably affect the findings.

Furthermore, the assumed effect of training quality on competence development holds only for the second period ( $T_1$  to  $T_2$ ) as data on training quality was surveyed at  $T_1$ . Thus, inversely, the competence development during the first period could influence the quality perceptions measured at  $T_1$ .

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<sup>9</sup> None of the models showed a significant covariance of the initial level (intercept) and development (slope), meaning that individual development takes place predominantly independent of the starting point (p-values > .36).

However, measuring in-company training quality at  $T_0$  did not appear plausible since trainees would have been trained within the company for less than a month (if at all, considering the time spent in vocational schools). In addition, the survey on training quality at  $T_1$  asked for quality evaluations considering the past time interval before competence at  $T_1$  was measured, supporting the assumed causal direction. Lastly, four scales (*Training Requirements and Ability Level*, *Involvement in Expert Culture*, *Relevance of Tasks*, *Functional Involvement*) showed suboptimal internal consistencies ( $.65 < \alpha < .70$ ) but were kept in the analysis as a trade-off for securing an encompassing approach to training quality and enabling their roles in the process of competence development to be explored.

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The authors declare that they have no competing interests.

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## Appendix

Table A1

*Sample characteristics*

Aspect	Coding	Frequency	Percentage	Valid Percentage	Cumulated Percentage
<b>Gender</b> n = 455	Female	291	63.5	64	64
	Male	164	35.8	36	100
<b>Educational Level</b> (highest school leaving certificate) n = 456	Below Secondary school (e.g. Hauptschulabschluss)	1	0.2	0.2	0.2
	Secondary school certificate (Mittlere Reife)	91	19.9	20.0	20.2
	Advanced technical college (Fachhochschulreife)	133	29.0	29.2	49.3
	General higher education certificate (allgemeine Hochschulreife/Abitur)	231	50.4	50.7	100
<b>Aspired Final Grade</b> n = 442	1.0 – 1.5	116	25.3	26.2	26.2
	1.6 – 2.0	237	51.7	53.6	79.9
	2.1 – 2.5	81	17.7	18.3	98.2
	2.6 – 3.0	7	1.5	1.6	99.8
	3.1 – 3.5	1	0.2	0.2	100
<b>Language(s)</b> (spoken at home) n = 453	Only German	344	75.1	75.9	75.9
	More than German	101	22.1	22.3	98.2
	Only other than German	8	1.7	1.8	100
<b>Company Size</b> (Number of employees) n = 438	1 – 5	2	0.4	0.5	0.5
	6 – 10	2	0.4	0.5	0.9
	11 – 20	9	2.0	2.1	3.0
	21 – 50	30	6.6	6.8	9.8
	51 – 100	49	10.7	11.2	21.0
	101 – 250	95	20.7	21.7	42.7
	251 – 500	105	22.9	24.0	66.7
	501 – 1000	68	14.8	15.5	82.2
	> 1000	78	17.0	17.8	100

Note. N maximum = 458.

Table A2

*Descriptive data on person abilities (competence)*

	T0	T1	T2	Δ
Domain-specific	-.80631	.04767	.86231	1.669
Domain-linked	-.38542	-.01792	.18770	.573



Table A3 – part 1  
Item statistics

Scale/Factor	Item/Indicator	Cronbach's $\alpha$ (if item deleted)	Mean value	Standard deviation	Factor loading
<b>Personal Factors</b>					
Maths interest	My interest in the following topics is... Maths: [i]		2.19	1.154	
Desired Occupation	My training course was my desired occupation at the time I chose it.		3.04	.981	
<b>Learning Environment</b>					
Work Climate	021 If necessary, the employees in my company support each other.	.724	3.11	.806	.677
(α .77)	022 There is a personal atmosphere within my company.	.723	3.02	.839	.714
	023 There is a bad working atmosphere in my company. [R]	.677	3.00	.900	.800
	024 There is strong competition between employees in my company. [R]	.732	2.91	.883	.517
	025 Employees in my company are rigorously monitored and controlled. [R]	.750	2.77	.956	.499
In-Company Learning Methods	026 Workplace learning in my company is characterized by different teaching methods.		1.89	.999	.868
(α .84)	027 Workplace learning in my company is characterized by the usage of different materials and media.		2.11	1.020	.789
<b>Work Tasks</b>					
Overload	044 In my company I fear making mistakes at work. [*]	.816	2.25	.977	.487
(α .83)	045 In my company I feel under pressure of time at work. [*]	.804	2.81	.829	.572
	048 In my company others interfere with my work. [*]	.830	3.32	.758	.421
	049 I have problems recharging my energy in my spare time after work. [*]	.791	2.83	1.137	.730
	050 Because of the daily demands in my company I feel totally exhausted, tired and drained. [*]	.780	2.47	1.109	.800
	051 I often think 'I can't go on any longer'. [*]	.792	3.12	1.052	.756
	xxx I have to do a lot of activities at once. [*]	.819	2.27	1.068	.492
Variety of Tasks	052 In my company I deal with a variety of work tasks.	.852	2.47	.867	.523
(α .78)	053 In my company I work on new tasks every now and then.	.594	2.34	.969	.841
	054 In my company work tasks are highly diversified.	.596	2.41	1.000	.872

Table A3 – part 2  
Item statistics

Scale/Factor	Item/Indicator	Cronbach's $\alpha$ (if item deleted)	Mean value	Standard deviation	Factor loading
Autonomy ( $\alpha$ .80)	056 In my company I am often able to make decisions myself.	.766	2.65	1.043	.701
	057 In my company I am able to decide what means to take to reach a goal.	.696	2.50	1.029	.805
	058 In my company I am given an enormous amount of freedom in doing my job.	.721	2.48	.982	.773
Relevance of Tasks ( $\alpha$ .68)	059 In my company I am given responsible tasks.	.551	2.69	.916	.727
	060 In my company I work on 'real tasks'.	.437	3.15	.901	.847
	061 In my company I have to deal with several tasks that are not part of my vocational training program (e.g. make coffee, copying, etc.). [R]	.774	2.94	1.087	.456
Complexity of tasks ( $\alpha$ .74)	063 In my company work tasks are characterized by considering a wide range of information.	.581	2.47	.810	.752
	064 In my company work tasks are characterized by considering a wide range of objectives. [*]	.649	2.60	.849	.687
	065 In my company work tasks are characterized by considering changes over time.	.722	2.50	.880	.569
Training Requirements and Ability level ( $\alpha$ .65)	067 In my company I am confronted with tasks that are too complicated. [*]	.389	1.55	1.668	.680
	068 In my company I am confronted with tasks I am insufficiently trained and prepared for. [*]	.484	1.65	1.623	.711
	070 In my company I am confronted with tasks that are challenging for me. [*]	.687	1.43	1.106	.452
<b>Social Interaction</b>					
Involvement in Occupational Expert Culture ( $\alpha$ .66)	072 I am involved in the improvement of work processes in my company.	.602	2.06	1.094	.546
	073 My ideas and proposals are considered in my company.	.545	2.01	1.075	.696
	074 I am involved in the discussion of technical and professional issues in my company.	.551	1.88	1.138	.617
Functional Involvement ( $\alpha$ .69)	075 Continuous collaboration is part of the daily work in my company.	.663	2.23	.930	.603
	077 I am involved in all work tasks in my department.	.668	2.50	1.042	.473
	078 Basically, my work tasks play a crucial role for my department.	.609	2.33	.979	.548
	079 I am well integrated into the operational working procedures.	.545	2.27	.899	.822

