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Research (ir)relevance for student teachers: the impact of epistemic beliefs, epistemic emotions and demographics

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Abstract

This survey study (n = 376) investigated student teachers' views about educational research, taking a social-psychological perspective in employing the conceptual frameworks of epistemic beliefs and epistemic emotions. Drawing on a cross-sectional sample, the study investigated relationships between epistemic beliefs (beliefs individuals hold about knowing and coming to know), epistemic emotions (resulting from appraisals about congruence between new information and existing beliefs and knowledge structures) and demographics. It also examined whether distinct person-centred profiles of student teachers emerged through latent profile analysis. The findings revealed statistically significant influences of gender, age and student teachers' chosen pathway in initial teacher education (university-led or school-led initial teacher education): males had epistemic beliefs and emotions that were broadly receptive to research but wished to acquire knowledge quickly; mature students were unlikely to have epistemic beliefs and emotions that led to negative views about research; undergraduates perceived less utility of research for practice than postgraduates; and students in initial teacher education on university-led courses had more receptive epistemic beliefs and emotions for research

than those on school-led courses. The latent profile analysis revealed four distinct profiles of student teachers, differentiated by particular clusters of epistemic beliefs and emotions. The article considers the implications of these findings for pedagogy of initial teacher education.

Keywords student teachers; educational research; epistemic beliefs; epistemic emotions; demographics

Background and rationale for the study

This article reports on a cross-sectional survey study (n = 376) that formed part of a larger mixed-methods investigation researching relationships between different student teacher demographics and their views about educational research. Much of the existing literature on student teachers' views of research has focused on the influence of contextual factors or initial teacher education (ITE) curriculum design. In contrast, this study took a social-psychological perspective, employing the conceptual frameworks of epistemic beliefs and emotions to provide a novel, person-centred theoretical approach, concentrating on factors relating more to individuals than to context. It builds on the work of Peiser et al. (2022), which revealed (a) how aspects of student teachers' prior socialisation (gender and academic experience) impacted views about research, (b) that there was a likely impact of epistemic beliefs on student teachers' choice of ITE course type, and (c) that emotions that student teachers experienced while engaging with academic assignments during ITE also influenced attitudes. Due to the small-scale nature of Peiser et al.'s (2022) enquiry, these findings warranted further investigation with a larger, more diverse population, which was conducted in the present study with a sample of student teachers studying on a wide variety of ITE courses in various parts of England.

Researchers have applied theoretical models of epistemic beliefs to investigate their relationship with academic performance (for example, Schommer, 1990, 1993) and teachers' views about pedagogy in a general sense. Epistemic emotions have been studied in relation to self-regulated learning (Muis et al., 2018). However, to our knowledge, these models have not been used in a combined fashion to investigate student teachers' views of research.

Epistemic beliefs are defined as theories and beliefs that individuals hold about knowing, how they come to know and the way in which these beliefs influence cognitive thinking (Hofer and Pintrich, 1997). Merk et al. (2017) and Joram et al. (2020) explain how views about educational research are bound up with beliefs about *knowledge for teaching*. Following Shulman (1986, 1987), knowledge for teaching comprises content knowledge (substantive subject knowledge), pedagogical content knowledge (PCK – the intersection of content and pedagogical knowledge) and general pedagogical knowledge (GPK). PCK and GPK involve not only practical know-how and situational knowledge, which are developed experientially, but also knowledge of theories of learning and findings from empirical research to inform pedagogical decisions and practice. Thus, learning to teach should entail both learning in the practicum, and critically reading and interpreting educational research as a basis for practice (Merk et al., 2017). However, not all student teachers are motivated to learn from these different knowledge sources. Beliefs about knowledge for teaching are therefore influenced by beliefs about the nature of knowledge and coming to know (Merk et al., 2017) and it follows that epistemic beliefs are likely to impact student teachers' views about educational research. As Ferguson et al.'s (2023) study established, student teachers' motivations to learn from different sources are strongly influenced by their personal beliefs about sources of knowledge for teaching.

The authors of the present study contend that if teaching is to be a genuinely professional endeavour, it should involve deliberative practice underpinned by a range of different knowledge sources, including perspectives from research. However, we are also cognisant that student teachers often perceive educational research and theory to be removed from practice (Braaten, 2019). For the most part, teacher educators and researchers of ITE have attributed challenges with the integration of research and practice to contextual factors. This has prompted valuable development of curriculum content and design to better promote a theory–practice dynamic. However, they have paid less attention to how epistemic beliefs may be consequential. Similarly, the literature has paid little

notice to the epistemic emotions that student teachers may experience, when they engage with research perspectives.

Epistemic emotions connect with beliefs since they result from appraisals about the degree of alignment between new information and existing beliefs and knowledge structures (Muis et al., 2018). These emotions are likely to be those of curiosity, enjoyment, surprise, confusion, boredom or frustration, aroused by learners' appraisals of novelty, complexity, usefulness and feelings of control (Pekrun et al., 2016). Although learning to teach is regarded as an emotional experience (for example, Korthagen, 2017; Waber et al., 2021), authors focusing on this issue have considered experiential rather than conceptual learning.

Our study took place in England, where the government has attempted since the late 1990s to erode university-based ITE by not only shifting its governance to schools, but also by controlling ITE curriculum content and limiting academic freedom of teacher educators (Ellis and Childs, 2023). This has resulted, on the one hand, in the privileging of experiential over conceptual knowledge, and, on the other, of political prioritisation of certain types and fields of research. While the Department for Education (DfE) has promoted research-informed practice, this is based on a particular and limited diet of educational research (Perry and Morris, 2023), arguably depriving teachers of richer and agentive professional development (Turvey, 2023). Although this situation may be more acute in England than in other jurisdictions of the UK and beyond, there are signs of policy travel (Barrett and Hordern, 2021; Beach and Bagley, 2013) to other countries.

Against this policy backdrop, we consider that it is important for teacher educators not only to defend and develop curricula promoting an intellectual approach to learning to teach (Winch et al., 2015), but also to carefully consider how such curricula are received by the very people they intend to impact. Our investigation was based on the premise that understanding more about variations in student teachers' epistemic beliefs, and the emotions they experience when engaging with educational research during their ITE courses, may provide new insights to inform curriculum development and pedagogy.

