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Closing the gap of teacher professional identity in student teachers between coursework learning and teaching practice: perspectives from Self-determination Theory

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ABSTRACT

In this longitudinal study, latent basis modelling was employed to capture nuanced developmental trajectories and examine the predictive power of perceived satisfaction of basic needs on the development of teacher professional identity in a group of student teachers ($N=266$ at the initial time point). The findings reveal a developmental pattern in which teacher professional identity shows positive growth during coursework learning but subsequently declines during teaching practice, highlighting an ongoing challenge in teacher preparation. Notably, perceived satisfaction of basic needs emerged as a significant predictor of this developmental pattern, with participants reporting higher needs satisfaction and maintaining positive identity development even during teaching practice. While these findings support the value of the university model in initial teacher education, they also underscore the persistent gap between coursework learning and teaching practice. The results suggest that supporting student teachers' basic psychological needs could be key to addressing this coursework-practice divide. It is, therefore, essential to equip faculty members, teacher educators, and cooperating teachers with evidence-based strategies that support student teachers' needs during both coursework learning and teaching practice.

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Introduction

Teacher professional identity (TPI) has gained much research interest due to its influence on teaching quality, attrition rates, and professional commitment (Schutz, Francis, and Hong 2018). Studies show that the concept of TPI could bring clarity to the complexity of the teaching profession by addressing both personal and professional dimensions of being a teacher (Olsen 2016) and the process of professional learning by showing that a teacher's growth is also shaped by one's identity (Beijaard, Meijer, and Verloop 2004).

Interest in TPI has also been emphasised at initial teacher education (ITE) (Beijaard 2019), with Liu and Tan (2015) stating the importance of developing teacher calling, identity, and professionalism alongside technical competencies. TPI research in ITE generally examines the personal and contextual elements involved in this development, focusing on programme development that used pre-determined facilitative processes

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or pedagogies (e.g. mentoring and reflection) to impact TPI development (e.g. Izadinia 2015). While these studies highlight the effectiveness of specific pedagogies, they do not systematically add to our knowledge of the TPI development process.

A key challenge in TPI development is the disconnect between coursework learning and teaching practice. Research suggests that while university-based coursework provides a strong foundation for teaching knowledge and theory, student teachers often struggle to transfer these theoretical understandings into real classroom contexts (Darling-Hammond 2014; Teng 2017). Studies have shown that teacher identity shifts dynamically throughout ITE, with some student teachers experiencing a decline in confidence and professional commitment during teaching practicum due to the realities of classroom demands (Lamote and Engels 2010; Suarez and McGrath 2022). A systematic review by Rushton et al. (2023) identified gaps in research, such as the limited focus on early-career identity shifts and the integration of coursework with fieldwork experiences. Similarly, Golzar (2020) emphasised that teacher identity is largely constructed through daily classroom interactions rather than just theoretical learning, underscoring the importance of bridging coursework and practice. Research by Titu (2019) further highlights that structured reflection and mentorship during ITE can help student teachers navigate identity shifts and develop a stronger commitment to their profession. These studies reinforce the argument that TPI is an evolving and context-dependent process shaped by both institutional structures and personal agency.

While various theoretical frameworks have been employed to understand TPI development, this study specifically employs Self-determination Theory (SDT; Deci and Ryan 1985) as an analytical framework to examine the complex developmental patterns of TPI during ITE. This study focuses on empirically documenting how needs satisfaction relates to the critical transition period between coursework and teaching practice. Using latent basis modelling allows this study to capture nuanced developmental trajectories that other analytical approaches might obscure. Through this approach, this study aims to provide empirical evidence that can inform the design and implementation of teacher preparation programs, particularly during critical transition periods.

Self-Determination theory and teacher professional identity development

SDT assumes an organismic dialectical perspective on human development where 'all individuals have a natural, innate, and constructive tendencies to develop an ever more elaborated and unified sense of self' (Deci and Ryan 2002, 5). This phenomenon is seen when people pursue their interests, learn, and gain mastery of their inner and outer worlds concerning their intrinsic motivation. This phenomenon is also seen when people 'assimilate social norms and regulations through active internalisation and integration' (Ryan and Deci 2017, 4). Internalisation describes the extent to which people adopt behaviours and regulations initially seen as external and accept them to become more autonomous.