Table A3 – part 3  
Item statistics

Scale/Factor	Item/Indicator	Cronbach's $\alpha$ (if item deleted)	Mean value	Standard deviation	Factor loading
Social Involvement  ( $\alpha$ .78)	080 Employees in my company are interested in me.	.680	2.91	.847	.777
	081 Employees in my company are interested in my private well-being.	.772	2.50	1.040	.662
	083 Employees in my company seem disturbed by my presence. [R]	.746	3.66	.670	.681
	084 Employees in my company ignore me. [R]	.724	3.69	.668	.705
<b>Educational Mediation</b>					
Mentoring  ( $\alpha$ .73)	085 In my company nobody feels responsible for me. [R]		2.65	1.682	.778
	086 In my company I am completely left alone to myself. [R]		2.68	1.694	.736
Feedback  ( $\alpha$ .83)	092 In my company good performances are praised.	.815	2.93	1.017	.617
	093 Normally I do know whether I perform work tasks satisfactorily or not.	.793	2.93	.829	.684
	094 I find it hard to figure out whether I perform work tasks satisfactorily or not. [R]	.825	2.96	.880	.539
	095 The training personnel and my colleagues let me know whether I perform work tasks satisfactorily or not.	.783	2.81	.917	.799
	xxx The training personnel always give clear and convincing reasons for the assessment of my performance.	.787	2.70	.933	.766
	xxx The training personnel check my work results and give me factual feedback.	.813	2.65	.958	.649
Personnel and Instructions  ( $\alpha$ .88)	096 Those who train me on the job give explicit work instructions.	.876	2.33	.862	.618
	097 Those who train me on the job are able to answer difficult technical questions.	.846	2.20	.929	.819
	098 Those who train me on the job can explain well.	.844	2.31	.838	.824
	99 There is a lot I can learn from those who train me on the job.	.837	2.17	.956	.854
	100 Those who train me on the job show that they enjoy their work.	.900	2.37	.911	.500
	101 Those who train me on the job are technically competent.	.836	2.14	.930	.856

Note. n = 458. [R] = reversed items. [\*] = items reverse-scored for the analysis in order to facilitate understanding of the results. 4 represents maximum quality. Original response options: 0 = strongly disagree, 1 = mostly disagree, 2 = partly agree, 3 = mostly agree, 4 = completely agree. [i] = response options: 0 = no interest, 1 = low interest, 2 = medium interest, 3 = high interest, 4 = very high interest. Scales taken from the instrument VET-LQI (Böhn & Deutscher 2021).

**Fig. A1** Exemplary company framework of the competence test (Deutscher and Winther 2018, 29 f.)

# Ceraforma Keramik AG



Since its foundation in 1982, the Ceraforma Keramik AG has developed into an expanding and globally active industrial enterprise having their head office in Aachen, Germany. The company is involved in the production of ceramic goods, such as china and porcelain for tableware and vases or sanitary ware.

In the past, the management of Ceraforma Keramik realized that the four divisions – procurement logistics, production, human resource management as well as marketing and sales – used to operate too independently from each other, which caused disturbances in the performance process and led to customer complaints. In response to these problems, so-called *horizontal teams* were established consisting of work members from different company divisions.

You have been employed with Ceraforma Keramik in such a horizontal team since the beginning of this year. Here the allocated customer orders are being handled in all business processes ranging from the receipt of orders to the settlement of accounts. Ms Kenk, the team leader, Mr Friebe and Ms Hoffmann, the new trainee, are your colleagues in the horizontal team.

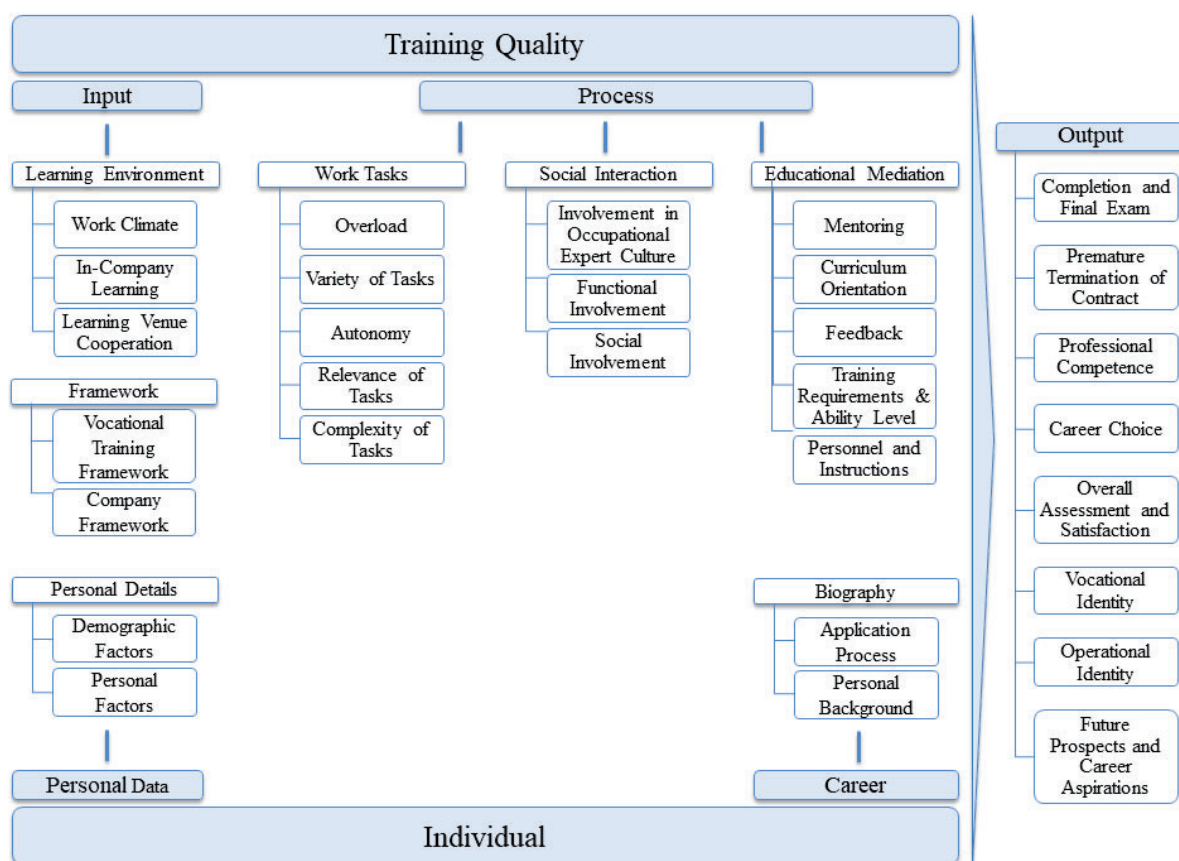


## Business Process 1

### **Situation:**

Your team just received a new customer enquiry. Your colleague, Mr Friebe, shows you the following e-mail which arrived on 30 March 20... at 10:17.