The literature review further elaborates on the rationale for, and challenges with, educational research in ITE and resulting curriculum development. It also refers to studies revealing the related role of person-centred factors. It then details the conceptual frameworks of epistemic beliefs and epistemic emotions, explaining their relevance in ITE, to provide the theoretical underpinning for our study.

Literature review

Research in ITE: why, challenges and curriculum development

When learning to teach is considered to be an intellectual activity (Winch et al., 2015), it should involve experiential and conceptual learning to underpin practice and professional judgement (Tang et al., 2019). Research-rich teacher education can provide beginning teachers with the tools to think critically and to explore alternative principles (Afdal and Spernes, 2018), mitigating against reproducing the status quo. Nonetheless, teacher education has been persistently subject to the *two-worlds pitfall* (Braaten, 2019), explained predominantly to result from judgement about the value of research with respect to direct classroom relevance (Hennissen et al., 2017; Tang et al., 2019). Student teachers are more likely to favour school-based mentors' contextual, transmissive insights over research-based knowledge, since the former are considered to provide quick-fix solutions to pressing problems (Murray et al., 2019). Furthermore, student teachers can find it challenging to understand how formalised knowledge fits with what they know so far (Hennissen et al., 2017). Despite the practicum turn in ITE (Mattson et al., 2011), resulting in student teachers spending increased amounts of time on school placement, student teachers' practical experience is still relatively limited.

In response to these challenges, teacher educators have designed curricula seeking to integrate research and practice, where insights from educational research regarded as most relevant to practice in particular contexts are brought to bear on student teachers' decisions and actions (Burn and Mutton, 2015). When theory and practice are most effectively integrated in ITE curricula, universities and schools work in genuinely collaborative partnerships, with neither perspective nor type of knowledge dominating. In 'ideal' partnerships, student teachers are encouraged to interrogate both theoretical and practical knowledge in light of each other to enable a reciprocal relationship between research and practice with carefully sequenced campus and placement learning (see Burn and Mutton, 2015).

However, in reality, the integration of research and practice in ITE is susceptible to receiving more attention from teacher educators in universities than from school-based mentors supporting student teachers in the field, due to different types of priorities and pressures (for example, national accountability for the progress of students) faced by the latter (Jaspers et al., 2014) and inadequate resources to release mentors from their daily responsibilities. Student teachers will therefore often engage in activities promoting the integration of research and practice (which are academic credit bearing) initiated by universities, such as enquiry-style coursework, action research studies or reflective practice tasks, with little input from school-based colleagues. Thus, although supported by university tutors, the actual integration of theory and practice can rely heavily on the mental resources, inclinations or responses of individual student teachers. Therefore, it is important to reflect on how and why different student teachers may respond to educational research due to more person-centred issues.

For example, Woore et al. (2020), Hagger et al. (2008) and Peiser et al. (2022) found that teachers and student teachers who enjoyed academic work were more likely to recognise its value for professional development. Peiser et al. (2022) established the influence of gender, with female student teachers indicating more enthusiasm for educational research than males. They also uncovered how individuals' perceptions of control, value, complexity and novelty about educational research elicited both positive and negative epistemic emotions, with consequences for their future research engagement. Similarly, Gold et al. (2023) demonstrated that student teachers' views about the value of research interacted with perceptions of self-efficacy, impacting (intended) research utilisation. This suggests that student teachers' epistemic beliefs and epistemic emotions may also be consequential.

Epistemic beliefs

Hofer (2016) has referred to three waves of research on epistemic beliefs. The first was dominated by Perry (1970), who created a four-stage developmentalist model contending that students hold more simplistic beliefs about knowledge and coming to know at a younger age, but that these become more sophisticated as they progress through education. The four stages comprised: dualism (absolutist views of knowledge), multiplicity (recognition of diversity of possible answers, but searching for the 'right' answer), relativism (acknowledgement of contextual influence and the self as meaning maker) and commitment within relativism (with responsibility and engagement).

This model, however, was critiqued because it was derived from data collected from a sample of White, male students at Harvard University. These limitations prompted others to study women's epistemic beliefs, which revealed gender-related patterns in ways of knowing (Magolda, 1992). For instance, females' beliefs were intertwined with self-concept, and women favoured 'connected' and empathetic knowing (Belenky et al., 1986).

In the 1990s, the second wave of research favoured dimensional models (for example, Schommer, 1990, 1993). In her research studying relationships between epistemic beliefs and academic performance, Schommer's model included beliefs about: knowledge stability (fixed or fluid); knowledge structure (separate or connected); source of knowledge (handed down by authority or derived from reason); speed of learning (quick or gradual) and ability to learn (innate or learned ability).

Schommer's results indicate that each dimension, apart from the latter, independently impacted academic performance. Views of knowledge as fluid, connected, derived from reason, and requiring time and effort to acquire had positive impacts. Nonetheless, this model has been subject to critique, especially from Hofer and Pintrich (1997), who questioned the conceptual validity of the fourth and fifth dimensions. In their view, these neither relate to the nature of knowledge, nor to how it is justified. Rather, these dimensions connect with the nature of learning. In a rebuttal, however, Schommer-Aikins et al. (2000) provide a more expansive view of personal epistemology, arguing that learning beliefs may be precursors to beliefs about knowledge, and that both critically impact learning. Schommer's model has made an important contribution to the field. Her 63-item questionnaire (Schommer, 1990) has been regularly implemented in studies on epistemic beliefs around the world (Schommer-Aikins, 2004), and it provides a basis for our own study.

A third wave of epistemic belief research broadened to focus on sociocultural influences. Hofer (2000) investigated differences between natural science and social science students, and between females and males. Students majoring in science were significantly more likely than those in social science to view truth as attainable, and men were more likely than women to see knowledge as certain and unchanging. Paulsen and Wells (1998) established that students studying in applied fields, where there is an emphasis on practical applications of knowledge, are likely to have less sophisticated epistemic beliefs than students studying in 'pure' fields. Growing attention to sociocultural influences on beliefs is also evident in Schommer-Aikins's (2004) embedded systemic model and Muis et al.'s (2006) theory of integrated domains in epistemology. These studies highlight inconclusive evidence regarding the influence of particular demographics on epistemic beliefs. Rather, they recognise how epistemic beliefs are reciprocally influenced by different life and educational experiences. The third wave of research was also characterised by debate about methodological approaches in the field and some contention about what constitutes sophisticated or 'availing' beliefs. For example, Hofer (2016) highlights how people can have different types of beliefs about particular issues, and that students may loop back through developmental progressions of various belief dimensions, especially when transitioning from one academic domain to another.