Understanding SDT means appreciating how these two aspects of integrative developmental processes harmonise for healthy development and what social-contextual factors facilitate or hinder them. Importantly, the natural inclinations towards intrinsic motivation, internalisation and social integration are energised by a social environment that supports the satisfaction of the three basic psychological needs of autonomy,

competence, and relatedness (Ryan and Deci 2017). The need for autonomy refers to the need to feel that one has the control to make choices over the actions one needs to undertake and align them with one's interests and preferences (Deci and Ryan 1985). The need for competence refers to the need to influence our environment actively and feel effective in realising and attaining important desired outcomes (Deci 1975). Lastly, the need for relatedness (Ryan 1995) can be understood as the need to feel connected to others and experience reciprocal care and concern.

SDT perspective on identity development

Ryan and Deci (2003) propose that people tend to adopt and develop identities that allow them to experience the satisfaction of the three basic needs, aligning with their intrinsic motivations, such as interests and curiosities. However, many adults develop various identities together with their associated roles and responsibilities that do not directly express their intrinsic motivation. Consequently, people undergo the internalisation process of accepting and endorsing values, beliefs, and behaviours seen initially as externally regulated. Importantly, contexts that support the satisfaction of these needs foster this internalisation and facilitate identity development (Ryan and Deci 2017; Vansteenkiste and Ryan 2013).

Recent research has demonstrated the particular relevance of this perspective for understanding teacher professional identity development. Wong and Liu (2024) found that student teachers actively construct their professional identities through a process of internalisation that is energised by the satisfaction of basic psychological needs. Their study revealed that when learning environments supported basic needs satisfaction, student teachers were more likely to deeply examine and internalise professional values and practices, leading to more robust identity development.

For the current research, it means that student teachers would develop deeper identification with the teaching profession when they experience, for example, support for relatedness when they build a deep relationship with their cooperating teachers, support for competence when they have opportunities to enhance their skills and knowledge and feel effective in the classrooms, and support for autonomy when they are engaged in meaningful and purposeful learning activities that aligned with their values and interests.

It is hence hypothesised that the development of TPI is a process of internalisation where student teachers actively accept (or reject) and endorse (or oppose) these values, beliefs, and behaviours, facilitated by the experience of needs satisfaction. As these beliefs and behaviours become internalised, they become part of their developing TPI. This study, therefore, focused on investigating the role of perceived satisfaction of the three basic needs for student teachers in developing their TPI during ITE.

Development of teacher professional identity in student teachers

Developing a strong TPI is a crucial element in learning to teach and is vital in becoming an effective teacher during ITE (Beijaard and Meijer 2017). Besides coursework learning, where student teachers learn essential theories and strategies, participation in teaching practice is another crucial aspect of engaging student teachers in constructing and shaping their identities (Beijaard and Meijer 2017). Specifically, teaching practice helps student teachers connect university theories to classroom practices, providing an

authentic and natural setting to develop their TPI through immersion and interactions with the various stakeholders in a school (Anspal, Eisenschmidt, and Löfström 2012). However, teaching practice is also viewed as a demanding phase when student teachers grapple with the balance of being both learners and aspiring professionals, highlighting that the shift from coursework to fieldwork continues to present a significant challenge for many student teachers (Cochran-Smith et al. 2015). Golzar (2020) also highlights that TPI is shaped not just by coursework but also by practical classroom experiences, reinforcing the importance of bridging the coursework-practice divide.

Both coursework learning and teaching practice play an essential role in supporting the development of TPI of student teachers, but differently. Hence, understanding how student teachers develop their TPI in the two contexts would provide invaluable information in designing a roadmap for successful teacher development during ITE.

Present study

This research aimed to provide insights into the direction and extent of changes in the TPI of student teachers through a longitudinal study over four timepoints: at course enrolment (month 0), after teaching practice 1 (month 4), completion of coursework, prior to teaching practice 2 (month 11), and after teaching practice, the completion of their ITE (month 16). In this programme, student teachers participated in a 5-week Teaching Practice 1 and a 10-week Teaching Practice 2 for additional practice opportunities.

Second, this research aimed to understand the predictive power of perceived satisfaction of basic psychological needs in relation to changes during coursework learning and teaching practice.

The two research questions which guided this research were:

- (1) To what extent does the TPI of student teachers change over time during their ITE?
- (2) Is student teachers' perceived satisfaction of needs a significant predictor of their TPI development during ITE?

