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Student teachers' prior experiences of history, geography and science: initial findings of an all-Ireland survey¹

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Research into student teachers' perceptions, attitudes and prior experiences of learning suggests that these experiences can exert an influence on practice which can be relatively undisturbed by their initial teacher education. This article is based on the initial findings of an all-Ireland survey of all first-year students on B.Ed. courses in colleges in Northern Ireland and in the Republic of Ireland. The survey is the first stage in a longitudinal study which will follow the same cohort of students for the duration of their initial teacher education, seeking to map and track the development of their ideas about teaching and learning in primary history, geography and science. Based on an analysis of the quantitative data in the entry questionnaire, the initial findings suggest that subject knowledge remains a problematic issue in initial teacher education and that both location and gender interact with knowledge, attitudes and subject area to produce a complex and challenging context for teacher educators in history, geography and science education.

Introduction

In the past few decades, research into the perceptions and experiences that student teachers bring with them to initial teacher education has been extensive and wide-ranging (see, for example, Wilson, 1990; Calderhead & Robson, 1991; Holt-Reynolds 1992; Kagan, 1992; Pajares, 1992; Sugrue, 1996, 1997, 1998, 2004; Marland, 1998; Younger *et al.*, 2004; Fajet *et al.*, 2005). In general, this research suggests that the prior educational experiences of student teachers act as an 'apprenticeship of observation' (Lortie, 1975) from which lay or common-sense theories about teaching and learning, the identity and role of the teacher and their knowledge evolve. Because all student teachers have experience of education, they come to teaching with a level of 'insider knowledge' that is not typical of other professions (Holt-Reynolds, 1992). Moreover, there is a tendency to generalize from their individual experiences, which are seen by the students as archetypical

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(Holt-Reynolds, 1992). Characterised by Wilson (1990) as the 'secret garden' of teacher education, student teachers' lay theories, beliefs and preconceptions provide the subtext to their engagement with theory and practice during their initial teacher education. Research in this area would suggest that these beliefs are remarkably stable, persisting into the early years of teaching and surviving the challenge of contrary ideas and research-based approaches to teaching presented by teacher educators (Holt-Reynolds, 1992; Doolittle *et al.*, 1993; Marland, 1998). The common practice in teacher education of introducing student teachers to innovative pedagogical approaches in the relative safety of initial teacher education may not counteract the appeal of the familiar and the experienced in the face of uncertainty (Virta, 2002).

Research into student teachers' beliefs about teaching and learning in history, geography and science reveals a complex array of relationships between experience, perception and subsequent practice. In the case of history, student teachers come to initial teacher education with strong views on the nature of history and its value as a discipline (Wilson & Wineburg, 1988), along with a sense of historical consciousness and beliefs about historical knowledge (Virta, 2001). Moreover, early experiences of learning history can influence their practice, particularly when teaching in stressful situations (Virta, 2002). A longitudinal study by Guyver & Nichol (2004) identified student teachers' prior experiences as learners of history as dominant influences on their professional development and emphasised that opportunities for student teachers to engage with their own preconceptions and understandings of history were essential to successful intervention strategies in initial teacher education. In geography and environmental education, recent studies have focused on students' views of the subject areas, on comparisons between their perceptions of their own teaching styles and those of remembered teachers (McPartland, 1996) and on their images of the teaching process in relation to geography. Corney (1998, 2000) concluded that student teachers' preconceptions of geography and how it should be taught remained influential throughout their initial teacher education. Indeed, Barratt Hacking (1996) described how novice teachers tended to 'fall in' with the methods and teaching styles used to teach geography in their schools, despite earlier stated convictions around the subject. Research in science education suggests that student teachers' prior experiences influence attitudes towards and conceptions of science and science teaching and that this, in turn, can influence practice (Gooday & Wilson, 1996; Parker & Spink, 1997; Tosun, 2000; Skamp & Mueller, 2001a,b; Thomas & Pedersen, 2003).

As can be seen from the above review, while there is evidence that student teachers' prior experiences can exert a long-term influence on practice, that relationship is complex. It would be a mistake, for example, to deduce that because student teachers' preconceptions and beliefs seem to be relatively stable, they are deterministic and not open to change. Student experiences are situated and have an historical and socio-cultural specificity that needs to be acknowledged. Indeed, this diversity provides rich opportunities for exploring the interaction between culture, beliefs and practice. Chan (2003), for example, indicates the extent to which

beliefs about the nature of knowledge can be influenced by cultural context and how epistemological beliefs in turn influence conceptions of teaching, while the interaction between students' lay theories, social influences and traditional cultural archetypes of teachers and teaching in Ireland has been explored by Sugrue (1997, 1998, 2004). Second, it would be wrong to conceptualise student teachers as passive in the face of tradition or experience. While their beliefs about teachers and teaching operate at an implicit or unconscious level, they are constructed and unfinished rather than received and static. There is general recognition of the need to provide space within teacher education for student teachers to reflect on their experiences and beliefs (Wubbels, 1992; Tann, 1993; Chan, 2003; Korthagen, 2004; Sugrue, 2004; Younger *et al.*, 2004). Providing opportunities for student teachers to make conscious their tacit beliefs and to rediscover the 'building blocks of the self' (Marland, 1998) will help them to challenge idealised and essentialised conceptions of teachers and teaching and promote the development of a reflexive and dynamic practice.