Epistemic beliefs in teacher education research

The teacher education literature has also considered the relevance of epistemic issues. By and large, however, researchers have focused more generally on how student teachers' epistemologies relate to views on pedagogy, or the extent to which epistemic beliefs are 'availing' for learning to teach (Bondy et al., 2007; Muis, 2004; Therriault and Harvey, 2013). While most teacher education researchers have claimed that more constructivist views of knowledge are more 'availing' for learning to teach, Buehl and Fives (2009) have argued that beliefs about stable knowledge could also lead to more meaningful processing of information. Therefore, as highlighted by Hofer (2016), beliefs should not be dichotomised as naive or availing.

More recently, some studies have considered the relationship between epistemic beliefs and views about knowledge sources, which also includes educational research. Joram et al. (2020) have established that in-service teachers with epistemic beliefs favouring knowledge certainty were sceptical about drawing on research to inform practice if they considered that findings or theories lacked applicability to their contexts. Guilfoyle et al. (2020, 2024) found that student teachers specialising in natural sciences may be dubious about educational research due to tensions they experienced with contrasting epistemologies in the domains of science and education. Yough et al. (2023) discovered that student teachers with epistemic beliefs favouring more fluid knowledge were more likely to connect formal knowledge with experiential learning.

Within the field of epistemic beliefs and teacher education, studies also reveal the influence of sociocultural factors. Wong et al. (2009) and Chai et al. (2006), located in Hong Kong and Singapore, found that the large majority of respondents held epistemic beliefs that corresponded with deep and achieving-oriented learning approaches. These researchers interpreted their results in relation to Confucian culture. Bondy et al. (2007), Guilfoyle et al. (2020), Muis (2004) and Therriault and Harvey (2013) uncovered widely variable beliefs within their data sets. These authors, who were all located in Western countries, concluded that views about knowledge for teaching were filtered by students' entering perspectives, personal priorities and prior academic learning.

Epistemic emotions and their antecedents

Epistemic emotions are linked to epistemic beliefs since they result from appraisals about degree of congruence between new information and existing beliefs and knowledge structures while engaging with a cognitive task, normally pertaining to academic work (Muis et al., 2018). According to Muis et al.'s (2018) model, antecedents for such emotions relate to appraisals of control (confidence about ability to decode research), value (capacity for improvement), novelty (degree of alignment with existing knowledge), complexity (perceived difficulty) and whether the new information will assist in achieving a particular aim (which, in ITE, would relate to professional practice or outcomes for young people). Appraisals of the positive value of an epistemic activity promotes positive epistemic emotions, such as curiosity and enjoyment, while perceived negative value results in confusion, frustration or boredom (Pekrun

et al., 2016). Epistemic emotions can also have both positive and negative consequences for future engagement with academic work, as they may impact future goal setting, motivation, implementation of cognitive and meta-cognitive strategies, and revisions to the antecedents of value and control (Muis et al., 2018). Peiser et al.'s (2022) study illustrates that when student teachers engaged with subject pedagogy research related to their teaching subject specialism (and prior study), they experienced positive feelings of control and value. These contrasted with negative feelings when research texts were perceived as abstract, did not relate to existing schema, and there was a perceived absence of application to practice.

To summarise, the ITE literature has argued for research-rich teacher education, and has also revealed associated challenges, which contribute to a theory–practice divide. In response, teacher educators have developed curricula to integrate theory and practice, attending to curriculum sequencing, collaboration with school-based colleagues, and nature of research content and tasks. However, there are also reasons to consider how more person-centred factors may impact student teachers' reception to educational research, in particular the influence of epistemic beliefs and (the antecedents of) epistemic emotions, which, in turn, may be associated with age, stage of study, domain of study, gender and prior academic experiences. These matters gave rise to the first research question (RQ) in our study.

> RQ1: Are there differences in epistemic beliefs and epistemic emotions relating to educational research between females and males; students with science and non-science backgrounds; primary and secondary student teachers; 'mature' and 'typically aged' students; postgraduate and undergraduate student teachers; and students following university-led and school-led ITE routes?

The second research question sought to investigate sub-groups within the population to provide a more nuanced, person-centred understanding of the data. The third question concerned itself with triangulating findings relating to RQs 1 and 2.

> RQ2: Do distinct profiles of student teachers emerge based on different epistemic beliefs and emotions?
>
> RQ3: Do profile indicators correlate with demographic differences?

As noted in the Introduction, the survey study was part of a larger mixed-methods study. The interview element aimed to uncover explanations for the trends emerging from the survey study, but due to the relatively small number of interviewees (n = 14), it was also concerned with gaining a more holistic understanding of the reasons for student teachers' differing epistemic beliefs and epistemic emotions. Thus, the two phases of research each addressed different research questions. Analysis proceeded separately for each type of data (which had equal weight) before comparison of information in the final interpretation stage, which sought to derive a comprehensive understanding of the role of epistemic beliefs and epistemic emotions. The authors considered it to be important to carry out independent and thorough analysis for each data set before the final integration phase. In this article, we report on the findings and analysis of data related to RQs 1–3.

Methodology

Recruitment, research context and participants

Data were collected via an online survey (n = 376) hosted on the Joint Information Systems Committee (JISC) online survey platform between February 2022 and April 2023 from students on different ITE courses across England (primary undergraduate [PriUG] in their final year of study, primary postgraduate [PriPG], and secondary postgraduate [SecPG] courses). In England, all secondary ITE courses are at postgraduate level and follow a consecutive model, typically comprising 60 days in university and 120 days practicum, with up to two weeks more in school than university if student teachers are on a school-led course. Secondary student teachers qualify to teach with Qualified Teacher Status (QTS) if they meet the statutory Teachers' Standards (created by the DfE), and most also study for a complementary academic qualification (postgraduate certificate or diploma). Primary ITE courses either follow the same postgraduate model or are at undergraduate level (bachelor's) in a three-year course with QTS. Primary undergraduates also spend 120 days in school over the course of three years.

