

**CONCEPTIONS OF SUBJECT KNOWLEDGE IN PRIMARY
INITIAL TEACHER TRAINING:
THE PERSPECTIVES OF STUDENT TEACHERS AND
TEACHER EDUCATORS**

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Abstract

This study is about the ways in which the term *subject knowledge* is conceptualised and interpreted by student teachers, university tutors and school mentors in the context of undergraduate primary initial teacher training (ITT) in two post-1992 university providers. Subject knowledge has been a consistent feature of the policy context of ITT over decades, although disparities are apparent between the rhetoric of policy directives, the theoretical knowledge base and how primary teachers' subject knowledge is represented, and enacted, in communities of practice in primary ITT. The conceptual framework for the research is underpinned by Shulman's (1987) theoretical knowledge bases for teaching, and draws significantly on the conceptual tools of culture, practice and agents in educational settings, provided by Ellis's (2007) situated model of subject knowledge. The perspective of the individual is developed further by utilising Kelchtermans's (2009) personal interpretative framework. An additional lens is provided by the external political context, within which primary ITT is located. The research adopted an inductive, interpretative approach that incorporated multiple methods to construct a bricolage. Data collection included semi-structured questionnaires, semi-structured interviews that incorporated the production of visual data, and content analysis of documents.

The study indicates that *subject knowledge* was understood by participants as an umbrella term representing general teacher knowledge, rather than as a critically distinct concept. Overall, there was a general lack of emphasis on subject-specific pedagogical knowledge evident in the discourse around *subject knowledge* for primary teaching.

Conceptualisations of *subject knowledge* were highly individualistic. The findings indicated that the culture and practice in different contexts is interpreted and experienced in very different ways by individuals to influence their interpretations of *subject knowledge* and its place in pedagogy. Thus, this study makes an original contribution to knowledge in the field by: 1) mapping the details of the conceptualisations of *subject knowledge* held by student primary teachers, university tutors and school mentors in the context of undergraduate primary ITT, to identify commonalities, and disparities, with the theoretical knowledge base; and 2) identifying and examining cross-contextual and personal influences on conceptions of subject knowledge and in so doing, extending and adapting Ellis's (2007) model of subject knowledge, to the specific context of undergraduate primary ITT.

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List of abbreviations

APP	Assessing Pupil Progress
CACE	Central Advisory Councils for Education
CATE	Council for the Accreditation of Teacher Education
CPD	Continuing Professional Development
DES	Department for Education and Science
DfE	Department for Education
DfEE	Department for Education and Employment
DfES	Department for Education and Skills
DT	Design and Technology
EBITT	Employment Based Initial Teacher Training
G&T	Gifted and Talented
GCSE	General Certificate of Secondary Education
GPK	General Pedagogical Knowledge
HEA	Higher Education Academy
ICT	Information and Communications Technology
INSET	In-Service Education and Training
ITE	Initial Teacher Education
ITT	Initial Teacher Training
MFL	Modern Foreign Languages
NASBTT	National Association of School-based Teacher Trainers
NLS	National Literacy Strategy
NNS	National Numeracy Strategy
NQT	Newly Qualified Teacher
OFSTED	Office for Standards in Education, Children's Services and Skills
PCK	Pedagogical Content Knowledge
PE	Physical Education

PGCE	Postgraduate Certificate in Education
PSHEE	Personal, Social, Health and Economic Education
QTS	Qualified Teacher Status
RE	Religious Education
SATs	Standard Assessment Tasks
SEN	Special Educational Needs
SENCO	Special Educational Needs Co-ordinator
SEND	Special Educational Needs and Disabilities
SSP	Systematic Synthetic Phonics
TA	Teaching Assistant
TDA	Training and Development Agency
TTA	Teacher Training Agency
UCET	Universities' Council for the Education of Teachers

1. Introduction

1.1 Background to the research

Since the 1980s, the government has exerted increasing control over all aspects of education, including initial teacher education. Embedded in successive policy directives issued during the 1990s (e.g. Circular 14/93, Department for Education and Science (DES), 1993; Circular 10/97, Department for Education and Employment (DfEE), 1997), were some clearly identifiable trends. Firstly, the importance of student teachers' subject matter knowledge for teaching was highlighted as a significant feature of policy. Secondly, there was emphasis on a stronger partnership model of teacher education between schools and higher education institutions, with schools having increased involvement in all aspects of students' training. The third trend was the move towards competency-based teacher education, with extensive criteria set out which all training courses had to meet (Circular 14/93 DES, 1993), coupled with tighter regulation of the standards required by new entrants to the profession. This culminated in the production of new National Curricula for primary teacher training and standards for the award of qualified teacher status (QTS) (Circular 10/97 DfEE, 1997). The professional standards have since provided the central framework for the design of initial teacher training (ITT) programmes. The standards were revised in 2002, 2007 and, most recently, in 2012 and their application was extended, not just for trainees but for all teachers from 2007 onwards. The three identified trends have endured and are still clearly evident in current teacher education policy and practice.