**Fig. A2** Operationalisation of training quality (Böhn and Deutscher 2019)



## 5 Discussion and Outlook

In this final chapter, the first subsection (5.1) summarizes the main findings of this dissertation paper-wise before a general résumé is drawn. In Section 5.2, the findings are discussed further by analyzing several scientific and practical implications of all papers, followed by overarching implications regarding the initially described problems in vocational training (e.g., black-box character). In a last step (Section 5.3), general limitations as well as more specific limitations with respect to particular papers are discussed. Furthermore, outlooks for future research to overcome the prevailing limitations and research gaps are stated.

### 5.1 Summary of Findings

The first overarching research interest in papers 1 and 2 was to assess in-company training quality in the business management domain and discover whether research findings might depend on who was asked. Overall, in-company training within the sample appears to be of relatively high quality as trainees and trainers were widely satisfied with most quality criteria. However, this satisfaction might be due to the comparably good training conditions within the included occupations from the business management domain, especially with regard to the large proportion from the banking sector. Both groups of actors agree on the best (*Mentoring, Curriculum Orientation*) and the worst (*Involvement in Expert Culture, Autonomy*) implemented quality aspects. However, findings in both papers confirm the impressions from the literature (e.g., Cully & Curtain, 2001; Griffin, 2017; Negrini et al., 2016; Stalder & Schmid, 2006; Walker et al., 2012), underlining that results do depend on who is asked, as trainers evaluated training quality significantly higher than trainees did. Additionally, the findings showed that differences in perception are higher when trainees are not taking part in their priorly most *Desired Occupation* and during the third *Year of Training*, while socio-demographic aspects and company size do not seem to play a significant role.

What was widely ignored until now was targeted by the second overarching research interest in papers 1 and 2: Does the finding of existing perceptual differences affect research on topics related to training quality? As was shown in Paper 2, the relation of training quality to outputs (exemplified by

drop-out intention) depends on which methodological approach (perspective) is taken. Here, the presented novel multi-perspective assessment of training quality (Paper 1), grounded on the Negative Incongruence Theorem (NIT) and operationalized as difference accounting multi-perspective (DAM-) scores, helps in reflecting on the different perceptions. The findings indicate that the approach could be useful regarding the research on drop-out intention, with higher explanatory power (increase of 10.6 percentage points), significance on a higher level, and partly stronger relations revealed. Moreover, the DAM-Scores show stronger correlation to drop-out intention than both trainees' and trainers' one-sided perception of training quality, especially for the first-year trainees, whose drop-out risk is the highest. In general, multi-perspective approaches appear to be better suited to modelling the interactive nature of the professional socialization processes within vocational training. However, the criterion *Social Involvement*, which was only relevant in the mono-perspective model, seems to be an indication that, for some aspects, the mere trainee perception might be superior to the difference approach, for example when subjective well-being might be of interest. Thus, the decision whether a mono- or multi-perspective approach is chosen should be made in consideration of the dependent variable of interest.

The findings of papers 3 and 4 investigate the question whether in-company training quality affects training outputs. Paper 3 defined, operationalized, and tested a four-directional approach to drop-out intention via four specific directional items. The approach proves useful in distinguishing between the upward, downward, and two horizontal (company vs. occupation change) directions and helps in identifying direction-typical influencing factors regarding drop-out intention. The findings confirm the complexity of the drop-out process as emphasized in the literature (e.g., Ertelt, 2003; Hensge, 1984; Schuster, 2016), with multiple factors involved, and indicate that the drop-out phenomenon cannot be traced back solely to the individual but seems, additionally, to be connected to several criteria related to the company environment. Of all factors considered, in-company training quality appears to have the largest influence on all directions of drop-out intention, especially the horizontal paths. However, it is only possible to explain small shares of the variance in upward and downward drop-out intention by training quality (adjusted  $R^2 < .1$ ). Generally, motivation-related (e.g., *Desired Occupation*, self-



assessed *Training Performance*) and socio-demographic aspects, such as the educational level, also play a crucial role.

The results indicate a two-tier scheme with (1) *Social Involvement* as an overarching factor influencing all four directions of drop-out intention and (2) several direction-typical factors. Upward drop-out within the sample was mainly intended by trainees who possessed a higher educational level and were facing high *Overload* and high *Complexity of Tasks*. Downward drop-out intention seems to be induced especially by a high *Requirement-level*, stringent *Curriculum Orientation* and priorly lower educational performance. The intention to change the training company predominantly appears to be related to weak *Mentoring* and *Feedback* and being *overloaded* as well as facing *Non-Training Tasks*. Lastly, trainees intending to change their training occupation were unsatisfied with their own *Training Performance*, *Overload*, *Complexity of Tasks*, *Curriculum Orientation* and indicated not being trained in their most *Desired Occupation* (Krötz & Deutscher, 2022, p. 12 f.).

The findings of Paper 4 stress the meaning of in-company training quality for a trainee's competence development and show that the broad measurement approach on training quality can clearly detect effects both on domain-linked and on domain-specific competence development. However, in contrast to drop-out intention, where different quality criteria differ in their relevance and seem to be related to specific directions, in-company training quality appears to affect competence development more as a broad and additive construct, where an encompassing quality level needs to be ensured that covers the entire training, for example, all areas of Böhn and Deutscher's (2019, p. 66) quality model (Learning Environment, Work Tasks, Social Interaction, and Educational Mediation). Furthermore, the findings indicate that, despite affecting both competence dimensions considerably, in-company training quality is more strongly related to domain-linked competence development (variance explanation of 86% including control variables) than to domain-specific competence development (variance explanation of 27% including control variables). Lastly, domain-specific competence develops relatively independently of a trainee's personal characteristics (except for trainee age), aspirations, and the company size. The same holds for the domain-linked competence dimension, where the effect of such characteristics on competence development is slightly higher but stays relatively similar to the

initial effect. The absence of a significant covariance between starting points and developments supports this finding. However, Paper 4 confirms the literature regarding the immense role of trainee educational level, mathematical interest, and motivation-related aspects (aspirations) for the starting point of competence development.