Method

Participants and procedure

The target participants were student teachers enrolled in postgraduate diploma programmes designed to prepare university graduates to become primary or secondary school teachers. The programmes across the two tracks are of similar duration (i.e. 16 months) and will equip student teachers with the knowledge and skills to teach two school subjects at their respective levels (See Table 1 for the profile of participants).

There were 266 participants at timepoint 1 (T1; enrolment), 186 at timepoint 2 (T2; post-teaching practice 1), 198 at timepoint 3 (T3; pre-teaching practice 2), and 106 at timepoint 4 (T4; end of programme). Table 2 presents the patterns of complete and incomplete data. 100% of respondents ($N = 275$) participated in at least two timepoints, and 57% ($N = 158$) participated in at least three.

The result from Little's test (Little 1988) was non-significant ($\chi^2 = 23.995$, $df = 18$, $p = .155$), indicating that the data were missing completely at random. The full information

Table 1. Profile of participants.

	Percentage of teachers in the Primary or Secondary school programme		Percentage of teachers prepared to teach in the various subjects						
	Primary	Secondary	Art or Music	English language	Humanities	Mathematics	Mother Tongue	Physical Education	Sciences
T1	51.5	45.5	10.9	28.9	16.2	4.9	21.1	2.3	15.8
T2	43.4	56.6	11.4	18.9	19.4	5.1	24.0	1.1	20.0
T3	46.8	53.2	10.6	30.3	15.4	4.3	14.9	3.7	20.7
T4	27.4	72.6	6.3	23.2	26.3	4.2	10.5	3.2	26.3

Table 2. Patterns of complete (✓) and incomplete (o) data.

	1	2	3	4	5	6	7	8
T1	✓	✓	✓	✓	o	o	✓	✓
T2	✓	✓	✓	o	✓	✓	o	✓
T3	✓	✓	o	✓	✓	✓	✓	o
T4	✓	o	✓	✓	✓	o	o	o
Frequency	50	51	23	32	2	7	57	53

maximum likelihood (FIML) procedure included in AMOS 26 was, therefore, employed to address the issue of missing data.

Ethical clearance from the University's Institutional Review Board was sought before data collection through an online platform. The purpose of the study and participants' rights to refuse or discontinue participation were explained through the survey's recruitment announcements and landing page. Informed consent was obtained before the survey was administered. Participation was strictly voluntary, and responses were kept confidential.

Measure

The scales used in this study were the Teacher Professional Identity Scale (TPIS; Wong and Liu 2022) and the Basic Psychological Needs Satisfaction at Work Scale (Kasser, Davey, and Ryan 1992).

Teacher professional identity

The TPIS (Wong and Liu 2022) assesses three subscales: teacher self-efficacy, commitment to teaching, and professional orientation. Participants used the 18-item self-report scale and rated each item on a 5-point Likert scale ranging from 1 (not well at all) to 5 (very well) for the teacher self-efficacy (e.g. 'How well can you establish effective classroom management procedures?'), 1 (strongly disagree) to 5 (strongly agree) for commitment to teaching (e.g. 'I enjoy the work of a teacher very much') and professional orientation (e.g. 'Continuous professional development is important for teachers') at all four timepoints.

Confirmatory factor analysis (CFA) was conducted to verify the TPIS's three-factor structure. The three-factor solution, where items were loaded onto their respective subscales of teacher self-efficacy, commitment to teaching, and professional orientation, indicated adequate fit across the four timepoints. For T1, $\chi^2/df = 1.803$, SRMR = .0519,

RMSEA = .055, TLI = .945 and CFI = .953; T2, $\chi^2/df = 1.854$, SRMR = .0656, RMSEA = .068, TLI = .918 and CFI = .931; T3, $\chi^2/df = 1.847$, SRMR = .0624, RMSEA = .065, TLI = .925 and CFI = .936, and T4, $\chi^2/df = 1.723$, SRMR = .0744, RMSEA = .082, TLI = .907 and CFI = .921.

Psychological needs satisfaction

The Basic Psychological Needs Satisfaction at Work Scale (Kasser, Davey, and Ryan 1992), a 21-item scale, was adapted to measure the degree to which student teachers perceived their basic needs being met during coursework learning and teaching practice. The scale consists of three subscales assessing autonomy (e.g. 'I am free to express my ideas and opinions to my tutors/lecturers'), competence (e.g. 'I have been able to learn interesting new skills'), and relatedness (e.g. 'I really like my tutors/lecturers'). Participants responded to each item using a scale ranging from 1 (not true at all) to 5 (very true).