Secure subject knowledge has been a consistent requirement in every version of professional standards for teachers. Over the years, the government has funded subject knowledge booster and enhancement courses for postgraduate trainees prior to the start of their formal programmes of study. The 1997 National Curricula for ITT (Circular 10/97 DfEE, 1997; revised Circular 4/98 DfEE, 1998b) promoted the practice of auditing student teachers' subject knowledge, often through baseline testing, to identify gaps in their knowledge to be addressed through their training. Reviews of audits were completed at regular intervals of time, to ensure students make satisfactory progress in developing their subject knowledge over the course of their training. Subject knowledge auditing remains a feature of the majority of ITT programmes as a means to demonstrate evidence of their impact on trainees' progress. So, the term subject knowledge has worked its way into the

fabric of ITT programmes and professional discourse; it is firmly embedded in government policy and is monitored via Ofsted inspections of ITT providers.

During the same period of time, the theoretical knowledge base concerning teachers' professional knowledge has grown substantially. Much of the focus on teachers' subject-specific knowledge stemmed from Shulman's (1987) seminal work in which he identified seven categories as a minimum knowledge base for teaching. Amongst the categories was pedagogical content knowledge; this was Shulman's (1986) term to describe the subject matter knowledge needed for teaching as a distinct phenomenon. It combined both content knowledge and pedagogical knowledge into a unique category of subject-specific teacher knowledge. Shulman's work stimulated much research interest in adding to the knowledge bases (e.g. Grimmet and McKinnon, 1992), reconceptualising them (e.g. Cochran *et al.*, 1993) and examining the impact of teachers' subject-specific knowledge for teaching on varied aspects of teaching and learning (e.g. Medwell *et al.*, 1998; Goulding *et al.*, 2002). Multiple theoretical models of teachers' knowledge have been constructed (e.g. Banks *et al.*, 1996; Turner-Bissett, 1999; Davis and Sumara, 2000) in an attempt to capture the unique nature of teachers' professional knowledge, including subject-specific knowledge, and the processes involved in its development.

The considerable research interest in teachers' knowledge coincided with the growth of initial teacher education as an academic discipline located increasingly in university departments, as former teacher training colleges amalgamated with the 'new' universities (post-1992) that evolved from the conversion of former polytechnics. Teacher education has occupied a somewhat contested space in the higher education academy (Ellis and McNicholl, 2015) and the quest to define the profession's knowledge, including subject knowledge, was an important focus for research, in relation to raising the status of the profession (Calderhead, 1991). The literature review chapter discusses the theoretical background in detail.

1.2 Personal context for the research

The original inspiration for this thesis stems from when I became a full-time teacher educator based in a university ITT department in 2007. The difficulties inherent in the transition from experienced primary teacher to teacher educator are well-documented (e.g. Murray and Male, 2005; McKeon & Harrison, 2010). One of the personal difficulties I experienced was in developing a coherent pedagogy for primary ITT. My own route into

primary teaching was via a postgraduate qualification, having studied Zoology as an undergraduate, followed by some years as a research scientist. All of my former university-based experiences were located in Russell Group universities. In this sense, I did not share the same experiences as the undergraduate student teachers I was teaching in the post-1992 university department in which I became employed. This added to my challenge in adapting to teaching in this new environment.

Student teachers' subject knowledge featured prominently in my experiences of grappling with ITT policy and departmental practices and processes. In fact, my interview for the job had involved giving a presentation in which I was required to identify the tensions between developing subject knowledge and pedagogy with primary trainee teachers. At the time, I had considered this to be a fishing question, designed to tease out the finer points of my understanding of pedagogy. I approached my response from the perspective of deconstructing what I believed, from theory, to be the components of subject-specific knowledge required for teaching, and demonstrating that there was no tension with pedagogic development, as subject knowledge is a key element of pedagogy. I was successful in securing the post, so assumed that my response was aligned with the philosophy underpinning the primary education programmes in the department.

What I encountered during my first year of working in the ITT department, suggested to me, on reflection, that I had perhaps read too much into the motivations behind the interview presentation task and my interpretation of the outcome was, in fact, naïve. I detected epistemological pluralism in the treatment of subject knowledge and I struggled to gain a firm grasp of how it was intended to be conceptualised within the narratives of the primary ITT programmes. It proved difficult to me to locate theory, with any consistency, in the multiple associated practices I was expected to engage with, such as auditing subject knowledge and scrutinising trainees' evidence against the teachers' standards in order to recommend the award of Qualified Teacher Status (QTS). The latter raised multiple questions for me in relation to subject knowledge when the trainees' evidence presented, bore limited relevance to subject knowledge, but was signed off by tutors as being good or outstanding evidence because there were sufficient lesson observations in which the observers had rated subject knowledge accordingly. The fact that the detail, or lack of it, in the accompanying lesson plans might actually have highlighted some major shortcomings in subject knowledge, appeared to be inconsequential. Initially, I attributed my observations to my lack of experience in the sector and part of its steep

learning curve. My unease did not subside, although my awareness of the policy landscape grew. For example, when I found myself, reluctantly, signing off similar samples of evidence to support subject knowledge-related standards, I realised that whilst my personal viewpoint had not changed, I was, nonetheless, being assimilated into the culture of ITT by complying with what seemed to be expected of me.