Overall, the findings help to enlighten the black box of vocational training by delivering new insights into (1) the status quo of in-company training quality with respect to the included occupations from the business management domain, (2) how the two main group of actors (trainees and trainers) differ in their evaluations of training quality, and (3) the effects training quality exerts on drop-out intention and competence development over the course of training. Concerning the used model of training quality (Böhn & Deutscher, 2019, based on Tynjälä, 2013), the findings support the assumed process structure, with outputs (drop-out intention and vocational competence) being results of both the input (e.g., educational level) and the process dimensions (training quality criteria), as argued by Krötz and Deutscher (2022). The scientific and practical implications resulting from the findings of this dissertation are discussed in the following section.

## **5.2 Scientific and Practical Implications**

Multi-perspective operationalization of training quality appears to be a fruitful approach to meeting the challenges of vocational training's interactive character. Especially with regard to the input and process dimensions' effects on outputs of training, multi-perspective approaches can illuminate relations that so far conventional mono-perspective approaches could not identify, which might partly explain the prevailing lack of empirical evidence for such relations (e.g., Nickolaus, 2009). However, the methodological decision on which approach on training quality to take depends on the target variable. The NIT appears particularly promising when conflict potential needs to be considered (e.g., in the case of drop-out) but might be inappropriate for other output aspects, where a sole trainee-related measurement is of interest (e.g., competence). In this regard, further research is necessary, for instance, examining the relation of in-company training quality to the four directions of drop-out intention in a multi-perspective design to compare the findings of both approaches and ultimately enable valid scientific implications.

As objective reference criteria for training quality are available for only few aspects (e.g., working hours regarding *Overload*) and objective evaluations for a sufficient sample size are, if at all, only achievable with considerable economic effort (e.g., observing whole training segments of individual trainees), the presented DAM-Score approach is helpful in mitigating the problem of subjective quality evaluations by providing a second perspective. Using DAM-Scores, both perceptions remain subjective but deliver a bilateral measure of training quality, in the sense of a conflict potential barometer, without applying the problematic mean-value approach that prevails within multi-perspective studies (e.g., Cully & Curtain, 2001; Greilinger, 2013; Griffin, 2017; Stalder & Schmid, 2006; Wisshak & Hochholdinger, 2019). The approach is thus a valuable tool to be used not only in research but also in practice, where quality assurance could benefit from obtaining a more balanced picture of training reality by additionally considering differences in perception between trainees and trainers. Furthermore, the approach could be implemented as an early alert system, indicating increasing dissent between trainee and trainer (Krötz & Deutscher, 2021a). Here, frequent and bilateral quality evaluations by each trainee and relevant trainers, for example, using short scale surveys on training quality via a smartphone app, could enable human resource management to intervene and initiate a dialogue, identify problematic training aspects, and approach reconciliation before negative consequences such as drop-out evolve.

Despite the numeric values expressing training quality on a given response scale for a range of criteria, individuals might view the relevance of those criteria differently, with trainees weighting criteria as more or less important (e.g., one trainee might find it important to be able to work on a wide variety of tasks, whereas another trainee weights a pleasant work climate as most important). Furthermore, the satisfactory quality level for each individual remains unclear: it remains unknown which survey response (mean scale response of, e.g., 3 vs. 3.5 vs. 4) reflects a ‘high’ training quality that would be judged satisfactory. In this regard, Kano et al.’s (1984, cited from Kano, 2001) two-dimensional approach (“physical sufficiency” vs. “user perception”) to quality perceptions and customer satisfaction, which differentiates quality evaluations into the categories “Must-Be Quality”, “Attractive Quality”, “One-Dimensional Quality”, “Indifferent Quality”, “Reverse Quality” and “Skeptical Quality”

(Kano, 2001, p. 4 f.), could be transferred to and tested for the catalogue of training quality criteria in future research.<sup>20</sup> Thereby, distinct satisfaction curves could potentially be revealed for different types of quality criteria as, for example, trainees could require quality levels for the *Work Climate* that are different to those for *Autonomy* (e.g., too much autonomy being taxing rather than being experienced as positive). Knowledge on such differing categories of training quality criteria (with regard to the trainee satisfaction patterns) could be useful for further research and also help practitioners allocate their efforts in assuring and improving training quality more efficiently.

On the outputs side of vocational training, operationalizing drop-out (intention) as a four directional construct (Paper 3) appears to be beneficial for differentiating more precisely between (1) different intentions during training, (2) different decisions and paths after terminating training, and (3) differing potential causes influencing (1) and (2) over the course of past training periods. With this approach, the complex nature of the drop-out phenomenon can be better depicted and partly disentangled. The four-directional operationalization can be seen as a first step away from the prevailing drop-out research, in the sense of a backward-oriented search for causes (see Böhn & Deutscher, 2022), towards research on helpful prognostic models, using personal characteristics and quality perceptions to ultimately predict drop-out potential in the future. For such an endeavor, more evidence on the relation between drop-out intention and actual drop-out is needed, as well as a national statistics or databases on the realized paths after dropping-out.

Nevertheless, the findings already offer some insights into the genesis of drop-out intentions for practice, so that more precise interventions are possible. Due to the impressions of a two-tier scheme of factors influencing drop-out intention, training companies should focus, above all, on the *Social Involvement* of trainees since it is the only aspect significantly related to all four directions of drop-out intention. With a satisfactory social involvement level present, the training personnel should aim to

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<sup>20</sup> The approach was inspired by Herzberg et al.'s (1959) Motivator-Hygiene Theory (here: "Attractive" vs. "Must-Be" Quality; Kano, 2001, p. 6), which will be referred to below. The original paper by Kano et al. (1984) was published in Japanese and is therefore cited indirectly.

improve the specific direction-typical factors for the drop-out type with which the company recently experienced the most problems (Krötz & Deutscher, 2022) or, ideally, monitor drop-out intentions for each direction and offer corresponding interventions regarding the specific direction-typical factors for different groups. As mentioned above, establishing a system of steady interchange, for example, by directly inquiring into trainees' drop-out intentions, enables interventions and increases the chances of preventing the costs, the loss of time, and the insecurity a drop-out entails.

The findings of Paper 3 generally indicate that in-company training plays a decisive role in drop-out, suggesting it would be fruitful to partially shift the prevailing research focus on learner characteristics (see Section 2.2.2) to processual aspects of vocational training. However, the findings regarding drop-out intentions are not simply transferable to actual drop-out (as will be discussed in the limitations, Section 5.3) and dropping out is not always merely negative since, for some individuals, a prior mismatch might be dissolved, enabling a more suitable subsequent career path (Schmid & Stalder, 2012).