Recruitment occurred via email invitations sent by the lead author in spring 2022 and 2023, a time in the academic year when student teachers would have had enough exposure to educational research to have developed a view. Invitations were sent to tutors and course leaders of 18 ITE providers known through membership of various national professional networks, who were asked to forward these to students. Recruitment advertisements were also sent to three national ITE professional organisations, which were published in newsletters and on social media posts. Overall, the aim was to reach approximately 2,000 student teachers, which, based on a 15 per cent response rate, would yield a target of 300 respondents. The demographic profiles of respondents are shown in Table 1.

Table 1. Profile of survey respondents

Demographic characteristic	Number of respondents by group
Age phase specialisation and undergraduate (UG)/postgraduate (PG) qualification	SecPG (170), PriPG (123), PriUG (83)
University-led/school-led course	university-led (290), school-led (86)
Subject specialism of secondary student teachers	art and design (4), computing (4), design and technology (5), English (12), geography (9), history (8), mathematics (24), modern languages (29), music (2), performing arts (18), physical education (23), religious education (4), science (30), social sciences (2), other (9)
Sex	male (91), female (282), other (1), prefer not to say (2)
Ethnic group	White (340), mixed/multiple ethnic group (10), Asian/Asian British (17), Black, African, Caribbean or Black British (5), another ethnic group (2), prefer not to say (2)
Age	18–25 (250), 26+ (126)

To provide a comparison between the demographics of the survey respondents and the national population, we set out statistics from the English Initial Teacher Training Census (DfE, 2022). In the academic year 2022/3, 44 per cent of ITE courses in England were university-led and 56 per cent were school-led. (The shift to school-led ITE in England started in full throttle in 2012, following the introduction of the employment-based training 'School Direct' route. Prior to this, employment-based training constituted approximately 20 per cent of provision. School-led courses transferred a significant degree of control over the recruitment and pre-service preparation of teachers on to postgraduate routes from universities to schools, with added time spent in the practicum.) Consideration of this demographic enabled a comparison of epistemological beliefs and epistemological emotions of student teachers on more or less 'applied' ITE routes (see Paulsen and Wells, 1998) and further investigation of Peiser et al.'s (2022) finding that there is a likely relationship between epistemological beliefs and ITE course chosen by students. Of student teachers, 42.6 per cent were secondary postgraduate, 37.5 per cent were primary postgraduate, and 19.9 per cent were primary undergraduate. While the respondents form a convenience rather than a representative sample, the demographic variability means that the sample was purposive.

Data collecting instrument and analysis

The survey contained 23 Likert 5-point scale items (5 = strongly disagree; 1 = strongly agree). Negatively worded items were reverse scaled so that higher scores represented epistemological beliefs that were likelier to be more receptive to research or antecedents that elicited more positive epistemic emotions. There were four domains relating to epistemological beliefs (knowledge complexity, speed of knowledge acquisition, knowledge stability, and involvement in knowledge construction), each with four items, and one domain with seven items on antecedents of epistemic emotions. We also

collected data on demographics. The epistemological belief items were informed by Wood and Kardash's (2002) instrument, which investigated American college students' epistemological beliefs, which Schommer-Aikins (2004) herself positively acknowledged as an improved and expanded version of her widely used questionnaire (Schommer, 1990). Adaptations to Wood and Kardash's (2002) instrument were made to make it appropriate for the ITE context. Epistemic emotions and their antecedents were researched based on Muis et al.'s (2018) model (a copy of the survey and full data set are provided in Peiser et al., 2024). A pilot with eight student teachers was conducted in May 2022 to establish the validity of the survey using a cognitive pretesting protocol (Karabenick et al., 2007). This involved a focus group, which explored the thoughts and feelings of the student teachers when responding to questions, to provide a comparison with the intentions of the researchers and to confirm whether participants could accurately understand and respond to all questions as intended. The only emerging issue at this stage was students' queries regarding emphasis in some items. As it was not possible to use italics on the online platform, the words warranting emphasis were written in upper case. The study was granted full approval by the university ethics committee (22/EDN/001) before commencement of data collection. On the first web page of the survey, respondents were informed that completing the survey would indicate their consent to participate in the research.

The data were first analysed using Statistics Package for the Social Sciences (SPSS). Although tests of association using Pearson's *r* indicated intercorrelations between items within the domains of knowledge structure and speed of knowledge acquisition, tests of internal consistency indicated that unidimensionality within four of the five domains (except for epistemic emotions) was insufficiently strong (see Peiser et al., 2024). Therefore, tests for statistical significance for different demographics were conducted on individual questions on an item-by-item basis.

Independent *t*-tests and Cohen's *d* effect sizes were conducted to test for statistically significant differences between males and females, student teachers on university-led and school-led courses, secondary student teachers who had a natural sciences background and those who did not, and 'typically aged' and 'mature' (more than 26 years) student teachers. One-way ANOVA tests were conducted for PriUG students, PriPG students and SecPG students. Pearson's *r* tests were also conducted to examine correlations between all Likert scale items. Mention has been made above of some noteworthy associations between items in relation to internal consistency. Other noteworthy associations will be reported alongside the findings of the latent profile analysis.

A second step in the analysis involved latent profile analysis (LPA) using Mplus software (Muthén and Muthén, 2017) to profile student teachers into homogeneous groups. The number of profiles was determined based on statistical fit indices, interpretability of each pattern and the number of persons per pattern (Boscardin et al., 2008; Spurk et al., 2020). Covariates were then added to the final model to test the relations between profiles and covariates (R3STEP; Asparouhov and Muthén, 2014). Further details of the LPA process are documented in Peiser et al. (2024). Four items were omitted in the LPA due to reconsideration of their appropriateness in their respective domains (8.4, 9.4, 10.4 and 11.1). Finally, the results of the variable-centred tests of difference were triangulated with the person-centred results. This involved examining how demographic variables predicted derived profiles from the LPA.

Results

The statistically significant results of the *t* tests and ANOVA tests are shown in Tables 2 and 3 (the results of all tests are documented in Peiser et al., 2024). Although all differences reported here are statistically significant, the effect sizes according to Cohen's *d* were small for all results.