My personal belief on entering the ITT sector was that subject-specific knowledge was a crucial factor in becoming a good primary teacher, but I encountered far less agreement with my stance than I had anticipated. On the one hand, subject knowledge was a prominent focus in programme documentation and general ITT rhetoric, but there appeared to be a mismatch with the treatment it was given in practice, which fluctuated considerably between different people in varying contexts. A sense of dissonance pervaded my work in the primary ITT department in its dealings with subject knowledge.

I came to appreciate that the quality of trainees' subject knowledge evidence, for example, was a product of the competency-drive system that focused on evidence of student outcomes in its narrowest form, as highlighted by Cochran-Smith (2008), rather than it representing inadequacy on the part of the individual or the institution. My concern, however, was how this might influence beginning teachers' ideas about the nature of subject knowledge and its role in pedagogy. The theoretical knowledge base pointed to the fact that attempts to categorise the knowledge required for teaching and to model the process of student teachers' development of professional knowledge, including subject-specific knowledge, were extensive and highly complex in nature. This complexity was rarely communicated in the general use of the term *subject knowledge* in the context of the primary ITT programmes. This caused me to question how student primary teachers came to make sense of the discourse around subject knowledge and how they interpreted their interactions with university teaching and school-based learning in this respect.

1.3 What has provoked this study?

When the Cambridge Primary Review of Education (Alexander, 2010) highlighted the lack of coherence to the discourse about subject knowledge and applications in teacher education in England in comparison to other European countries, it signalled to me that my personal experiences were part of a wider concern. What is apparent is that, although subject knowledge has been a significant feature for decades of both the policy context of initial

teacher education and the evolving theoretical knowledge base, it is still not a well-defined concept that is coherently embedded with pedagogy, in the context of primary ITT.

Whilst considerable attention has been afforded to subject knowledge via its representation in consecutive versions of the professional standards for teachers since their inception, there have been nuances of meaning embedded in their changing wording. Modifications in emphasis and underpinning philosophy that imply subtle differences in epistemology leave the precise nature of subject knowledge requirements resting on slightly shifting sands and relatively open to interpretation. Almost two decades ago, with reference to the original version of standards (DfEE, 1997), Turner-Bisset (1999: 40) was asking the question of 'what, precisely, is meant by subject knowledge?' Given the implicit nuances apparent in the changing wording of subsequent versions of the professional standards concerning subject knowledge, the question is still pertinent.

Returning to the theoretical knowledge base, it is important to note that, whilst there has been a comprehensive examination of teachers' professional knowledge, most of the models of teachers' subject knowledge have been developed in the subject-specialist context of secondary education rather than in primary education (e.g. Leach and Moon, 2000; Ellis, 2007). Turner-Bisset's (1999) model of the knowledge bases of the expert teacher represents an important addition to the literature as it deals specifically with the nature of primary teachers' knowledge. Plentiful studies contribute a wealth of evidence about subject knowledge in relation to particular subjects within primary education (e.g. Medwell *et al.*, 1998; Goulding *et al.*, 2002; Golby *et al.*, 1995). Less prevalent in the literature are studies that represent the holistic nature of how primary teachers work across an extended range of curriculum subjects simultaneously, and the demands that this makes of them.

At the peak of interest in subject knowledge in ITT, Edwards and Ogden (1998) expressed a warning in relation to this distinction about primary teachers' subject knowledge, based on their research with student primary teachers and their school mentors. They found limited evidence of subject-specific support in school-based learning and advised that primary teachers' subject knowledge was, perhaps, being taken for granted in a way that it should not. Subsequent studies (e.g. Brown and McNamara, 2005; Strong and Baron, 2004) have found a similar lack of subject-specificity in the mentoring of trainee primary teachers, whilst, others have indicated a generally limited subject-specific knowledge base amongst

primary teachers in different curriculum subjects (e.g. McKeon, 2004; Heywood, 2005; Catling and Morley, 2013).

When considered from this perspective, the research evidence suggests that primary teaching, in contrast to secondary, represents quite a different lens through which to view subject knowledge and the requirements espoused through the professional standards for teachers. There appears to be some incongruity between the theoretical knowledge base, the rhetoric embedded in policy directives and how primary teachers' subject knowledge is represented and enacted in communities of practice in primary education and initial teacher education.

1.4 The research focus

The aims of the research were to determine to what extent individuals' conceptualisations of subject knowledge, in the context of primary ITT, related to theory and to map their exact nature. The particular focus of the study was on student teachers but it was important to also examine the perspectives of some of the key people in the ITT partnership contexts who are directly involved with the student teachers during their training, namely, university tutors and school mentors. I was interested in detecting similarities of opinion, or tensions, between the views of the three groups of stakeholders in their perspectives on subject knowledge for primary teaching, and in gaining deeper understanding of the influences that shape their thinking.