The outstanding role of *Social Involvement* in drop-out intention is in line with findings in the literature, where social aspects and conflicts are often found to be relevant to drop-out (e.g., Alex, 1991; Ernst & Spevacek, 2012; Faßmann & Funk, 1997; Findeisen et al., 2022; Greilinger, 2013; Schöngen, 2003; Stalder & Schmid, 2006), and reinforces the decision for the interactional framework of this dissertation to meet vocational trainings' interactivity and socialization processes. The finding of the criterion not being significant in the DAM-Score analysis (Paper 1), despite its effect as trainee-evaluated variable, indicates that, for some training aspects, the trainee perspective might be more relevant for research – at least for *Social Involvement*, it seems plausible that trainees need to feel comfortable. Furthermore, the finding of a two-tier scheme of influences on different directions of drop-out intention (with *Social Involvement* being an overarching influence factor) partly corresponds to Herzberg et al.'s (1959) two-factor theory, in which the assumption is made that extrinsic work conditions (including comparable social aspects such as the relations to chiefs, colleagues, and subordinates) are responsible for dissatisfaction and thus plausibly clearly related to drop-out intention as well. On the other hand, the work itself is intrinsic to motivation and satisfaction, which is also partly

reflected in the findings of Paper 3, where work task characteristics seem to be more specifically decisive for trainee intent to change an occupation or a company, or leave VET upwards versus staying within the training company.

The findings of Paper 4 – in-company training quality as a broad construct influencing competence development – underline the meaning of in-company training quality for trainee competence development and thereby enrich the research status, where some studies have found effects on competence development only for specific training quality criteria, which were, in turn, partly disconfirmed by other scholars (see Paper 4, Section *The Role of Vocational Training for Competence Development*). The findings also highlight the importance and impact of pedagogical work within training companies since the various quality criteria can be seen as pedagogically shapeable aspects of training. In this regard, an encompassing quality assurance should be established within the training companies, where the whole range of quality criteria is considered, as in-company training quality affects competence development as a broad construct rather than through isolated competing criteria. To avoid neglecting single quality aspects, again, training personnel should implement comprehensive and frequent quality evaluations. The role of pedagogical work is emphasized further as the findings reveal didactical variety (*In-Company Learning Methods*) and *Mentoring* to be the most relevant quality criteria for competence development within the analyses. This finding also reinforces the assumed constructivist view on learning, where the trainer takes the role of a learning guide and mentor for trainees' learning processes. Furthermore, in connection with the finding of differing starting points for competence development due to trainees' diverse background characteristics, this finding also underlines the recommendation by Seeber (2014), who demands didactical variety from the training personnel, a variety that has to be adapted to the needs of heterogeneous trainees differing in their entrance abilities.

Another interesting finding with practical relevance is that trainees' socio-demographic characteristics, their aspirations (regarding the final grade), and mathematical interest show lower impacts on competence development than could be expected from the literature (e.g., Abele, 2014; Baethge-Kinsky et al., 2016; Dietzen et al., 2014; Frank et al., 2017; Nickolaus et al., 2015; Schafer &

Baeriswyl, 2015; Seeber, 2014). Moreover, such characteristics affect the individual starting points, but the development of vocational competence shows no significant relation to these initial positions. The findings on competence development during training, thus, neither confirm a further spreading of competence levels by trainees with higher initial competence compared to trainees with lower starting positions nor a significant catch-up effect by initially ‘weaker’ trainees; while both effects were described in the literature (e.g., Atik & Nickolaus, 2016, p. 246). However, more detailed analyses are necessary to examine the differences in competence development potential of specific trainee groups (e.g., cluster analysis). Furthermore, the degree to which the current training matches the priorly *Desired Occupation* does not significantly affect competence development over the course of training, despite the role of expectational mismatches discussed in the literature (e.g., CEDEFOP, 2016; Michaelis & Findeisen, 2022; Nägele & Neuenschwander, 2015) and the influence of *Desired Occupation* on drop-out intention in papers 2 and 3.

Lastly, with regard to the two dimensions of vocational competence presented, the findings of Paper 4 suggest that trainees develop domain-specific competence to a greater extent in vocational schools: Despite incorporating requirements from company and school-curricula into the competence test, the models for domain-linked and domain-specific competence development differed considerably in the extent of variance explained (86% vs. 27%), although the same encompassing approach was applied. Referring back to the quote<sup>21</sup> from Salas et al. (2012, p. 77), stated in the beginning of Section 2.3, in-company training surely appears to ‘produce’ learning and, over time, foster competence development. But with regard to the sample’s context of dual VET, “a great deal of learning occurs outside of [in-company] training” (ibid., p. 77) in vocational schools, where domain-specific contents (such as specific calculation schemes) are predominantly learned and practiced. Training quality is, however, strongly related to the development of more general knowledge and basic skills (domain-linked competence). For research, the approach of modelling two distinct, but related, vocational

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<sup>21</sup> “Although learning and training are related, they are not the same. Some training fails to produce any learning, and a great deal of learning occurs outside of training” (Salas et al., 2012, p. 77).



competence dimensions appears useful for analyzing relations to training quality and could be transferred to research in the school context (using school-specific quality aspects) in the future. Additionally, in light of the needed international comparative studies (Winther & Achtenhagen, 2009), the findings reinforce the proposed two-dimensional structure of vocational competence for any valid monitoring of training quality and training outputs.

The findings of this dissertation<sup>22</sup> indicate that in-company training quality (1) can be made more ‘tangible’ by, for example, using the various criteria from the proposed quality model (Böhn & Deutscher, 2019) and its corresponding survey instrument VET-LQI (Böhn & Deutscher, 2021), and (2) affects outputs, such as drop-out intention (satisfaction) and vocational competence, through a broad range of pedagogically influenceable quality criteria that – unlike the black-box view – offer extensive opportunities for companies and training personnel to shape the outputs of future trainee cohorts.

For company-based pedagogical work, three central implications, in the sense of recommendations, stand out. First, the necessity to create a social environment where trainees like to participate and learn and where they are socially involved. Second, the need to implement a system of continuous exchange of ideas, opinions, and concerns over the course of training, with clear and easily accessible contact persons. This need stems from the importance of reaching agreement on training quality perceptions (or at least in avoiding large perceptual differences), which seems only achievable through frequent exchange, and from the influence of the quality of *Mentoring* on competence development. In this regard, this objective could be supported by technological tools (e.g., smartphone apps, virtual meetings, online forums), yet further research seems to be necessary to maximize the potential of such practices. Third, the findings throughout the four papers further stress the relevance of considering trainees’ educational level, prior school and training performances, interests, expectations, and motivation-related characteristics in the context of company-based pedagogical work. Moreover,

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<sup>22</sup> As well as relevant findings of several other recent studies, to which reference is made within the respective papers.

the general necessity for professional pedagogical training of the training personnel within companies can be emphasized as it plays an important role in achieving a high-quality training environment.

### 5.3 Limitations and Research Outlook

When interpreting and generalizing the findings of this dissertation, several limitations should be considered. First, all results are limited to the commercial and business management domain, where in-company training conditions are relatively good compared to other areas such as trades' or home economics' professions (e.g., BIBB, 2021; Destatis, 2022; DGB-Bundesvorstand, 2019). However, as for the multi-perspective approach of negative differences in perception, the explanatory power of the approach for drop-out intention could be larger in occupations with lower levels of training quality since differences might be more severely pronounced. Further research is necessary to confirm the assumptions of the NIT in lower quality settings. Additionally, to investigate the role of training quality in samples with a greater variance of quality perceptions (or generally lower quality levels), the analyses of training quality's effects on drop-out intention and competence development need to be replicated in other settings, such as trades' or home economics' professions,.

