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RESEARCH

Career choice motivation, academic and social integration, and their relationship with intention to drop out of vocational teacher training

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Abstract

Not every student who enrolls in a teacher training program completes it and obtains a degree. Students dropping out of vocational teacher training is a particularly concerning trend in Germany, where there is a significant shortage of vocational education and training (VET) teachers. Against this backdrop, it is crucial to understand why students fail to complete their teacher training programs. Using data from the student cohort of the National Educational Panel Study in Germany, this study examines the career choice motivation, academic and social integration, and their relationship with the intention to drop out of 114 students in a VET teacher training program. Additionally, the study explores whether the relationship between career choice motivation and dropout intention of VET teacher training is mediated by academic and social integration, which are established predictors of drop out. We found that extrinsic motivation was positively linked to dropout intention, while intrinsic motivation showed a negative association with dropout intention. No significant relationships were found between academic or social integration and dropout intention.

Keywords Career choice motivation, Dropout intention, Academic integration, Social integration, Pre-service teachers, Vocational education and training (VET)

Introduction

The attrition of students from teacher training programs represents a significant challenge contributing to the ongoing shortage of educators, a concern not limited to Germany but also prevalent across various European nations (European Commission 2023; Porsch and Reintjes 2023). The demand for vocational education and training (VET) teachers consistently exceeds the supply of individuals who complete teacher training programs. This imbalance further worsens the workforce deficit in the crucial education sector (Kuhlee 2021). In Germany, VET teachers are typically employed in part-time vocational schools as part of the dual education system or in full-time vocational

schools, with a focus primarily on fields such as healthcare and social professions, including roles like nursing or childcare (Cedefop and BIBB 2019). These teaching positions typically require a university degree (Kuhlee 2021). Understanding the underlying factors that contribute to high dropout rates in university teacher training is crucial for institutions and policymakers seeking to improve program effectiveness and retention rates (European Commission 2023; Porsch and Reintjes 2023). Pre-service VET teachers differ in a number of characteristics that set them apart from their counterparts in general teacher training programs (Stellmacher et al. 2020; Wyrwal and Zinn 2018), so it is both appropriate and necessary to study this group separately.

The decision to drop out from university teacher training is a complex, multi-causal process, in which personal predispositions and study conditions are important factors (Heublein 2014; Behr et al. 2020). In this context, Tinto's (1975) student integration model offers a broader theoretical framework for understanding the factors influencing dropout. He argued that when students experience a high degree of academic and social integration, they are likely to persist in their studies and achieve academic success. Additionally, this model posits that motivation and commitment constitute the foundational elements for successful integration into the academic and social systems of higher education institutions (Tinto 1975).

A significant amount of research has provided empirical evidence on the connection between academic and social integration and the decision to drop out among higher education students in general as well as pre-service teachers in particular (Bohndick 2020; Franz and Paetsch 2023; Klein 2019; Piepenburg and Beckmann 2021). Moreover, existing research underscores the significant impact of career choice motivation on this decision (Hartl et al. 2022; Stellmacher and Paetsch 2023). This motivation not only determines the initial commitment to pursuing a teaching career but also affects students' capacity to navigate challenges during their studies (Eder et al. 2023). However, it is important to recognize the unique context of VET teacher training compared with other teacher training programs (Kuhlee 2021). Pre-service VET teachers constitute a distinct cohort of university teacher training. A significant proportion of these individuals possess vocational qualifications, come from non-academic backgrounds, and have limited exposure to academic environments (Wyrwal and Zinn 2018). Consequently, their motives for pursuing a teaching career differ from those of their peers in other pre-service teacher programs (Stellmacher et al. 2020). These divergent motives may affect their academic and social integration and, thus, may play a critical role in shaping their decision to discontinue their studies without obtaining a degree. The present study seeks to fill the gap in the existing literature by examining the extent to which career choice motivation predicts the intention to drop out of VET teacher training as well as the role of academic and social integration as mediators in this relationship.

Theoretical framework

Characteristics of VET teacher training programs and their students

German VET teacher training consists of two phases: The first phase is a study program at university that focuses on theoretical education but also includes initial practical experiences. Students usually combine a vocational subject, such as business and administration, nursing, or electrical engineering, with a general teaching subject or a second vocational subject (KMK 2021). After graduation, students receive a Master of

Education or the First State Examination (named *Erste Staatsprüfung*). In the second phase, the probationary period (named *Vorbereitungsdienst* or *Referendariat*), prospective teachers apply their academic training in practice and prepare themselves for their work and responsibility as teachers and educators. Upon successful completion, students are awarded the (Second) State Examination (named *Zweite Staatsprüfung*), indicating the completion of their formal training (KMK 2021).

In recent years, VET teacher training programs have become significantly more diversified. Based on the revised framework conditions of 2016 (KMK 2018), existing study programs for the vocational teaching profession have been further differentiated. In addition to the standard model (which can vary by university location), various lateral entry models are available (Lange et al. 2024). Some VET teacher training programs, especially in business and administration, are polyvalent; they qualify students not only for the teaching profession but also for other career paths. This flexibility can be a key factor in the decision to choose such a program (Goller and Ziegler 2021).

The student body in VET teacher training is markedly more diverse than other teacher training programs (BMBF 2021). A high proportion of students have already completed VET before entering teacher training and often work part-time during their studies (Berger and Ziegler 2021). Additionally, some pre-service VET teachers enter the teacher training program after completing a technical degree. Thus, these pre-service VET teachers have already gone through a career choice process before starting teacher training (Klusmeyer 2005) and are therefore often older than pre-service teachers from other school types (BMBF 2021). They are also more likely to have a non-academic background (Grunau and Petzold-Rudolph 2021) and tend to be less academically interested than their counterparts in general teacher training programs, suggesting that their motivation to study is primarily driven by the prospects of their future professional activities (Berger and Ziegler 2020). The sum of the characteristics or differences in the attributes of the students may influence their study behavior, personal circumstances during their studies, and ultimately their academic success, potentially leading to their decision to leave their studies without completing a degree (Ebert and Heublein 2017).

