



OPEN ACCESS

EDITED BY

Benjamin Dreer,
University of Erfurt, Germany

REVIEWED BY

Zselyke Pap,
West University of Timișoara, Romania
Kris-Stephen Besa,
University of Münster, Germany

*CORRESPONDENCE

Sebastian Franz
✉ sebastian.franz@lifbi.de

RECEIVED 03 March 2023

ACCEPTED 12 May 2023

PUBLISHED 02 June 2023

CITATION

Franz S and Paetsch J (2023) Academic and social integration and their relation to dropping out of teacher education: a comparison to other study programs.
Front. Educ. 8:1179264.
doi: 10.3389/feduc.2023.1179264

COPYRIGHT

© 2023 Franz and Paetsch. This is an open-access article distributed under the terms of the [Creative Commons Attribution License \(CC BY\)](https://creativecommons.org/licenses/by/4.0/). The use, distribution or reproduction in other forums is permitted, provided the original author(s) and the copyright owner(s) are credited and that the original publication in this journal is cited, in accordance with accepted academic practice. No use, distribution or reproduction is permitted which does not comply with these terms.

Academic and social integration and their relation to dropping out of teacher education: a comparison to other study programs

Sebastian Franz^{1*} and Jennifer Paetsch²

¹Leibniz Institute for Educational Trajectories (LifBi), Bamberg, Germany, ²Institute of Educational Science, University of Bamberg, Bamberg, Germany

Introduction: Academic and social integration have been identified as key predictors of the decision to drop out by higher education students. So far, there is limited knowledge about whether there are differences in the degree of integration between teacher education students and students in other academic programs, although these differences might affect the decision-making process of students and their likelihood of dropping out. Furthermore, it is still unclear if the reasons for students dropping out of teacher education programs differ from those in other academic programs.

Methods: This study aims to address this research gap by examining integration and dropout rates of 8,237 students who were studying to become teachers, compared to students in similar fields of study in German higher education. The data for the study were collected from the National Educational Panel Study (NEPS).

Results: The results revealed significant differences between teacher education students and other students in peer and faculty social integration, but not in normative and structural academic integration. However, no moderation effect of the teacher education program on the association of integration and dropout was found.

Discussion: The findings contribute to the discussion on causes of dropout in teacher education by showing higher values in peer social integration and lower values in faculty social integration for teacher education students. These results complement previous research by providing new findings on the causes of students' decision to drop out of initial teacher education. Practical implications on how to increase retention in teacher education programs are discussed.

KEYWORDS

initial teacher education, pre-service teacher, higher education, academic integration, social integration, dropout

1. Introduction

The number of teacher education graduates is an important factor in the quality of initial teacher education (OECD, 2015), as graduation is a necessary condition for the entrance into the second practical preparatory phase of teacher education (Cortina and Thames, 2013). Student dropout in higher education (HE) is recognized as a problem across many countries, as it refers to inefficient use of resources. In Germany, about one in four students leave HE without a degree (Heublein, 2014), which is comparable with estimated rates for other countries (OECD,

2019). However, dropout rates differ across study programs, with the highest rates (30–50%) in science, technology, engineering, and mathematics (STEM). In contrast, teacher education students are outstanding concerning their consistently low dropout rates (about 20%) compared to other programs (Heublein et al., 2022).

Due to the negative consequences for the student (e.g., labor market drawbacks) and the institution (e.g., financial costs), there is great interest in determining the causes of dropout in HE and preventing it (Heublein, 2014; Neugebauer et al., 2019). Despite the comparatively low dropout rate in teacher education, Germany and many other countries face a severe lack of teachers (OECD, 2015). Hence, reducing the dropout rate is one important factor in counteracting teacher shortages (Roberts, 2012). Recent research emphasizes that individual predispositions of teacher education students, as well as their study conditions, differ in several ways from other students and study programs (Bohndick and Buhl, 2014; Roloff Henoch et al., 2015; Savage et al., 2021). Consequently, there is evidence that the causes of dropout vary between teacher education students and students in other programs (Blömeke, 2009; Blüthmann and Thiel, 2011).

In HE research, dropout is described as a complex multi-causal process in which personal predispositions on an individual level and study conditions on an institutional level are crucial factors (Heublein, 2014; Behr et al., 2020). The student integration model (SIM) focuses on the interplay of these factors while stating that the dropout decision results from insufficient integration in HE culture (Tinto, 1975). There is a considerable body of empirical research supporting the relationship between academic and social integration and the intention to drop out as well as the actual dropout decision (for an overview see Bohndick, 2020; Tight, 2020; Piepenburg and Beckmann, 2021). For example, Thomas (2000) conducted a study of undergraduate students at multiple institutions in the western United States and found that both academic and social integration were positively associated with persistence intention. Research has indicated a relation between social and academic integration and the risk of dropping out of tertiary education not only in the United States (e.g., Pascarella and Chapman, 1983; Bers and Smith, 1991; Thomas, 2000) but also in European countries such as the United Kingdom and Germany (Chrysikos et al., 2017; Isleib et al., 2019; Klein, 2019).

Furthermore, recent longitudinal studies have provided evidence that academic and social integration are significant predictors of actual dropout, even after accounting for other factors such as success probability and perceived costs (Isleib et al., 2019; Müller and Klein, 2022). For example, Müller and Klein (2022) found that academic and social integration were among the strongest predictors of actual dropout in a sample of German university students. Larsen et al. (2013) conducted a comprehensive literature review and found that academic and social integration consistently explained substantial variance in dropout, above and beyond other predictors such as demographic factors and academic preparation. These findings suggest that promoting both academic and social integration may be a key strategy for preventing dropout and increasing student success (see Behr et al., 2020).

Although the association of students' integration with the decision to drop out is well documented (e.g., Larsen et al., 2013; Isleib et al., 2019) studies are often limited to a few universities and an unspecified group of students in terms of their study programs (Heublein, 2014).

Specifically, only few empirical studies have focused on systematic differences between teacher education students and students in other programs (Herfter et al., 2015; Bohndick, 2020). Referring to the SIM, these group differences could result in (a) different levels of integration that influence the dropout decision, and/or (b) different effects of integration on the dropout decision.

In order to find ways of reducing dropout in teacher education, it is essential to examine the SIM in the teacher education context. Therefore, this study explores the expected differences between teacher education students and other students in HE, concerning the decision to drop out, by analyzing how academic and social integration as well as their relationship to dropout differ between the groups. Using data from the first-year student cohort of the German National Educational Panel Study (NEPS), linear and logistic regression analyzes including interaction effects are applied to investigate the differential effects of various aspects of integration.

2. Theoretical framework

2.1. The student integration model

The SIM (Tinto, 1975, 1997) is a prominent explanatory model for dropout in HE. When entering university, students evaluate and adapt their personal fit in the academic context. This process is called integration and refers to the adjustment to the university context and the preservation of the individual's uniqueness to find a sense of belonging in the HE system (Tinto, 2017). The reciprocal relationship between the students and the university leads to the continuous development of integration over time (Stage, 1989; Dahm et al., 2016).

Tinto (1975) differentiates between integration into the academic and the social systems of the university. Academic integration results from feedback from the university through exams and the appraisal of the personal fit to HE (Dahm et al., 2016). Meeting the performance standards of the university displays structural academic integration. Identification with the norms of HE and the respective study programs results in normative academic integration. Students' structural and normative academic integration mainly reflect the success of their incorporation into the university's academic system (Tinto, 1975).

Social integration refers to interactions between the student and other people in the HE environment, in particular, contact with other students and participation in extracurricular activities. Additionally, social integration reflects the sense of community among the students and the feeling of cohesion. Contact with fellow students is important for establishing a social network that is supportive in difficult situations, such as personal problems and issues concerning their studies (Roberts, 2012; Tinto, 2017). Students' interaction with faculty and staff reflects not only social but also likewise academic integration (Schaeper, 2020). Therefore, social integration can be distinguished into peer social integration (contact with fellow students) and faculty social integration (contact with faculty staff).