Second, throughout the analyses, a few quality scales show weak internal consistency (Cronbach's Alpha < .7). Following the recommendations of Schermelleh-Engel and Werner (2012, p. 136), the scales were kept within the analyses in most cases ( $\alpha \geq .63$ ) to preserve the broad approach to training quality, in favor of a valid, holistic view on the construct, as opposed to narrowing training quality to a few quality criteria. Nevertheless, revising items or creating additional items seems to be necessary for the scales *Relevance of Tasks*, *Training Requirements and Ability Level*, and *Curriculum Orientation*. Since the VET-LQI was initially designed as a survey instrument from the trainee perspective, further research on bilateral surveys could improve multi-perspective assessments, not only for the perception of in-company training quality but also for teacher-learner differences related to (vocational) school quality.

The third overarching limitation is inherent in using a retrospective, self-report survey instrument:

We are generally not asking people to report a specific or finite event. We are asking persons to go well beyond that and to engage in a higher-order cognitive process—a process that involves not only recall but weighting, inference, prediction, interpretation, and evaluation. (Podsakoff & Organ, 1986, p. 533)

This request means that participants need to “work at a fairly high level of abstraction” (ibid, p. 533) to summarize their perceptions of several situations within the work environment. Here, as Rausch (2012, p. 7) argues, referring to Tourangeau (2000), memory errors, in the sense of imperfect recollection and filling-in, bias overall responses. Therefore, the obtained data is distant (to an unknown extent) from an immediate measurement within the process or close to specific events, for example. by using a series of surveys in shorter intervals or experience sampling via direct diaries. Furthermore, Rausch (2012, p. 7) points out that the causality inherent in the response behavior could be reversed compared to the assumptions made within the conducted statistical analysis since output factors such as the overall satisfaction or drop-out intention at the time of measurement could retrospectively influence how trainees evaluate their training conditions (input and process criteria).

Against this backdrop, training quality’s relation to outputs can only be interpreted as a presumed effect direction, for which the findings of this dissertation deliver plausible indications. The causality problem is less prominent in longitudinal designs (Paper 4: causality assumable for  $T_1 - T_2$ ; see Paper 4 specific limitations below) and can partly be mitigated as an objective measurement of the output variable (competence test) was conducted after trainees completed the survey on training quality scales. Also drop-out intention (papers 1–3) was measured (without prior announcement) after trainees had evaluated training quality in the survey, so that the impact of drop-out intentions within the quality scales is less likely. Lastly, the relevance of this issue can, in part, be weakened since such a retrospective ‘reversed causality’ response behavior would imply apparent multicollinearity of the quality scales, as their evaluation would be induced by the same overall satisfaction level. However, multicollinearity was no issue within the analyses. Besides the absence of multicollinearity, biases due to common method variance cannot be ruled out for papers 1 to 3 since the dependent and independent variables were collected within the same survey (e.g., Podsakoff & Organ, 1986). The clearly varying and mostly low

to moderate correlations between the quality scales indicate that, at least, no severe common method bias should be present.

For papers 1 and 2, a further limitation lies in the validity and reliability of the trainer perspective. In the data collection, only the central training officers were considered, and they are usually not the main interaction partner for trainees in the context of daily on-site training. Furthermore, one trainer response would be aligned with responses from more than ten trainees on average, and thus, for the calculation of the DAM-Scores, the particular trainer response has enormous effects on the resulting perceptual differences across several trainees. As an alternative research design, multiple colleagues charged with training tasks could be requested to evaluate training quality so that a mean rating would produce a more balanced company perspective within the DAM-Scores. In this regard, to improve the representation of the interactive training reality when evaluating in-company training quality, future studies could also involve trainees' daily contact persons within their measurement approach, either by direct interviews and surveys or by letting trainees describe their daily interactions in work diaries. In light of the desired multi-perspective assessment, trainer characteristics are still neglected in most studies and were also not available in this data collection. However, quality perceptions by both group of actors (trainees and trainers) should be controlled for socio-demographic and motivational characteristics in future research designs.

Consequently, a research gap prevails regarding the genesis of differences in perceptions: Despite considering numerous characteristics from the individual and company side, only about 10% of the variance in DAM-Scores could be explained (Paper 2), mainly stemming from the variable *Desired occupation* and *Year of training*. Gaining insights into the factors that influence differences in perception between trainees and trainers requires further research that considers missing aspects such as trainers' socio-demographic characteristics, as well as work motivation, attitudes, and self-concepts of trainees and trainers. Additionally, distinguishing between a self-evaluation and an outside evaluation could partially explain differences in perception since answers by the training personnel equate to self-evaluations, which normally result in higher values than external evaluations (Clausen, 2002, p. 65). However, besides these open research tasks, the missing explained variance could stem from different

demands on quality from both groups, rather than being induced by the socio-demographical background or being company-size dependent. Future research should additionally consider the individual quality demands and the individual relevance of each quality criterion for both group of actors (see reference to Kano, 2001; Section 5.2) and examine the relation of quality expectations and criterion relevance to actual quality perceptions and differences between both groups.

Finally, for the interpretation of the results of papers 1 and 2, two additional aspects have to be considered. First, within the DAM-Scores' calculation procedure, only negative differences in perception were considered, i.e., cases when trainees rated single items of training quality lower than their trainers did. The final DAM-Scores are thus (weighted) negative differences from trainees' perspectives and no balancing tally of mutual differences. However, this effect was intended and related to theoretical consideration to measure the quality criteria-specific conflict potential (as argued extensively in Paper 1, p. 374 f.; p. 379 f.). Otherwise, conflict potential would be distorted or offset with other training aspects that an individual trainee has rated more positive than the trainer, despite the existing negative difference on a specific item that potentially has negative consequences. Second, the analysis of the drop-out intention in the cross-sectional sample (including trainees in the first, second, and third year of training) involves an unknown extent of drop-out that may have already occurred, partly biasing the results (survivorship bias; e.g., Elton et al., 1996; Roth, 1994). Findings should be interpreted with caution, especially when it comes to statements connected to the year of training.

Within the scope of Paper 3, data on training quality and drop-out intention was analyzed after one year of training ( $T_1$ ), implying a similar limitation of unknown amount of drop-out during the first year. This omission could partly produce the relatively low values of drop-out intention in the sample, besides the relatively good training conditions and high popularity of the training course (industrial business management trainees), as mentioned earlier. With respect to project design, as data was anonymously collected in vocational schools, real drop-out could not be registered since no information on trainees' continuance, companies, and private contact details was available. Unfortunately, this is a common hurdle in drop-out research, as it is often not possible to trace real drop-out within the companies over a longitudinal large-scale project or to collect further data (interviews, surveys) from

those trainees after dropping out. A future ideal design of longitudinal drop-out research needs to establish a contact system via the participating schools, companies, or the more external trade chambers (e.g., the Chamber of Industry and Commerce), one which would ensure the tracking of actual drop-out and enable those individuals to be contacted to learn more about their reasons, perceptions of training quality, personal background, and future plans (e.g., via interviews by phone or surveys by [e-]mail) and to amalgamate the information with the data on training quality. Moreover, such a design would allow the statistical relation of drop-out intention and actual drop-out to be examined in detail and therefore substantially advance drop-out research. Furthermore, such a study needs to additionally capture drop-out intention at earlier stages (e.g., after three months) to enable the tracing of critical cases during the initial phase of training.