Given the range of existing research in the area of student teachers' beliefs and lay theories, it is pertinent to address the potential value of this current study. While some research has been done in this area in an Irish context (most notably, Sugrue, 1997, 1998, 2004), the scale of this all-Ireland study allows questions relating to gender and to systemic differences north and south to be examined. It is planned as a longitudinal study that will combine large-scale survey and ethnographic interviews, and the combination of quantitative and qualitative approaches will allow the probing and elucidation of the trends, themes and relationships that emerge over the course of the research. As it will be tracking the same student cohort through their initial teacher education in all colleges, it will provide opportunities to observe and recognise change and continuity in the students' perceptions, as well as provide the teacher educators and institutions involved with opportunities to assess the effectiveness of their planned interventions.

As a study of prospective teachers' experiences and perceptions, this research is timely. The education system in both jurisdictions is going through a period of significant curricular and pedagogical change and innovation in the three subject areas. This study will provide an important benchmark in relation to student teachers' lay theories which can be revisited in future research. In the Republic of Ireland (RoI), the subjects of primary history, geography and science are grouped together under the common title of Social, Environmental and Scientific Education (SESE) (Government of Ireland, 1999). The equivalent grouping, with the addition of technology, in Northern Ireland (NI) is entitled *The World Around Us* (CCEA, 2000). While there are differences in emphases and approach between the two curricula, they share an underlying commitment to the ideas of investigation/enquiry-based learning and the concept of evidence across the three subject areas. The organization of the subjects into overarching thematic groups in both curricula is also indicative of a shared belief in the potential for an integrated and holistic approach to children's learning in these areas.

This article is based on an analysis of the statistical section of the entry questionnaire, which formed the first stage of the longitudinal study. The survey aimed to gather biographical data, information about students' own knowledge base, their school experiences and their conceptions of what makes a good teacher, as well as attitudinal data relating to the three subjects. The questionnaire was wide-ranging in scope and not all of its elements are addressed here. In particular, this article does not address student teachers' positive and negative experiences in the three subject areas nor their models of what makes a good teacher.

Methodology

The questionnaire was developed across the participating institutions over a two-year period, following established practices (Czaja & Blair, 1996; Munn & Drever, 1999; Cohen *et al.*, 2000). Early versions of the questionnaire contained Likert-scale items to ascertain students' prior experiences; however, extensive pre-testing with students both north and south indicated that open-ended responses were a more appropriate means of obtaining these data (Varley, 2004). A revised version was subjected to further rounds of piloting with second- and third-year B.Ed. students, including post-questionnaire interviews to resolve remaining ambiguities. The final version included a combination of closed, open-ended and semantic differential scale response items.

The questionnaire was distributed to first-year B.Ed. students in all seven participating institutions in NI and the RoI in autumn 2004. In each college, administration and collection took place during lecture time, where the whole year group was likely to be present. All questionnaires were distributed within a two-week period early in the first term, before students had encountered any college courses in curriculum history, geography or science. There was a potential population of 1,358 students and a total of 1,114 usable replies were received, giving an 82% response rate. Given the gender profile of primary teaching, it is not surprising that the respondents are predominantly female (88% female, 12% male). Quantitative data were entered into the Statistical Package for Social Scientists (SPSS) Version 11.0 for further analysis. Responses to the open-ended questions were entered into a Microsoft Excel database to facilitate coding and qualitative analysis using the constant comparative method (Glaser & Strauss, 1967).

This article presents an analysis of the quantitative data from all respondents (1,114 respondents). Using the key variables of subject, gender and north/south location, it examines the certified levels of knowledge achieved by the respondents in the three subject areas, their attitudes towards the subjects (like/dislike) and the level of confidence they attribute to themselves in relation to teaching the subjects in primary classrooms. In the concluding discussion, the implications of the findings from the quantitative data for teacher educators are presented.

General findings

The quantitative data are drawn from the initial sections of the questionnaire, which included questions relating to the highest levels of qualification achieved by the students in history, geography and science and whether or not they were pursuing any of the subjects as academic subjects at college.² Students also indicated both their attitudes to the three subject areas and their levels of confidence in relation to teaching them.

Knowledge base

The data collected in relation to the levels of qualification achieved by the student cohorts in NI and in the RoI in the three subject areas suggest that, while there are important variations between subjects and between the two educational jurisdictions, student teachers in general are working from a relatively high knowledge base in terms of participation in terminal examinations. This is particularly true in the area of science, where 72% had a qualification in at least one science or science-related subject at post-16.³ When science only is considered, the figure remains high, at 64%. In geography, almost half (49%) of the respondents had studied the subject to this level. History, at 22%, was the lowest of the three.

As Table 1 indicates, when location is used as a variable, some interesting differences emerge, presenting a more complex picture. The percentage of respondents with no qualifications in history and geography in NI is significantly higher than in the RoI, while almost one-quarter of the NI cohort has a qualification in both subjects at the mid-level of 15/16 years. At the post-16 level (17/18 years plus tertiary), the percentages rise for the NI cohort to almost 30% and 33% respectively for history and geography.

In the RoI, the majority of students (75%) have a history qualification at the mid-level of 15/16 years while only 21% go on to achieve a qualification at the post-16 level. For geography, the picture is more positive, with over half of the students having a qualification at post-16 level and over 43% having a mid-level 15/16 years qualification. From a science perspective, the percentage of students from the RoI

Table 1. Levels of qualification on the basis of location

Level	Science%		History%		Geography%	
	NI	RoI	NI	RoI	NI	RoI
No qualification	2	4	46	4	43	3
At 15/16 years	57	25	25	75	24	43
17/18 years	41	70	30	21	33	54
Tertiary Post-16 level	0.5	1	0	0.5	0	0.5

Percentages have been rounded to the nearest whole number.