In investigating the predictive power of perceived satisfaction of basic needs, a total needs satisfaction score was calculated by averaging all items in the two contexts (Li et al. 2019; Vansteenkiste et al. 2006). CFA was conducted to confirm the three-factor structure of the scale, with items loading onto their respective subscales of autonomy, competence, and relatedness. The three-factor solution showed adequate fit in both contexts. For coursework learning, $\chi^2/df = 2.067$, CFI = .929, TLI = .904, SRMR = .0827 and RMSEA = .067. For teaching practice, $\chi^2/df = 1.781$, CFI = .926, TLI = .900, SRMR = .0989 and RMSEA = .083.

Statistical analysis procedures

Given the potentially complex nature of TPI development during different phases of teacher preparation, we employed latent basis modelling to allow the data to determine the shape of growth rather than imposing a pre-determined form. Two key considerations drove this methodological choice. First, the development of professional identity during ITE involves multiple transitions between coursework and teaching practice, suggesting that change patterns might not follow simple linear or quadratic trajectories. Second, the relative impact of needs satisfaction might vary across different phases of teacher preparation, requiring an analytical approach sensitive enough to capture such nuanced patterns. The latent basis model offers this flexibility by estimating the shape of the growth curve from the data itself, making it particularly suitable for examining developmental processes that may involve periods of acceleration, plateaus, or potential declines. This approach allows us to identify critical periods in TPI development and explore how needs satisfaction relates to growth patterns during these transitions.

Latent growth curve modelling (LGCM; Meredith and Tisak 1990) was used to analyse the data in two steps (Kline 2016). First, intra-individual differences were modelled via a two-factor growth model to test for inter-individual differences. The two factors were 1) the Intercept factor, representing the participant's TPIS score at T1 (i.e. TPI1), and 2) the Shape factor, representing the participant's rate of change over the four timepoints. Second, the perceived satisfaction of needs as time-invariant covariates (TIC) was included in the model to predict changes over time.

The standard model-fit indices (Kline 2016) used included the ratio of chi-square to degrees of freedom (χ^2/df), where a value less than 2 may indicate a good-fitting model; the CFI, where values should exceed .90 and preferably reach .95; and the RMSEA, where

values smaller than .08 are favourable. Structural equation modelling (SEM) was conducted using AMOS 26.

Results

Descriptive statistics

The means TPIS scores over the four timepoints (see Table 3) showed an increasing trend over the first three timepoints before a decrease between T3 and T4. The variance was the largest at T4. The correlation over time also showed higher stability over short-term development (i.e. T1–T2 & T2–T3) and lower longer-term stability (i.e. T1–T4).

The Kolmogorov-Smirnov test at each timepoint was non-significant except for T2, $D(186) = .068$, $p < .05$. However, the skewness and kurtosis statistics fell within the absolute value of less than 2 and 7, indicating no severe univariate non-normal distribution in the data. Since the FIML estimation is fairly robust under such conditions (Finney and DiStefano 2013), the data set was suitable for further SEM analysis.

The change model

Three separate models were tested to determine which model had the best fit. First, the linear growth model had a poor model fit ($\chi^2/df = 8.096$, CFI = .849, TLI = .698, RMSEA = .161). This result was expected since the descriptive statistics indicated that the trajectory was not linear. Second, the quadratic latent growth model also had an unsatisfactory model fit ($\chi^2/df = 8.110$, CFI = .879, TLI = .697, RMSEA = .161).

The latent basis model was then employed, where the development shape takes on a form based on the data (See Figure 1 for the generic latent basis model). The paths from the Intercept factor to the observed variables were set to 1 (Duncan, Duncan, and Strycker 2013). The Shape factor loadings at T1 and T4 were constrained to 0 and 1, respectively (McArdle 1998). The loadings at T2 and T3 were left to be freely estimated, allowing the model to approximate the actual trajectory of the development of TPI over time according to the data (Bollen and Curran 2006; Newson 2015). The resultant factor loadings from the Shape factor were 0, .516, 1.592, and 1. The selected goodness of fit indices indicated very good model fit: $\chi^2/df = 1.837$, CFI = .975, TLI = .964, RMSEA = .055. The remaining analysis adopted the estimation of the growth trajectory based on the latent basis model since it provided the best fit.