The findings on drop-out intention within Paper 3 show that other relevant influence factors have been omitted, for example, influences on the macro-level or from the economical or psychological perspective (see Table 2). Especially as upward and downward drop-out intention could only be weakly explained, further important aspects such as trainees' life situations or extrinsic motivation through wage or prestige (e.g., Bessey & Backes-Gellner, 2015; Neuber-Pohl, 2021) are missing in our approach (Krötz & Deutscher, 2022, p. 14). In general, the findings on factors influencing drop-out intention cannot be simply transferred to actual drop-out, as they only relate to an intention to act, and additional access barriers, such as a missing higher-education entrance qualification, might impede an actual contract termination. However, as is argued extensively within the respective sections in papers 1, 2, and 3, several studies indicate a considerable relation of drop-out intention and real drop-out (e.g., Bean & Metzner, 1985; Schuster, 2016; Vallerand et al., 1997; Webb & Cotton, 2018). Lastly, different classifications of drop-out directions are also possible, as upgrades in the level of requirements or reputation when changing occupation (e.g., upward vs. downward occupation change) could be accounted for. However, classifying hundreds of occupations would be difficult and subjective. The chosen operationalization differentiating between leaving the vocational system upwards or downwards versus vocational reorientation (horizontal drop-out; split up into a mere company change vs. occupation change) seemed feasible and in line with the available literature (e.g., Faßmann, 1998; Feß, 1995).

Paper 4 contains several limitations connected to the measurement time points. First, the sample only includes trainees within three-year training courses while, in Germany, a shortened (2 or 2.5 year) training is possible, an opportunity usually seized by applicants with better performances in school or higher educational levels.<sup>23</sup> This shortening means that the used three-year sample excludes trainees who presumably have greater potential for competence development. However, within the project framework, further mid-year data collections were not possible and, as a positive consequence, the data constitutes a more homogenous sample. Second, as mentioned with regard to Paper 3, the data suffers from survivorship bias as a small but unspecifiable number of trainees may have dropped-out of training or at least not managed to show up for the second and third data collection. Since the relation of competence and (different directions of) drop-out is not scientifically clear (see Paper 3), the implications resulting from this limitation remain unknown. Third, the causal relation of training quality influencing competence development (besides the problematic nature of survey data for causal relations described above) is only a sound assumption for the second time frame ( $T_1$  to  $T_2$ ). As training quality was used as measured at  $T_1$ , the competence development over the first year ( $T_0$  to  $T_1$ ) could influence the quality perceptions at  $T_1$ , thus being inverse to the assumed causal direction. However, using perceptions of training quality at  $T_0$  did not seem appropriate since, due to the early measurement and the amount of training time spent in vocational schools, most trainees have, at that time, only been trained within the company for a few weeks, if at all. Furthermore, the  $T_1$  survey requested retrospective (instead of current) quality perceptions so that a measurement of trainees' evaluations regarding the first time frame ( $T_0$  to  $T_1$ ) can be assumed.

Furthermore, besides the theoretically induced modelling of vocational competence as consisting of a domain-linked and a domain-specific dimension, there might be other approaches to modelling vocational competence that potentially deliver sufficient fit values. The test items could be differentiated into mathematical versus linguistic requirements, modelling vocational competence as a

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<sup>23</sup> In some instances, training duration is shortened over the course of training in cases of higher educational level (e.g., higher-education entrance qualification) and good performance.



two-dimensional construct consisting of economic numeracy and economic literacy (see Klotz, 2015, p. 205 f.). Yet, the applied theoretical model (using a domain-linked and domain-specific dimension) was developed and tested over the past 15 years and can be deemed as a plausible and valid competence model (in addition to related conceptualizations, going back to Winther & Achtenhagen, 2009). The corresponding competence test by Klotz (2015) was developed to measure vocational competence relevant for the business domain, based on company and school curricula. However, conclusions cannot be drawn about the actual learning situation where specific contents were learned, as even school knowledge might have been repeatedly applied at the workplace and thereby become consolidated. The test does not measure ‘when’ or ‘how’ (in what situations, e.g., formal vs. informal) knowledge was learned. An additional limitation lies in the exclusion of implicit and company-specific knowledge as it is simply not possible to measure such contents in a company-independent large-scale assessment focused on the general school and company curricula. Nevertheless, in-company training quality might play a decisive role for conveying such knowledge over the course of training, and future studies should, thus, examine this relation by, for instance, exemplarily conducting more company-specific competence tests with a small group of training companies.

Lastly, a clear limitation of this dissertation is that the role of motivation could not be considered within the analyses. As it was not within the focus of the DFG-funded research project, no data on trainee motivation were available for this dissertation, despite the presumable (direct and indirect) impacts of motivation on the analyzed connection between training quality and outputs such as competence development (e.g., Abele, 2014; Dietzen et al., 2014; Nickolaus et al., 2015). While requirement-related state motivation would not have been practical to measure in a yearly survey, individual trait motivation could have been a useful complementation, increasing the insights of this dissertation (for state vs. trait motivation see, e.g., Dweck, 1986; Schiefele & Rheinberg, 1997; Tremblay et al., 1995). The variable *Aspired Final Grade*, sometimes denoted as a motivational proxy or motivation-related, tends to constitute trainee aspiration and possibly self-perception and (similar to the scale *Professional Commitment* in Paper 3) cannot claim to deliver equal insights. Therefore, any interpretation of the findings with regard to statements on motivation (e.g., not being relevant for

competence development, despite being relevant for the initial competence level) must consider that a more precise measure of motivation might have shown different effects. Here, the above proposal of applying experience sampling, for example, by using direct diary entries or ‘mini surveys’ on work tasks, and the individual motivation regarding those tasks could improve insights into learning and competence development processes in future research.

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## Declaration in lieu of oath

Declaration in lieu of oath according to section 8 subsection 2 sentence 1 (b) of the Regulations and Procedures Governing the Doctoral Dissertation to Earn a Doctoral Degree in Business at the University of Mannheim:

1. The submitted doctoral dissertation on the subject of “The Quality of In-Company Training – Perspectives and Effects” is my own work and adheres to the rules of proper scientific conduct.

2. I did not seek unauthorized assistance of a third party and I have employed no other sources or means except the ones listed. I clearly marked any direct and indirect quotations derived from the works of others.

3. I did not yet present this doctoral dissertation or parts of it at any other higher education institution in Germany or abroad.