Dropout in VET teacher training

Dropping out of higher education is perceived as a problem in several countries since it is viewed as an ineffective use of personal and financial resources (Porsch and Reintjes 2023). Heublein et al. (2022) define dropout as someone who enrolls in a first degree program at a postsecondary institution but leaves without earning a degree. Change of major, transfer to another institution, or unsuccessful attempts at a second degree are not considered dropout scenarios. In Germany, 31% of Bachelor's students and 21% of Master's students drop out of higher education without a degree (Heublein et al. 2022); these rates are comparable to the average rate in OECD countries (OECD 2019). Dropout rates differ across fields of study, with the highest rates reported in mathematics, natural science, and engineering (Heublein 2014). In the broader context of teacher training programs, dropout rates are comparatively low, at approximately 15%.; additionally, students' intention to drop out is less pronounced in teacher training programs than in other academic programs (Bohndick 2020; Heublein et al. 2022).

Dropout rates for VET teacher training are not well documented, with limited data available, primarily from regional studies conducted at individual universities in

Germany. For instance, at the University of Stuttgart, the reported dropout rates were notably high, reaching almost 50% in the Bachelor's program and 30% in the Master's program (Wyrwal and Zinn 2018). Further, regionally focused studies that inquire about students' intentions to drop out are scarce. For example, at a university in Berlin, approximately 7% of Bachelor's students and 18% of Master's students contemplated dropping out of VET teacher training (Stellmacher et al. 2021). These findings highlight the need for comprehensive research on dropout rates in VET teacher training.

A commonly cited predictor of dropout in teacher training programs is the inability to attain the required performance benchmarks (Bohndick 2023; Franz and Paetsch 2023; Hartl et al. 2022). Students who struggle to meet these benchmarks are more likely to drop out of teacher training programs than their peers. Additionally, a lack of social contact and support from peers and lecturers constitutes another set of factors contributing to drop out across various school types (Chambers et al. 2010; Franz and Paetsch 2023; Wolf et al. 2021). In an interview study conducted by Wyrwal and Zinn (2018), ten pre-service VET teachers from a German university were interviewed regarding their decision to drop out or change their study program. The aim of the study was to explore the reasons behind their decisions. Among the responses, academic challenges emerged as the most frequently cited reason for their decision, which appeared to be interconnected with several underlying factors. The participants mentioned that they had not adequately anticipated the demands and curriculum of their study program. Additionally, some students expressed having vague or unfulfilled expectations about the program, either lacking concrete expectations or finding that their preconceived notions were not met during their academic journey (Wyrwal and Zinn 2018). The findings indicate that the students were not sufficiently informed about the teacher training program in advance, especially about its content and requirements.

At the beginning of their studies, students differ in both their expectations regarding their studies and in their career choice motivations (Göller et al. 2022; Grüneberg et al. 2018). Career choice motivation is relevant for pre-service teachers' dropout decisions because it plays a fundamental role in shaping their engagement, professional development, and persistence in their chosen field (Dörrenbächer-Ulrich et al. 2019; Watt et al. 2014). Students with strong intrinsic career choice motivation are more likely to effectively navigate challenges and difficulties during their teacher training programs, exhibiting higher levels of persistence than students with weak intrinsic career choice motivation (Fokkens-Bruinsma and Canrinus 2012; Watt et al. 2014). In their study, Stellmacher and Pfetsch (2020) found that pre-service VET teachers with a strong pedagogical interest and high confidence in their abilities were more certain about their decision to become teachers than those with low levels of these characteristics.

In summary, there is a scarcity of empirical findings on dropout rates and predictors of dropout decisions in VET teacher training. Existing studies are limited to specific regions and have relatively small sample sizes, making it difficult to draw comprehensive conclusions (Burfeind et al. 2021). The available empirical findings underscore the complex and multifaceted nature of the decision to drop out of VET teacher training programs. Furthermore, they suggest that students' career choice motivation, which plays a pivotal role in shaping their initial commitment to VET teacher training, could be a significant factor in the challenges they encounter and potentially influence their decision to either withdraw from the program or consider a change in their educational path.

Career choice motivation of pre-service VET teachers

Career choice motivation refers to the underlying factors and considerations that hold a central role in an individual's decision to pursue a teaching career (Han and Yin 2016). This motivation encompasses a range of personal, professional, and intrinsic factors that shape an individual's commitment to the teaching profession and guide their choice of career path (Watt et al. 2012). When analyzing career choice motivation, a distinction is often made among intrinsic, altruistic, and extrinsic career choice motives (Brookhart and Freeman 1992). Intrinsic career choice motivation is driven by personal interests and enjoyment of the work itself; altruistic motivation, by a desire to make a positive impact on society or to help others; and extrinsic motivation, by external rewards such as salary, job security, or other tangible benefits that come from the job (Pohlmann and Möller 2010; Watt et al. 2012). Research on the career choice motivation of pre-service teachers in general education is part of a well-established global tradition (e.g., Thomson et al. 2012; Watt et al. 2012). However, such research remains relatively rare within the domain of vocational education (Stellmacher et al. 2020). A shared finding applicable to both vocational and general education is the predominance of intrinsic career choice motivation, such as a passion for pedagogical work and engaging with children and young adults. However, extrinsic career choice motivation is also relevant, including time or financial utility factors and the desire for a balanced personal life (Driesel-Lange et al. 2017; Watt et al. 2012).