Students need to integrate not only into the HE system in general but also into their program of study with its cultural specificities and special demands (Tinto, 1997; Ylijoki, 2000; Pascarella and Terenzin, 2005). Consequently, it is assumed that integration processes vary across academic programs (Georg, 2009; Bohndick, 2020).

2.2. Academic and social integration of teacher education students

In Germany, initial teacher education at a university is comparable to other study programs in HE (Cortina and Thames, 2013). Thus, the model assumptions of the SIM should also apply in this context. At the same time, there are specific characteristics of teacher education programs that can lead to differences in academic and social integration. Particularly individual predispositions of teacher education students as well as their study conditions differ in several ways from other students and study programs (Bohndick and Buhl, 2014; Roloff Henoeh et al., 2015; Savage et al., 2021).

Teacher education students are characterized by high social interests and values manifested in the motivation to make a social contribution and work with children or adolescents (Watt et al., 2012; Neugebauer, 2013; Savage et al., 2021; Osada and Schaeper, 2022). They show lower investigative interest, which implies low motivation for science and research compared to students in other programs (Roloff Henoeh et al., 2015; Osada and Schaeper, 2022). Although prior academic achievement does not generally differ between students in teacher education programs and others (Neugebauer, 2013; Roloff Henoeh et al., 2015), university lecturers perceive teacher education students as having a lower level of academic competence in comparison to other students (Ihme and Möller, 2015). In fact, German teacher education students tend to have a lower final university grade than students in other programs (Alesi and Neumeyer, 2017).

The study conditions differ greatly between teacher education programs and others in terms of their curriculum, structure, and demands (Bohndick and Buhl, 2014). Teacher education students usually study at least two subjects and attend the same subject-specific courses as students from other study programs (Cortina and Thames, 2013). Moreover, teacher education students need to attend courses in other disciplines, such as didactics, pedagogy, educational psychology, and educational sociology (Cortina and Thames, 2013; Kunter et al., 2013), exposing them to several domain-specific study cultures and academic attitudes.

Both the characteristics of the students and the study conditions in teacher education programs influence academic and social integration following the SIM. Evidence from empirical studies shows that psychological factors (e.g., motivation, interests), and cognitive abilities (e.g., prior achievement) as well as teaching quality influence academic and social integration (e.g., Napoli and Wortman, 1998; Braxton et al., 2000; Rubin, 2012; Schaeper, 2020).

The high social interests of teacher education students could lead to a higher tendency to seek contact with other students and higher peer social integration compared to students in other programs. At the same time, being exposed to faculty and staff from different disciplines and corresponding mind-sets (Ihme and Möller, 2015; Carstensen et al., 2021), teacher education students may not have such a high-quality relationship with HE lecturers as other students, and they may have lower faculty social integration. The lower academic achievement in HE and the lower motivation regarding science imply that studying in a teacher education program possibly leads, on average, to lower structural and normative academic integration.

Empirical findings from studies examining the integration of teacher education students in contrast to students in other study programs are scarce and inconsistent. Kim and Corcoran (2017)

investigated the amount of teacher education students' engagement in HE in the US and found the level of engagement among teacher education students to be rather low; specifically, they were least engaged in interactions with faculty members, followed by academic challenges and contact with their peers. Bohndick (2020) found no general differences in structural academic integration between teacher education students and other students in Germany. However, lower levels of peer social integration were found for teacher education students focusing on non-STEM subjects, whereas those specializing in STEM subjects had a higher amount of social integration compared to the other student groups.

2.3. The moderating effect of teacher education programs on the relationship between integration and dropout

Predispositions of teacher education students and characteristics of teacher education programs might not only affect integration into HE itself, but also the association between integration and dropout. There is considerable overlap in the reasons for dropping out between teacher education students and other students, such as financial and personal issues (Hobson et al., 2009; Chambers et al., 2010; Lin et al., 2016). The causes of dropout that teacher education students mention more often or perceive to be more crucial compared to students in other fields mirror the different academic mind-sets and values in teacher education programs. Herfter et al. (2015) showed that low academic achievement is not as important for the dropout decisions of teacher education students as it is for students of other programs. They argue that the aspiration of becoming a teacher, not academic success, is the driving motivation for choosing teacher education. Simultaneously, the decision to pursue a different career as well as the lack of practical and professional reference are typical causes for withdrawal from teacher education programs (Hobson et al., 2009; Chambers et al., 2010). Based on these findings, structural academic integration might be less related to dropout for teacher education students compared to others. In contrast, normative academic integration might have a stronger association with dropping out of teacher education programs compared to other programs, since it leads directly to a profession.

The absence of social support from faculty, staff, and mentors as well as an inadequate social network are also reasons for dropout that are reported by teacher education students (Chambers et al., 2010; Powazny and Kauffeld, 2020; Wolf et al., 2021). A strong sense of community might be more important for teacher education students to support each other in different disciplines when appreciation by faculty and staff is missing (Carstensen et al., 2021). Hence, it can be expected that insufficient peer social integration plays a more important role in the decision to drop out for teacher education students compared to other students. At the same time, faculty social integration may only be of minor importance for teacher education students compared to their counterparts in other fields.

Only a few studies have investigated the effects of academic and social integration on the dropout of teacher education students, and their results are inconsistent. Kim and Corcoran (2018) examine factors that influence the persistence of first-year and senior bachelor's degree students in the teacher education program. They found that neither social nor academic integration was related to persistence in

teacher education programs. This result is rather unexpected, as the relation between both predictors and HE retention has been demonstrated several times (see [Larsen et al., 2013](#)). One possible explanation for [Kim and Corcoran's \(2018\)](#) results might be that the dropout mechanism differs between teacher education programs and other programs. When interpreting these findings, it is important to take into account that the authors did not investigate retention of students who did not study a teaching profession. The null findings, therefore, could also be caused by a lack of construct validity or the fact that the study focuses only on retention in master programs.

To our knowledge, so far, only [Bohndick \(2020\)](#) has examined the moderation effects for teacher education students and students in other study programs in the SIM. Her results show that academic and social integration were related to the intention to drop out, but there was no moderation effect of teacher education programs. However, interpretations of these findings are limited for two reasons. Firstly, the study included neither normative aspects of academic integration nor faculty social integration, although both factors have been shown to have a notable effect on the decision to drop out ([Braxton and Lien, 2000](#); [Baars et al., 2009](#); [Piepenburg and Beckmann, 2021](#)). Secondly, the study investigated only the intention to drop out, but not the actual dropout decision. While the intention to drop out is strongly correlated with the ultimate decision to do so ([Cabrera et al., 1993](#); [Dewberry and Jackson, 2018](#)), it is important to note that these are distinct constructs with different implications. Merely intending to drop out does not necessarily lead to action. Furthermore, research has shown that academic and social integration may not have the same predictive value for both the intention to drop out and the actual decision ([Thomas, 2000](#)). Thus, the absence of significant moderation effects in the study by [Bohndick \(2020\)](#) could be attributed to either the selective measurement of integration, which may have led to an underestimation of effects, or the study's exclusive focus on dropout intention, which may not fully capture the complex and dynamic factors that influence students' decisions to leave a program.

In summary, the relationship between integration and dropout in teacher education students is still unclear due to methodological limitations in existing studies. However, as described above, there is theoretical evidence to suggest that the association between academic and social integration and dropout may be moderated by teacher education programs.

3. The present study

Academic and social integration have been identified as key predictors in explaining the dropout decision of HE students (e.g., [Piepenburg and Beckmann, 2021](#)). Nevertheless, research on the dropout decision of teacher education students is scarce. The above literature review points out that there are notable differences between teacher education students and other students in their personal characteristics and their study conditions. However, there is a research gap on (1) the differences between teacher education students' and other students' academic and social integration, and (2) the moderation effect of teacher education on the relationship between integration and the decision to drop out.