Table 2. Levels of qualification on the basis of gender

Percentage of students	Science%		History%		Geography%	
	Female	Male	Female	Male	Female	Male
No qualification	3	2	13	12	11	12
15/16 years	32	38	65	54	40	31
17/18 years	64	57	21	34	48	57
Tertiary Post-16 level	1	4	0.5	0	0.5	1

Percentages have been rounded to the nearest whole number.

with a post-16 qualification is notable (71%) and compares favourably with the NI percentage of 41%. Over half of the NI student cohort terminated their science education at the mid-level of 15/16 years, with most of these students taking double science at GCSE. It is also notable, however, that very few students in either jurisdiction enter initial teacher education with no background in science. For NI, this is in marked contrast to the other two subjects.

The results of three chi-square tests indicated that for science ($\chi^2 = 88.3$; $df = 2$; $p < .001$), history ($\chi^2 = 337.4$; $df = 2$; $p < .001$) and geography ($\chi^2 = 306.24$; $df = 2$; $p < .001$) the differences noted above between the qualifications of respondents in the RoI and those in NI are statistically significant.

As Table 2 illustrates, the results for gender were less obvious and while there were differences for science and geography, they were not found to be statistically significant.⁴ The gender differences in academic achievements in history, however, were more striking. For example, over 34% of male students held a qualification at post-16 level in history, as opposed to 21% of female students. At 15/16 years, the percentages of students gaining qualifications in history were 54% and 65% respectively. The result of a chi-square test indicated that these differences were statistically significant ($\chi^2 = 9.92$; $df = 2$; $p < .01$).

Subject liking

In general, student teachers exhibited positive attitudes towards the three subjects, with the majority of all students selecting positive scores. Taking cumulative scores (1–3) for subject liking, geography was the most favoured subject, with 63% of students expressing positive views, followed by history (61%), then science (59%). However, when only the students expressing an extremely strong liking for each subject were considered (score = 1), a different pattern appeared, in which history gained the strongest support (27%), followed by science (22%), then geography (18%). However, further analyses did not reveal any statistically significant differences between these data.

Attitudes towards all three subjects were broadly positive in both NI and the RoI, with the majority of students in both jurisdictions expressing positive attitudes. As

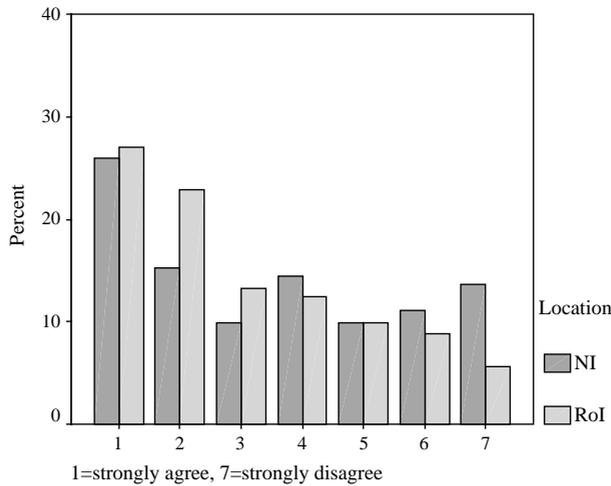


Figure 1. NI and RoI students' liking for history

Table 2 illustrates, students in the RoI were more positive than students in NI, with differences being statistically significant for all three subjects (independent samples t-tests: science, $t [1106] = 3.674, p < 0.001$; history, $t [1108] = 3.291, p = 0.001$; geography, $t [1106] = 2.739, p = 0.006$). In general, the scoring patterns followed broadly normal distributions with a slightly positive skew for geography and science. However, the pattern of scoring for history in NI compared with the RoI was more complex (Figure 1). 27% of students from the RoI scored 1 for history (strongest liking), with scores tapering to a low of 6% at the other end of the scale. In contrast, scores in NI were much more mixed, with 26% scoring a liking for history of 1, whilst 14% of students expressed a strong dislike (score of 7).

When gender was considered as a variable, history emerged as the subject where the most notable differences were detected. As their mean score indicates (Table 3), male respondents expressed a stronger liking for history than female students. These differences were found to be statistically significant (Mann-Whitney U Test: $p = 0.000, U = 47996.0, Z = -4.765$).

Table 3. Mean score for liking by gender and location

I like ...	Total Cohort	Female	Male	NI	RoI
History	3.16 (1.95)	3.26 (1.97)	2.39 (1.63)	3.55 (2.15)	3.05 (1.88)
Geography	3.11 (1.63)	3.13 (1.65)	2.88 (1.39)	3.37 (1.74)	3.03 (1.59)
Science	3.18 (1.74)	3.16 (1.73)	3.32 (1.79)	3.52 (1.61)	3.18 (1.74)

Standard deviation indicated in parentheses.

Confidence

In general, student teachers expressed confidence in their capacity to teach the three subjects, with the majority of respondents claiming a degree of confidence. Taking cumulative scores (1–3) for subject confidence, respondents felt most confident about teaching geography, with 65% of respondents expressing positive views, followed by history (62%), then science (56%). However, when only the respondents expressing the highest level of confidence for each subject were considered (confidence = 1), a different pattern appeared, in which confidence was highest to teach history (20%), followed by geography (18%), then science (14%).

One-way repeated measures ANOVA was conducted to compare the confidence of respondents about teaching the three subjects. Mean confidence levels differed, with mean confidence for geography being highest (mean = 3.05, SD = 1.61), followed by history (mean = 3.16, SD = 1.71), then science (mean = 3.40, SD = 1.66). There was a statistically significant difference in the mean confidence levels between the three subjects (Wilks' Lambda = 0.97, $F[2, 1106] = 17.18$, $p < 0.005$). However, it should be noted that the size of that difference measured in terms of a partial Eta squared could be considered very small; hence, not a great deal of practical significance can be attributed to the observed differences in confidence between subjects.