In the area of VET teacher training, Goller and Ziegler (2021) questioned students across Germany in business and economics education programs about their career choice motivation, using an adapted version of the FIT-Choice scale (Watt and Richardson 2007).[1] Because of the polyvalent character of the study program, the authors distinguished between students who wanted to later work in the school service and those who wanted to work outside the school service. For the first-mentioned group, the motives of intrinsic value, job security, and perceived teaching abilities held the greatest significance, followed by the motives of shaping the future of youth, making a social contribution, working with young people, and the polyvalent character of the study program. Students who wanted to work in the school service demonstrated significantly higher scores in all subscales (except for the polyvalent character of the study program) than the students who did not.

Another line of research focuses on the career choice motivation of individuals who enter the teaching profession as a second career. Since a large proportion of pre-service VET teachers have already completed VET, the teaching profession also represents a second career for this group, making these empirical findings potentially insightful. In an international literature review study, Hogg et al. (2023) provided three categories of motives for entering teaching as a second or later career: pragmatic, altruistic, and personal motives. Pragmatic motives were cited most frequently, such as job security, salary, or a more family-friendly job. The second category included altruistic motives, such as working with children or giving something back to the community. Personal motives (the third category), such as influence from family or friends, passion for the teaching

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[1] The vocational subject of business education has a specific characteristic: it is the only polyvalent study program, which means that students can choose whether they want to become a teacher or take up another profession, such as in-company training and further education, human resources development, accounting, marketing, or business management (Kremer and Mauer 2021).

subject, or dissatisfaction with previous jobs, have become increasingly important, especially in recent studies (Hogg et al. 2023).

In recent years, there has been a growing trend toward employing person-centered approaches in research on career choice motivation within both general and VET teaching professions. This approach aims to identify specific patterns that are conducive or detrimental to the successful completion of teacher training programs (Eder et al. 2021). Profile analysis of general teacher training courses using the FIT-Choice instrument (Watt and Richardson 2007) usually identifies three motivational profiles: a primarily intrinsically or pedagogically motivated profile, balanced motivated profile, and primarily extrinsically or benefit-oriented pragmatic motivated profile (Dörrenbächer-Ulrich et al. 2019; Eder et al. 2021; König et al. 2018). Primarily intrinsically motivated and balanced profiles, which represented the largest groups in the samples, were found to have high or favorable values for learning and achievement motivation, pedagogical knowledge, and self-efficacy expectations. In contrast, primarily extrinsically motivated profiles, which accounted for approximately 10% of the samples, exhibited lower values for these characteristics and were described as unfavorable (Dörrenbächer-Ulrich et al. 2019; König et al. 2018). However, only two studies in the field of VET teacher training have used person-centered approaches. Berger and D'Ascoli (2012) studied 605 VET teachers or trainers in Switzerland using the FIT-Choice instrument (Watt and Richardson 2007) and found five motivational profiles: "maladaptive motivations" (9% of the sample), "low opportunity (18% of the sample), "high personal utility" (16% of the sample), "high opportunity" (29% of the sample), and "multiple motivations" (28% of the sample). The cluster membership showed no correlation with sex, diploma level, age, years of experience working with apprentices, or years of experience as a VET educator (Berger and D'Ascoli 2012). Moreover, Stellmacher and Paetsch (2023) surveyed 350 pre-service VET teachers in Germany using the FEMOLA scale (Pohlmann and Möller 2010) and identified five profiles with partially similar characterizations, although different samples were surveyed (VET teachers vs. pre-service VET teachers). They called the profiles "primarily intrinsically motivated" (15% of the sample), "multiple high motivated" (23% of the sample), "pragmatically motivated" (15% of the sample), "multiple motivated" (41% of the sample), and "utility motivated" (6% of the sample). Students with the multiple high motivated profile rated their competencies highly and exhibited strong career choice certainty, reflecting the decisiveness and clarity with which individuals commit to their chosen professional path. In contrast, students with the utility motivated profile reported low career choice certainty and the lowest competence ratings compared to the other profiles (Stellmacher and Paetsch 2023). In both studies, the (high) multiple motivation profiles seemed to be favorable, whereas maladaptive or utility-motivated profiles appeared to be rather unfavorable (Berger and D'Ascoli 2012; Stellmacher and Paetsch 2023). Thus, pre-service VET teachers with predominantly extrinsic motivation, such as salary or job security, may be more likely to drop out if they perceive their career choice as not meeting their extrinsic needs or expectations. On the other hand, pre-service VET teachers with a high intrinsic motivation, such as personal interest, a sense of purpose, or multiple motivations, may be less likely to drop out (e.g., Stellmacher and Paetsch 2023).

Studies exploring the relationship between career choice motivation and dropout rates in VET teacher training are scarce. However, empirical evidence on this relationship can

be gleaned from studies focusing on career choice certainty. These findings indicate that pre-service teachers, whether in general or vocational education, who exhibit relatively low career choice certainty tend to have low intrinsic and high extrinsic motivation. This combination of high extrinsic and low intrinsic motivation can be regarded as a potential risk profile associated with dropout intention (Porsch 2018; Stellmacher and Paetsch 2023).

Explaining dropout with the student integration model

Tinto (1975, 1993) originally formulated the student integration model, which remains the foundational framework for understanding dropout in higher education. This model uniquely considers individual pre-study attributes, including initial study motivation, alongside various aspects of the current study situation, thus providing a comprehensive approach for explaining dropout. The main argument of this theoretical approach is that students must integrate into the higher education environment to remain and graduate in their respective study programs. On the one hand, students need to integrate into the academic system, as demonstrated through students' external and internal evaluations, where academic integration refers to meeting the performance standards indicated by grades and adapting to the academic norms of a study program (Dahm et al. 2016; Schaeper 2019). On the other hand, students need to be active and integrate into the social sphere of higher education institutions, where social integration is mirrored in students' interactions with fellow students, their participation in social activities, and their contact with faculty staff (Dahm et al. 2016).