This study extends the literature about the effects of academic and social integration on the decision to drop out by comparing teacher education students with students from other programs. In addition,

we use a more precise differentiation of academic and social integration that is more closely aligned with Tinto's theoretical considerations and distinguish between structural academic integration, normative academic integration, peer social integration as well as faculty social integration. The purpose of this study is, first, to explore differences in integration into the academic and social systems between teacher education students and students in other programs and, second, to find out whether the relationships between academic and social integration and the decision to drop out differ between groups.

Based on the theoretical assumptions, we propose the following hypotheses:

H1: Teacher education students report lower scores of structural academic (H1a), normative academic (H1b), and faculty social integration (H1c) than students in other programs.

H2: Teacher education students report higher scores in peer social integration than students in other programs.

H3: Academic and social integration are, for both student groups, negatively related to dropout.

H4: The teacher education program moderates the effects of academic integration and social integration on dropout.

H4a: Structural and normative academic integration as well as faculty social integration are less strongly related to dropout for teacher education students compared to other students.

H4b: Peer social integration is more strongly related to dropout for teacher education students compared to other students.

As mentioned above, integration and dropout are associated with a variety of factors. Sex, socioeconomic background, migration background, and studying STEM subjects have consistently been found to be related to both outcomes ([Heublein, 2014](#); [Vossensteyn et al., 2015](#); [Bargmann et al., 2022](#)). Moreover, research indicates that students in STEM fields are more likely to leave the profession compared to their peers in other teaching subjects ([Guarino et al., 2006](#); [Klassen and Chiu, 2011](#)). Therefore, we control for these variables in the analyses.

4. Data and methods

4.1. Sample

The analyses are based on data from the NEPS (see [Blossfeld and Roßbach, 2019](#)), a nationwide random sample that consists of six so-called starting cohorts and aims to provide insights into the pathways in the German educational system. Starting Cohort 5 is a sample comprised of students in a HE institution that started their first studies in the winter term of 2010/2011; it contains an over-sampling of teacher education students. Participants in the panel study are surveyed about every 6 months using telephone and online surveys. The latest scientific use file of the data set

(wave 16) used for the analysis covers an observation time of about 9 years.

Students in medicine, law, and engineering were excluded from the sample to generate comparable groups with fields of study that can be taken both in teacher education programs and in other study programs ($N=10,595$). Students with neither an identified graduation nor dropout event before leaving the panel were also excluded, which results in an analytical sample size of 8,237 students.

In the final sample, 43% of the students were enrolled in a teacher education program ($n=3,502$) and 31% were affiliated with at least one STEM subject (37% in teacher education programs, 26% in other programs). The majority of the sample was female (67%) and the students were, on average, 21 years old when academic and social integration was measured (wave 2). Almost half of the sample (46%) had an academic background, with at least one parent with a HE degree. Only 5% of the students were not born in Germany and had a migration background (for detailed information, see Table 1).

4.2. Measurements

Academic and social integration were measured using four scales each, accounting for the various facets and sub-dimensions of the constructs (see Dahm et al., 2016). Research on instruments measuring academic and social integration in the German context is limited (Tarazona and Rosenbusch, 2019). Therefore, within the NEPS framework, it was necessary to gather and test several well-established instruments. Validity analyses indicate that the instruments used, including the ‘Fulfillment of Achievement Expectation’ scale (Trautwein et al., 2006), the sub-dimension achievement orientation of the ‘Academic Commitment’ scale (Grässmann et al., 1998), and the two subscales developed by Schiefele et al. (2002), provide a parsimonious measurement of student integration in higher education based on Tinto’s conception (see Dahm et al., 2016; Schaeper, 2020). As a result, these four scales were employed to capture the various facets and sub-dimensions of the construct, including structural academic integration, normative academic integration, peer social integration, and faculty social integration. The academic and social integration constructs were measured using the four scales during the second wave, approximately 1 year after the start of the students’ studies (see Appendix 1 for a full description of measurements).

Structural academic integration was operationalized using the ‘Fulfillment of Achievement Expectation’ scale (Trautwein et al., 2006). It measures the perceived performance of the students via three items on a four-point Likert scale ($\alpha=0.81$). Normative academic integration was operationalized using the sub-dimension achievement orientation of the ‘Academic Commitment’ scales (Grässmann et al., 1998), measured with three items each on a five-point Likert scale ($\alpha=0.71$).

The social integration scale contains two subscales and was conducted during the second wave (Schiefele et al., 2002). One subscale measures contact with other students (peer social integration) with three items ($\alpha=0.84$); the other measures interaction with faculty and staff (faculty social integration) with four items on a four-point Likert scale ($\alpha=0.76$).

Because the biographical data are collected every year, we are able to identify dropout among participants in the sample. We define dropout as leaving the study program (after the measurement of integration constructs; wave 2) without a degree in the observation time of 9 years. Thereby, 15% of the students appeared to have dropped out in our sample. This dropout rate is lower than in other studies, which could be due to different conceptualizations of dropout or the problem of panel attrition, possibly leading to an underestimation of the relationship between integration and dropout (see Section 7).

4.3. Data analyses

Missing data (see Table 2) occur in the items on integration constructs (25–26%) and final school exam grade (4–19%) due to unit and item non-response. We applied Little’s test to analyze the missing data (Li, 2013). The result indicated that the missing values are not missing completely at random (MCAR). Therefore, missing data was classified as missing at random (MAR) and multiple imputation can be applied to produce unbiased results. To avoid including cases with missing data, multiple imputation with chained equation was applied using Stata 16.1 (Stata Corp, 2019). Five data sets were generated in which all missing values were imputed. Each imputed data set was analyzed separately, and the results were combined according to Rubin’s rules.

To compare group differences in sub-dimensions of academic and social integration, the linear regression analysis included a dummy variable (teacher education program vs. other programs). Standardized

TABLE 1 Descriptive statistics of the sample.

	Whole sample ($N=8,237$)				Teacher education students ($n=3,502$)				Other students ($n=4,735$)			
	Mean/percentage	SD	Min	Max	Mean/percentage	SD	Min	Max	Mean/percentage	SD	Min	Max
Female	67%	0.47	0	1	76%	0.43	0	1	60%	0.49	0	1
Age	21	3.81	16	60	20	2.61	17	56	22	4.44	16	60
Migration background	5%	0.22	0	1	4%	0.19	0	1	6%	0.24	0	1
Academic background	46%	0.50	0	1	44%	0.50	0	1	47%	0.50	0	1
STEM	31%	0.46	0	1	37%	0.48	0	1	26%	0.44	0	1

TABLE 2 Descriptive statistics of integration and grade point average (GPA; standardized).

	All students (N = 8,237)					Teacher education students (n = 3,502)					Other students (n = 4,735)				
	M	SD	Min	Max	Share imputed	M	SD	Min	Max	Share imputed	M	SD	Min	Max	Share imputed
Structural academic integration	2.61	0.67	1	4	0.25	2.59	0.63	1	4	0.25	2.62	0.70	1	4	0.25
Normative academic integration	3.57	0.83	1	5	0.25	3.57	0.82	1	5	0.25	3.58	0.83	1	5	0.26
Peer social integration	3.10	0.65	1	4	0.25	3.14	0.62	1	4	0.25	3.07	0.67	1	4	0.26
Faculty social integration	3.04	0.44	1	4	0.24	3.00	0.42	1	4	0.25	3.07	0.46	1	4	0.26
GPA (standardized)	0.04	0.96	-2.51	2.00	0.13	0.1	0.92	-2.51	2.00	0.04	0.07	0.99	-2.51	2.00	0.19

regression coefficients are reported, and robust standard errors are used. Since Bohndick (2020) showed that studying STEM subjects influences academic and social integration in teacher education programs, we controlled for having a STEM focus. To evaluate model fit, R^2 and adjusted R^2 values are reported.

Logistic regression with robust standard errors was used to investigate the relationship between academic and social integration and student dropout. Odds ratios (OR) are reported for easier interpretation of the coefficients; values above one indicate a higher probability, whereas values below one indicate a lower probability. Furthermore, we modeled the moderation effects via interaction effects. Regression models controlled for sex, age, migration background (not born in Germany), academic background (parent with academic degree), and STEM subject (at least one STEM subject vs. no STEM subject) since these variables have been proven to be related to the dropout rate (Heublein, 2014; Vossensteyn et al., 2015). To evaluate model fit, pseudo- R^2 , and C-statistic values are reported.