Confidence to teach all three subjects was generally high in both NI and the RoI, with the majority of students in both jurisdictions expressing some level of confidence. Overall the scoring patterns for confidence levels in teaching the three subjects followed broadly normal distributions, with a slightly positive skew. However, as illustrated in Table 4, students in the RoI were more confident than students in NI, with differences in expressed confidence levels being statistically significant for history and geography (independent samples t-test: history, $p < 0.001$, $t [1107] = 5.055$; geography, $p < 0.001$, $t [1106] = 3.956$).

Mean confidence levels for male respondents were higher for two out of the three subject areas (Table 4), with science presenting as the only subject where female respondents expressed on average a higher level of confidence than males. This difference in relation to science was not found to be statistically significant. As with attitude, history emerged as the subject where gender appeared to have the strongest effect on respondents' feelings of confidence in relation to teaching. As illustrated by Figure 2, male respondents indicated a noticeably higher level of confidence at the first two points on the scale. While the differences for geography were less striking,

Table 4. Mean scores for confidence by gender and location

I feel confidence to teach ...	Total Cohort	Female	Male	NI	RoI
History	3.16 (1.71)	3.24 (1.72)	2.49 (1.47)	3.55 (1.86)	3.01 (1.64)
Geography	3.05 (1.61)	3.08 (1.62)	2.78 (1.46)	3.43 (1.74)	2.94 (1.55)
Science	3.40 (1.66)	3.38 (1.65)	3.53 (1.75)	3.42 (1.48)	3.39 (1.71)

Standard deviation in parentheses.

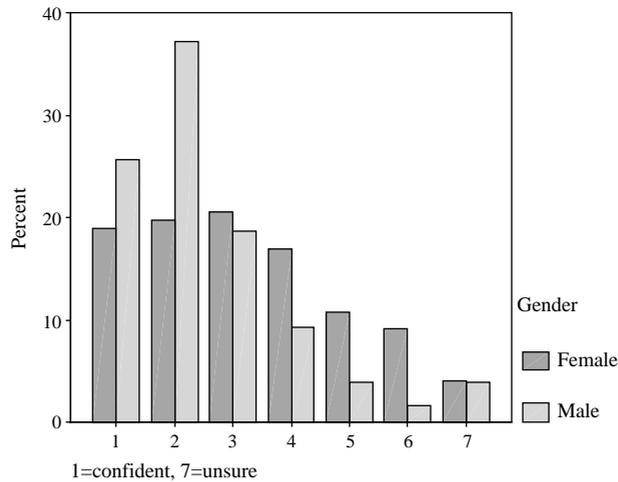


Figure 2. Confidence to teach history by gender

they were also found to be statistically significant (independent samples t-test: history, $p < 0.05$, $t [175.996] = 5.252$; geography $p < 0.05$, $t [1106] = 2.110$).

Summary of findings by subject

Science was found to have a relatively strong knowledge base amongst the student cohort surveyed, with 64% claiming a qualification at the post-16 level in at least one science subject and a further 8% holding a post-16 qualification in a science-related subject. When this was broken down for location, significant differences emerged between the two groups, with almost 70% of RoI students having a qualification at post-16 years as opposed to 41% in NI, where over 57% of students terminated their science education at 15/16 years. In terms of attitude, students overall exhibited a broadly positive attitude towards science, with those from the RoI tending to be more positive than their northern counterparts, particularly at the strongest level of liking. Students in both locations were relatively confident in relation to the teaching of science and while there were some differences with regard to location, they were not found to be statistically significant. Gender was not found to have a significant impact on students' knowledge base, attitudes or confidence in relation to science.

Geography, while not as strong as science, can still claim a fairly robust knowledge base, with almost half of the respondents holding qualifications at post-16 level. When location is taken into account, however, there is a significant difference in the percentages attaining this level of qualification (NI, 33%; RoI, 54%), while almost 43% of students in the NI cohort had no qualification in geography. Geography elicited positive attitudes from the majority of respondents, with almost 63% expressing a liking of the subject to some degree. As with science, students from the RoI tended to be more positive than their northern counterparts. In terms of

confidence, over 65% of students expressed some level of confidence in relation to the teaching of geography, with students from the RoI expressing higher levels of confidence than students from NI. Gender was found to have some impact on students' expressed levels of confidence around teaching geography.

History presented the least positive data in terms of the knowledge base of the students, with 21% and 30% of respondents in the RoI and NI respectively having a post-16 qualification, while almost 46% of the northern cohort had no qualification in history. History proved to be the only subject where gender had a significant impact on the level of qualification achieved by the respondents, with over one third of male respondents claiming the higher level qualification as opposed to 22% of female respondents. Indeed, 65% of female students terminated their history education at the 15/16 years level. Although attitudes to history were positive overall, there were significant location and gender differences. While positive in the broader sense, the attitudes of respondents from NI towards history appeared to be more polarized than those of their RoI counterparts, while male students expressed a stronger liking for the subject than female students. Confidence levels also yielded gender and location differences, with both NI respondents and female respondents less confident than their RoI and male equivalents.

Concluding discussion

If one takes successful participation in terminal exams at post-16 years level as an indication of student teachers' knowledge base on entry into initial teacher education, the level of knowledge is variable across the three subjects. Science, particularly in the RoI, would seem to have the highest level of subject knowledge, and history the least. The percentage of students entering teacher education with no qualification in history raises important questions for teacher education in Northern Ireland, while in the Republic the percentage achieving a post-16 level of qualification suggests that the level of knowledge and understanding of history amongst the student cohort is very limited. For geography, the issue of subject knowledge on entry to initial teacher education appears to be less problematic in the Republic, with over half of the students achieving a post-16 qualification. Again, the high number of students without any qualification in geography in NI suggests that the knowledge base of over 40% of the student population is highly questionable. Given these lacunae in the knowledge base of student teachers in both NI and the RoI, it is pertinent to ask what opportunities are offered to the students in initial teacher education programmes to help them to develop their subject knowledge in the three subject areas. Undergraduate initial teacher education in Ireland is characterised by two models of provision: a B.Ed. programme that includes other academic subjects along with education and one that focuses solely on education. Table 5 indicates the provision for the three subjects across the humanities, sciences and education in all participating colleges.

