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Student experiences of academic transition: Undergraduate STEM to postgraduate social science

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Abstract

This research contributes to developing a deeper understanding of student lived experience of navigating the transition from undergraduate to taught postgraduate study. As reported in the literature, this is generally an under-studied phenomenon. In this research we specifically focused on exploring the experience for students who are making an interconnected disciplinary change as part of their shift from undergraduate to Master's level study.

This research explores the lived experience of a group of pre-service physics teachers in Scotland as they transition from their previous undergraduate academic studies in the field of STEM to postgraduate academic study in the field of social science. To be successful in their current academic studies they need to acculturate to a discipline with noticeably different assumptions and underlying ways of thinking and knowing. To explore the students' lived experience of this interconnected transition we adopted a phenomenological methodology, gathering data through semi-structured interviews which we then thematically analysed.

Areas for reflection for educators teaching students undergoing similar transitions are identified in the paper. These include the need to recognise the complexities of moving between academic disciplines at the same time as moving from undergraduate to taught postgraduate study. The students in this study articulated holding prior conceptualisations, expectations of, and responses to what makes for knowledge, theory, testing theory and using theory. They further articulated having to reconcile those conceptualisations with new ways of thinking and knowing as they undertook a disciplinary transition as part of their undergraduate to taught postgraduate transition. Students implicitly, rather than explicitly, identified challenges in acculturating to epistemological differences through the articulation of developing strategies.

Keywords: Initial Teacher Education, postgraduate taught qualifications/courses, disciplinary transition

Introduction

This study focuses on exploring the lived experience of a sub-set of students with STEM (Science, Technology, Engineering and Mathematics) undergraduate degrees moving into a postgraduate taught course in the discipline of social sciences. The participants in this study had previously completed an undergraduate degree in either physics or engineering and were undertaking a 1-year course in Initial Teacher Education (ITE) at a Scottish University with the intention of becoming physics teachers. As such they were navigating multiple transitions concurrently. Firstly, transition from undergraduate to postgraduate study. Secondly, transition between academic disciplines. Thirdly, the "reality shock" (Squires et al., 2022, p.14) of becoming a teacher. We hope that through better understanding the lived experience,

we can plan intervention to minimise the negative impact on pre-service teachers' progress and confidence, both during the ITE year itself, and in how or to what extent in the future, as qualified teachers, they continue to engage with education research to inform their practice. The findings of this study have broader relevance for anyone teaching students navigating any of these three transitions individually or in combination.

Teacher education in the Scottish context

To understand the context of this research, and the transitions navigated by the participants, it is important first to have an overview of the context of teacher education in Scotland. The most common route to becoming a secondary teacher in Scotland is to undertake a 1-year postgraduate qualification at Master's level, the Post Graduate Diploma in Education (PGDE). This is a university-based programme for which the expectations and requirements are regulated by a uniquely independent professional organisation: the General Teaching Council for Scotland (GTCS). The students on these courses are referred to as pre-service teachers.

The specifics of this Initial Teacher Education (ITE) year vary between institutions, however there are key commonalities relevant to the context of this research. Firstly, and notably, this qualification year is referred to as teacher education, not teacher training (MacDonald & Rae, 2018). Secondly, there is a shared stakeholder position between parents, teachers, universities, and government bodies that this education should be both intellectual and practical (Kennedy et al., 2021). Aligning with arguments presented elsewhere by educationalists such as Dewey and Boydston (1976), Furlong and Whitty (2017), and Cochran-Smith (2004), there is a presumption in Scotland that theory is important in teacher education generally and a specific expectation that ITE incorporates a well-grounded theoretical underpinning (Hulme and Kennedy, 2016). As such, GTCS accreditation requires programmes to combine taught academic study based in the university (50%), and practice based on placements in schools (50%) (GTCS, 2022). Deregulated school-based routes into teaching, such as Teach First, are currently rejected in Scotland. Thirdly, since ITE programmes are university based their taught academic courses must align with expectations at Scottish Credit and Qualification Framework (SCQF) level 11. This requires students to be able, for example, to develop a critical understanding of specialist theories and concepts (SCQF, 2024). Both of the programmes involved in this research place a significant emphasis on students engaging critically with academic literature in the field of education.