The student integration model (Tinto 1975) emphasizes that students' pre-entry characteristics influence their ability to integrate effectively during their studies. Beyond family background and prior educational experiences, individual characteristics, such as career choice motivation, play a significant role in shaping students' level of engagement during their academic journey (e.g., Jungert et al. 2014; Noyens et al. 2019; Schaeper 2019). In turn, this level of engagement is linked to their extent of integration into the university's academic and social systems (Tinto 1975).

Following Tinto's argument, students who fail to integrate into the academic and social systems of their study programs and higher education institutions are likely to not complete their studies. Several empirical studies have tested this theoretical model, confirming the assumption that low levels of academic and social integration are predictive of students not finishing the degree (Klein 2019; Piepenburg and Beckmann 2021).

Recent empirical findings have shown that academic and social integration are related to the decision to leave a teacher training program (Bohndick 2020; Franz and Paetsch 2023). Using data from a German student survey, Bohndick (2020) showed that pre-service teachers and students in other programs exhibited no substantial differences in the relationship between academic and social integration and the intention to drop out. Franz and Paetsch (2023) found similar results in their analysis of data from a student cohort in a national educational panel study. They showed that academic integration as well as peer social integration were related to actual dropout decisions for both per-service teachers and other students in comparable fields of study.

While the relationship between academic and social integration and dropping out is well documented for pre-service teachers in general, there is a lack of research on this relationship among pre-service VET teachers. However, examining student integration

in VET teacher training is particularly significant because of the program's unique characteristics. For example, pre-service VET teachers commonly enroll in subject-specific study components alongside students pursuing other consecutive degree programs. These pre-service teachers often constitute a relatively small cohort within these courses, resulting in feelings of anonymity and a limited sense of belonging within the academic environment (Burfeind et al. 2021; Wyrwal and Zinn 2018).

The present study

To date, there is a paucity of empirical evidence on the predictors of attrition among pre-service VET teachers. Given the differences in individual background characteristics between pre-service VET teachers and pre-service teachers from other school types, it is also unclear whether the research findings from pre-service teachers are applicable to VET.

To address this research gap, this study focused on the following research question: To what extent does career choice motivation predict the intention to drop out of VET teacher training, and how is this relationship mediated by academic and social integration?

Compared to pre-service teachers in primary or secondary education, a higher proportion of pre-service VET teachers tend to have non-academic backgrounds, possess vocational qualifications, are typically older than their peers at the same stage of their study program, and often have already started a family (Stellmacher et al. 2021; Wyrwal and Zinn 2018). These distinct characteristics make it particularly relevant and necessary for this study to focus on the unique experiences and challenges faced by this specific group.

Previous research has shown that pre-service teachers who are primarily intrinsically motivated show favorable values such as motivation to learn, as well as self-efficacy beliefs about their ability to teach (Dörrenbächer-Ulrich et al. 2019; König et al. 2018). Hence, we assume that high intrinsic motivation leads to a reduced intention to drop out as pre-service teachers' motivation is rooted in a perception of a good fit between their interests and the teacher training program (e.g., Stellmacher and Paetsch 2023).

H1: Pre-service vocational teachers' intrinsic career choice motivation is negatively associated with their dropout intention.

However, extrinsic motivation in pre-service VET teachers has been reported to be unfavorable as extrinsically motivated teachers show relatively low career choice certainty (Stellmacher and Paetsch 2023). Individuals with predominantly extrinsic motivation, such as salary or job security or low study demands, may be more likely to drop out if they perceive their career choice as not meeting their extrinsic needs or expectations.

H2: Pre-service VET teachers' extrinsic career choice motivation is positively associated with their dropout intention.

Furthermore, we assume that the relationship between intrinsic/extrinsic career choice motivation and intention to drop out might be mediated by integration. Social and academic integration are among the strongest predictors of dropout intention, while motivational constructs such as achievement and goal motivation are related to integration (e.g., Schaeper 2019; Stage 1989). Thus, we assume that individuals who show an unbeneficial initial motivation to become a VET teacher have a higher intention to drop

out as they have problems with academic and social integration in the higher education context.

H3: The relationships between pre-service VET teachers' career choice motivation and dropout intention are mediated by academic integration.

H4: The relationships between pre-service vocational teachers' career choice motivation and dropout intention are mediated by social integration.

Figure 1 shows a graphical representation of our theoretical assumptions and hypothesis.

Methods

Data and sample

To answer the research question and test our hypotheses, we used panel data from the National Educational Panel Study from Germany (NEPS; Blossfeld and Roßbach 2019). Specifically, we analyzed data from the study cohort of the NEPS, including the Panel of Teacher Education Students (Schaeper et al. 2023) that encompassed an initial sample of about 5500 students who started teacher training in a German higher education institution in the winter term of 2010/2011. Participants were surveyed almost every half a year about their educational and occupational trajectories as well as other education related psychological and sociological constructs.

At the first measurement point (2010/11), about 6.5% of the 5500 student teachers were enrolled in VET teacher training program (Schaeper et al. 2023). Our sample consisted of university students in a VET teacher training program who participated in the survey in 2014 ($n = 114$). The majors were categorized to fit the usual classification of vocational subjects at vocational schools in Germany.