The study is particularly important as employment-based routes into teaching have expanded in parallel with the research journey. If there is a lack of coherence to the treatment of subject knowledge in primary ITT in the current university-led system, then the challenges of addressing this will increase further as ITT provision becomes more fragmented across multiple routes and settings. If university primary ITT departments are to articulate their unique contribution to initial teacher education in a system of free markets and increased surveillance (Apple, 2001: 190), then a potentially important starting point is in having a clear understanding of the nature of existing attitudes, beliefs and practices in particular settings that influence how subject knowledge is conceived. By creating detailed narratives relating to subject knowledge in primary ITT, I hope to offer vicarious experiences (Stake, 1995) that might resonate with others and stimulate reflection on the current discourse of subject knowledge in the immediate settings in which the research is situated, and in the wider sector.

The research is located within a theoretical framework that draws on Shulman's (1986, 1987) knowledge bases for teaching and Kelchtermans's (2009) personal interpretative framework. The research also utilises the conceptual tools of culture, practice and agents, provided by Ellis's (2007) situated model of subject knowledge. The research is a qualitative inquiry that adopts an interpretivist approach. Data were collected from two post-1992 university providers of initial teacher education located in the North West of England. Student teacher participants were drawn from the four-year undergraduate B.A./B.Ed. (Hons) Primary Education programmes in both institutions. Other participants included university tutors who taught on the specified programmes and some of the school mentors who were responsible for the trainee teachers during their teaching placements in primary school settings.

A variety of data collection tools were used. Semi-structured questionnaires with student teachers (n=104) and school mentors (n=9) were used to gather opinions about the nature and importance of subject knowledge. They were followed up with in-depth semi-structured interviews (incorporating the production of visual data) with student teachers (n=18), school mentors (n=11) and university tutors (n=12) to gain more detailed insights into their conceptualisations of subject knowledge and influences. How subject knowledge is framed in ITT partnership processes was examined via content analysis of relevant documents, including samples of lesson observation feedback (n=427).

The key objectives of the research were:

- to explore the perspectives of key stakeholders (student teachers, school mentors, university tutors) about the nature and role of *subject knowledge* in the initial training of primary teachers and construct a comprehensive picture of their conceptualisations of *subject knowledge*;
- to identify and examine the nature of influences on key stakeholders in relation to *subject knowledge*;
- to analyse how ITT partnerships frame and position *subject knowledge* for primary teaching.

The research has been guided by the following questions:

1. What is the nature of student teachers', school mentors' and university tutors' conceptions and interpretations of the term *subject knowledge* in the context of undergraduate primary initial teacher training?

2. What are the views of student teachers, school mentors and university tutors about the position and role of subject-specific knowledge for teaching (*subject knowledge*) in a) the process of learning to teach in the primary phase and b) expert primary teaching?
3. What are the perceived influences of culture and practice in the university, school and partnership contexts in which primary ITT is situated, on student teachers, school mentors and university tutors in relation to *subject knowledge*?
4. How might student teachers' personal conceptualisations of *subject knowledge* differ according to the interplay between their biographies, personal interests and emerging professional identities in participation in cross-contextual settings?
5. a) How is *subject knowledge* represented in:
 - i. the professional standards for teachers (Teachers' Standard 3);
 - ii. key documentation and guidance used in ITT to support the assessment of student teachers in practice;
 - iii. feedback provided to student teachers in completed lesson observation paperwork?
 b) How might these specific documents/tools, that provide a framework for supporting partnership processes, contribute to conceptions of *subject knowledge* and associated culture and practice?

Thus, this thesis makes an original contribution to knowledge in the field by: 1) mapping the details of the conceptualisations of *subject knowledge* held by student primary teachers, university tutors and school mentors in the context of undergraduate primary ITT, to identify commonalities, and disparities, with the theoretical knowledge base; and 2) identifying and examining cross-contextual and personal influences on conceptions of subject knowledge and in so doing, extending and adapting Ellis's (2007) model of subject knowledge development, to the specific context of undergraduate primary ITT.

1.5 Overview of the thesis

The resulting chapters of the thesis have been structured around these research questions. Chapter 2 provides the literature review and is divided into nine sections: 2.1 charts the place of subject knowledge in historical policy content of initial teacher education; 2.2 discusses teaching as a profession; 2.3 provides a comprehensive critical analysis of types of teacher knowledge, whilst 2.4 seeks to locate subject knowledge within this framework; 2.5 explores teacher thinking about knowledge; 2.6 analyses and critiques characteristics

of expert teachers; 2.7 explores existing research on the role of subject knowledge in primary teaching and initial teacher education; 2.8 examines the role of context and 2.9 discusses personal influences. In Chapter 3, I discuss my research methodology. Chapter 4 presents the empirical findings and their analysis: 4.1 deals with conceptualisations and interpretations of subject knowledge; 4.2 presents and discusses participants' perceptions of the significance and role of subject knowledge; 4.3 analyses contextual influences, whilst 4.4 examines personal influences; 4.5 presents and discusses the findings from the analysis of documentary data. In Chapter 5, I draw together the cross-contextual influences of culture and practice on the individual in relation to subject knowledge. Chapters 6 and 7 contain some final reflections on the research journey.