This focus on education, rather than practice only training, and on academic aspects of teacher education speaks to the Scottish policy understanding of teacher professionalism (Hargreaves, 2000; Sachs, 2016). The purpose of ITE in Scotland is to prepare pre-service teachers to become "competent, thoughtful, reflective and innovative practitioners, who are committed to providing high-quality learning for every learner" (GTCS, 2022, p.1). The aim is to develop a reflective and research-informed teaching profession (Adams, 2022). The ambition is that an academic theoretical grounding, embedded in course requirements, establishes a profession who will continue to critically engage with difficult questions including challenging social injustices. In part this will be achieved through developing an internalised expectation to draw on academic research, read, and collaborate with others as routes to developing action (Sachs, 2016). Pre-service teachers are expected to become enquiring practitioners (GTCS, 2021) which facilitates them to respond to, and shape an evolving education system (Hargreaves, 2000). Without such an academic

underpinning, all that a good teacher can do is refine and perpetuate the status quo without the ability to effect significant educational change (Dewey & Boydston, 1976).

Undergraduate to taught postgraduate

The PGDE, as a postgraduate taught course, requires students to navigate a transition from undergraduate study. Such a transition has not been examined thoroughly within academic literature (Bamber et al., 2019; Bownes et al., 2017; McPherson et al., 2017) and is under-theorised (Scott et al., 2013).

Staff often falsely assume that postgraduate students will be experts in managing the demands of study at tertiary education level yet achievement at undergraduate level does not necessarily translate into similar success with taught postgraduate study (Hussey & Smith, 2010), and the research which does exist indicates that the transition requires adaptation to a range of changes and challenges. Students experience a significantly higher workload than at undergraduate level (McPherson et al., 2017) with a step-up in academic standard (Coneyworth et al., 2020), requiring an increased emphasis on criticality and independence (McEwan et al., 2005), in a shorter time frame (Coneyworth et al., 2020) and generally with less direction from staff (McPherson et al., 2017). Students are reported as expressing confusion about what was expected in assignments, how much to read, how to do essays, how to get good grades and were unclear about coursework expectations (McPherson et al., 2017). Given the short time frame of taught postgraduate courses these students have a pressing need for support (Bownes et al., 2017). As such, it is important for us to understand their experiences and the challenges they face.

Movement between undergraduate and postgraduate taught study is complex and entwined with a range of other transitions (Scott et al., 2013). We do not consider here additional aspects of transition experienced by international students, nor those experienced by students who enter a different university for their postgraduate study from that in which they completed their undergraduate studies. Instead, we give consideration to the interconnected transition between academic disciplines required for the physics PGDE.

Disciplinary differences

Within the limited academic research into transitions between undergraduate and taught postgraduate study there are suggestions from researchers such as Bamber et al. (2019) that there are significant differences in how well-prepared students from different academic disciplines are to undertake postgraduate taught courses. There is however a gap in the literature for the subset of these transitions which also involve a disciplinary transition. Although we note Trowler's (2014) argument against holding an essentialist position when thinking about disciplines there are some epistemological differences between disciplines identified by Becher and Trowler (2001), and Trowler (2009) which can provide a useful framework.

Significant epistemological differences between disciplines include the nature of knowledge itself, the meaning of truth, as well as what constitutes evidence of this truth and how research is carried out to establish it (Becher & Trowler, 2001; Trowler, 2009). Understanding potential differences in these for physics and engineering in comparison to the social sciences, where education is situated, can help to explain some of the distinctive aspects of the lived experience for the participants in this study. The discipline of physics

arguably values a form of knowledge that Furlong and Whitty (2017) refer to as academic knowledge, knowledge that is analytical, objective and context independent. There is a body of (long) established physics knowledge that is agreed upon, can be looked up in any relevant textbook, and can be transferred intact. Knowledge in education, on the other hand, is subjective, highly context dependent and frequently contested. Becher and Trowler (2001) introduce the terminology of hard versus soft knowledge. Physics, for example, is a discipline built on hard knowledge: it has well developed theory, universal laws, generalisable findings. Education, on the other hand, is built on soft knowledge: it has unclear boundaries, loosely defined problems, less consensus even on the nature of the discipline. This leads, for example, to questions such as 'What makes good physics teaching?' being considered within education to have no one right answer, but rather to be dependent on cultural and contextual settings which change over time. In the context of this research then, academic theory and associated research in education is very different from academic theory in physics or engineering.