We used information from the computer-assisted web interview (CAWI) conducted in 2014 (the eighth wave of the sample) because at that measurement point, the predictors of interest were measured. Of the 114 teacher training students, 30 attended a Bachelor's program, 74, a Master's program, and 10 were enrolled in a state examination program (see Table 1). All typical vocational subjects were reflected in the sample (nutrition/food science/gardening ($n = 10$), nursing/health science ($n = 12$), industrial technical subjects ($n = 16$), (social) pedagogy ($n = 17$), and business education ($n = 50$; no vocational subject was identified ($n = 9$)).
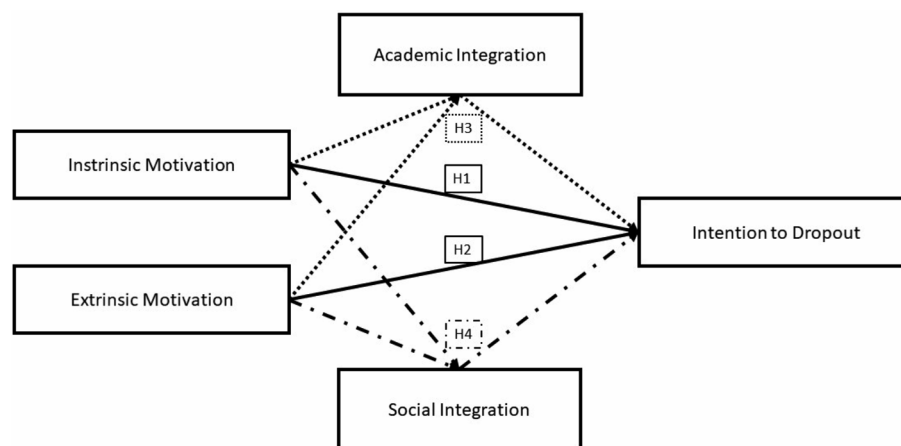

Fig. 1 Graphical representation of our theoretical assumptions and hypothesis (own presentation). Dotted lines represent the mediation hypotheses

Table 1 Descriptive statistics on the analyzed sample

	n	Mean / %	SD	Min	Max	Missing
Sex: Female	114	66%				0
Age at study start	114	22.48	4.06	18	46	0
Academic background	114	29%				0
Final school grade	96	2.40	0.52	1.4	3.6	18
VET degree	114	64%				0
Type of degree						
Bachelor	30	26%				
Master	74	65%				
State Examination	10	9%				
Vocational subject						
Nutrition/food science/gardening	10	9%				
Nursing/health science	12	11%				
Industrial technical subjects	16	14%				
(social) pedagogy	17	15%				
Business education	50	44%				
No vocational subject	9	8%				

Table 2 Descriptive statistics on the measurement of intention to drop out, career choice motives, and academic and social integration

	n	Number of items	Mean	SD	Min/Max	Omega	Alpha	Missing
Intention to drop out	112	5	1.36	0.44	1/3.2	0.79	0.73	2
Career choice motives (FEMOLA)								
Utility	114	6	2.92	0.59	1.3/4	0.81	0.82	0
Extrinsic	114	6	1.68	0.52	1/3.2	0.75	0.75	0
Intrinsic	114	9	3.05	0.41	1.7/3.9	0.70	0.69	0
Academic integration								
Objective academic integration	70	1	2.01	0.45	1.2/3.5	---	---	44
Subjective academic integration	86	1	3.10	0.84	1/5	---	---	28
Social integration								
Peer social integration	112	3	3.09	0.60	1.67/4	0.84	0.84	2
Faculty social integration	112	4	2.95	0.52	1.25/4	0.82	0.82	2

On average (median), students were 22 years old when they started studying. In the sample, 66% of the students were female and 71% had a non-academic background as none of their parents had completed an academic degree. Before they started studying at the university, 64% of the students had completed VET with a degree.

Measurements

In this section, we provide a brief overview of the measurements used in the study. A more detailed description, including descriptive statistics and measures for quality of psychometric property (Cronbach's α and McDonald's ω), is presented in Table 2. The specific wording of individual items can be found in the Appendix.

Dropout intention

Dropout intention was measured using a scale consisting of five items on a 4-point Likert scale used in a previous German study (Trautwein et al. 2007). The scale comprises questions about the intention to leave or stay in the study program as well as the intention to switch to another study program. For example, the participants are asked to rate

the following statement: "I am seriously thinking of quitting studying altogether." Reliability was acceptable ($\alpha = 0.73$; $\omega = 0.79$).

Career choice motives

The FEMOLA scale was used to measure the initial choice to start the teacher training program and become a teacher (Pohlmann and Möller 2010). It is a well-established instrument in the German context, and its validity has been proven several times (Stellmacher and Paetsch 2023). In the NEPS, a shortened version of the scale was used with three items 4-point Likert scale to measure the following FEMOLA subdimensions: pedagogical interest, subject interest, self-concept, financial utility, time utility, social influences, and study demands (Pohlmann and Möller 2010). Theoretically and statistically, pedagogical interest, subject interest, and self-concept reflect higher order factor intrinsic motivation whereas financial utility, time utility, social influences, and study demands reflect extrinsic motivation (Pohlmann and Möller 2010).

However, a confirmatory factor analysis for a model with extrinsic and intrinsic latent factors based on the single items showed a poor fit to the data (χ^2 (df) = 595.584 (188); $p < .001$; RMSEA = 0.141; CFI = 0.461; TLI = 0.398; SRMR = 0.177).

EFA was conducted to identify underlying factors in the 24-item shortened FEMOLA questionnaire. Using principal axis factoring with varimax rotation, we extracted three factors that accounted for 44% of the total variance. The eigenvalues for each factor were 4.50, 2.50, and 2.22, respectively. Factor 1 ($\alpha = 0.82$, $\omega = 0.81$) consisted of six items that explained 17% of the variance with factor loadings from 0.506 to 0.798, representing utility motivation. Utility motivation encompasses the motives of studying to become a vocational teacher due to financial and time benefits. Items 7 to 12 loaded heavily (0.563 to 0.756) on Factor 2 ($\alpha = 0.75$, $\omega = 0.75$) and explained 14% of the variance, representing indexed extrinsic motivation (included items of the subscales social influences and study demands). Factor 3 ($\alpha = 0.69$, $\omega = 0.70$) consisted of 9 items that explained 14% of the variance with factor loadings from 0.420 to 0.630 representing intrinsic motivation. This factor included items of the subscales pedagogical interest, subject interest, and self-concept (see Table 2).