Table 5. Subject provision for history, geography and science in B.Ed. programmes

College	Academic Subjects	Education Subjects
St. Mary's University College, Belfast	History Geography Science	Curriculum Studies (History) Curriculum Studies (Geography) Curriculum Studies (Science)
Stranmillis University College, Belfast	History Geography Science	The World Around Us
Mary Immaculate College, Limerick	History Geography Science	Social, Environmental and Scientific Education
St. Patrick's College, Drumcondra, Dublin	History Geography Bioscience (First Year)	Curriculum History Curriculum Geography Curriculum Science
Coláiste Mhuire, Dublin		Social, Environmental and Scientific Education
Froebel College, Dublin		Social, Environmental and Scientific Education
Church of Ireland College of Education, Dublin		Social, Environmental and Scientific Education

For those students who choose to study any of the three subject areas to degree level, there are obvious opportunities for the development of subject knowledge. Thus, 29% of the student teachers for whom that choice was available indicated that they intended to take history as an academic subject for at least the first year of their B.Ed. programme.⁵ For geography and science, the percentages were 28% and 10% respectively. For those students who chose subjects other than history, geography and science, and for students in the three smaller colleges who follow the alternative model, subject knowledge is mediated through pedagogical and professional knowledge courses to a greater or lesser extent.

The subject knowledge of teachers and student teachers has been a core area of research for decades across a range of subject areas, most notably science and mathematics (see, for example, Rowland *et al.*, 2000; Johnson & Ahtee, 2006). It remains a relevant and important area of research and one that has had considerable implications for initial teacher education, particularly in the United Kingdom, where a concern with teacher knowledge has informed 'top-down reforms' (Poulson, 2001, p. 40) in initial teacher education (Burgess, 2000; Poulson, 2001). The concept of subject knowledge itself has been deconstructed by theorists, most notably by Schwab (1978), whose delineation of subject-matter knowledge into substantive and syntactic knowledge has been highly influential. While substantive knowledge includes the facts, concepts, principles and theories of a subject, syntactic knowledge refers to the process by which knowledge is created and legitimated within a subject. Moreover, the idea that subject knowledge in teaching can be reduced to explicit, formal and/or accredited knowledge has been challenged, most famously by Shulman

(1986), who posited the concept of pedagogical content knowledge as the critical interface between subject knowledge and the requirements of classroom teaching.⁶ Furthermore, a narrow focus on subject knowledge can suggest a static and reified view of knowledge and promotes a deficit model of teacher knowledge (Poulson, 2001).

The relationship between subject knowledge and pedagogy is a complex one. Martin (2000) found that having expertise in geography as a discipline did not necessarily translate into ability to teach geography well; indeed, all students were reduced to the state of novice when it came to teaching in primary schools. Martin's findings in relation to geography are supported by Burke (2000), who notes that there is no automatic transfer between subject knowledge and pedagogical expertise across a range of subjects. While positing an association between subject-matter knowledge and teaching competence in relation to mathematics, Goulding *et al.* (2002), for example, stress that they are not suggesting a causal relationship and point to the importance of context and the affective dimension of knowledge in the relationship between subject-matter knowledge and good teaching (p. 699). Thus, the concept of subject knowledge is a multi-faceted and dynamic one and cannot be reduced to any single dimension. Neither can the relationship between subject knowledge and good teaching be conceptualised in terms of an unmediated and simple transfer.

There is an interconnection between knowledge, affect and pedagogy that requires a comprehensive and integrated approach to the issue of subject knowledge. It is arguable that providing student teachers with more opportunities to acquire a higher level of formal knowledge, for example through the provision of subject knowledge/academic courses, is unlikely to have a positive impact on their classroom practice unless the affective dimension is addressed and their subject-matter knowledge is successfully integrated with their pedagogical knowledge in a way that is consistent with the constructivist view of knowledge that underpins teacher education and child education in Ireland. The successful mediation of subject knowledge (in terms of both substantive and syntactic knowledge) through courses that primarily focus on pedagogical and professional knowledge requires a conscious structuring of those courses. These should include opportunities for the development of that knowledge in ways that take account of student diversity across and within subjects, the importance of self-regulated and self-initiated learning in the future professional lives of the students and the nature of subject knowledge itself.

From a north/south perspective, the findings in relation to history are interesting and significant. While any suggestions as to causation must be tentative at this stage, it would seem that history provokes a stronger negative response, both in terms of attitude and confidence to teach, amongst student teachers from NI than amongst their counterparts in the RoI. While one could posit an explanation for these differences rooted in the historical context of NI, further analysis of the open responses around students' positive and negative experiences, along with the in-depth exploration of issues which future semi-structured interviews will allow, will

facilitate an exploration and elucidation of those variations in terms of possible causation.