Throughout the thesis, to indicate that the term *subject knowledge* might be interpreted differently according to context or personal interpretation, it is written in italics to make this distinction. It should also be noted that the terminology used for initial teacher education (ITE) has shifted over time with government policy, to initial teacher training (ITT) and student teachers have become referred to as 'trainees'. The shift in terminology signalled a cultural change in the sector (as discussed in Chapter 2). Although 'ITT' and 'trainees' are used in current policy contexts, both versions of terminology are still used in more general contexts within the sector. In the thesis, the two versions of terms are used interchangeably, as they are in the sector, and the use of one or the other does not signify a particular epistemological stance, except specifically in relation to policy.

2. Literature Review

2.1 Subject knowledge in the historical policy context of initial teacher education

Teachers' subject knowledge has long been established as a matter of concern for educational policy. The McNair report (1944:70) recommended that 'a teacher must be equipped for his task not only with professional skill but also with such a knowledge of the subjects he proposes to teach that he can justify his claim to teach them.' The report also recommended that all teacher training should be under the supervision of universities, whether in their own education departments or in training colleges. At this time, the Education Act 1944 provided a statutory framework that required schools to teach both a 'religious' and a 'secular' curriculum - the latter being overseen by local education authorities - but had no influence on teaching methods. Teachers were largely autonomous.

The significance of teachers' knowledge was underlined in the Robbins Report (1963) through the recommendation to introduce a four-year Bachelor of Education degree (B.Ed.), to replace the three-year certificate course for students, deemed suitable for degree-level study. The nature of the content and structure of the degree was not subject to any form of prescription. The report explains the rationale thus: 'We do not think that anyone can yet claim a monopoly of wisdom about the most constructive intermixture of theory and practice in the education and training of a teacher' (Robbins, 1963: 115). Experimentation by teacher educators was instead encouraged. The result was a degree which was split between education studies, comprising the psychology, sociology, philosophy and history of education and subject studies. Emphasis was placed firmly on teachers' knowledge. The Plowden Report (1967) recommended upgrading the teacher profession and during this era teachers made professional decisions about the curriculum and how to teach and assess it. Teacher educators shared this autonomy in their roles in deciding how to prepare teachers for the profession, however, with such emphasis on pre-service teachers' knowledge rather than their skills, theory and practice had become somewhat separated.

Following Callaghan's Ruskin College speech in 1976, in which he raised concerns about the relevance of the education system in meeting the needs of learners and society, there was

significant movement towards reinstating the significance of the professional elements of initial teacher education and increased direct involvement of politicians in influencing education policy. This culminated in the formation of the Council for the Accreditation of Teacher Education (CATE) who, from 1984, were responsible for the official accreditation of all pre-service programmes of teacher training via a single set of criteria (DES Circular 3/84, DES, 1984). These criteria defined entry qualification requirements, length of course, course content, professional experience and curriculum coverage. Recent, successful experience of school teaching was a requirement for staff whose roles concerned pedagogy, thus re-orientating training towards current professional practice-based skills. However, knowledge maintained its significance in the criteria due to findings of HMI surveys between 1978 and 1983 that highlighted the importance of a teacher's knowledge base and confidence in the subjects they teach (DES, 1978, 1979, 1983). Undergraduate courses required the inclusion of at least two years of subject study at a level appropriate to higher education. For undergraduate routes into teaching (which remained the most popular route for primary, despite the rise of the Postgraduate Certificate in Education (PGCE) in the 1980s), in addition to subject study at the student's own level, the focus of initial teacher education included subject 'applications' (knowledge of the subject and how it is taught in schools), professional studies (practice-oriented knowledge and skills for the classroom) and educational studies (knowledge about education in a broader sense). The content of initial teacher education remained fairly constant until the 1990s.

The 1988 Education Reform Act brought significant changes to primary education with the introduction of a national curriculum and, later, national testing at ages 7 and 11. Although the content of the primary curriculum was prescribed at this point, pedagogy and curriculum organisation remained in the professional domain of teachers. Alexander (2010:32) describes this aptly as a form of 'regulated autonomy.' The same term could be applied to describe the circumstances mirrored in initial teacher education during this period which saw the government begin to prescribe the number of days of training (DES Circular 24/89, DES, 1989) and the official introduction of the notion of partnership with schools (DES Circular 9/92, DES, 1992; DES Circular 14/93, DES, 1993). Circular 14/93 (DES, 1993) outlined proposals for primary ITE that aligned with the 'Three Wise Men' report (Alexander, Rose & Woodhead, 1992) which focused on the nature of pedagogy in primary schools and, amongst its recommendations, advocated a greater degree of semi-specialist and specialist teaching in primary schools to help to address the shortage of subject expertise that hindered children's entitlement to the whole curriculum. Trainee teachers'

subject knowledge for teaching became an increasingly significant feature of policy as a direct result. McNamara, Webb and Brundrett (2010: 652) cite inspection evidence gathered over a decade (HMI, 1982, 1983, 1987, 1988a, 1988b, 1991a), which suggested that although new primary teachers' general teaching skills were good, the same was not true in subject teaching. The DES 14/93 Circular set out 'strict new criteria which training courses must meet, focusing on the subject knowledge and teaching skills new teachers require to be effective in the classroom' (DES Circular 14/93, DES 1993: 3).