Academic and social integration

Two items were used to measure academic integration. The first item measured objective academic integration, which was assessed using previous academic grades during the course of study. These grades serve as an objective indicator of meeting formal performance standards. A similar operationalization can be found in studies by Pascarella and Chapman (1983) and Pascarella et al. (2004). Specifically, academic achievement was measured using the current grade-point average recorded in Wave 8.

Second, perceived subjective academic integration was measured using the question "How would you rate your academic performance so far in your current course of study compared to your fellow students?". Students responded on a 5-point Likert scale ranging from 1 "much better") to 5 ("much worse"). For the analysis, the scale was recoded so that high values indicated good performance evaluations.

Furthermore, two dimensions of social integration (Dahm et al. 2016; Schaeper 2019) were measured using subscales of an instrument by Schiefele et al. (2002). Peer social integration was measured with three items on a 4-point Likert scale that showed good

reliability ($\alpha = 0.84$; $\omega = 0.84$). An example item is "I have been successful in building contacts with other students during my studies up to now." Faculty social integration was measured using three items on a 4-point Likert scale that also showed good reliability ($\alpha = 0.82$; $\omega = 0.82$). An example item is "I get along well with the instructors in my degree program."

Control variables

We incorporated control variables known to be associated with dropout intention, ensuring the robustness of our findings (e.g., Behr et al. 2020). A binary variable was used to operationalize the participants' sex (1 = female, 0 = male). Academic background describes whether or not at least one of each participants' parents holds an academic degree. Furthermore, we included the final school grade, which is the average grade of the higher education entrance qualification, regardless of the type of school in which it was acquired (1 = best grade; 4 = worst grade). Lastly, we controlled for whether the participants had already successfully VET (called as VET degree, coded as a binary variable) as this might function as a fallback career.

Methods and missing values

Due to the study design and item non-response, missing values occurred in the data (ranging from 1 to 37%). In most cases, there were no missing values, and the data were complete (55%). Little's MCAR test appeared to be non-significant at the 0.05 significance level ($p = .358$), indicating that the data were not missing completely at random.

A multiple imputation approach was used to impute the missing values. The imputation model included a carefully selected set of relevant variables chosen based on their theoretical significance and empirical support and included all variables used in the analyses. Furthermore, we included measurements of the Big Five and vocational interests in the imputation model, as they might be related to both, dropout intention as well utility, extrinsic and intrinsic motivation, and academic and social integration. Passive imputation was applied to generate indices for motivation and integration factors, and 20 imputed datasets were generated. Imputation diagnostic tests were performed by comparing the imputed values with those observed via graphical representations, confirming that the imputation was successful.

We applied multiple linear regression analysis to examine the relationship of career choice motivation as well as academic and social integration with the intention to drop out. A stepwise approach was applied to investigate possible mediation effects. First, the association of initial career choice motivation with intention to drop out was estimated to test hypotheses 1 and 2. Afterwards, we added the academic and social integration constructs to test the mediation hypotheses that these factors explain the relationship between motivation and dropout intention. To test the robustness of our findings, we included control variables in the third and last step. The results of the analysis of the imputed datasets were summarized according to Rubin's rules.

Data preparation as well as formal analyses were conducted using Stata 18.0.

Results

Descriptive results

The descriptive results are presented in Table 2. The pre-service VET teachers showed, on average, a low intention to drop out, with an average value of 1.36 ($SD = 0.44$) in the range of 1 to 4.

In the sample, utility motivation (financial and time benefits) was rather high with an average value of 2.92 ($SD = 0.59$) in the range of 1 to 4. Extrinsic motivation (social influences and study demands) was rather low ($M = 1.68$; $SD = 0.52$), while intrinsic motivation (subject interest, pedagogic interest, and self-concept) had a rather high average ($M = 3.05$; $SD = 0.41$).

The academic integration of pre-service VET teachers was above the theoretical mean in all aspects. The objective academic integration is indicated by the actual grade point average during studies that was 2.01 ($SD = 0.45$); in Germany, 1 represents good grades and 4 represents bad grades. Subjective academic integration measured by comparison with others ($M = 3.10$; $SD = 0.60$) was only slightly above the theoretical average of 3. Despite the average high values of objective academic integration, the measures for subjective academic integration only showed mediocre values. On a scale from 1 to 4, pre-service VET teachers showed high values for interaction with peers ($M = 3.09$; $SD = 0.60$) and contact with faculty ($M = 2.95$; $SD = 0.52$), indicating, on average, a comparatively high level of social integration.

Relationship between career choice motives, academic and social integration, and the intention to drop out

To investigate the relationship between career choice motivation, academic and social integration, and the intention of dropping out of a study program to become a VET teacher, we applied multiple regression analysis. By doing so, we wanted to answer the research question on how intrinsic and extrinsic motivations to become a VET teacher as well as academic and social integration are related to dropout intention. The results of the analysis are presented in Table 3.

Following a stepwise approach, we first added career choice motivation to the model to examine hypotheses 1 (pre-service VET teachers' intrinsic career choice motivation is negatively associated with their dropout intention) and 2 (pre-service VET teachers' extrinsic career choice motivation is positively associated with their dropout intention). In line with our hypotheses, the results show a significantly negative effect of intrinsic motivation ($\beta = -0.27$; $p = .004$) on the intention to drop out. In addition, confirming our hypothesis, extrinsic motivation ($\beta = 0.31$; $p = .002$) showed a significantly positive effect on dropout intention. Utility motivation ($\beta = -0.02$; $p = .983$) was not significantly related to intention to drop out. The R^2 value indicated that the chosen model explained approximately 15% of the variance in intention to drop out.