Table 3. Input data for latent growth model of change in TPI over four timepoints.

Timepoint	Sample size (N)	Mean TPIS	SD	Correlations				Skewness	Kurtosis
				T1	T2	T3	T4		
T1	266	3.85	.39	1				.166	.525
T2	186	3.88	.38	.671**	1			-.557	2.729
T3	199	4.07	.36	.491**	.717**	1		-.374	1.564
T4	107	3.93	.43	.388**	.633**	.555**	1	-.689	2.653

** $p < .01$.

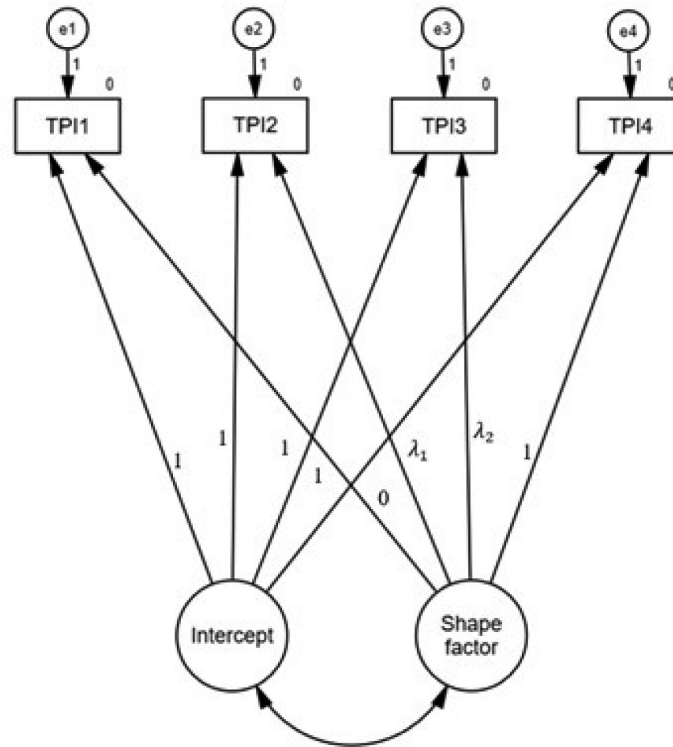


Figure 1. Generic latent basis model to investigate growth trajectory.

Table 4. Parameter estimates related to the latent basis model.

	Estimate	SE	CR	<i>p</i>
Regression weights				
λ_0	0			
λ_1	.516	.143	3.613	***
λ_2	1.592	.324	4.914	***
λ_3	1			
Means				
Intercept	3.835	.023	168.067	***
Shape factor	0.150	.016	9.443	***
Covariances				
Intercept \longleftrightarrow Shape factor	-.022	.007	-3.024	.002
Variances				
Intercept	.107	.013	8.432	***
Shape factor	.023	.007	3.391	***

****p* < .001.

Characteristics of the growth curve

The AMOS output on the parameter estimates related to the latent basis growth model is presented in Table 4.

In a latent basis model, the Shape factor loadings represent the 'cumulative proportion of total change that has occurred from the initial time period to that specific time period' (Bollen and Curran 2006, 102). Therefore, the change in TPIS scores from T1 to T2 was 51.6% of the difference in TPIS scores from T1 to T4. The scores then increased from T2 to T3 by 107.6% of the difference in TPIS scores from T1 to T4. The scores subsequently decreased from T3 to T4 by 59.2% of the total difference between T1 and T4 scores.

Additionally, the estimates related to the Intercept and Shape factors were statistically significant ($p < .001$), revealing significant inter-individual differences in the initial TPIS scores and the rate of change over time. This evidence supported the further investigation of variability related to the participants' growth trajectories.

Effects of basic psychological needs satisfaction on the development of teacher professional identity

The descriptive statistics of the perceived satisfaction of the three psychological needs in the two contexts are presented in Table 5. The perceived needs satisfaction during coursework learning across the three needs were high and had a moderate and significant positive correlation ($p < .01$), showing that participants experienced needs satisfaction during coursework learning. Similar results were found in the context of teaching practice, where the three variables had a high and significant positive correlation. The negligible correlation among the variables for the two contexts showed that participants experienced needs satisfaction differently in the two contexts. The correlation between the total needs satisfaction in the two contexts was also low and non-significant.