5. Results

5.1. Differences in academic and social integration between teacher education students and other students

Table 2 presents descriptive results of the integration scales and GPA, including a comparison of means. The means of structural academic integration ranged between 2.59 and 2.61 in both subsamples. There were no significant differences between students in teacher education and those in other programs [$t(6158)=1.53$; $p=0.127$; $d=0.04$]. The same accounts for normative academic integration with means that ranged between 3.57 and 3.58, indicating rather positive values. There were no significant differences between the two groups [$t(6142)=0.33$; $p=0.741$; $d=0.01$]. Teacher education students ($M=3.14$) rated peer social integration higher than other students ($M=3.07$) did. This difference in the means of peer social integration appeared to be significant [$t(6142)=-4.45$; $p\leq 0.001$;

$d=-0.11$]. In contrast, teacher education ($M=3.00$) students reported lower values on faculty social integration compared to other students ($M=3.07$). For faculty social integration, results revealed a statistically significant difference between both student groups [$t(6156)=0.530$; $p\leq 0.001$; $d=0.14$].

To investigate if these differences in academic and social integration between teacher education students and students in other programs are robust, linear regression analysis was applied, including the studied subject (STEM vs. non-STEM) as a control variable (Table 3). We assumed that studying in a teacher education program is negatively related to structural academic, normative academic, and faculty social integration (H1). This hypothesis is partly supported, as studying to become a teacher is indeed negatively related to faculty social integration ($\beta=-0.06$; $SE=0.01$; $p\leq 0.001$). However, teacher education students and students in other programs do not significantly differ in their structural ($\beta=-0.01$; $SE=0.02$; $p=0.498$) and normative academic integration ($\beta=-0.00$; $SE=0.02$; $p=0.971$). Furthermore, the hypothesis was proposed that teacher education students have higher values of peer social integration (H2). The positive regression coefficient of $\beta=0.06$ ($SE=0.02$; $p\leq 0.001$) for studying to become a teacher supports this hypothesis.

5.2. The effects of academic and social integration on student dropout

To investigate the effect of integration on student dropout and the moderation effect of teacher education on this relationship, stepwise logistic regression models were estimated including interaction effects (Table 4). The first model displays the results of the analysis with all students. Controlling for sociodemographic characteristics and a STEM focus, teacher education students have a higher probability of dropping out ($OR=1.46$; $SE=0.11$; $p\leq 0.001$) from their studies than other students. This finding is contrary to previous research, which reports lower dropout rates and lower dropout intentions for teacher education students in Germany (Bohdick, 2020; Heublein et al., 2022).

TABLE 3 Linear regression analysis of academic and social integration.

	Structural academic integration			Normative academic integration			Peer social integration			Faculty social integration		
	β	SE	p	β	SE	p	β	SE	p	β	SE	p
Teacher education	-0.01	0.02	0.498	-0.00	0.02	0.971	0.06*	0.02	≤ 0.001	-0.06*	0.01	≤ 0.001
STEM	-0.12*	0.02	≤ 0.001	-0.02	0.02	0.273	0.05*	0.02	0.005	-0.07*	0.01	≤ 0.001
Constant	2.65*	0.01	≤ 0.001	3.57*	0.01	≤ 0.001	3.03*	0.01	≤ 0.001	3.08*	0.01	≤ 0.001
N	8,237			8,237			8,237			8,237		
R ²	0.01			0.00			0.01			0.01		
Adj. R ²	0.01			0.00			0.01			0.01		

* $p < 0.05$.

In line with the assumptions, higher normative academic integration ($OR = 0.61$; $SE = 0.03$; $p \leq 0.001$), higher structural academic integration ($OR = 0.49$; $SE = 0.04$; $p \leq 0.001$), and higher peer social integration ($OR = 0.70$; $SE = 0.05$; $p \leq 0.001$) lower the probability of dropping out. However, no significant coefficient for faculty social integration ($OR = 1.02$; $SE = 0.11$; $p = 0.866$) was found.

Next, two separate models were estimated to examine if academic and social integration predict dropping out for teacher education students (Model 2a) and others (Model 2b). Again, normative academic integration (teacher education: $OR = 0.57$; $SE = 0.04$; $p \leq 0.001$; other students: $OR = 0.64$; $SE = 0.04$; $p \leq 0.001$) and structural academic integration (teacher education: $OR = 0.52$; $SE = 0.06$; $p \leq 0.001$; other students: $OR = 0.46$; $SE = 0.04$; $p \leq 0.001$) were negatively related to the dropout decision for both samples. Students with higher normative academic integration and structural academic integration had a lower probability of dropping out from their studies compared to their lower-integration counterparts. Furthermore, peer social integration is negatively and significantly related to dropout in both (teacher education: $OR = 0.79$; $SE = 0.08$; $p = 0.016$; other students: $OR = 0.63$; $SE = 0.06$; $p \leq 0.001$). Faculty social integration is once again no significant predictor for dropout (teacher education: $OR = 1.08$; $SE = 0.17$; $p = 0.642$; other students: $OR = 0.97$; $SE = 0.13$; $p = 0.823$). Overall, it appears that the SIM model applies to teacher education students as well as to those in other programs. However, the odds ratio coefficients differ between groups, which might hint at a possible moderation effect.

5.3. Moderation effects of teacher education students on the effects of academic and social integration on dropout

In Model 3, interaction effects between belonging to a teacher education program and academic as well as social integration were considered to verify the assumed moderation effects. Normative academic ($OR = 0.65$; $SE = 0.04$ $p \leq 0.001$), structural academic ($OR = 0.45$; $SE = 0.04$; $p \leq 0.001$), and peer social integration ($OR = 0.63$; $SE = 0.06$; $p \leq 0.001$) again had a significant single effect, whereas the coefficient of faculty social integration appeared to not be significant ($OR = 0.97$; $SE = 0.13$; $p = 0.814$). The single effect of belonging to a

teacher education program was not significant in this model ($OR = 0.60$; $SE = 0.52$; $p = 0.435$). This result means that normative academic, structural academic, and peer social integration are still related to dropping out. Yet, there is no overall difference between teacher education students and other students in the relationship between the integration variables and dropping out.

Ultimately, the interaction coefficients of teacher education and the four dimensions of integration are not significant. The hypothesis of a moderation effect of membership in a teacher education program on the relationship between academic and social integration and dropout must be rejected.

6. Discussion

This study investigated differential dropout mechanisms of teacher education students compared to other students using data from the HE student cohort of the German NEPS. Building upon Tinto's well-established theoretical framework to explain dropout by students, this contribution applied his SIM to teacher education students and examined if the amount of integration and the relationship between integration and dropping out differs by the study program. The Hypothesis was proposed that structural academic integration, normative academic integration, faculty social integration, and peer social integration are related to the decision to drop out in both student groups. Additionally, it was argued that the unique characteristics of teacher education students and the teacher education program might affect the amount of perceived integration as well as the relationship between integration and dropout.

The findings contribute to research on dropout in teacher education, as they provide further knowledge on differences in the causes of dropping out as determined by the comparison of teacher education students and those in comparable programs. Moreover, this study extends previous research by providing more detailed measurements of integration by considering sub-dimensions and thus drawing a more accurate picture of the integration process. While previous studies often investigated the intention to drop out, in this study, the actual dropout event was considered the dependent variable.

In the present study, no differences in structural and normative academic integration were found between the two student groups. This indicates that, contrary to our assumptions, teacher education

TABLE 4 Logistic regression for student dropout.