Gender poses similar problems in relation to history. The gender profile of students in initial teacher education gives added significance to the findings that female students had a lower knowledge base in terms of formally accredited knowledge and less positive attitudes towards history, in terms of liking and confidence, than male students. The phenomenon of gendered preferences in relation to subject choice has been noted and, paradoxically in terms of the findings of this survey, history is generally deemed to be a 'feminine' subject (Whitehead 1996; Francis, 2000). This research, however, would suggest that such categorizations would not necessarily transfer to Irish students, in particular those who opt for initial teacher education. While the findings of this survey identify a gender issue in relation to history, the issue of causation remains to be explored. Of more interest, perhaps, is the question of whether differences that have been identified persist in the longer term and whether or not they have an impact on how male and female students interact with their curriculum courses. One immediate implication of the findings in relation to gender is that issues relating to gender and history have a concrete, rather than an abstract, relevance to history education courses.

It is important, at this point, to sound a note of caution in relation to the interpretation of the findings of this study. First, while formal qualification has been used in this study as some indication of the knowledge base that student teachers bring with them to initial teacher education, there is no implication that such qualifications are directly related to the capacity of student teachers to teach the subjects. Neither is it intended to portray a deficit model of student teacher knowledge. However, students' understanding of and attitudes towards the three subjects will influence their reaction to and their interaction with the equivalent courses in initial teacher education. The extent to which issues relating to knowledge and attitude identified by the findings are addressed effectively by existing provision remains to be seen and will provide an important focus for the second and third stage of the study.

The findings raise other questions that remain to be teased out. Why is it that, with the exception of expressed confidence levels around the teaching of science, students from the RoI were generally more positive in their attitudes than students from NI? It is possible that the reason is systemic in that the less specialized model of second-level education in the Republic allows students to experience a wider range of subjects. Holden & Hicks (2007), for example, note the negative impact of early specialization on student teachers' knowledge of global issues, global history and world cultures in England (p. 16). It is worth noting, however, that expressions of confidence in relation to the teaching of a subject may not necessarily be well founded or linked to good subject knowledge (Johnson & Ahtee, 2006, p. 510). From the perspective of this study, such findings present interesting questions to pursue in the semi-structured interviews and in the exit questionnaire. The differences based on gender and location found in this analysis of the quantitative elements of the survey suggest the importance of context in relation to the interpretation of the

qualitative data. For teacher educators, the findings underline the situated and contextualized nature of teacher education and the need to recognise and respond to the historical and socio-cultural context of the student populations with which they work. The findings also underscore the need to develop further research in this area in an Irish context and to promote comparative studies of the effectiveness of different models of provision in teacher education in Ireland.

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Notes

1. This study is the first stage of a longitudinal study undertaken by the Irish Association for Social, Scientific and Environmental Education (IASSEE) and is funded by the Standing Conference on Teacher Education North and South (SCoTENS), by Mary Immaculate College, Limerick and by St. Patrick's College, Drumcondra.
2. Students attending St. Patrick's College, Mary Immaculate College, St. Mary's University College and Stranmillis College have the option of studying history and geography to degree level. St. Patrick's College offers bioscience as a first-year academic course. St. Mary's University College and Stranmillis University College offer science to degree level. All colleges offer curriculum courses in these areas, either as discrete subjects or on an integrated basis.
3. For students from RoI, the post-16 level of qualification refers to the Leaving Certificate Examination, while for NI students it refers to A level and AS level. A small number of students had qualifications at tertiary level. These have been included in the post-16 category. Apart from pure science subjects, there is a range of science-related subjects available in both jurisdictions that give students access to varying levels of knowledge in science. It was decided to include these subjects in the questionnaire as forming part of the students' knowledge base in science. These subjects include agricultural science and home economics.
4. Because the number of male students is small, the gender analysis is based on the whole cohort of students and is not broken down by location.
5. Not all academic subjects chosen are taken to degree level. Two of the colleges, Mary Immaculate College and St. Patrick's College, provide for more than one academic subject along with education in the first year of the B.Ed.
6. Shulman's theory of teacher knowledge has been subjected to sustained critique. See, for example, Edwards & Ogden (1998). For an examination of the concept of pedagogical content knowledge, see Segall (2004).

References

- Anderson, L. M. & Holt-Reynolds, D. (2005) Prospective teachers' beliefs and teacher education pedagogy: research based on a teacher educator's practical theory. National Centre for Research on Teacher Learning. Available online at <http://ncrtl.msu.edu/http/rreports/html/rr956.htm>