These differences and the cultures associated with them lead to differences in learning, teaching, and assessment practices within the disciplines (Becher & Trowler, 2001; Trowler, 2009). Success in postgraduate taught study that involves a disciplinary transition is predicated on students' ability to adapt to these practices. Teaching practices within the social sciences commonly make use of seminars which draw on critical reading, discussion, and reflective practice (Abbas et al., 2016). Assessment is often in the form of open book essays and portfolios (Abbas et al., 2016). In contrast, in undergraduate physics and engineering degrees, teaching practices typically draw on lectures for the transmission of information and tutorials for the solving of problems with closed book exams as the most common approach to assessment (Abbas et al., 2016). The need for tutor support in tackling assessment requirements in postgraduate taught courses to become a teacher has been identified by Hobson et al. (2009) however, their research did not explore differences in prior assessment experience of students from different disciplinary backgrounds. Similarly, research into students' experiences of Initial Teacher Education in South Africa by Gravett and Kroon (2021) acknowledges the challenge of developing reflective practice but does not explore any differences or similarities in this experience for those from differing academic disciplinary backgrounds.

If they are to be successful, physics or engineering graduates as subject specialists learning to become teachers, need to adapt to the ways of a new academic culture incorporating values, beliefs and attitudes (Bianchini, 2012). This is not simply a matter of becoming used to different learning, teaching, and assessment styles, but of being able to reconceptualise expectations and understandings of what constitutes knowledge and theory, and how one might respond to posited knowledge and theory. These are students who are conditioned to there being a right answer, an accepted way to do or know something, and a process for rigorously controlling and testing theory before it becomes accepted factual knowledge. It is worth noting that this reconceptualisation must sit alongside their existing understanding. As pre-service teachers in Scotland, they are asked to habituate to a social sciences discipline. In addition, as pre-service physics teachers they must maintain expert physics knowledge and also learn to better articulate and teach how science works as a way of generating and understanding knowledge, in order to introduce school pupils to a science discipline.

Becoming and remaining a teacher

Unlike transitions from undergraduate to postgraduate study, and disciplinary transitions, the general experiences of becoming a teacher (developing professionalism and teacher identity, developing an enquiring stance, and so on) are widely interrogated in the literature. For example, Rushton and colleagues' systematic literature review (Rushton et al. 2023) demonstrated a significant growth in teacher identity research over the last two decades, with many such as Aspal et al. (2011) considering the development of a solid professional identity key to beginning a teaching career. The “reality shock” (Squires et al., 2022, p14) of becoming a teacher is multifaceted. One aspect of this is a developing appreciation that teaching is an enormously complex job. Pre-service teachers are very often taken aback by the busyness, the previously unseen workload, and the need to rebalance their expectations of the anticipated satisfaction of the job against the challenges (Younger et al., 2004). This can lead to an undervaluing of an academic underpinning of their practice. Becoming a teacher entails the shifting from an often unsophisticated and idealistic understanding of being a teacher to a more realistic, complex, and nuanced understanding of the characteristics of practice (Younger et al., 2004).

In the Scottish context, one such characteristic is the underpinning of practice by academic literature and educational research. This has led to ITE in Scotland long enjoying a high-quality reputation internationally (Kennedy et al., 2023) with professionalisation identified as one of its key strengths (Hardy et al., 2021). Many pre-service teachers, however, struggle to make connections between theory and practice and there is much in the teacher education literature about approaches to bridge this gap (e.g. Anderson & Freebody, 2012; Fwu & Yuan-Her, 2016; Ramsaroop et al., 2024). For those students who struggle to adapt to a new academic culture this can widen feelings of disconnect between the theory of education studied at university and the practice of education in the classroom on school placement. Such feelings of disconnect are also seen in other professions underpinned by academic theory such as nursing (Singh et al., 2024) and midwifery (Kensington, 2017). This disconnect between theory and practice, and the lack of ability to engage confidently with academic literature and research is often reported within the ITE literature as limiting the long-term effectiveness and impact of teacher’s practice (Leat et al., 2015; Hennissen et al., 2017). The ability to draw on academic literature and research from the field of education, especially through research into their personal practice, and to critically reflect on such practice, contributes to feeling empowered and in control (Sullivan et al., 2021). This can help to sustain positive health-and-wellbeing for teachers, reducing burnout (Sullivan et al., 2021) which in turn can lead to increased retention of teachers within the profession (Fisher, 2011). This is particularly important for physics teachers in the Scottish context given high rates of attrition from the profession for a wide range of reasons explored elsewhere (e.g. Farmer & Whalley, 2025) and consistent under-recruitment into physics PGDE courses. For example, recruitment to physics PGDE courses in Scotland in the academic year of the participants in this research was only 29% of government target (Scottish Government, 2024).