The move towards competency-based teacher education accelerated when CATE was replaced by the Teacher Training Agency (TTA) via the 1994 Education Act. The TTA was awarded extra powers to control the funding and supply of teachers. The same Education Act gave Ofsted the statutory remit for inspecting providers of initial teacher training. Teacher training providers were forced to comply with the TTA's requirements through their direct control of their training allocations and funding, linked to the new regime of OFSTED inspections of ITT. The middle-ground of 'regulated autonomy' for ITT diminished and was replaced with a regime of increased prescription and enforced compliance. The requirement for Central Advisory Councils for Education (CACE) was abolished via the 1996 Education Act, thus removing the capacity of the system to be informed by independent advice.

The 1993 competences (DES Circular 14/93, DES 1993) were later superseded by new National Curricula for teacher training and standards for the award of qualified teacher status (QTS), which formed the basis for the design of initial teacher training and assessment of 'trainees' (DfEE, 1997, circular 10/97; revised DfEE, 1998b, Circular 4/98). Extensive lists of 'standards' for the award of Qualified Teacher Status were specified. Primary teachers' subject knowledge requirements were substantial and detailed; the equivalent of a Grade C GCSE was expected for the core subjects of English, mathematics, science and ICT. The requirement for a specialist subject (knowledge level equivalent to A-level) was preserved. All providers of ITT were required to audit trainees' knowledge and understanding of curriculum subjects to identify 'gaps' in trainees' subject knowledge. Where such gaps were identified, ITT providers were required to 'make arrangements to ensure that trainees gain that knowledge during the course' (DfEE, Circular 10/97, DfEE 1997:27). The legacy of this practice remains embedded in much of current practice in ITT programmes and in the Ofsted inspection framework (Ofsted, 2015).

The introduction in 1998-99 of the National Literacy Strategy (NLS) (DfEE, 1998a) and the National Numeracy Strategy (NNS) (DfEE, 1999), signalled the arrival of centrally prescribed pedagogy that was imposed on primary teachers. Ofsted inspections ensured compliance, with the combined effect of reducing primary teachers' autonomy. Curriculum requirements for other subjects were streamlined further in 2000 and national targets for literacy and numeracy began the intensive pursuit of measurable outcomes as a priority. The nature of ITT became intertwined with changes to the primary curriculum in an intensified manner; Furlong (2005) highlights how ITT has been used as a means to steer curriculum change since this time. Subject knowledge demands were increased in 2001 with the introduction of QTS skills tests for English, mathematics and ICT, focusing on their application to professional usage. With the increased focus on literacy and numeracy, ITT course content began to get 'squeezed' (Furlong *et al.*, 2000: 103).

A slimmed down version of the requirements for qualifying to teach was published in 2002 (Department for Education and Skills (DfES), 2002). For primary trainees, the focus was placed predominantly on enforcing the NLS and NNS; the means to do this was the removal of the requirement for pre-service teachers to train to teach a specialist subject, coupled with reduced expectations of knowledge across the full range of primary curriculum subjects. Instead, primary trainees were required to be trained to teach the core subjects plus 'have sufficient understanding of a range of work' (DfES 2002: 8) across some key areas of the other foundation subjects. Some foundation subjects were made optional for courses: either history or geography, and either art and design or design and technology. The detailed requirements cited in Circular 4/98 (DfEE, 1998b) had been abandoned and there was no prescribed subject knowledge and pedagogy, besides that contained in the NLS and NNS. The corresponding professional standards for QTS were reduced significantly, with the standard relating to subject knowledge simply describing that a newly qualified teacher should 'have a secure knowledge and understanding of the subject(s) they are trained to teach' (DfES 2002: 8). The political targets for raised national standards in literacy and numeracy effectively eliminated the prior focus on trainee teachers' subject knowledge, and replaced it with a considerably narrower concept of the knowledge needed for primary teaching underpinned by a culture of political compliance, rather than teachers' professional decision-making.

The TTA was replaced by the Training and Development Agency for schools (TDA) by the 2005 Education Act which extended the remit of the newly formed TDA to include the

wider workforce and continuing professional development. ITT became inevitably linked to raising standards of achievement in schools. The professional standards for newly qualified teachers were reduced significantly in number to 33 in 2007 (TDA, 2007) and, along with this streamlining, the significance of teachers' subject knowledge receded further with only one of the 33 standards making explicit reference to subject knowledge. ITT content became framed entirely by the primary curriculum as enacted in the primary classroom, resulting in a relatively simplistic ethos pervading the education of pre-service teachers.