- Ballantyne, R. (1999) Teaching environmental concepts, attitudes and behaviour through geography education: findings of an international survey, *International Research in Geographical and Environmental Education*, 8(1), 40–58.
- Barratt Hacking, E. (1996) Novice teachers and their geographical persuasions, *International Research in Geographical and Environmental Education*, 5(1), 77–86.
- Burgess, H. (2000) What future for initial teacher education? New curriculum and new directions, *The Curriculum Journal*, 11(3), 405–417.
- Burke, A. (2000) The devil's bargain revisited: the BEd programme under review, *Oideas*, 48 (single issue).
- Calderhead, J. & Robson, M. (1991) Images of teaching: student teachers' early conceptions of classroom practice, *Teaching and Teacher Education*, 7, 1–8.
- Chan, K. W. (2003) Preservice teachers' epistemological beliefs and conceptions about teaching and learning: cultural implications for research in teacher education, paper presented at *New Zealand Association for Research in Education Australian Association for Research in Education Conference*, Auckland, New Zealand, 29 November to 3 December.
- Cohen, L., Mannion, L. & Morrison, K. (2000) *Research methods in education* (5th edn) (London, Routledge).
- Corney, G. (1998) Learning to teach environmental issues, *International Research in Geographical and Environmental Education*, 7(2), 90–105.
- Corney, G. (2000) Case studies in student geography teachers' conceptions of teaching environmental issues, *International Research in Geographical and Environmental Education*, 9(4), 305–326.
- Czaja, R. & Blair, J. (1996) *Designing surveys: a guide to decisions and procedures* (Thousand Oaks, CA, Pine Forge Press).
- Department of Education (2007) *The Education (Curriculum Minimum Content) Order (Northern Ireland)* (Belfast, HMSO).
- Doolittle, S. A., Dodds, P. & Placek, J. H. (1993) Persistence of beliefs about teaching during formal training of pre-service teachers, *Journal of Teaching on Physical Education*, 12, 355–365.
- Edwards, A. & Ogden, L. (1998) Constructing curriculum subject knowledge in primary school teacher training, *Teacher and Teacher Education*, 14(7), 734–747.
- Fajet, W., Bello, M., Leftwich, S. A., Mesler, J. L. & Shaver, A. N. (2005) Pre-service teachers' perceptions in beginning education classes, *Teacher and Teacher Education*, 21, 717–727.
- Francis, B. (2000) The gendered subject: students' preferences and discussions of gender and subject ability, *Oxford Review of Education*, 26(1), 35–48.
- Glaser, B. G. & Strauss, A. L. (1967) *The discovery of grounded theory* (Chicago, Aldine).
- Gooday, M. & Wilson, J. (1996) Primary pre-service courses in science: a basis for review and innovation, *Journal of Education for Teaching*, 22(1), 95–110.
- Goulding, M., Rowland, T. & Barber, P. (2002) Does it matter? Primary teacher trainees' subject knowledge in mathematics, *British Educational Research Journal*, 28(5), 689–704.
- Government of Ireland (Department of Education and Science) (1999) *Primary School Curriculum: Introduction* (Dublin, Government Publications).
- Gratch, A. (2000) Becoming teacher: student teaching as identity construction, *Teaching Education*, 11(1), 120–126.
- Guyver, R. & Nichol, J. (2004) From novice to effective teacher: a study of postgraduate training and history pedagogy, *International Journal of Historical Learning, Teaching and Research*, 4(1). Available online at <http://www.centres.ex.ac.uk/historyresource/journalstart.htm>
- Hagger, H. & McIntyre, D. (2000) What can research tell us about teacher education?, *Oxford Review of Education*, 26(3&4), 483–494.
- Harnett, P. (2000) History in the primary school: re-shaping our pasts. The influence of primary school teachers' knowledge and understanding of history on curriculum planning and

- implementation, *International Journal of Historical Learning, Teaching and Research*, 1(1). Available online at <http://www.centres.ex.ac.uk/historyresource/journalstart.htm>
- Holden, C. & Hicks, D. (2007) Making global connections: the knowledge, understanding and motivation of trainee teachers, *Teaching and Teacher Education*, 23, 13–23.
- Holt-Reynolds, D. (1992) Personal history-based beliefs as relevant prior knowledge in course work, *American Educational Research Journal*, 29, 325–349.
- Johnson, J. & Ahtee, M. (2006) Comparing primary student teachers' attitudes, subject knowledge and pedagogical content knowledge needs in a physics activity, *Teaching and Teacher Education*, 22, 503–512.
- Kagan, D. M. (1992) Implications of research on teacher belief, *Educational Psychologist*, 27(1), 65–90.
- Kennedy, M. (1990) A survey of recent literature on teachers' subject matter knowledge, *National Center for Research on Teacher Learning* (NCRTL), issue papers 90–93. Available online at <http://ncrtl.msu.edu/issue.htm>
- Kennedy, M. M. (1991) An agenda for research on teacher learning. National Center for Research on Teacher Learning. Available online at <http://ncrtl.msu.edu/http/sreports/sr391.pdf>
- Kennedy, M. (1999) Some surprising findings on how teachers learn to teach, *Educational Leadership*, 49(3), 14–17.
- Korthagen, F. A. J. (2004) In search of the essence of a good teacher: towards a more holistic approach in teacher education, *Teacher and Teacher Education*, 20, 77–97.
- Leat, D. (1996) Geography student teachers and their images of teaching, *International Research in Geographical and Environmental Education*, 5(1), 63–68.
- Lortie, D. C. (1975) *Schoolteacher: a sociological study* (Chicago, University of Chicago Press).
- Mahlios, M. & Maxson, M. (1995) Capturing preservice teachers' beliefs about schooling, life and childhood, *Journal of Teacher Education*, 46, 192–199.
- Marland, P. (1998) Teachers' practical theories: implications for preservice teacher education, *Asia-Pacific Journal of Teacher Education & Development*, 1(2), 15–23.
- Martin, F. (2000) Postgraduate primary education students' images of geography and the relationship between these and students' teaching, *International Research in Geographical and Environmental Education*, 9(3), 223–244.
- McPartland, M. (1996) Walking in our own footsteps: autobiographical memories and the teaching of geography, *International Research in Geographical and Environmental Education*, 5(1), 57–62.
- Munn, P. & Drever, E. (1999) *Using questionnaires in small-scale research* (Edinburgh, Scottish Council for Research in Education).
- Pajares, M. F. (1992) Teachers' beliefs and educational research: cleaning up a messy construct, *Review of Educational Research*, 62(3), 307–332.
- Parker, J. & Spink, E. (1997) Becoming science teachers: an evaluation of the initial stages of primary teacher training, *Assessment and Evaluation in Higher Education*, 22(1), 17–31.
- Poulson, L. (2001) Paradigm lost: subject knowledge, primary teachers and education policy, *British Journal of Educational Studies*, 49(1), 40–55.
- Rousmaniere, K. (2000) From memory to curriculum, *Teaching Education*, 11(1), 88–98.
- Rowland, T., Martyn, S., Barber, P. & Heal, C. (2000) Primary teacher trainees' mathematics subject knowledge and classroom performance, in: T. Rowland & C. Morgan (Eds) *Research in mathematics education*. Vol. 2: *Papers of the British Society for Research into Learning Mathematics* (London, BSRLM), 3–18.
- Salisbury-Glennon, J. D. & Stevens, R. J. (1999) Addressing preservice teachers' conceptions of motivation, *Teaching and Teacher Education*, 15, 741–752.
- Schwab, J. J. (1978) Education and the structure of the disciplines, in: I. Westbury & N. J. Wilkof (Eds) *Science, curriculum and liberal education* (Chicago, University of Chicago Press), 229–272.