Table 2. Statistically significant demographic differences from *t*-tests

Gender	**Males**		**Females**			
	M	***SD***	***M***	***SD***	***t (df)***	***d***
Q9.2 Almost all the information I can understand in educational research, I will get from the first reading.	3.47	1.05	3.66	0.20	1.66 (371)*	0.20
Q10.3 Even advice from educational experts should be questioned.**	4.32	0.65	4.11	0.69	−2.58 (371)*	−0.31
Q11.4 Successful teachers understand and develop good pedagogy QUICKLY.	2.86	1.04	3.17	1.03	2.50 (371)*	0.30
Q12.1 When working on academic assignments (prior to submission), I felt confident that I could pass them.**	3.76	0.95	3.34	1.13	−3.51 (179.64)*	−0.39
Q12.6 The research promoted on my initial teacher education course relates to things where I have existing knowledge.	3.62	0.84	3.81	0.79	2.00 (371)*	0.24
ITE Pathway	**University-led course**		**School-led course**			
	M	***SD***	***M***	***SD***	***t (df)***	***d***
Q8.1 I like educational research information to be presented in a straightforward way; I don't like having to read between the lines.	1.51	0.80	1.36	0.64	−1.82 (162.45)*	−0.20
Q9.2 Almost all the information I can understand in educational research, I will get from the first reading.	3.68	0.91	3.42	1.01	−1.09 (122.33)*	0.28
Q10.3 Even advice from educational experts should be questioned.**	4.12	0.68	4.30	0.69	2.16 (371)*	0.27
Q11.1 For me, the best way to learn to teach is by receiving guidance from experienced practitioners.	2.08	0.88	1.84	0.85	−1.15 (371)*	−0.27
Q11.2 Some people are born good teachers; others are just stuck with limited ability.	3.63	1.01	3.27	1.04	−2.89 (371)*	−0.36
Q11.4 Successful teachers understand and develop good pedagogy QUICKLY.	3.17	1.02	2.89	1.08	−2.19 (371)*	−0.27
Q12.2 Engaging with educational research has been interesting.**	3.96	0.78	3.77	0.95	−1.61 (115.29)*	−0.22
Prior study background	**Science background**		**Non-science background**			
	M	***SD***	***M***	***SD***	***t (df)***	***d***
Q9.2 Almost all the information I can understand in educational research, I will get from the first reading.	3.74	0.86	3.55	0.96	−1.60 (281)*	0.20
Mature versus typical-aged students	**Mature**		**Typical-aged**			
	M	***SD***	***M***	***SD***	***t (df)***	***d***
Q8.3 When I research the literature for assignments, I look for specific facts (rather than a variety of different views/perspectives).	3.23	1.08	3.02	1.18	−1.68 (374)*	−0.18
Q9.4 I get confused if I try to apply ideas from educational research to an aspect of my teaching practice if I already have some knowledge about how to do this.	3.46	0.99	3.16	1.04	−2.65 (374)*	−0.29
Q12.3 Engaging with educational research has been enjoyable.**	3.74	0.96	3.41	1.04	−3.04 (268.96)*	−0.32

Notes: * $p < 0.05$; ** item was reverse scored.

Table 3. Statistically significant demographic differences from ANOVAs

	Primary undergraduate		Primary postgraduate		Secondary postgraduate			
	M	***SD***	***M***	***SD***	***M***	***SD***	***F (df)***	η_p^2
Q8.4 A good teacher's job is to keep students from wandering from the right track.	2.46 [a]	0.96	2.86 [b]	1.10	2.49 [a]	1.02	5.63 (2,372)*	0.03
Q12.5 Insights gained from educational research have helped me to find solutions to some challenges in my professional practice.**	3.61 [a]	0.82	3.91 [b]	0.81	3.79 [a,b]	0.87	3.22 (2,372)*	0.02

Notes: * $p < 0.05$; ** item was reverse scored; Means with statistically different values ($p < 0.05$) are shown with different subscripts.

Gender

There were statistically significant different results between males and females in terms of time allocated for reading educational research and time to develop good pedagogy. Responses to Q9.2 indicated that females were less likely than males to agree that almost 'all the educational information they understand they will get from the first reading'. Responses to Q11.4 showed that males were more likely to think that successful teachers develop good pedagogy quickly. Although the issue of time could relate to students' perceptions about quick understanding, self-efficacy in comprehending text or their beliefs about innate ability, we know that willingness to devote time and effort to learning have a critical impact on academic success (see Dweck, 2010). It could be inferred from this that student teachers who are more prepared to dedicate time to learning have a more conscientious approach, and consequently may be more prepared to read or learn from educational research.

Gender differences were also significant relating to confidence. Males agreed more than females that advice from educational experts should be challenged (Q10.3). On the one hand, this could indicate cynicism about more formal knowledge, and, on the other, it may reflect criticality about sources of knowledge. Males also reported greater confidence in passing academic assignments (prior to submission) (Q21.1), indicating stronger self-efficacy, which is an antecedent for positive epistemic emotions. Females, nevertheless, were significantly more likely to think that educational research promoted on their ITE course related to some pre-existing knowledge (Q12.6), suggesting alignment with some existing schema.

ITE pathway

There were several significant differences in views between students who followed university-led and school-led courses. Apart from Q12.2, where university-led students expressed greater interest in educational research (degree of interest is related to intrinsic value, which is an antecedent for epistemic emotions), the other differences related to epistemic beliefs about engagement in knowledge construction, time to learn and knowledge structure. University-led students were more prepared to embrace knowledge complexity (Q8.1), take time to read research (Q9.2) and think that developing good pedagogy takes more time (Q11.4), and less likely to think that some people are born good teachers (Q11.2). University-led students were also less likely than school-led students to think that the best way to learn to teach was to receive direct guidance from experienced practitioners (Q11.1), suggesting that the former group valued developing professional knowledge from a variety of sources. School-led students were more likely than university-led students to think that advice from educational experts should be questioned (Q10.3), perhaps indicating cynicism about advice from academics, although this could possibly also indicate criticality.