Soon after the election of the Coalition Government in 2010, the education White Paper (Department for Education (DfE), 2010) made its intentions clear in relation to major expansion of school-based routes into teaching, with an overarching neoliberal narrative of the marketisation of ITT. Juxtapositioned, was the publication of a revised set of Teachers' Standards (DfE, 2012) and a new knowledge-based primary national curriculum (DfE, 2013), which were both permeated with the neoconservative rhetoric of what Ball (1990) terms cultural restorationism. Teachers' Standard 3 specifies that teachers 'must demonstrate good subject and curriculum knowledge.' This is expanded with reference to the importance of teachers demonstrating 'a critical understanding of developments in the subject and curriculum areas', suggesting engagement with research and theory beyond the boundaries of the primary curriculum. They must also 'promote the value of scholarship' which, again, suggests a renewed emphasis on teachers' subject knowledge. Primary ITT places for 2012-13 were prioritised for providers that offered specialisms in mathematics education in response to a recognised shortage of subject expertise in primary schools. Assessment of spelling, punctuation, grammar and vocabulary was added to the end of Key Stage 2 writing tests, on the recommendation of the Bew Report (2011). Actions suggested that the 'back to basics' narrative was becoming realised in practice which, in turn made fresh demands on teachers' subject knowledge that had been somewhat neglected in recent years. However the Carter Review (Carter, 2015) that was commissioned to evaluate the quality of ITT courses, whilst recognising the significant contribution of university-based ITT in relation to expertise in research and subject pedagogy (important components of subject knowledge), also hailed the diversity of routes into teaching as a strength of the current system. The review's recommendations included the need for a renewed focus on subject knowledge and subject-specific pedagogies whilst simultaneously proposing that the PGCE should become optional. When combined with the instability in university ITT departments created by the proliferation of school-based routes and the outcomes-focused inspection regimes of both primary education and ITT, there

appears to be a lack of congruence in the current discourse around teachers' subject knowledge and ideologies are in conflict.

What becomes clear from examining the historical policy context of *subject knowledge* in initial teacher education is that it is inextricably bound to national policy and the accompanying prevailing notions of curriculum, effective pedagogy and teaching as a profession.

2.2 Teaching as a profession

The location of teaching as a profession within traditional discourses has been subject to much analysis and debate. Etzioni (1969) described teachers as semi-professionals, whilst Hoyle (1974) distinguished between 'restricted' and 'extended' professionalism. Restricted professionalism in relation to teachers describes the competence underpinning their effectiveness, in which skills are derived from classroom experience. Workplace learning is gradual and, for the most part, passive. Hoyle's notion of extended professionalism, in contrast, cites the development of understanding and skills from the interaction of practice and analysis, including theoretical perspectives. Teaching methods are research-informed and subject knowledge and pedagogies are constantly updated. Educational policies and practice are rooted in understanding of their social, economic and political origins and purposes. This perspective implies a requirement for rigorous and extensive training. The idea of making such distinctions is refuted by Johnson (1972, 1984) who treats professionalism as an ideology without distinguishing between true professions and contested professions.

Whilst there is no universally accepted version of a profession, most accounts of professionalism (following the models of Merton (1960), Parsons, (1968) and Goode (1969)) attribute significance to the professional knowledge base within which a professional's expertise is located. Teachers' subject-specific knowledge is obviously an important component of this. Shared ethical codes of conduct under autonomous control are also key features of self-regulating professions. According to Eraut (1994:2), 'Relative freedom from external interference is based on unique expertise, moral integrity, confidentiality and protection from political abuse.' Furlong *et al.* (2000: 5) summarise the interdependent nature of these central concepts in relation to teaching:

The three concepts of knowledge, autonomy and responsibility central to a traditional notion of professionalism, are often seen as interrelated. It is because

professionals face complex and unpredictable situations that they need a specialized body of knowledge; if they are to apply that knowledge, it is argued that they need the autonomy to make their own judgements. Given that they have autonomy, it is essential that they act with responsibility - collectively they need to develop appropriate professional values.

Clearly identifiable trends in the changing policy contexts of primary education and ITT over time include increased prescription of curriculum content and pedagogy, resulting in reduced teacher autonomy. Professional values and ethical codes of conduct have been officially produced by government in successive versions of 'standards' for teachers since the 1990s. Ball (2013: 135) argues that as a result, 'collective professional values are displaced by commercial values, and professionals are dispossessed of their expertise and judgment.' The underlying emphasis of the system is on technical competence and performativity (Ball, 1990). Sachs (2001) identifies three key paradoxes in the current system concerning teacher professionalism. Firstly, teachers are being de-skilled and their work is intensifying. Classrooms are becoming more demanding settings whilst fewer resources are allocated to teacher education (initial and continuing). Rhetoric encourages teachers to be more autonomous whilst simultaneously being subject to greater accountability for raising standards.

Stronach *et al.* (2002: 121) highlight the importance of grounding theories of professionalism for teachers in precisely these uncertainties and contradictions as 'professionals juggle between economies of performance and ecologies of practice.' These ideas relate directly to how subject knowledge is positioned in the professional landscape of the primary schools and university ITT departments at the heart of this study, the policy contexts within which they operate and the professional identities of those individuals engaging in initial teacher education within and between them.