Methodology

Purpose of the research

This research focused on exploring the lived experience of those from a subset of STEM undergraduate backgrounds moving into postgraduate taught study within a social sciences discipline with the intention, on completion of the course, of becoming a secondary school physics teacher. The aim was to better understand the students' experience of the intertwined transitions of the move into postgraduate taught study, between two academic disciplines, and to becoming a teacher. Navigating this transition is necessary for current and future success. Success in meeting the academic requirements of the qualifying programme, and success in becoming a confident and effective professional retained within the profession for a sustained period of time, able to meet the needs of learners and interrogate complex questions of education and social justice. We hope that through better understanding this lived experience, we can plan interventions to minimise any negative impact on pre-service teachers' progress and confidence, both during the ITE year and beyond.

Phenomenology

Phenomenology is a kind of naturalistic research that is a way of seeing things as they really are (Cohen et al., 2018a). The distinctive feature of the research approach is a focus on the subjective experience of the participants (Cohen et al., 2018a). Since each participant has their own authentic experience, this leads to multiple realities and makes complexity rather than uniformity likely (Cohen et al., 2018a). Yet within a phenomenological approach, the aim is to identify commonality in experience (Creswell, 2007).

There are a range of phenomenological approaches from 'What-it's-like' research, through descriptive approaches building on the work of Edmund Husserl, to interpretive approaches building on the work of Martin Heidegger (Williams, 2021). We chose the latter approach of interpretive phenomenology as the methodological approach for this research. In this approach, the task of the researcher is to describe, understand, and interpret participants' experiences of the phenomena (Cohen et al., 2018a), ensuring that the description produced includes both what was experienced as well as how it was experienced (Creswell, 2007).

The first step for researchers using a phenomenological approach is to identify a phenomenon that is an abiding concern for them (Creswell,2007). For us, this was our students' transition from an undergraduate course in a STEM discipline to a postgraduate taught course in the social sciences. This is followed by a reflection on the key themes that constitute the nature of that lived experience (Creswell, 2007). These have been discussed above in the introduction section. It is important that the researchers try to put aside their own pre-conceptions of the experience (Cohen et al., 2018a), through, for example, bracketing their own experiences as much as possible (Creswell, 2007). For us, this was particularly important given our own experiences of the phenomena being researched. Both researchers undertook a one-year postgraduate taught course to become physics teachers having successfully completed physics undergraduate degrees. In addition, both researchers have undertaken an additional transition to become teacher educators based within a university. The transition from subject specialist in physics, to teacher and now teacher educator as a specialist in education requires a great deal of academic disciplinary transition (Kaçaniku, 2023).

Phenomenology is well suited to small-scale research (such as ours) focused on the lived experience of phenomena (Cohen et al., 2018a). It is the lived experience that is the start and end point of phenomenological research (Van Manen, 1990). It was the researcher's own lived experience of this phenomenon that initiated an interest in this research. Lived experience comprises two aspects. The first is an immediate pre-reflective consciousness of an experience (Van Manen, 1990). The second is a reflective process required to illuminate that and develop an understanding of it (Van Manen, 1990). As such, individual semi-structured interviews which allow for reflection are an appropriate form of data collection for phenomenological research (Creswell, 2007).

Participants and data collection

For this small-scale preliminary study, our participant group was our own cohorts of taught postgraduate students, pre-service physics teachers. The number of pre-service teachers undertaking physics PGDE courses in Scotland is relatively small. Over the academic year of this study there were only 38 in total spread across 10 Higher Education Institutions. Our sample size was seven students (18% of pre-service physics teachers) in total, drawn from our two institutions. They were a mix of genders and ages from their early 20s to late 40s. All had either a physics or engineering degree, but otherwise brought a wide range of experiences, some coming direct from undergraduate study, others having accumulated extensive work experience.

Aligning with a phenomenological methodology, data collection was through individual, semi-structured interviews (Cohen at al. 2018b). We each interviewed our own students. At the point of data collection, approximately half-way through the year of study, all students had undertaken university based academic study, completed one school-based placement of several weeks and had submitted and received feedback on the summative assessment for at least one academic module. The majority (but not all) of the participants had passed the academic module assessment(s). As such, we are concerned with students who, by definition that they are qualified to enter the ITE year, were previously academically successful in their STEM discipline and who are generally currently experiencing success in the practice aspect of teaching.