Science background versus non-science background

Within the survey, postgraduate students were asked to provide the name of their undergraduate degree, which informed the coding of students into two groups. Those who had previously studied natural sciences, pharmaceutical science, neuroscience or mathematics were classified as 'science background', and those who had not were classified as 'non-science background'. The only significant different result was for Q9.2. Students with science backgrounds were less likely to think that almost all the information they can understand in educational research they will get from the first reading than those with non-science backgrounds.

'Mature' (aged 26+) versus 'typically aged' (aged 18–25) students

Three significant differences were apparent between different age groups. Mature students were more likely to look for a variety of viewpoints rather than for facts when carrying out research for assignments (Q8.3), to experience less confusion when they applied ideas from educational research to pre-existing knowledge (Q9.4), and to find educational research more enjoyable (Q12.3).

Primary undergraduate (PriUG) versus primary postgraduate (PriPG) versus secondary postgraduate (SecPG)

ANOVA tests indicated significantly different views for two items (see Table 3). First, PriPGs were less likely than PriUGs and SecPGs to think that a good teacher's job is to keep students from wandering from the right track (Q8.4). Post-hoc tests indicated significant differences between both PriUG and PriPG ($p = 0.02$, $d = 0.38$) and between PriPG and SecPG ($p = 0.008$, $d = 0.35$). This may be reflective of a more holistic, child-centred approach that PriPGs take in the classroom. The purpose of this survey item was to investigate views about knowledge complexity. However, on reflection, we are unsure that the associated data enable us to draw conclusions on student teachers' views of research. Second, in response to Q12.5, PriUG showed that they were less likely to find that insights gained from educational research helped them to find solutions to some challenges in their professional practice compared to PriPG only ($p = 0.04$, $d = 0.37$).

Latent profile analysis

Using MPlus, solutions were first examined with up to six profiles. Table 4 shows the fit information (BIC, aBIC, CAIC, LMR, BLRT and entropy). Although the aBIC continued to decrease, the BIC and CAIC suggested that a five-profile solution was optimal. However, it was also necessary to consider profile interpretability, since profiles with <25 cases should be rejected (Lubke and Neale, 2006; Spurk et al., 2020). A four-profile solution was therefore supported, since the five-profile solution involved too small a class size (class 1 = 22 students). Examination of three-to-five profile solutions also supported a four-profile solution which was well-defined, qualitatively different and theoretically meaningful. The addition of a fifth profile resulted in an arbitrary division of existing profiles into smaller ones that differed from one another only quantitatively. Thus, based on the fit indices, the plot and the interpretability of classes, the four-profile solution was selected (see Figure 1).

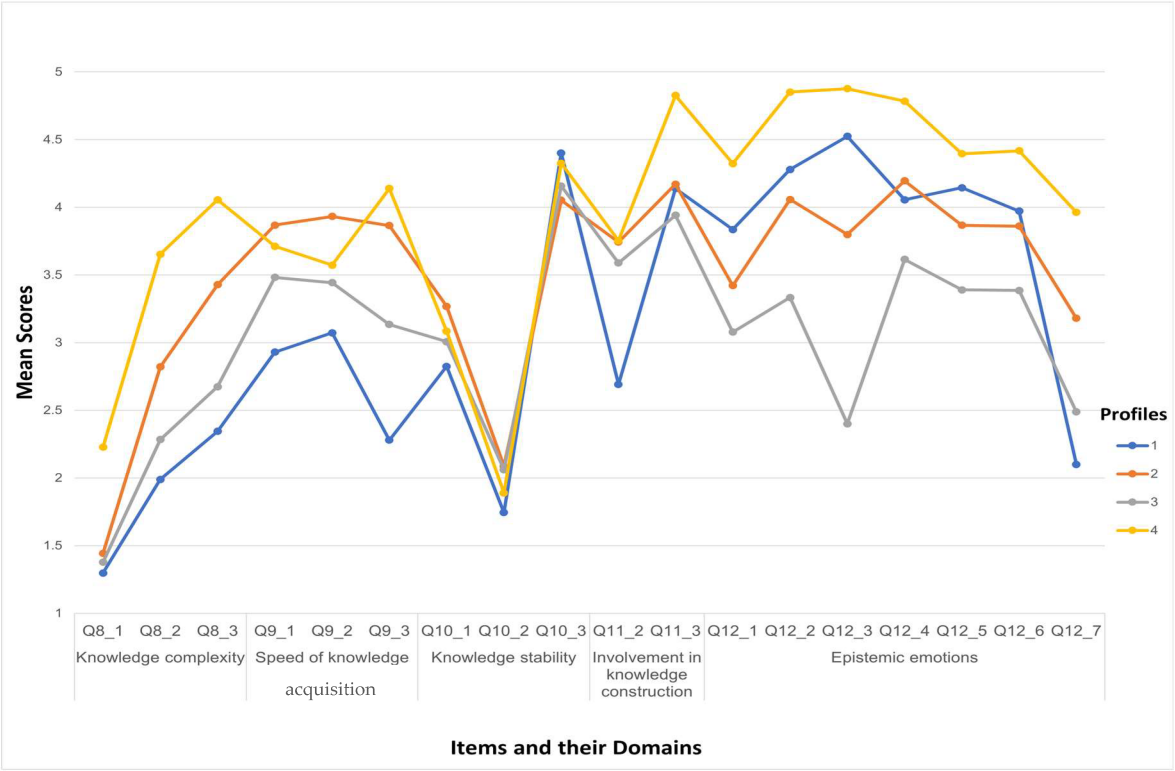
Profile 1 (12.8 per cent): *like research but want a quick fix* was characterised by low scores for knowledge complexity (Q8.1–8.3) and speed of knowledge acquisition (Q9.1–9.3), combined with a tendency to think that people are born good teachers (Q11.2), despite being open to think about different possibilities for teaching (Q11.3). Most antecedents (for example, value for professional practice) of epistemic emotions had quite high scores, although Q12.7 (research is difficult to understand) was notably lower, aligning with responses to Q8.1–8.3. In this profile, therefore, there are students who are potentially positively disposed to learning from educational research, and who may experience positive epistemic emotions when so doing. However, their epistemological beliefs indicate less enthusiasm about investing the intellectual effort that may be required in the process.