4. I hereby confirm the accuracy of the affirmation above.

5. I am aware of the significance of this affirmation and the legal ramifications in case of untrue or incomplete statements. I affirm in lieu of oath that the statements above are to the best of my knowledge true and complete.

I agree that for the purpose of assessing plagiarism the dissertation may be electronically forwarded, stored and processed.

Mannheim, December 19, 2022.

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Place (*Ort*), Date (*Datum*)

Eidesstattliche Versicherung gemäß § 8 Absatz 2 Satz 1 Buchstabe b) der Promotionsordnung der Universität Mannheim zur Erlangung des Doktorandinnengrades oder des Doktorgrades der Betriebswirtschaftslehre:

1. Bei der eingereichten Dissertation zum Thema „Betriebliche Ausbildungsqualität – Perspektiven und Wirkungen“ handelt es sich um mein eigenständig erstelltes Werk, das den Regeln guter wissenschaftlicher Praxis entspricht.

2. Ich habe nur die angegebenen Quellen und Hilfsmittel benutzt und mich keiner unzulässigen Hilfe Dritter bedient. Insbesondere habe ich wörtliche und nicht wörtliche Zitate aus anderen Werken als solche kenntlich gemacht.

3. Die Arbeit oder Teile davon habe ich bislang nicht an einer Hochschule des In- oder Auslands als Bestandteil einer Prüfungs- oder Qualifikationsleistung vorgelegt.

4. Die Richtigkeit der vorstehenden Erklärung bestätige ich.

5. Die Bedeutung der eidesstattlichen Versicherung und die strafrechtlichen Folgen einer unrichtigen oder unvollständigen eidesstattlichen Versicherung sind mir bekannt. Ich versichere an Eides statt, dass ich nach bestem Wissen die reine Wahrheit erkläre und nichts verschwiegen habe.

Ich bin damit einverstanden, dass die Arbeit zum Zwecke des Plagiatsabgleichs in elektronischer Form versendet, gespeichert und verarbeitet wird.

Maximilian Krötz

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Signature (*Unterschrift*)



## **Doctoral Study Program**

### **GESS Graduate School of Economic and Social Sciences**

MAN 807 Experimental Research in Management

Spring 2020

Grade: 1.3

MAN 801 Advances in Entrepreneurship and Management Research

Spring 2021

Grade: 1.3

MAN 805 Applied Methods in Management Research

Fall 2021

Grade: 1.7

### **Additional Courses**

Workshop ‘Factor Analysis in R’

(Original title: Faktorenanalyse mit R)

Area Economic and Business Education

University of Mannheim, July 27, 2020

Workshop ‘It's All in the Mix! Tips and Examples for More Variety in Synchronous and Asynchronous Online Events’

(Original title: Der Mix macht's! Tipps und Beispiele für mehr Abwechslung in synchronen und asynchronen online-Veranstaltungen)

University of Mannheim, Sept. 17, 2020

Workshop ‘Structural Equation Models in R’

(Original title: Strukturgleichungsmodelle mit R)

Area Economic and Business Education

University of Mannheim, Dec. 18, 2020

## Curriculum Vitae

Maximilian Krötz

### Professional Experience

- since 09/2019   Research Assistant at the University of Mannheim  
Management of DFG-funded Project ‘Competence Development in Professional Enculturation Processes’ at the University of Mannheim  
Area Economic and Business Education  
Chair of Competency Development and Training Quality
- 07–09/2014   Department of Distribution Management  
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### Education

- 2020 – 2023   Doctoral Study Program, University of Mannheim
- 2017 – 2019   Master of Science Economic and Business Education  
Elective: Political Science  
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- 2014 – 2017   Bachelor of Science Economic and Business Education  
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- 2012 – 2014   Dual Vocational Training as Financial Management Assistant  
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### Publications

- Krötz, M. (2022). Alles eine Frage der Perspektive? Aktuelle Befunde zur betrieblichen Ausbildungsqualität [Is it all a Question of Perspective? Current Findings on In-Company Training Quality]. *Bildung und Beruf*, 5, 58–62.
- Krötz, M., & Deutscher, V. (2022). Drop-out in dual VET: Why we should consider the drop-out direction when analysing drop-out. *Empirical Research in Vocational Education and Training*, 14, 1–26. <https://doi.org/10.1186/s40461-021-00127-x>
- Krötz, M., & Deutscher, V. (2021). Betriebliche Ausbildungs-qualität – Eine Frage der Perspektive? [Quality of In-Company Training – A matter of perspective?]. *Zeitschrift für Erziehungswissenschaft*, 24, 1453–1475. <https://doi.org/10.1007/s11618-021-01041-4>

Krötz, M., & Deutscher, V. (2021). Differences in perception matter – How differences in the perception of training quality of trainees and trainers affect drop-out in VET. *Vocations and Learning*, 14, 369–409. <https://doi.org/10.1007/s12186-021-09263-7>

**Conference Presentations (selected):**

Deutscher, V., & Krötz, M. (2022). Ausbildungsabbrüche in dualen Bildungssystemen – Eine internationale Meta-Synthese von Abbruchgründen [Dropouts in dual Educational Systems – An international Meta-Synthesis of Dropout Reasons]. *Jahrestagung 2022 der DGfE, Deutsche Gesellschaft für Erziehungswissenschaft – Sektion Berufs- und Wirtschaftspädagogik 2022: Jahrestagung*, Freiburg, Germany.

Krötz, M., & Deutscher, V. (2022). Drop-out in dual VET – Why we should consider the drop-out direction when analysing drop-out. *11th EARLI SIG14 Conference 2022 Learning and Professional Development*, Paderborn, Germany.

Krötz, M., & Deutscher, V. (2022). In-Company Training Quality: A Matter of Perspective? *American Educational Research Association (AERA) 2022 Annual Meeting, SIG Workplace Learning*, online.

Ma, B., Krötz, M., Winther, E., & Deutscher, V. (2022). Kompetenzentwicklung in der kaufmännischen Berufsbildung [Competence Development in commercial vocational Training]. *GEBF-Tagung 2022*, online.

Krötz, M., & Deutscher, V. (2021). Differences in perception matter: How differences in perception of trainees and trainers affect vocational education and training drop-out. *American Educational Research Association (AERA) 2021 Virtual Annual Meeting, SIG Workplace Learning*.

Krötz, M., & Deutscher, V. (2020). Die Wahrnehmung macht den Unterschied – Wie unterschiedliche Wahrnehmungen der Ausbildungsqualität von Ausbildenden und Auszubildenden mit Ausbildungsabbrüchen in Zusammenhang stehen [The Perception makes the Difference – How different Perceptions of Training Quality by Trainers and Trainees relate to Dropout]. *Jahrestagung der Sektion Berufs- und Wirtschaftspädagogik der DGfE 2020*, online.

Böhn, S., Braunstein, A., Krötz, M., & Deutscher, V. (2020). Dropout from initial vocational training – reasons and perspectives. *9th Meeting Professional Development Research Network PDRNet*, Antwerpen, Belgium.