Data analysis

The interviews were recorded on Microsoft Teams and the automatic transcript generation facility was utilised. These transcripts were subsequently copied into a Microsoft Word document by the interviewer, and the transcripts edited for accuracy using intelligent *verbatim* transcription. This approach to transcription adapts the oral to written norms, whilst maintaining indications of nonverbal clues, to ensure that meaning is not lost or distorted (McMullin, 2023). This data was then analysed using thematic analysis. Thematic analysis is a widely used umbrella term (Braun & Clarke, 2021) describing a method for identifying, analysing, and reporting themes within data (Braun & Clarke, 2006), and which is particularly suitable for interpretive phenomenological research (Braun & Clarke, 2021). The approach taken followed the six phases of Braun and Clarke's (2006) thematic analysis framework. The first phase is to familiarise oneself with the data (Braun & Clarke, 2006). To do this each researcher repeatedly read the transcripts for all interviews to immerse themselves in the data. During this phase there is a holistic analysis of the data which is later followed by analysis of themes (Creswell, 2007). The researchers then undertook a process of

blind parallel coding which as described by Cohen et al. (2018c) involves each researcher separately highlighting initial points of interest and noting down ideas. At this stage, the process of coding was inductively driven. This involves coding the data without trying to fit it into a pre-existing frame allowing the data to drive the analysis (Braun & Clarke 2006). This analysis is not constructed in a vacuum (Braun & Clarke, 2006) and still relies on theoretical assumptions (Braun & Clarke, 2021) but allows for themes to be identified that do not directly relate to the specific interview questions (Braun & Clark, 2021). Following the parallel coding the researchers met together to collate the codes and to identify, review, and name themes.

This process covers the third to fifth phases of Braun and Clarke's (2006) thematic analysis. Phases two through five were then repeated using a deductive analysis approach. In this approach termed 'theory-driven data coding and analysis' by Braun and Clarke (2021, p.58), the analysis and interpretation of the data are explored through the lens of previous research and explanatory theory (Braun & Clark, 2021) considered in the introduction above. Given the small sample size, we incorporated at this stage what Cresswell (2007) describes as a direct interpretation approach to coding; theory-driven codes could be drawn from the data without the need to look for multiple instances. This analysis yielded additional themes. During both analyses the focus was on semantic codes, which according to Braun and Clarke (2021) draw on the surface meaning of the data rather than attempting to identify underlying assumptions or ideologies. The final theme names from the combined analysis are used below to structure the 'Lived experience' section.

Ethical considerations

The research proposal was reviewed and given approval by the Edinburgh Napier University School of Applied sciences Ethics and Research Integrity Committee and the University of Glasgow College of social sciences Ethics Panel. Participants gave informed consent to participate and for publication. Verbal briefing and agreements were supported by a written participant information sheet and a signed consent form prior to data collection. Participants have been de-identified using pseudonyms.

Findings and discussion of students' lived experience

Given the preliminary nature of this research, and the small group size of participants, our intention was not to draw broad generalisation from the group but to better understand our own students' lived experience, in order to enhance procedures and resources we have in place at our own institutions to support this particular multifaceted transition. Despite this, the findings and discussion presented below provide food for thought for anyone teaching students undergoing a transition from undergraduate to postgraduate taught study in general and/or those students who are transitioning between academic disciplines.

The participants in this research all had a physics, engineering, or physics-related degree. Below we use STEM as a shorthand for this range of backgrounds. We do, however, note that STEM as is usually understood covers a broader spectrum of subjects than here. For example, life science undergraduates might have a different experience than the participants in this study.

We have grouped emergent findings and discussion under four headings:

i) Perceived disciplinary differences

ii) Perceived learning and teaching differences

iii) Perceived assessment differences

iv) Tackling academic challenges

i) Perceived disciplinary differences

As would be expected from the framework provided by Becher and Trowler (2001), and Trowler (2009) participants described perceptions of differences between the fundamental natures of the two disciplines. When recalling their experience of undergraduate study and perhaps what had originally drawn them to study STEM related subjects there were several references to there being a right answer, albeit with some acknowledgement that some modern physics is less deterministic. This idea of one correct answer and the inherent structure and logicality was a large incentive for many of the students to continuing with their undergraduate degree subject. Joe, for example, said “I liked the, the fact that there was a correct answer, so it didn't matter what my opinion of it was - that is the correct answer”. Blair commented on the problem-solving aspect associated with logical application.

> So, I think that's what kind of drew me to the [sic] physics like being able to use the knowledge that I've learned to now solve and apply it to different problems. So, I was definitely drawn more to the problem-solving aspect of physics. (Blair)

Allied to that, there were a lot of references to 'getting good marks', 'getting the answers right' as an aspect the students had enjoyed about studying STEM. Greg for example, commented “I enjoyed it and got good, like, best grades of all my subjects was physics.”

For the PGDE, there was a recognition of having to conceptualise the idea of theory in a different way. In physics if you want to check something in, say, electromagnetism, you can go to any textbook on electromagnetism, and it will give you the same physics. Here there might be a plurality of theories. This was identified by Ailsa who said “Obviously, there's a lot of different theories and they all say different things”, and also Blair.