Table 4. Model fit criteria of the two to six class solutions in latent profile analysis

Class enumeration	*k*	*df*	BIC	aBIC	CAIC	LMR	BLRT	Entropy
2 Profiles	2	56	17674.04	17496.37	17730.04	0.11	£0.001	0.72
3 Profiles	3	75	17553.93	17315.97	17628.93	0.20	£0.001	0.82
4 Profiles	4	94	17487.63	17189.39	17581.63	0.20	£0.001	0.87
5 Profiles	5	113	17402.10	17043.58	17515.10	0.03	£0.001	0.94
6 Profiles	6	132	17454.28	17035.48	17586.28	0.36	£0.001	0.90

Notes: *k* = number of profiles; *df* = degrees of freedom; BIC = Bayesian information criterion; aBIC = sample-size-adjusted Bayesian information criterion, CAIC = consistent Akaike information criterion; LMR = Lo, Mendell & Rubin likelihood ratio test; BLRT = bootstrap likelihood ratio test.

Figure 1. The four-profile LPA solution



Profile 2 (42 per cent): *medium all* was characterised by relatively high scores in knowledge complexity, speed of knowledge acquisition, involvement in knowledge construction and antecedents of epistemic emotions. These student teachers appear to be neither overly positive nor overly negative about educational research.

Profile 3 (35.4 per cent): *medium-low epistemic beliefs and low epistemic emotions* was characterised by medium-low scores in knowledge complexity, speed of knowledge acquisition, involvement in knowledge construction, and rather low scores for antecedents of emotions, especially regarding enjoyment of educational research (Q12.3). This profile, to which over a third of participants belong, is least likely to respond positively to educational research.

Profile 4 (9.8 per cent): *all high* was characterised by rather high scores for knowledge complexity, speed of knowledge acquisition, involvement in knowledge acquisition, and antecedents of epistemic emotions. Interestingly, scores are lower for Q9.1 and Q9.2 (related to how quickly they understand research texts) than for respondents in Profile 2, which may be interpreted as perceptions of higher self-efficacy. Perhaps students in this profile perceive themselves to be more academically able.

The odds ratio (OR) indicated that males were significantly more likely to be in Profile 4 than in Profile 1 ($OR = 3.27$, $p = 0.01$), Profile 2 ($OR = 2.74$, $p = 0.01$) or Profile 3 ($OR = 2.15$, $p = 0.02$) compared to females. Mature students were significantly more likely to be in Profile 2 than in Profile 3 ($OR = 2.15$, $p = 0.02$) than typical-aged students. University-led students were significantly more likely to be in Profile 4 than in Profile 1 ($OR = 5.23$, $p = 0.02$) or in Profile 3 ($OR = 3.71$, $p = 0.04$) than school-led students. Undergraduates were significantly more likely to be in Profile 4 than in Profile 3 ($OR = 2.47$, $p = 0.03$) than postgraduates.

In addition to the profiles, a visual inspection of Figure 1 suggests that student teachers' 'availing' epistemic beliefs corresponded with positive epistemic emotions (and vice versa) in Profiles 2 to 4, and a 'sameness' of views for the knowledge stability item across all four profiles. This latter point would indicate relative consensus that current 'wisdom' on teaching is susceptible to change, advice from educational experts should be questioned, and that wisdom about teaching is characterised by time-sensitive 'know-how'.

Conclusions and discussion

To answer our first research question, the data indicate that there are significantly different epistemic beliefs and epistemic emotions related to certain demographics, particularly in relation to gender, ITE pathway and maturity. In considering the third research question, namely the triangulation of the *t*-test and ANOVA test results with the LPA profiles and their predictors, there appear to be four key trends. First, student teachers who have opted for university-led instead of school-led courses have epistemic beliefs and epistemic emotions that are more positively disposed to engaging with educational research, and they are prepared to invest time in engaging with formal knowledge. This lends support to Peiser et al.'s (2022) conclusion that epistemic beliefs are likely to influence student teachers' choice of ITE pathway. To some extent, it also resonates with Paulsen and Wells (1998), who found that students who opted for applied study courses are likely to have less sophisticated epistemic beliefs than students studying in 'pure' fields. While learning to teach must always be 'applied', a school-led pathway could be regarded as even 'more applied' than a university-led pathway, with less value associated with theoretical elements. Although this first trend may have a degree of predictability due to a policy discourse promoting experiential learning through school-led pathways, the present empirical study has probed this assumption, rather than accepting it as an inevitability.

The second triangulated result indicates some influence of gender. Although males may broadly be more receptive to educational research, they wish to acquire knowledge more quickly than females, which may act as a barrier to taking the time that may be needed for engaging with formal knowledge. On the other hand, males are more confident about passing assignments, due to perceived feelings of 'control', and therefore they could have more positive epistemic emotions than females while engaging with associated research literature. However, females' greater likelihood to think that the educational research with which they engage connects with some existing knowledge could positively influence their epistemic emotions. As highlighted in Muis et al. (2018), connections with existing schema, supported by more connected approaches to knowing favoured by women (Magolda, 1992; Belenky et al., 1986), may promote positive epistemic emotions. This array of results related to gender means that it is challenging to draw overall conclusions about the relationship between gender and attitudes to research. This echoes existing literature pointing to the influence of broader experiences from primary and secondary socialisation (Muis et al., 2006; Schommer-Aikins, 2004), rather than to gender as an individual factor.

The third triangulated finding revealed that mature students have certain epistemic beliefs and epistemic emotions which positively dispose them to educational research, and that they are unlikely to have epistemic beliefs and epistemic emotions that make them negatively disposed. This suggests that student teachers' maturity influences views on knowledge complexity and appreciation of knowledge from different sources, extending beyond experiential knowledge, resonating with Perry's (1970) developmental epistemic beliefs model. Finally, while undergraduate student teachers may perceive less utility of research for practice compared to postgraduates, their epistemic beliefs and epistemic emotions are more likely to be positively than negatively disposing. This finding could be interpreted in light of a more 'blocked' curriculum on PriUG courses, where students spend longer periods of time either at university or at school. On the one hand, this may mitigate against integration

of research and practice, but, on the other hand, it may permit more time and space for appreciating research knowledge without the concurrent pressures of the practicum.