	Model 1 (H3, all students)			Model 2a (H3, teacher education students)			Model 2b (H3, other students)			Model 3 (H4, all students)		
	OR	SE	p	OR	SE	p	OR	SE	p	OR	SE	p
Female (vs. male)	0.76*	0.06	≤0.001	0.70*	0.08	0.003	0.84	0.09	0.104	0.76*	0.06	≤0.001
Age	1.07*	0.01	≤0.001	1.03	0.02	0.063	1.07*	0.01	≤0.001	1.06*	0.01	≤0.001
Migration background (vs. no migration background)	1.24	0.19	0.144	1.21	0.32	0.466	1.32	0.24	0.129	1.25	0.19	0.141
Academic background (vs. no academic parents)	0.77*	0.06	≤0.001	0.77*	0.08	0.016	0.75*	0.08	0.008	0.77*	0.06	≤0.001
STEM (vs. no STEM)	1.26*	0.10	0.003	1.04	0.11	0.725	1.60*	0.19	≤0.001	1.26*	0.10	0.003
Teacher education (TE; vs. other study programs)	1.46*	0.11	≤0.001							0.60	0.52	0.435
Normative acad. Integration	0.61*	0.03	≤0.001	0.57*	0.04	≤0.001	0.64*	0.04	≤0.001	0.65*	0.04	≤0.001
Structural acad. integration	0.49*	0.04	≤0.001	0.52*	0.06	≤0.001	0.46*	0.04	≤0.001	0.45*	0.04	≤0.001
Peer social integration	0.70*	0.05	≤0.001	0.79*	0.08	0.016	0.63*	0.06	≤0.001	0.63*	0.06	≤0.001
Faculty social integration	1.02	0.11	0.866	1.08	0.17	0.642	0.97	0.13	0.823	0.97	0.13	0.814
TE*normative acad. Integration										0.86	0.09	0.111
TE*structural acad. integration										1.16	0.15	0.330
TE*social integration										1.25	0.14	0.062
TE*social acad. Integration										1.13	0.21	0.513
Constant	3.09*	1.53	0.037	5.95*	4.00	0.009	3.32*	2.03	0.068	4.53*	2.71	0.023
N	8,237			3,502			4,735			8,237		
Pseudo-R ²	0.11			0.08			0.13			0.11		
C-statistic	0.73			0.70			0.76			0.74		

*p < 0.05.

students estimate their own achievement orientation and their academic performance similarly to other students. While other studies have shown that teacher education students show lower academic achievement in HE (Alesi and Neumeyer, 2017) and lower motivation regarding science compared to students of other programs (Osada and Schaeper, 2022), our results are comparable with the findings by Bohndick (2020), who found no group differences in structural academic integration while controlling for a STEM focus. One possible explanation for these findings is that the scientific values and academic demands in teacher education programs do not significantly differ from those of other programs. Another explanation could

be that lower performance during studies and lower motivation for science are not reflected in self-perceived academic integration. For instance, teacher education students may have different standards for assessing their own performance compared to other students, which may be reflected in their self-perceived integration despite having different (objective) performances. The finding that one important relevant influence on forming mental representations of one's own abilities are processes of comparisons (Jansen et al., 2015) supports this notion. Students may compare their own beliefs about their skills with the perceived skills of other students within their frame of reference, such as other teacher education students. Future studies

could investigate the factors that contribute to the formation of academic self-concept among teacher education students.

A further possible explanation for the lack of differences between teacher education students and other students regarding academic integration in our study is that the integration climate at the university level may supersede the effects of an individual teacher education student. Previous research suggests that the curricula of teacher education programs can differ significantly between universities (Bauer et al., 2012). However, the university context plays an important role in the academic integration of students (e.g., Severiens and Schmidt, 2009; Schaeper, 2020). Future studies should therefore investigate the actual curricula and the proportion of subject-specific and education-specific components in the study program more closely to grasp contextual influences on teacher education students' integration.

Another possible explanation for the missing differences is that the measurement of integration in our study did not capture the theoretical construct adequately despite the former validation analyses (Dahm et al., 2016). Future research should include more established measurements for academic and social integration to replicate the results.

As expected, teacher education students scored higher in peer social integration, indicating that they rate their interaction with other peers as better, compared to the ratings by students in other programs. However, Bohndick (2020) and Kim and Corcoran (2017) reported that teacher education students (with non-STEM subjects) have lower values of peer social integration than other students (Bohdick, 2020) and they are overall only weakly engaged in interactions with their peers (Kim and Corcoran, 2017). In these studies, other measurements for peer social integration were used, focusing more on competition rather than cooperation among students, which might elucidate the different results. However, a cooperative purpose orientation is far more beneficial to achievement and social interaction than competition (Roseth et al., 2008). Future research should investigate whether peer social integration can be disaggregated into two distinct factors, reflecting completion and cooperation among peers. Additionally, researchers should explore potential differences between these sub-dimensions.

Furthermore, the current study revealed that teacher education students reported lower faculty social integration compared to other students. This result is consistent with the study by Kim and Corcoran (2017) who found that teacher education students in the US show little engagement in interaction with faculty and staff. One possible explanation for the finding is that study conditions in teacher education programs do not appear to be conducive to accomplishing high faculty social integration because teacher education students move between the discipline of education and their chosen subjects (Cortina and Thames, 2013). Therefore, they lack a clear affiliation and identifiable contact persons, which suggests that especially faculty and staff need to establish a framework that maintains social support networks (Hartl et al., 2022). Additionally, HE members appear to hold rather negative stereotypes toward teacher education students and rated them as not very competent (Ihme and Möller, 2015; Carstensen et al., 2021), which might hinder the development of a high-quality relationship between teacher education students and their educators.

The second research question addressed the relationship between the integration dimensions and dropout in teacher education

programs and others. The analysis showed that normative and structural academic integration are negatively associated with student dropout in both student groups. Furthermore, peer social integration is negatively related to the likelihood of dropping out in both groups. These results imply that the SIM is a useful theoretical concept in explaining and predicting dropout in teacher education. In comparison to previous studies (e.g., Piepenburg and Beckmann, 2021), we used a more detailed conceptualization featuring integration sub-dimensions—namely, normative academic integration, structural academic integration, peer social integration, and faculty social integration. The results emphasize that social integration is not generally related to dropping out, but that peer interaction, rather than faculty social integration, predicts the dropout decision. This contradicts the assumptions of the SIM and needs to be replicated in further studies.

Contrary to our initial expectations, no moderation effect of teacher education on the relationship between integration components and dropout was found. Structural and normative academic integration and peer social integration predicted dropout to the same degree for teacher education students and students of other programs. Meanwhile, faculty social integration was not predictive of student dropout in either group. This finding implies that the relationship between integration and dropout does not differ between teacher education students and other students. One possible explanation for this result is that, although teacher education students are exposed to a range of academic cultures, they face similar challenges to those encountered by other students in HE, and their programs have comparable demands. As such, cultural and curricular differences between teacher education programs and others may not be as significant in the decision to drop out as general integration into the HE system. Previous research (Blüthmann and Thiel, 2011; Herfter et al., 2015), however, indicates that the causes of dropout, more often mentioned by teacher education students or perceived to be more crucial compared to students in other fields, mirror the different academic mind-sets and values in teacher education programs. It is therefore unlikely that specific reasons concerning the teacher education program will not have an impact. Another possible explanation for the missing moderation effect is that the methods applied may have some limitations. Firstly, we distinguished between STEM and non-STEM subjects to account for subject-specific influences, but there might be other subjects to take into account. Matching approaches might help to overcome this limitation and extract the actual effect of studying a teacher education program. Secondly, we considered teacher education students as a homogenous group in our study. Although this was a deliberate choice, it may have neglected differences between different types of schools. For example, teacher education students for primary schools have more courses in education and fewer subject-specific courses, resulting in a more distinct curriculum compared to other students. On the other hand, teacher education students aiming to become a teacher at a Gymnasium share more courses with non-teaching students (Cortina and Thames, 2013).

Future research could use a mixed method approach to examine the possible differential dropout mechanisms between teacher education students and other students more closely. Qualitative interviews could identify specific dropout reasons for both groups and create a more appropriate conceptualization of the integration process in the respective study program.