> The one thing I have found challenging about it is coming from physics, like when we're doing like an electricity magnetism course, anything I really want to know about that course I can find in pretty much one textbook, but then here if I want to learn something … there's about 200 different articles on that one subject … there's no like one defined answer… if I'm looking out for specific magnetism rule, I'll look in the textbook and be like this is proven that this is true. (Blair)

Students are having to reconcile 'theory' not with verified ‘fact’ or with a mathematical relationship with universal applicability, but with 'idea', 'opinion'.

> It's like they're not theories in the way that you might be like used to theories in STEM. They're kind of ways of helping you think about things. … but I think sometimes I read the research papers for the courses and it's … I'm like, this is someone's opinion being presented as kind of hard fact in research. (Ailsa)

Some, as Ailsa describes in the above quote, were still resistant to this perception that a researcher's 'opinion' is being 'presented as hard fact'. She goes on to describe her difficulties with understanding qualitative data processes:

> So, they're, they're very different things. … the way that science research papers are written, if everything's quite rigorous and there's like the data collection, the data quality, the analysis steps. And I think that doesn't happen in every subject. I understand more how a piece of like physics research is carried out and written up and in educational research, every kind of part of it … from like sort of the data collection to like how much is there data quality to the analysis to the … because I don't understand how all those steps are done and what's normal and how that relates to like the, what the paper is saying. (Ailsa)

ii) Perceived learning and teaching differences

Aligning with the research by Abbas et al. (2016) participants also identified differences in learning and teaching between the disciplines. Thinking back to their experiences of undergraduate teaching, the participants uniformly described a passivity. For example, Alisa said "You're just kind of like sitting absorbing or listening to information … it was much more sort of audience and lecturer" and Anna described "… not much interaction. Just like … it was like radio. Yeah, we are … we are at the receiver end". Teaching, in their recollection, was experienced as receiving information during lectures, with little or no opportunity for dialogue or interaction. Information was being transferred. What they identified that the research by Abbas et al. (2016) did not was the sense that learning happened separately to the teaching and was individualistic. "Yeah, the lecturers, they do their lecture, you take your notes and then you have to really go away and learn it yourself" (Greg). This perception links back to the idea of a body of established knowledge associated with physics and engineering that the individual learner needs to acquire.

Going beyond the scope of the research by Abbas et al. (2016) there were multiple references to feeling they had struggled as undergraduates around learning. This was in part due to the self-discipline participants felt was needed to engage during lectures:

> … after the first couple lectures I, I tended to lose my focus and… Which I, which I regret doing. Uh, I think a lot of students do that, don't they? They, they kind of … jump, jump in with enthusiasm, but then it sort of, you need to self-discipline, don't you? And it's easy in lectures just to sit in the back and switch off and just, just write things down. Umm so I spent more time watching the clock in lectures than I did (laughs) than I did the blackboard. (Tom)

In contrast to the findings of McPherson et al. (2017) and Coneyworth et al. (2020) who identified higher workload and short time frames associated with postgraduate taught study respectively, participants identified a greater need for time management in their undergraduate study.

> You didn't really have to have that much. You could, you could just go to lectures, get the information... Then you're not really having to do anything until the very end. So, it's very it's very much up to you how you use that time and how you approach it compared to PGDE. (Ailsa)

This was also described by some as the self-discipline needed to learn how to learn (transition from secondary school to undergraduate):

> I felt like I wasn't really learning to learn because I was just sort of sticking with my strengths and I wasn't kind of addressing the areas where I wasn't so good and like, really trying with them… It wasn't until later on in my life that I really sort of like, oh, this is how you learn things properly because you sort of, you challenge yourself. (Ailsa)

For many their undergraduate learning was quite an isolating experience. One student spoke of forming study groups with peers to alleviate that isolation.

At both our institutions, the PGDE courses involve structured discussions in small groups as well as some lectures. This dialogic approach, reflective of teaching and learning in the social sciences (Abbas et al. 2016), was universally seen as positive. It was described as enjoyable and productive, rather than a challenge or barrier to overcome. For example, Ailsa said "There's a lot more kind of back and forth, a lot kind of a lot more discussions" and Anna observed that "Students have the opportunity to interact". Blair felt similarly:

> I like how they have like the seminars and you're able to talk and compare with the people in your class … it's opened up to like the conversation as the whole class …. We're able to get a bunch of different point of views on it. (Blair)