In this study, only the Shape factor was regressed on the TIC (Newsom 2015) since the perceived satisfaction of needs facilitates development but does not influence the initial TPIS score, which was formed before their ITE started.

To investigate the predictive power of needs satisfaction on the development of TPI, perceived needs satisfaction in both contexts was incorporated into the model (See Figure 2 for the conditional growth curve model), yielding a moderate fit: $\chi^2/df = 3.052$, CFI = .906, RMSEA = .084. Perceived needs satisfaction in both contexts was a significant predictor of development ($\beta_{CL} = .126$, $p < .0001$; $\beta_{TP} = .061$, $p < .005$).

The mean plot technique (Cohen et al. 2013; Curran-Bauer Analytics 2017) was employed to visualise and interpret interaction effects in the latent growth model

Table 5. Input data for conditional latent growth model of change.

Time point ^a	Sample size (N)	Mean	SD	Correlations							
				A(CL)	C(CL)	R(CL)	A(TP)	C(TP)	R(TP)	T(CL)	T(TP)
A(CL)	199	3.20	.58	1							
C(CL)	199	3.50	.66	.643**	1						
R(CL)	199	3.64	.59	.573**	.574**	1					
A(TP)	107	3.45	.70	.185	.177	.022	1				
C(TP)	107	3.50	.78	.218*	.192	.053	.727**	1			
R(TP)	107	3.80	.70	.099	.070	.118	.737**	.695**	1		
T(CL)	199	3.44	.52	.857**	.876**	.831**	.149	.103	.317	1	
T(TP)	107	3.58	.65	.192	.168	.072	.907**	.903**	.894**	.167	1

* $p < .05$; ** $p < 0.01$.

^aA = Perceived autonomy satisfaction; C = Perceived competence satisfaction; R = Perceived relatedness satisfaction; T = Total; CL = Coursework learning; TP = Teaching practice.

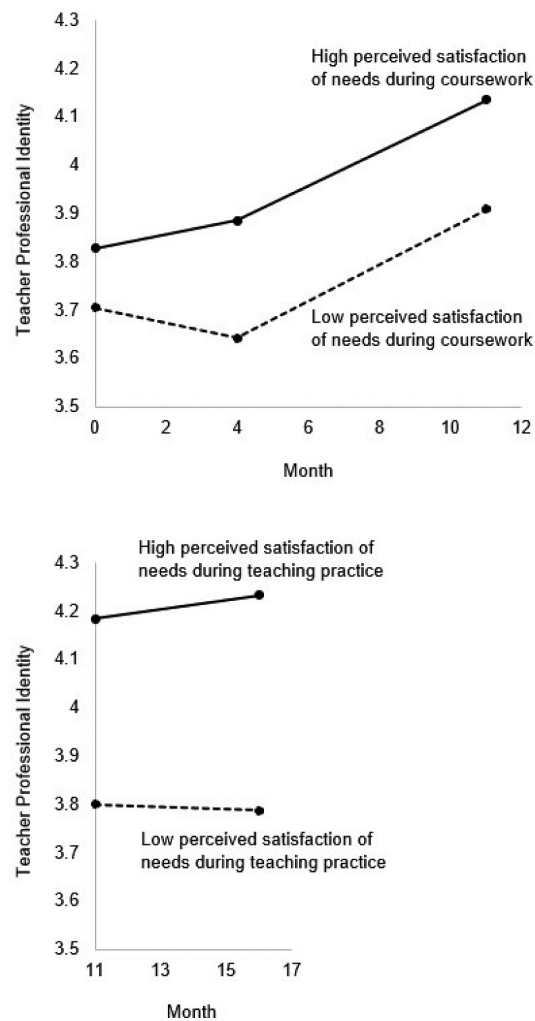


Figure 3. Interaction effect of TPI and perceived needs satisfaction.

Discussion

In this study, the latent basis model provided an empirical representation of TPI development during ITE, revealing both developmental patterns and the influence of needs satisfaction on this development. Our analysis yielded key insights that advance understanding of teacher preparation in the complex developmental patterns in TPI, the protective function of needs satisfaction, and empirical evidence for program enhancement.