In the second step (see Model 2), the indicators for academic and social integration were included in the model to investigate the mediation hypotheses, H3 ("The relationships between pre-service VET teachers' career choice motives and dropout intention are mediated by academic integration") and H4 ("The relationships between pre-service VET teachers' career choice motives and dropout intention are mediated by social integration"). The results showed that neither objective ($\beta = 0.02$; $p = .880$) or subjective ($\beta = -0.15$; $p = .270$) academic integration nor peer ($\beta = -0.11$; $p = .265$) or faculty ($\beta = -0.27$;

Table 3 Multiple regression analysis on intention to drop out

	Model 1			Model 2			Model 3		
	Beta	SE	p	Beta	SE	p	Beta	SE	p
Career choice motives (FEMOLA)									
Utility	0.02	0.07	0.983	0.02	0.08	0.829	0.05	0.08	0.601
Extrinsic	0.31	0.08	0.002	0.26	0.08	0.006	0.27	0.08	0.005
Intrinsic	−0.27	0.10	0.004	−0.23	0.10	0.015	−0.23	0.10	0.018
Academic integration									
Objective academic integration				0.02	0.09	0.880	0.06	0.10	0.708
Subjective academic integration				−0.15	0.05	0.270	−0.20	0.06	0.146
Social integration									
Peer social integration				−0.11	0.07	0.265	−0.10	0.08	0.343
Faculty social integration				−0.12	0.08	0.230	−0.09	0.08	0.360
Controls									
Sex: Female							−0.05	0.10	0.618
Academic background							0.01	0.10	0.926
Final school grade							−0.24	0.08	0.032
VET degree							0.05	0.09	0.597
N	114			114			114		
R^2	0.146			0.220			0.274		
Adj. R^2	0.123			0.168			0.195		

$p = .230$) social integration had significant effects on the intention to drop out. However, the significant effects of extrinsic motivation ($\beta = 0.26$; $p = .006$) and intrinsic motivation ($\beta = -0.23$; $p = .015$) on dropout intention remained rather stable. Consequently, the mediation hypothesis was rejected. Overall, the model explains 22% of the variance in dropout intention.

To test the robustness of the findings, we added control variables in the third step (see Model 3) that were found to be related to dropout intention (e.g., Behr et al. 2020). Sex ($\beta = -0.15$; $p = .618$), academic background ($\beta = 0.01$; $p = .926$), and a prior achieved VET degree ($\beta = 0.05$; $p = .597$) were not significantly related to dropout intention. Final school grade showed a significantly negative effect on dropout intention ($\beta = -0.24$; $p = .032$). The effects of extrinsic motivation ($\beta = 0.27$; $p = .005$) and intrinsic motivation ($\beta = -0.23$; $p = .018$) on dropout intention are comparable with the effects observed in the previous model. As in the model without covariates, the effects of utility motivation, academic and social integration were not significant. Overall, the model explained 27% of the variance in dropout intention. The coefficients did not change severely when including covariates or using listwise deletion (see Appendix), underlining the robustness of our findings.

Discussion

Pre-service teachers' decision to drop out of teacher training is complex and influenced by a range of factors, such as personal predispositions, study conditions, or social and academic integration (Behr et al. 2020; Franz and Paetsch 2023; Franz et al. 2022). It is crucial to have a deeper understanding of the intricate factors underlying this decision, as this can pave the way for early intervention and support to prevent potential dropouts. Notably, within the field of VET teacher training, there remains a lack of research into dropout and dropout intention, and its underlying factors. However, pre-service VET teachers possess unique characteristics that set them apart from their counterparts in general teacher training programs. These distinctive attributes include a higher

proportion of individuals with prior VET, non-academic backgrounds, limited exposure to traditional academic environments, and nuanced career choice motivations (Stellmacher et al. 2020; Wyrwal and Zinn 2018). By investigating dropout intention among students in VET teacher training, we can gain a comprehensive understanding of the complex interplay of factors in this context.

Within the framework of established theories and empirical findings on dropout in higher education (Heublein 2014; Tinto 1975, 1993), our study endeavors to highlight the intricate relationships between career choice motivation, social and academic integration, and the intention to drop out. This study not only builds upon existing research on dropout in teacher education but offers novel insights by exploring these relationships within the unique context of pre-service VET teachers.

First, the findings indicate that pre-service VET teachers have a low dropout intention compared to teachers in other fields of study. This result corresponds with previous studies showing that pre-service teachers in general tend to have low dropout rates (Bohndick 2023; Stellmacher et al. 2021).

Our findings suggest that pre-service VET teachers mainly choose teacher training because of their strong intrinsic and utility motivation for this profession. These results align with existing research on pre-service VET teachers' career choice motivation (Driesel-Lange et al. 2017; Stellmacher et al. 2020).

Second, based on the current state of research, we assumed that pre-service VET teachers' intrinsic career choice motivation is negatively associated with their dropout intention and that the extrinsic career choice motivation is positively associated with their dropout intention. The results indicate that intrinsic motivation appears to be significantly negatively related to dropout intention, suggesting that students who prioritize intrinsic career choice motivation are less likely to contemplate dropping out. This finding is in line with those of other studies, showing that pre-service teacher's high level of intrinsic or altruistic career choice motivation is an important factor in study success (Stellmacher and Paetsch 2023; Watt et al. 2014).