7. Limitations

This study has several limitations. Due to panel attrition, a graduation or dropout event could not be identified for every participant, which might lead to a biased sample since only successful students continued participating in the panel study (see Zinn et al., 2018). In addition, dropout events are only considered when they occurred within the observation time—that is, between 1 year after the start of a student's studies and 9 years after the beginning of the research, leading to two possible implications. On the one hand, there might be a large time gap between the measurement point of integration and the dropout decision. On the other hand, dropout events before this measurement point or after the period of study are not taken into account. Therefore, the relationship between integration and dropout might be underestimated. The estimated models have rather low (*pseudo-*) R^2 values that indicate a low variance clarification, which points to the need for an adaptation of the SIM. In contrast, the C-statistic values are over 0.7 and point to a good model fit. Furthermore, measurements of academic and social integration may not correspond to the theoretical model, as discussed above.

Due to the outstanding study structure in teacher education compared to other study programs in HE, there is a possibility of specific integration processes related to the motivation to become a teacher being more critical to leaving teacher education programs than integration into the academic and social systems of HE (e.g., Hobson et al., 2009). Thus, an additional dimension of integration that accounts for the teaching professionalization process needs to be considered (Roberts, 2012). Hence, it is recommended for future research to add constructs that have already been shown to be predictive for teacher retention, such as identification with the teaching profession or teacher self-efficacy (Klassen and Chiu, 2011; Chesnut and Burley, 2015).

Additionally, investigating the alternative careers that teacher education students pursue may provide a more comprehensive understanding of the factors that lead them to leave their study programs and shed light on the characteristics of these alternatives that are most attractive to them. Such an inquiry may help researchers and educators to develop targeted interventions that could help retain more teacher education students in their programs.

8. Conclusion and practical implications

The present study shows that teacher education students are more involved in contact with other students, but are less engaged in interacting with faculty and staff in comparison to other students in similar fields of study. Yet, this difference is rather small, and there were no significant differences in normative and structural academic integration.

Our findings include practical implications for teacher education programs, which in particular address the lower faculty social integration of teacher education students. The results imply that teacher education institutions should emphasize social exchange and cooperative learning between students to strengthen their social integration. Specifically, HE institutions need to foster relationships between lecturers and teacher education students. Possible ways to reach that goal are establishing fixed contact persons, holding special

events, and offering subject-specific counseling (Williams and Roberts, 2022). Offering introductory courses and implementing counseling and supportive structures for teacher education students might help them to develop a sense of belonging to the study program and increase the responsibility of faculty and staff as well as their support of the students.

Incoherence in teacher education programs was identified as one limitation of the programs' impact on beginning teachers' practice (Levine et al., 2022). Improving coherence in teacher education programs with courses that build on or connect with each other might be one promising strategy to foster teacher education students' academic integration.

The findings of this study supported the validity of the SIM for explaining teacher education students' dropout. Except for faculty social integration, all integration constructs appeared to be negatively related to dropout for all students. Against our expectations, no interaction effect was revealed, indicating that the mechanisms explaining the decision to drop out are the same for teacher education students and students in other programs in the SIM context. Nevertheless, it can be concluded that academic and social integration are important factors to foster because they can prevent students from dropping out of initial teacher education.

Data availability statement

Publicly available datasets were analyzed in this study. This data can be found at: <https://www.neps-data.de/Datenzentrum/Daten-und-Dokumentation/Startkohorte-Studierende/Daten-und-Zitation>.

Author contributions

SF and JP planned the study and drafted the manuscript. SF performed the statistical analyzes. All authors discussed the results, contributed to the final manuscript, and read and approved the submitted manuscript.

Funding

This work was supported by the German Federal Ministry of Education and Research [B1018A]. From 2008 to 2013, NEPS data was collected as part of the Framework Program for the Promotion of Empirical Educational Research funded by the German Federal Ministry of Education and Research (BMBF). The publication of this article was supported by the Open Access publication fund of the University of Bamberg.

Acknowledgments

This paper uses data from the National Educational Panel Study (NEPS): Starting Cohort First-Year Students, doi: [10.5157/NEPS:SC5:16.0.0](https://doi.org/10.5157/NEPS:SC5:16.0.0). Since 2014, NEPS has been carried out by the Leibniz Institute for Educational Trajectories (LifBi) at the University of Bamberg in cooperation with a nationwide network.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

All claims expressed in this article are solely those of the authors and do not necessarily represent those of their affiliated

organizations, or those of the publisher, the editors and the reviewers. Any product that may be evaluated in this article, or claim that may be made by its manufacturer, is not guaranteed or endorsed by the publisher.

Supplementary material

The Supplementary material for this article can be found online at: <https://www.frontiersin.org/articles/10.3389/feduc.2023.1179264/full#supplementary-material>