The analysis using the latent basis model revealed a nuanced developmental trajectory of TPI during ITE, revealing both the effectiveness of coursework learning and persistent challenges during teaching practice. While the increase in TPI during coursework learning supports the university model's merit (Robinson 2017), the general decline during teaching practice reflects common challenges documented in the literature (Cochran-Smith et al. 2015; Lamote and Engels 2010). The complex pattern captured through our latent basis modelling approach, which conventional growth models would have obscured, suggests that the teaching practice arrangements, while essential, may require additional support to bridge theoretical learning with classroom realities more effectively.

For instance, a study by Lamote and Engels (2010) found that student teachers perceived themselves as confident in their classroom management skills before teaching practice but were less confident during and after, highlighting the challenge of facing the reality of teaching. This study echoes that the provision of teaching practice within ITE, while critical and essential, may not be sufficient in preparing student teachers for teaching in a real classroom (Anspal, Eisenschmidt, and Löfström 2012). While we could attribute this decline to the stressful nature of teaching practice (Teng 2017) and student teachers underestimating the complexity of teaching and mismatches between expectations and classroom experiences (Lamote and Engels 2010), another possibility is insufficient opportunities to enact pedagogical practices during coursework learning (Darling-Hammond 2014). Additionally, when the social environments were perceived as less supportive, student teachers experienced needs thwarting and reduced engagement in identity work (Wong and Liu 2024).

Most significantly, our analysis revealed that perceived needs satisfaction functioned as a protective factor during these challenging transitions. The inclusion of perceived needs satisfaction into the growth model and further analysis mean plot technique uncovered that participants with high needs satisfaction maintained positive TPI development throughout their ITE journey and were less susceptible to the negative impact of the teaching practice. In contrast, others with lower needs satisfaction showed a decline during teaching practice. This finding extends established SDT literature by demonstrating specific patterns in how the needs satisfaction and TPI development relationship manifests during the critical transition between coursework, teaching practice, and the teaching practice itself. The empirically documented patterns provide a more nuanced understanding of when and how needs satisfaction becomes critical in teacher preparation. By identifying this transition period, this research moves beyond theoretical predictions to suggest concrete implications for program design. Specifically, these findings indicate that systematically supporting basic psychological needs could be key to addressing the persistent coursework-practice divide in teacher education.

Need-supportive environments ITE facilitated TPI development, affirming SDT's proposition that the internalisation process is energised by basic needs satisfaction (Wong and Liu 2024). In a supportive environment, as perceived during coursework learning, student teachers felt energised to engage in the internalisation process where they actively interrogate their values, beliefs, and classroom practices against the information and learning activities (e.g. coursework, peer conversations, faculty feedback) presented to them, and autonomously decide to accept or reject them as part of their values, beliefs and classroom practices, thus developing their TPI. These findings align with research

showing that basic needs satisfaction enhances teacher self-efficacy (González et al. 2018) and professionalism (Kaplan and Madjar 2017; Korthagen and Evelein 2016).

However, when the environment was perceived as less supportive, student teachers felt their basic needs were being thwarted and less energised to engage in identity work (Wong and Liu 2024). Research on mentoring approaches (Burger, Bellhäuser, and Imhof 2021; Richter et al. 2013), on the other hand, suggests that when key socialising agents (e.g. cooperating teachers) in schools were perceived as needs supportive, it facilitated the internalisation process where student teachers revisited their values and beliefs regarding their skills, understanding, classroom practices and the sense of their TPI.

This study extends this understanding by demonstrating that sustained needs satisfaction during teaching practice not only prevents TPI decline but also supports continued growth, pointing to a potential pathway for enhancing teaching practice effectiveness. This protective function of needs satisfaction offers concrete implications for program design, suggesting that strengthening pre-practicum preparation, fostering mentor support, and providing structured identity-reflection sessions may help student teachers navigate the challenging coursework-practice transition (Golzar 2020; Ingersoll and Strong 2011; McGarr and McCormack 2014). The empirically documented patterns from our latent basis modelling provide a more nuanced understanding of when and how needs satisfaction becomes critical in teacher preparation. By identifying specific periods where enhanced support could help address the coursework-practice divide, the findings from this study move beyond theoretical predictions to offer evidence-based guidance for program enhancement.