Furthermore, as expected, the analysis revealed that extrinsic motivation was positively related with dropout intention, showing that pre-service VET teachers with high extrinsic motivation tend to think about leaving teacher education. This result is also consistent with other research findings where comparatively high extrinsic motivation and simultaneously low intrinsic motivation in pre-service teachers was found to be unfavorable (Berger and D'Ascoli 2012). Utility motivation showed no significant effect in our study, possibly due to the fact that utility motives, such as financial and time-related benefits, are tied to the teaching profession itself rather than being addressed during the teacher training program. Among the control variables, only the final school grade was significantly negatively associated with the intention to drop out, indicating that a better final school grade corresponded to a lower intention to drop out. This counterintuitive finding suggests that students with higher grades see more alternative educational or career opportunities available to them, potentially making them more willing to consider leaving their current program if it does not meet their expectations or align with their goals (Franz and Schindler 2024).

Third, we expected the relationship between career choice motivation and dropout intention to be mediated by academic and social integration. However, our findings did not support this hypothesis, as we did not observe significant relationships between the

integration variables and dropout intention. This result was unexpected, given that previous research has often found significant associations between integration factors and dropout intention (Bohndick 2020; Klein 2019). While Tinto's model has been influential in understanding dropout dynamics in higher education, each educational context may have unique characteristics and dynamics that impact students' decisions (Heublein et al. 2017). For instance, the expectations and experiences of pre-service VET teachers could play a role. Many pre-service VET teachers have prior work experience or have completed VET, which might make them less dependent on traditional academic and social structures for a sense of belonging. Instead, they may rely on other forms of support or guidance tailored more specifically to their professional needs (Berger and Ziegler 2021; Wyrwal and Zinn 2018).

Methodological differences between studies could also explain the lack of relationship between the integration variables and dropout intention. For example, the effects of integration on the intention to drop out could have diminished over the course of the study, particularly given the fact that the highest dropout rates occurred at the beginning of the study and the sample of the present study was already selected.

Variations in how integration variables were measured and the specific sample characteristics may also have contributed to discrepancies in the findings. In our study, dropout intention exhibited a low mean value, which raises the potential for floor effects to manifest.

This study has several limitations. First, owing to the small sample size, smaller effect sizes might not have reached statistical significance, potentially limiting the detection of subtle but meaningful relationships between the variables. However, the sample was drawn from an originally representative sample of pre-service teachers from Germany, spanning several higher education institutions. The small sample we used included a specific population and was at the same time broadly distributed across different occupational fields. The analyses carried out could not clarify whether the results are applicable to VET teacher training in general or whether they vary by higher education institution or subject. This remains an open question and an important avenue for future research.

Second, when interpreting the results, it is important to consider that the data were collected in 2014. The VET teacher training program has since evolved and become more differentiated. Therefore, it would be valuable to replicate the study with a more current survey, as there may be differences, for instance, between students in regular degree programs and those in lateral entry programs. Third, this study focused on examining dropout intention rather than the actual occurrence of students leaving the teacher training program. Subsequent research should aim to replicate these findings by studying actual dropout events to provide a more comprehensive understanding of the factors influencing such decisions. Fourth, according to Ebert and Heublein (2017), dropout intention is influenced by various individual factors not captured in our study, such as stress during the teacher training program, financial challenges, or academic difficulties. Future studies should be expanded by incorporating additional variables to enhance variance explanation. The polyvalent nature of certain study programs could also impact dropout intentions. However, this factor could not be considered in the present analysis owing to the small sample size and should be explored in future studies.

Fifth, we selected a cross-sectional analytical approach owing to the measurement points of interest. In addition, the point of measurement was relatively late in the course of study. However, since most dropouts occur at the beginning of studies, many intentions to drop out are not taken into account and could not be studied. Future longitudinal studies should survey the career choice motives at the beginning and in the middle of the teacher training program to determine whether the motives have changed and how they relate to drop out intention and dropping out.

The measurement also shows limitations insofar as the FEMOLA subscale self-concept had low reliability. Therefore, we conducted a factor analysis with the FEMOLA items and identified three factors: intrinsic motivation, extrinsic motivation, and utility motivation. Pohlmann and Möller (2010) identified intrinsic and extrinsic career choice motivation as two secondary factors with utility motivation as a subcomponent of extrinsic motivation. However, it seems reasonable to treat utility motivation as a separate factor, as other studies have shown it to have similarly high values compared to intrinsic motivation and be positively associated with career choice certainty, unlike the other extrinsic motivation scales (Driesel-Lange et al. 2017; Hogg et al. 2023; Stellmacher and Paetsch 2023).

Our findings highlight that students with high intrinsic motivation are likely to complete their studies. Conversely, students who choose to study based on perceived low requirements or external influences are at a high risk of dropping out. The results emphasize the importance of engaging students through their intrinsic motivation, as this provides them with the resilience needed to complete their studies despite the time and effort required. The connection between extrinsic motivation (which included study demands and social influences) and dropout intention underscores the importance of addressing potential misinformation and unanticipated performance requirements within teacher training programs to better support students' persistence and success. Our findings hint at the need to better inform students about the content and curriculum of VET teacher training programs. Given the complexity of the teaching profession and the intricate study structures involved, choosing teacher training solely as a fallback career option can lead to misconceptions and academic challenges. Our study did not find a significant effect of social and academic integration on dropout intention, suggesting that future research should investigate whether the distinctive characteristics of pre-service VET teachers—such as their professional identity, prior work experience, and reliance on external support networks—moderate the relevance of integration factors, or whether methodological aspects in measuring these constructs play a role.

Abbreviations
CAWI   Computer-assisted web interview
VET   Vocational education and training

Supplementary Information
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Supplementary Material 1

Declarations

Competing interests
The authors declare that they have no competing interests.

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