As mentioned above, seminars in the social sciences commonly draw on reflective practice (Abbas et al., 2016) and there is an expectation that teachers in Scotland will become reflective practitioners (GTCS, 2022). Several students identified this emphasis on reflection, and developing habits of reflection, as something new to them. Students in our sample had mixed reactions to this requirement. All students identified the emphasis on developing reflection as a very different way of engaging with learning compared to their previous requirements on STEM courses. Some, such as Hailey, have welcomed it: "I found like reflection very … I found that's quite rewarding". Others, however, identified it as challenging:

> … a lot of the reflective stuff, because that's probably a skill that I hadn't really used previously that I've now ... having to use a lot. So, I think like the reflective, reflection aspect is probably challenging. (Ailsa)

For all the students, the idea of being expected to critique and challenge academic papers was a new concept and many described finding that difficult. Blair summed up his thought process related to this, "I'd say probably the most challenging is challenging the articles you read, so I'm so used to thinking that, alright, this is published. They know what they're talking about". The participants were unused to challenging something published and that they therefore perceive as authoritative. The requirement for critique is an intertwined aspect of transition for these PGDE students. Postgraduate taught study requires increased criticality (McEwan et al., 2005) and unlike physics or engineering courses, the social sciences seminars commonly draw on criticality (Abbas et al., 2016). In addition, becoming a teacher who can engage with difficult questions and challenge the *status quo* also requires criticality (Sachs, 2016).

iii) Perceived assessment differences

Aligning with the research of Abbas et al. (2016) the students noted that their undergraduate experiences of assessments were mostly in the form of closed book written exams.

Expanding on their comments above, for some of the students there were challenges associated with this approach. They made references to learning, in the form of revising for exams, being challenging and almost at the last minute. Students felt you could attend lectures and so on, but the actual learning and associated work could pile up at the end of the semester. For example, Greg said “Just the most challenging thing would have been like revising for exams for sure” and Ailsa “I think with physics and math there was, there was not very much demand on you in terms of exams and assignments until the very end and then there was like a lot of, there was a lot of exams”.

We had anticipated the students would see a lot of difference with the kinds of assessments we ask them to do as part of the PGDE programme. For example, neither of our programmes have closed book in-person exams. However, some students did not represent this as a notable difference and instead had a pragmatic view of assessment: “I'd say it's quite reminiscent of any other … like the other Uni courses that I've done. Kind of, you go to lessons you get, you get information, you apply it in some coursework and then that's it" (Joe). This student felt their experience of attending the taught components, being given content, and then doing something with that content was broadly consistent across different educational experiences. To Joe it did not really matter that the nature of the content was different, or that the required ways and formats of applying the content were different. This contrasts with the postgraduate taught students in McPherson et al.’s (2017) research who felt unsure about how to complete assessments and is not representative of the confusion that Tobbell et al. (2010) reports of most students transitioning to postgraduate taught courses.

Most of our sample had previous experience of extended, academic writing, either through Honours projects and/or Masters dissertations, and those students expressed being able to draw on that prior experience for the essay writing requirements in PGDE. The actual experience of writing for most was not new, it was the requirement to critique, discussed above as an intertwined aspect of transition, that was the challenge. Greg described his experience:

> I guess the, the challenge would … is just like, it's kind of something new doing the, you know, like that formal style of writing, but you have … I have had experience with that, like with the references and everything with the dissertation. (Greg)

For the few who didn't have that prior experience to draw on, though, this was perceived as another barrier. Hailey for example shared her experience: “It was in [course], the teacher asked if anyone had written a dissertation or written anything. And like everyone put their hand up. Because I did a Bachelors without Honours, I didn't write a dissertation”.

The idea of being required to challenge and critique academic literature and theory was a big difference for some, and one they did not find easy to adopt.

> But now, especially in our assignments, one of the critiques I've had is that they want me to challenge the articles that we're reading or what have been reading. So, a lot of times I've been finding articles to say, oh, this goes with what I was thinking here, but the next step for me is being able to say, well, this article says this, but I've actually found this ... So that's different, kind of challenging like a published article now. because I know I would ... just you read it and you're like, oh, it's published. Someone found this, so it must be true, but now you have to kind of challenge those things. (Blair)

This response suggests there is a hurdle to overcome in terms of the nature of knowledge, the nature of theory, and therefore what we ask the learner to do with that theory which is specific to the disciplinary transition being undertaken by these students.

iv) Tackling academic challenges

Our interest in this research was to better understand where our students faced challenges. However, for the most part, aside from developing criticality as discussed above, the participants did not generally explicitly identify specific significant challenges in undertaking the academic aspects of the PGDE programme. However, although they did not extensively name challenges explicitly, there was an implicit sense of challenge being overcome in their interview comments.