Implication

A key contribution of this research was the adoption of the non-linear latent basis growth model to provide an empirical representation of TPI development during ITE. This finding would provide invaluable information to researchers and practitioners to better appreciate the development of student teachers across the ITE experience and specific experiences at certain stages and enable them to identify critical stages in student teachers' development trajectory, particularly during the transition to teaching practice.

The study also extends SDT literature by demonstrating its applicability to TPI development, supporting SDT's claim that meeting basic psychological needs impacts one's growth and development (Ryan and Deci 2017). The strong relationship between needs satisfaction and sustained TPI growth, particularly during teaching practice, suggests that SDT provides a valuable framework for designing teacher education programs that effectively support student teachers' development through both coursework and practical experiences (Kaplan and Madjar 2017; Korthagen and Evelein 2016).

These theoretical insights point to several practical directions for enhancing ITE programs. Wong and Liu (2024) emphasise that the effectiveness of ITE programs depends not only on the quality of education but also on creating needs-supportive environments that nurture TPI development. A primary consideration is fostering autonomy-supportive environments to strengthen intrinsic motivation and professional commitment (Su and Reeve 2011). Providing student teachers with choices in lesson planning and pedagogical approaches enables them to internalise their professional identity more effectively. Additionally, structured reflection supports

deeper professional identity development and could meet the need for autonomy and competence. McGarr and McCormack (2014) emphasise moving beyond procedural reflection towards critical analysis of teaching experiences to bridge the theory-practice gap.

Mentorship and induction support enhance teaching effectiveness and professional belonging, meeting the need for competence and relatedness. Ingersoll and Strong (2011) highlight that structured mentoring programs provide crucial emotional and instructional support during teaching practice. Successful implementation requires faculty members, teacher educators, and cooperating teachers to be equipped with strategies to support student teachers' basic psychological needs (Burger, Bellhäuser, and Imhof 2021), especially during the critical transition to teaching practice. Such alignment of support across both coursework and teaching practice phases could help address the theory-practice divide, ultimately fostering more sustainable TPI development throughout ITE programs.

Limitations and future research

One limitation of the current study is the attrition rate. While the number of participants at the first three timepoints was reasonable, the sample size at T4 was relatively small. Additionally, data were only from postgraduate diploma programme student teachers. The findings should, therefore, be interpreted with caution. Future studies should expand the participant range to include other ITE programmes and employ strategies to minimise attrition.

Also, while aligned with key programme features (enrolment, teaching practices, coursework completion), the selected timepoints may be too close to detect meaningful change. Future studies could examine longer-term trajectories extending into the first few years of teaching to understand how TPI development continues beyond ITE. Additionally, while this study deliberately focused on SDT, future research could benefit from incorporating multiple theoretical perspectives to provide complementary insights into TPI development and further illuminate its complex nature.

Beyond psychological needs satisfaction, broader contextual factors such as school environments, mentoring quality, and institutional support play significant roles in TPI development. Research suggests that positive school climates, structured mentorship, and institutional backing can moderate the effects of needs satisfaction, shaping student teachers' identity and professional commitment (Helms-Lorenz, van de Grift, and Maulana 2015; Ingersoll and Strong 2011). Future research should explore how these factors interact with SDT constructs to shape TPI trajectories during and beyond ITE.

Furthermore, while LGCM provides valuable insights into general trends and predictors of TPI growth, it does not capture the personal and context-dependent dimensions of identity development, such as individual reflections, emotions, and institutional culture. Future research should adopt a mixed-methods approach integrating longitudinal case studies, interviews, or narrative inquiry to explore how student teachers experience needs satisfaction in different school environments. By incorporating contextual factors, future research can move towards a comprehensive model of TPI development that integrates both psychological and structural influences.

Conclusion

This study provided empirical evidence of the complex development of TPI during ITE, demonstrating both the effectiveness of coursework learning and re-surfacing the uneasy divide between coursework learning and teaching practice. Through latent basis modelling, this study identified critical periods in TPI development and revealed that needs satisfaction serves as a protective factor during challenging transitions, particularly evidenced by sustained positive development during teaching practice among student teachers who experienced high needs satisfaction. The findings suggest that ITE programs should be designed to systematically support student teachers' basic psychological needs, ensuring that coursework learning and teaching practice complement each other. Future studies should, therefore, investigate how student teachers experience needs satisfaction in different ITE contexts to build a more rigorous understanding of specific program features that facilitate TPI development.

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