In responding to our second research question, there are four qualitatively distinct sub-groups of student teachers who share similar patterns of epistemic beliefs and epistemic emotions: 'like research but want a quick fix', 'medium all', 'medium-low epistemic beliefs and low epistemic emotions' and 'all high'. From a positive perspective, three out of the four profiles (comprising almost two thirds of the participants) are more positively disposed to research, although there is some apparent ambivalence in Profile 2 and variation in views about preparedness or need to dedicate time to read research literature. It is possible that Profile 4 contains student teachers who enjoy academic work or who have experienced previous academic success, although this was not explored via the survey instrument. Notably, however, Profile 3, containing the largest number of participants, has student teachers with epistemic beliefs and epistemic emotions which are negatively disposed to research.

What, therefore, may this imply for ITE curriculum development and pedagogy? Since epistemic beliefs are malleable (Muis, 2004) and epistemic emotions can be channelled (Rosman and Mayer, 2018), teacher educators could use knowledge about variability between different demographic groups and distinct profiles of student teachers to develop these to become more receptive to research. Just as teachers adapt pedagogies depending on the needs and characteristics of the young people, we argue that teacher educators should be aware of the possible influence of chosen ITE route, age and gender of student teachers on attitudes to research, and of clusters of student teachers with qualitatively different combinations of epistemic beliefs and epistemic emotions. Given the threat to educational research in ITE in the English policy context, it is more important than ever that beginning teachers have an understanding and appreciation of the role of theory in their learning. Our findings offer teacher educators an understanding of the role that epistemic beliefs and epistemic emotions play as part of that learning process.

We argue, therefore, that it is important for both teacher educators and student teachers themselves to find out more about epistemic beliefs and epistemic emotions, especially if the former wish to advocate particular epistemological stances to beginning teachers and encourage epistemic change (Muis et al., 2006). As recommended by Brownlee et al. (2011), who studied epistemic beliefs relating to teaching and learning, reflection on personal epistemologies should become focal in ITE courses. Our findings imply that this principle should be extended to epistemic beliefs about knowledge sources for teaching, and to the role of research as one of these.

While the school-led demographic may currently be applicable in certain national contexts, the data imply that student teachers following school-led and university-led courses have contrasting entering views about knowledge, even before embarking on ITE. In this study, these differences are simply explicit and manifest in the ITE pathway demographic. However, in line with the findings of Bondy et al. (2007), this divergence of entering perspectives is likely to exist in other student teacher cohorts. ITE pedagogy therefore needs to respond to student teachers who are predisposed to questioning the value of formal knowledge, or who believe that teaching skills are innate or learnt quickly, with meaningful and scaffolded learning activities, demonstrating the value of learning to teaching as an intellectual endeavour that benefits from deep learning. It needs to stress the benefits of connected knowing, challenge views which favour the inherent superiority of experiential learning and foster the self-efficacy of those who feel less secure with academic work, or in the (new) subject discipline of education.

While it is beyond the scope of this article to discuss the details of such pedagogies, which in themselves provide new avenues for research, these could involve careful consideration of 'mixed-up' workshop groups, so that student teachers share and listen to each other's perspectives, personal tutoring that fosters both teacher educators' and student teachers' awareness of epistemic beliefs and epistemic emotions, so that they can work collaboratively to develop and channel these, or activities demonstrating the advantages of formal knowledge for learning to teach that extend beyond the remit of academic credits. If undergraduates have epistemic beliefs and epistemic emotions which are generally receptive to research, but find research less helpful for practice, this may be owing to timetabling of sustained blocks of university or placement learning, which make it more challenging to reciprocally interrogate theoretical and practical learning. Timetabling changes may facilitate closer intertwining of conceptual and experiential learning.

An additional finding worthy of attention is the correspondence of epistemic beliefs and epistemic emotions, apparent from visual inspection of Figure 1 for Profiles 2 to 4 in the LPA. If ITE seeks to channel more positive epistemic emotions, this may result in more positively disposed epistemic beliefs,

and vice versa. This would reinforce Peiser et al.'s (2022) recommendation to carefully scaffold student teachers' research engagement in ITE to buffer negative feelings about complexity, control, novelty and relevance, while not shying away from open discussions about negative emotions to develop more resilient responses.

By adopting the theoretical lenses of epistemic beliefs and emotions, and by collecting responses from a cross-sectional sample, this study has contributed to the field on the theory–practice divide in ITE, clearly demonstrating the need to attend to social-psychological influences on student teachers. As this is the first time such a survey has been used in the field of ITE to address these particular research questions, we would like to stress that our instrument served an exploratory purpose, rather than attempting to achieve theoretical validity. We recognise the limitations of our instrument in relation to both the internal consistency of some of the scaled items, which need further refining in future studies, and the item enquiring about undergraduate degree title, which did not enable us to identify nuanced differences among student teachers who had previously studied science subjects. The fact that there was just one significant result relating to differences in views between students from science and non-science backgrounds is perhaps due to issues with the coding of the data, which did not adequately recognise the heterogeneity of academic backgrounds. Thus, we also do not purport that our results can be generalised.

Nonetheless, our medium-sized study, drawing on a cross-sectional sample, has revealed the importance of considering how contrasting demographics and entering perspectives may influence epistemic beliefs, epistemic emotions and related views of educational research. The findings serve as a starting point for informing ITE curriculum development and pedagogy; that is, that certain demographics can have an influence, and that there are likely to be qualitatively distinctive profiles of student teachers with certain epistemic beliefs and experiences of (antecedents of) epistemic emotions, and indeed for further research in the field. Nonetheless, as the particular findings cannot be generalised, it is important for teacher educators to find out more about these for their own particular cohorts. As mentioned in the introduction, our survey research was also part of a larger mixed-methods study. The complementary interviews, which aimed to understand reasons for different views based on individuals' experiences, should provide further insights, and should contribute to a more holistic picture. The survey findings, however, clearly reveal noteworthy trends, which are worthy of consideration in their own right.

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Declarations and conflicts of interest

Research ethics statement

The authors declare that research ethics approval for this article was provided by the Liverpool John Moores University ethics board.

Consent for publication statement

Not applicable to this article.

Conflicts of interest statement

The authors declare no conflicts of interest with this work. All efforts to sufficiently anonymise the authors during peer review of this article have been made. The authors declare no further conflicts with this article.

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