Predominantly, there was reference to a general logical problem-solving approach:

> I think if you do everything you're kind of advised to do. You can get through it OK… that really lowers the barriers. If you just do everything that's been laid out for you and it's all like kind of laid out on [virtual learning environment] like, and if you just kind of like go through the steps, then it's like, yes, that's fine. (Ailsa)

Ailsa here is describing a process of deliberately going through a set of steps as directed. Tom, below, describes doing sensible things like reading the exemplars provided, but also describes proactively downloading an e-book on how to write this kind of assessment:

> I was quite worried about writing [assessment] because I, I didn't even until …until I sort of looked into it and, and looked at the exemplars and sort of downloaded an e-book as well. Which was very helpful. And I can't remember what … I think it was just like "how to write a …" (Tom)

The same student described quite a logical process of starting to read on his chosen topic. He noted that there were certain names and certain references that kept recurring, so recognising those were likely the key contributions, he read those ones and described that process as "following threads". Unlike with physics, where anyone can look up any relevant textbook and find the answer, here students are having to work out what to read, and how much to read. This is something that many postgraduate students find challenging (McEwan et al., 2005; McPherson et al., 2017), and our participants were no exception to this. Tom for example, said "I didn't like the prospect of just reading randomly because I thought you'd be reading for, for decades…I was looking for threads I suppose to, to follow". In addition, there was a sense that through the reading, as well as reading for their chosen topic, students were absorbing the structure and 'rules' of the disciplinary academic literature which they could then mimic: "I feel like you can read enough articles and journals and get a feel for how these, these things flow when you're writing them yourself" (Greg).

Limitations of the research

This research was intended as a preliminary study in an under researched area. We do however acknowledge three key limitations of the research. Firstly, as discussed above, although the sample of students is a significant percentage of the available PGDE physics students, the absolute number of participants is small. This significantly reduces the generalisability of findings. Secondly, students were

interviewed at only one point part-way through their course. When interviewed the students in the study were at a point in their programmes where they had predominantly experienced success in at least one academic assessment. This position was chosen to balance between the students having enough time to settle into the PGDE whilst allowing time for us to make adaptations to procedures and resources to support students for the remainder of the course. However, it should be acknowledged that over the course of their PGDE what is at the forefront of their mind in relation to their lived experience may evolve. Thirdly, the framing students put around their experiences might have been, understandably, albeit unconsciously, affected by the fact that we (the interviewers) were also the staff who would be continuing to teach them, and in collaboration with others would be involved in marking their assessments and making summative decisions about their performance. We acknowledge that despite reassurances given at the start of the interview that responses would not affect their assessment results and that we were not looking for right answers, students may have to some extent been influenced in how they presented themselves as coping or struggling to their tutors. The choice to each interview our own students was a conscious decision to balance this concern of (unconscious) self-monitoring against the expected benefits of being interviewed by a familiar tutor. The expectation was that this familiarity would lead to a relaxed and comfortable conversation with students being open and willing to reflect honestly on personal experiences.

Conclusion

Despite our cautions about making claims of generalisability from this preliminary research, the emerging findings and discussion presented here persuade us that there is merit in focusing attention on those students for whom there is an additional layer to the already complex process of transition into a new level of study. Whilst our participants were specifically pre-service secondary physics teachers, we anticipate that our findings have implications across other taught postgraduate programmes where students are drawn from different disciplinary backgrounds.

The students in this study articulated holding prior conceptualisations, expectations of, and responses to what makes for knowledge, theory, testing theory and using theory. They further articulated having to reconcile those conceptualisations with new ways of thinking and knowing as they undertook a disciplinary transition as part of their undergraduate to taught postgraduate transition. For our particular students this was also intertwined with the transition associated with becoming a teacher. Alongside acculturating to the epistemological differences, students noted perceptions of differences in learning and teaching practices, and of approaches to assessing learning. Whilst the majority of the participants did not explicitly describe these experiences as challenging, they did implicitly through articulating the strategies they were developing and (for the most part) successfully employing. Of particular note is that they described the development of those strategies as independent and individual activity. Whilst this perhaps indicates a level of resilience, the mental and emotional energy required is an additional burden for this sub-set of postgraduate taught students.

As explored in this paper, we suggest that there is a need for educators teaching postgraduate students to be cognisant of and responsive to the challenges of undergraduate to taught postgraduate transition, and to the extra challenges associated with students undergoing a parallel, interconnected, disciplinary transition.

Biographies

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