References

- Alesi, B., and Neumeyer, S. (2017). Studium und Beruf in Nordrhein-Westfalen: Studierenerfolg und Berufseinstieg der Absolventinnen und Absolventen des Abschlussjahrgangs 2014 von Fachhochschulen und Universitäten [study and career in North Rhine-Westphalia: study success and career entry of graduates of the 2014 graduation year from universities of applied sciences and universities]. International Centre for Higher Education Research INCHEP-Kassel. Available at: <https://nbn-resolving.org/urn:nbn:de:0168-ssaoar-56323-8>
- Baars, G. J. A., Stegers-Jager, K. M., Stijnen, T., and Slijnter, T. A. W. (2009). "Exploratory study to improve a model to predict student failure in the first-year medical curriculum" in *Factors Related to Student Achievement in Medical School*. ed. G. J. A. Baars (Lemna: Hague), 47–60.
- Bargmann, C., Thiele, L., and Kauffeld, S. (2022). Motivation matters: predicting students' career decidedness and intention to drop out after the first year in higher education. *High. Educ.* 83, 845–861. doi: 10.1007/s10734-021-00707-6
- Bauer, J., Diercks, U., Rösler, L., Möller, J., and Prenzel, M. (2012). Lehramtsstudium in Deutschland: Wie groß ist die Strukturelle Vielfalt? [Teacher education in Germany: How heterogeneous are study programs?]. *Unterrichtswissenschaft* 40, 101–120.
- Behr, A., Giese, M., Teguin Kamdjou, H. D., and Theune, K. (2020). Dropping out of university: a literature review. *Rev. Educ.* 8, 614–652. doi: 10.1002/rev3.3202
- Bers, T. H., and Smith, K. E. (1991). Persistence of community college students: the influence of student intent and academic and social integration. *Res. High. Educ.* 32, 539–556. doi: 10.1007/BF00992627
- Blömeke, S. (2009). Ausbildungs- und Berufserfolg im Lehramtsstudium im Vergleich zum Diplom-Studium—Zur prognostischen Validität kognitiver und psychomotivationaler Auswahlkriterien [predicting educational and occupational success in teacher training and subject-specific degrees – on the predictive validity of cognitive and psycho-motivational selection criteria]. *Z. Erzieh.* 12, 82–110. doi: 10.1007/s11618-008-0044-0
- Blossfeld, H.-P., and Roßbach, H.-G. (2019). *Education as a lifelong process: The German National Educational Panel Study (NEPS) (Vol. 3)*. Wiesbaden: Springer Fachmedien.
- Blüthmann, I., and Thiel, F. (2011). Abbruchgründe von Bachelorstudierenden mit und ohne Studienziel Lehramt [reasons for dropping out among Bachelor's students with and without the aim of becoming a teacher]. *Journal Für Lehrerinnen-und Lehrerbildung* 11, 56–65.
- Bohndick, C. (2020). Predictors of dropout intentions in teacher education programmes compared with other study programmes. *J. Educ. Teach.* 46, 207–219. doi: 10.1080/02607476.2020.1724652
- Bohndick, C., and Buhl, H. M. (2014). Auf dem Weg zur Professionalisierung: Anforderungen im Lehramtsstudium [Study Requirements in Teacher Education]. *Zeitschrift Für Pädagogische Psychologie* 28, 63–68. doi: 10.1024/1010-0652/a000119
- Braxton, J. M., and Lien, L. A. (2000). "The viability of academic integration as a central construct in Tinto's interactionist theory of college student departure" in *Reworking the Student Departure Puzzle*. ed. J. M. Braxton (Nashville: Vanderbilt University Press), 11–28.
- Braxton, J. M., Milem, J. F., and Sullivan, A. S. (2000). The influence of active learning on the college student departure process: toward a revision of Tinto's theory. *J. High. Educ.* 71, 569–590. doi: 10.1080/00221546.2000.11778853
- Cabrera, A. F., Nora, A., and Castaneda, M. B. (1993). College persistence: structural equations modeling test of an integrated model of student retention. *J. High. Educ.* 64, 123–139. doi: 10.2307/2960026
- Carstensen, B., Lindner, C., and Klusmann, U. (2021). Wahrgenommene Wertschätzung im Lehramtsstudium: Fachunterschiede und Effekte auf Wohlbefinden und Abbruchsintention [Perceived Appreciation in University Teacher Education: Subject Differences and Effects on Well-Being and Intention to Quit]. *Zeitschrift für Pädagogische Psychologie*, 1–147. doi: 10.1024/1010-0652/a000337
- Chambers, G. N., Hobson, A. J., and Tracey, L. (2010). "Teaching could be a fantastic job but ...": three stories of student teacher withdrawal from initial teacher preparation programmes in England. *Teach. Teach.* 16, 111–129. doi: 10.1080/13540600903475652
- Chesnut, S. R., and Burley, H. (2015). Self-efficacy as a predictor of commitment to the teaching profession: a meta-analysis. *Educ. Res. Rev.* 15, 1–16. doi: 10.1016/j.edurev.2015.02.001
- Chrysikos, A., Ahmed, E., and Ward, R. (2017). Analysis of Tinto's student integration theory in first year undergraduate computing students of a UK higher education institution. *Int. J. Comp. Educ. Dev.* 19, 97–121. doi: 10.1108/IJCED-10-2016-0019
- Cortina, K. S., and Thames, M. H. (2013). "Teacher education in Germany" in *Cognitive Activation in the Mathematics Classroom and Professional Competence of Teachers, Results From the COACTIV Project*. eds. M. Kunter, J. Baumert, W. Blum, U. Klusmann, S. Krauss and M. Neubrand (Springer), 49–62.
- Dahm, G., Lauterbach, O., and Hahn, S. (2016). "Measuring students' social and academic integration—assessment of the operationalization in the National Educational Panel Study." In *Methodological Issues of Longitudinal Surveys*, H.-P. Blossfeld, Maurice], von, M. Bayer and J. Skopek (eds.), Springer. 313–329.
- Dewberry, C., and Jackson, D. J. (2018). An application of the theory of planned behavior to student retention. *J. Vocat. Behav.* 107, 100–110. doi: 10.1016/j.jvb.2018.03.005
- Georg, W. (2009). Individual and institutional factors in the tendency to drop out of higher education: a multilevel analysis using data from the Konstanz student survey. *Stud. High. Educ.* 34, 647–661. doi: 10.1080/03075070802592730
- Gräßmann, R., Schultheiss, O. C., and Brunstein, J. C. (1998). "Exploring the determinants of students' academic commitment" in *Advances in Motivation*. eds. P. Nieninger, R. S. Jäger, A. Frey and M. Wosnitza (Landau: Verlag Empirische Pädagogik), 103–109.
- Guarino, C. M., Santibañez, L., and Daley, G. A. (2006). Teacher recruitment and retention: a review of the recent empirical literature. *Rev. Educ. Res.* 76, 173–208. doi: 10.3102/00346543076002173
- Hartl, A., Holzberger, D., Hugo, J., Wolf, K., and Kunter, M. (2022). Promoting student teachers' well-being: a multi-study approach investigating the longitudinal relationship between emotional exhaustion, emotional support, and the intentions of dropping out of university. *Z. Psychol.* 230, 241–252. doi: 10.1027/2151-2604/a000495
- Herfter, C., Grüneberg, T., and Knopf, A. (2015). Der Abbruch des Lehramtsstudiums-Zahlen, Gründe und Emotionserleben [dropout from teacher education-numbers, reasons and emotional experience]. *Zeitschrift Für Evaluation* 14:57.
- Heublein, U. (2014). Student drop-out from German higher education institutions. *Eur. J. Educ.* 49, 497–513. doi: 10.1111/ejed.12097
- Heublein, U., Hutzsch, C., and Schmelzer, R. (2022). *Die Entwicklung der Studienabbruchquoten in Deutschland [The development of dropout rates in Germany]*. (DZHW Brief 05|2022). German Centre for Higher Education Research and Science Studies (DZHW).
- Hobson, A. J., Giannakaki, M.-S., and Chambers, G. N. (2009). Who withdraws from initial teacher preparation programmes and why? *Educ. Res.* 51, 321–340. doi: 10.1080/00131880903156906
- Ihme, T. A., and Möller, J. (2015). "He who can, does; he who cannot, teaches?": stereotype threat and preservice teachers. *J. Educ. Psychol.* 107, 300–308. doi: 10.1037/a0037373
- Isleib, S., Woisch, A., and Heublein, U. (2019). Ursachen des Studienabbruchs: Theoretische basis und empirische Faktoren [causes of higher education dropout: theoretical basis and empirical factors]. *Z. Erzieh.* 22, 1047–1076. doi: 10.1007/s11618-019-00908-x
- Jansen, M., Schroeders, U., Lüdtke, O., and Marsh, H. W. (2015). Contrast and assimilation effects of dimensional comparisons in five subjects: an extension of the I/E model. *J. Educ. Psychol.* 107, 1086–1101. doi: 10.1037/edu0000021
- Kim, E., and Corcoran, R. P. (2017). How engaged are pre-service teachers in the United States? *Teach. Teach. Educ.* 66, 12–23. doi: 10.1016/j.tate.2017.03.020