- Segall, A. (2004) Revisiting pedagogical content knowledge: the pedagogy of content/the content of pedagogy, *Teacher and Teacher Education*, 20, 489–504.
- Shulman, L. S. (1986) Those who understand: knowledge growth in teaching, *Educational Researcher*, 15(2), 4–14.
- Skamp, K. (1995) Student teachers' conceptions of how to recognise a 'good' primary science teacher: does two years in a teacher education program make a difference?, *Research in Science Education*, 25(4), 395–429.
- Skamp, K. & Mueller, A. (2001a) A longitudinal study of the influences of primary and secondary school, university and practicum on student teachers' images of effective primary science practice, *International Journal of Science Education*, 23(3), 227–245.
- Skamp, K. & Mueller, A. (2001b) Student teachers' conceptions about effective primary science teaching: a longitudinal study, *International Journal of Science Education*, 23(4), 331–351.
- Stanford, G. C. (1998) African-American teachers' knowledge of teaching: understanding the influence of their remembered teachers, *The Urban Review*, 30(3), 229–243.
- Stokes, D. (1994) Analysing the continued efficacy of teaching metaphors in the first year of teaching. Australian Association for Research in Education. Available online at <http://www.aare.edu.au/94pap/stokd94191.txt>
- Sugrue, C. (1996) Student teachers' lay theories: implications for professional development, in: I. F. Goodson & A. Hargreaves (Eds) *Teachers professional lives* (London, Falmer Press), 154–177.
- Sugrue, C. (1997) Student teachers' lay theories and teaching identities: their implications for professional development, *European Journal of Teacher Education*, 20(3), 213–225.
- Sugrue, C. (1998) Confronting student teachers' lay theories and culturally embedded archetypes of teaching: implications for professional development, in: C. Sugrue (Ed.) *Teaching, Curriculum and Educational Research* (Dublin, St. Patrick's College), 118–141.
- Sugrue, C. (2004) Revisiting teaching archetypes: identifying dominant shaping influences on student teachers' identities, *European Educational Research Journal*, 3(1), 583–602.
- Tann, S. (1993) Eliciting student teachers' personal theories, in: J. Calderhead & P. Gates (Eds) *Conceptualising Reflection in Teacher Development* (London, Falmer Press), 53–69.
- Thomas, J. A. & Pedersen, J. E. (2003) Reforming elementary science teacher preparation: what about extant teaching beliefs?, *School Science and Mathematics*, 103(7), 319–330.
- Thornton, M., Bricheno, P. & Reid, I. (2002) Students' reasons for wanting to teach in primary school, *Research in Education*, 67, 33–43.
- Tillema, H. H. (1997) Guest editorial: stability and change in student teachers' beliefs, *European Journal of Teacher Education*, 20(3), 209–212.
- Tosun, T. (2000) The beliefs of preservice elementary teachers toward science and science teaching, *School Science and Mathematics*, 100(7), 374–379.
- Varley, J. P. A. (2004) Pilot of the IASSEE questionnaire: an analysis. Paper presented at the Irish Association for Social, Scientific and Environmental Education Annual Conference, Dublin, June.
- Virta, A. (2001) Student teachers' conceptions of history, *International Journal of Historical Learning, Teaching and Research*, 2(1). Available online at <http://www.centres.ex.ac.uk/historyresource/journalstart.htm>
- Virta, A. (2002) Becoming a history teacher: observations on the beliefs and growth of student teachers, *Teaching and Teacher Education*, 18(6), 687–698.
- Weinstein, C. (1989) Teacher education students' preconceptions of teaching, *Journal of Teacher Education*, 6(3), 279–290.
- Weinstein, C. (1990) Prospective elementary teachers' beliefs about teaching: implications for teacher education, *Teaching and Teacher Education*, 6(3), 279–290.
- Whitehead, J. (1996) Sex stereotypes, gender identity and subject choice at 'A' level, *Educational Research*, 38, 147–160.

- Wilson, S. & Cameron, R. (1996) Student teacher perceptions of effective teaching: a developmental perspective, *Journal of Education for Teaching*, 22(2), 181–195.
- Wilson, S. M. (1990) The secret garden of teacher education, *Phi Delta Kappan*, 72(3), 204–209.
- Wilson, S. M. & Wineburg, S. (1988) Peering at history through different disciplinary lenses: the role of disciplinary perspectives in teaching history, *Teachers' College Record*, 89, 525–539.
- Witcher, A., Onwuegbuzie, A. J. & Minor, L. C. (2001) Characteristics of effective teachers: perceptions of pre-service teachers, *Research in Schools*, 8, 45–57.
- Wood, K. (2000) The experience of learning to teach: changing student teachers' ways of understanding teaching, *Journal of Curriculum Studies*, 32(1), 75–93.
- Wubbels, T. (1992) Taking account of student teachers' preconceptions, *Teaching and Teacher Education*, 8, 137–149.
- Younger, M., Brindley, S., Pedder, D. & Hagger, H. (2004) Starting points: student teachers' reasons for becoming teachers and their preconceptions of what this will mean, *European Journal of Teacher Education*, 27(3), 245–264.