- Kim, E., and Corcoran, R. P. (2018). Factors that influence pre-service teachers' persistence. *Teach. Teach. Educ.* 70, 204–214. doi: 10.1016/j.tate.2017.11.015
- Klassen, R. M., and Chiu, M. M. (2011). The occupational commitment and intention to quit of practicing and pre-service teachers: influence of self-efficacy, job stress, and teaching context. *Contemp. Educ. Psychol.* 36, 114–129. doi: 10.1016/j.cedpsych.2011.01.002
- Klein, D. (2019). Das Zusammenspiel zwischen akademischer und sozialer Integration bei der Erklärung von Studienabbruchintentionen. Eine empirische Anwendung von Tintos Integrationsmodell im deutschen Kontext [the interplay between academic and social integration in explaining higher education dropout intentions. An empirical application of Tinto's integration model in the German context]. *Z. Erzieh.* 22, 301–323. doi: 10.1007/s11618-018-0852-9
- Kunter, M., Kleickmann, T., Klusmann, U., and Richter, D. (2013). "The development of teachers' professional competence" in *Cognitive Activation in the Mathematics Classroom and Professional Competence of Teachers*. eds. M. Kunter, J. Baumert, W. Blum, U. Klusmann, S. Krauss and M. Neubrand (Berlin: Springer), 63–77.
- Larsen, M. S., Kornbeck, K. P., Kristensen, R. M., Larsen, M. R., and Sommersel, H. B. (2013). *Dropout Phenomena at Universities: What is Dropout? Why Does Dropout Occur? What Can Be Done by the Universities to Prevent or Reduce It?: A Systematic Review*. Copenhagen: Danish Clearinghouse for Educational Research.
- Levine, T. H., Mitoma, G. T., Anagnostopoulos, D. M., and Roselle, R. (2022). Exploring the nature, facilitators, and challenges of program coherence in a case of teacher education program redesign using Core practices. *J. Teach. Educ.* 74, 69–84. doi: 10.1177/00224871221108645
- Li, C. (2013). Little's test of missing completely at random. *Stata J.* 13, 795–809. doi: 10.1177/1536867X1301300407
- Lin, P.-Y., Childs, R. A., and Zhang, J. (2016). It takes a toll on pre-service teachers and programs: case studies of teacher candidates who withdrew from a teacher education program. *Cogent Educ.* 3:1160524. doi: 10.1080/2331186X.2016.1160524
- Müller, L., and Klein, D. (2022). Social inequality in dropout from higher education in Germany. Towards combining the student integration model and rational choice theory. *Res. High. Educ.* 64, 300–330. doi: 10.1007/s11162-022-09703-w
- Napoli, A. R., and Wortman, P. M. (1998). Psychosocial factors related to retention and early departure of two-year community college students. *Res. High. Educ.* 39, 419–455. doi: 10.1023/A:1018789320129
- Neugebauer, M. (2013). Wer entscheidet sich für ein Lehramtsstudium—und warum? Eine empirische Überprüfung der These von der Negativselektion in den Lehrerberuf [who Chooses to Study Education—and Why? An Empirical Examination of the Thesis of Negative Selection Into the Teaching Profession]. *Z. Erzieh.* 16, 157–184. doi: 10.1007/s11618-013-0343-y
- Neugebauer, M., Heublein, U., and Daniel, A. (2019). Studienabbruch in Deutschland: Ausmaß, Ursachen, Folgen, Präventionsmöglichkeiten [higher education dropout in Germany: extent, causes, consequences, prevention]. *Z. Erzieh.* 22, 1025–1046. doi: 10.1007/s11618-019-00904-1
- OECD (2015). Making teaching an attractive career choice: Pointers for policy development. Available at: <http://www.oecd.org/edu/school/45399482.pdf>
- OECD (2019). *Education at a Glance 2019: OECD Indicators*. OECD Publishing, Paris.
- Osada, J.-C., and Schaeper, H. (2022). Individual characteristics of teacher education students. Re-examining the negative selection hypothesis. *J. Educ. Res. Online* 13, 109–131. doi: 10.25656/01:24160
- Pascarella, E. T., and Chapman, D. W. (1983). A multiinstitutional, path analytic validation of Tinto's model of college withdrawal. *Am. Educ. Res. J.* 20, 87–102. doi: 10.3102/00028312020001087
- Pascarella, T., and Terenzin, P. (2005). *How College Affects Students, a Third Decade of Research (2nd)* San Francisco, CA: Jossey-Bass.
- Piepenburg, J. G., and Beckmann, J. (2021). The relevance of social and academic integration for students' dropout decisions. Evidence from a factorial survey in Germany. *Eur. J. Higher Educ.* 12, 255–276. doi: 10.1080/21568235.2021.1930089
- Powazny, S., and Kauffeld, S. (2020). The impact of influential others on student teachers' dropout intention—a network analytical study. *Eur. J. Teach. Educ.* 44, 520–537. doi: 10.1080/02619768.2020.1793949
- Roberts, D. (2012). Modelling withdrawal and persistence for initial teacher training: revising Tinto's longitudinal model of departure. *Br. Educ. Res. J.* 38, 953–975. doi: 10.1080/01411926.2011.603035
- Roloff Henoch, J., Klusmann, U., Lüdtke, O., and Trautwein, U. (2015). Who becomes a teacher? Challenging the "negative selection" hypothesis. *Learn. Instr.* 36, 46–56. doi: 10.1016/j.learninstruc.2014.11.005
- Roseth, C. J., Johnson, D. W., and Johnson, R. T. (2008). Promoting early adolescents' achievement and peer relationships: the effects of cooperative, competitive, and individualistic goal structures. *Psychol. Bull.* 134, 223–246. doi: 10.1037/0033-2909.134.2.223
- Rubin, M. (2012). Social class differences in social integration among students in higher education: a meta-analysis and recommendations for future research. *J. Divers. High. Educ.* 5, 22–38. doi: 10.1037/a0026162
- Savage, C., Ayaita, A., Hübner, N., and Biewen, M. (2021). Who chooses teacher education and why? Evidence from Germany. *Educ. Research.* 50, 483–487. doi: 10.3102/0013189X211000758
- Schaeper, H. (2020). The first year in higher education: the role of individual factors and the learning environment for academic integration. *High. Educ.* 79, 95–110. doi: 10.1007/s10734-019-00398-0
- Schiefele, U., Moschner, B., and Husstegge, R. (2002). *Skalenhandbuch SMILE-Projekt [Scale Manual SMILE Project]*. Bielefeld, Universität Bielefeld, Abteilung Für Psychologie, Unveröffentlichtes Manuskript.
- Severiens, S. E., and Schmidt, H. G. (2009). Academic and social integration and study progress in problem based learning. *High. Educ.* 58, 59–69. doi: 10.1007/s10734-008-9181-x
- Stage, F. K. (1989). Reciprocal effects between the academic and social integration of college students. *Res. High. Educ.* 30, 517–530. doi: 10.1007/BF00992201
- Stata Corp (2019). *Stata Statistical Software: Release 16* Stata Corp LLC.
- Tarazona, M., and Rosenbusch, C. (2019). Refining measurements of social and academic integration: lessons from a German University of Applied Sciences. *Tert. Educ. Manag.* 25, 239–253. doi: 10.1007/s11233-019-09025-0
- Thomas, S. L. (2000). Ties that bind. *J. High. Educ.* 71, 591–615. doi: 10.1080/00221546.2000.11778854
- Tight, M. (2020). Student retention and engagement in higher education. *J. Furth. High. Educ.* 44, 689–704. doi: 10.1080/0309877X.2019.1576860
- Tinto, V. (1975). Dropout from higher education: A theoretical synthesis of recent research. *Review of Educational Research.* 45, 89–125. doi: 10.3102/00346543045001089
- Tinto, V. (1997). Classrooms as communities: exploring the educational character of student persistence. *J. High. Educ.* 68, 599–623. doi: 10.1080/00221546.1997.11779003
- Tinto, V. (2017). Through the eyes of students. *J. Coll. Stud. Retent. Res. Theory Pract.* 19, 254–269. doi: 10.1177/1521025115621917
- Trautwein, U., Jonkmann, K., Gresch, C., Lüdtke, O., Neumann, M., Klusmann, U., et al. (2006). *Transformation des Sekundarschulsystems und Akademische Karrieren (TOSCA). Dokumentation der eingesetzten items und Skalen. Welle 3 [transformation of the secondary school system and academic careers (TOSCA). Documentation of the items and scales used. Wave 3]*. Berlin: Max-Planck-Institut für Bildungsforschung.
- Vossensteyn, H., Kottmann, A., Jongbloed, B., Kaiser, F., Cremonini, L., Stensaker, B., et al. (2015). Dropout and completion in higher education in Europe: Main report. *Publications Office of the European Union*. doi: 10.2766/82696
- Watt, H. M. G., Richardson, P. W., Klusmann, U., Kunter, M., Beyer, B., Trautwein, U., et al. (2012). Motivations for choosing teaching as a career: an international comparison using the FIT-choice scale. *Teach. Teach. Educ.* 28, 791–805. doi: 10.1016/j.tate.2012.03.003
- Williams, H., and Roberts, N. (2022). 'I just think it's really awkward': transitioning to higher education and the implications for student retention. *High. Educ.* 85, 1125–1141. doi: 10.1007/s10734-022-00881-1
- Wolf, K., Maurer, C., and Kunter, M. (2021). "I Don't really belong Here": examining sense of belonging in immigrant and nonimmigrant teacher students. *Zeitschrift für Entwicklungspsychologie und Pädagogische Psychologie* 53, 1–14. doi: 10.1026/0049-8637/a000233
- Ylijoki, O.-H. (2000). Disciplinary cultures and the moral order of studying—a case-study of four Finnish university departments. *High. Educ.* 39, 339–362. doi: 10.1023/A:1003920230873
- Zinn, S., Würbach, A., Steinhauer, H. W., and Hammon, A. (2018). Attrition and selectivity of the NEPS starting cohorts: An overview of the past 8 years. (No. 34 NEPS Survey Paper).