The significance of a profession's knowledge base made it an important focus of study for teaching in a conscious bid to raise the status of the profession (Calderhead, 1991). Most of this work stemmed from the seminal work of Lee Shulman (1986, 1987) who proposed a categorisation of identified knowledge bases for teaching. In order to examine the nature of subject knowledge within the professional knowledge base of primary teachers, Shulman's work is, therefore, a logical starting point.

2.3 Types of teacher knowledge

Eraut (1994: 25) states that 'people are so accustomed to using the word 'knowledge' to refer only to 'book knowledge' which is publicly available in codified form, that they have developed only limited awareness of the nature and extent of their personal knowledge.' The extensive knowledge needed for teaching is undoubtedly complex in nature and whilst these intricacies must be considered, analysis of its components is also required. Through the discussion of the educational policy context, it is apparent that over time, policies have emphasised and prioritised different types of knowledge in the education of pre-service and in-service primary teachers. Trends can be tracked through from an initial focus on personal understanding and scholarship of subjects and subject applications for teaching, to increasing value being placed on practical knowledge of classroom-based skills and knowledge of prescribed curricula. Shulman's (1987) categories of knowledge for teaching provide a useful analytical framework that will be supplemented and extended with additional insights from subsequent studies. Those that provide especially significant additional detail in helping to classify teachers' knowledge have been incorporated into an extended framework of Shulman's categories to support data analysis.

Shulman (1987) classified the knowledge base of teaching into seven distinct categories:

- Content knowledge;
- General pedagogical knowledge;
- Curriculum knowledge;
- Pedagogical content knowledge;
- Knowledge of learners and their characteristics;
- Knowledge of educational contexts;
- Knowledge of educational ends, purposes and values, and their philosophical and historical grounds.

Each of these will be examined and incorporated with evidence from other relevant studies.

i) Content knowledge (or subject matter knowledge)

The first of Shulman's categories refers to the amount and organisation of knowledge *per se* in the mind of the teacher and its scope reaches far beyond facts. Shulman draws on the ideas of Schwab (1964, 1978) who characterised knowledge structures as 'substantive' or 'syntactic'. Substantive knowledge structures relate to the facts, concepts and principles of a discipline and their organising frameworks. Syntactic knowledge encompasses the ways in

which ideas have gained validity, why a proposition is warranted and how a proposition is connected to others within and between disciplines, and between theory and practice. Essentially, syntactic knowledge is how propositional knowledge has been generated and become established within the discipline.

For example, the primary science curriculum programmes of study stipulate that Year 6 pupils should be taught about evolution and inheritance and they provide some simple summarised bullet points of key ideas to be taught. In reality, there is much greater breadth and depth of knowledge behind that specified in the curriculum document and this is what Shulman's content knowledge base captures. In this example, the teacher should have a deeper understanding of the theory of evolution and how it connects to the key mechanism of natural selection. Substantive knowledge structures provide the mental framework and how these concepts relate to each other, and to associated concepts, such as population variation and inheritance and classification of living things. The syntactic knowledge structures would comprise knowledge and understanding of how the theory of evolution via natural selection has been established through the processes of scientific enquiry, to build a body of evidence of different forms (e.g. the fossil record, biogeography, comparative anatomy and embryology, extinction of species and molecular biology). Syntactic knowledge in this example would also include knowledge of competing ideas and arguments relating to evolution, which propositions have gained credence and why, and which have become established within the discipline as result of the working practices of the domain. The full scope of Shulman's content knowledge base is vastly different to a teacher learning a few isolated facts about evolution to be delivered to their pupils.

In their research on immersing children in authentic learning contexts, Clayden *et al.* (1994:172) underline the necessary requirements of teachers' knowledge and understanding of the authentic practices and cultures of academic domains including their specialist language and discourse. They view learning as 'enculturation into these practices.' This adds a layer of working practices that are used to generate knowledge within different disciplines; this, therefore, serves as another element of detail to incorporate into a description of syntactic knowledge structures.

Turner-Bisset (1999) proposed that 'beliefs about the subject' were of similar significance to substantive and syntactic knowledge structures within the content knowledge base due to their influence on how subject matter was interpreted for teaching. Turner-Bisset (1997) showed that student teachers' beliefs about the nature of a subject influenced their

teaching. Wilson and Wineburg (1988) found that differences in new teachers' conceptions of the nature of the discipline of history influenced not only their teaching approaches, but also the manner in which they went about researching to acquire subject knowledge for teaching new history topics. In relation to the teaching of English, Grossman (1987) drew similar conclusions and also found that teacher orientations towards the subject and the concepts that they considered to be important to know, affected how they approached their work. The evidence suggests that 'beliefs about the subject' is a useful additional element to incorporate into the content knowledge base.

ii) General pedagogical knowledge

Shulman's category refers to the 'broad principles and strategies for classroom management and organisation that appear to transcend the subject matter' (1987: 8). This includes knowledge, both practical and theoretical, of how children learn and how this translates to classroom practice. In particular, the category denotes pedagogical knowledge that is not particular to a subject or curriculum area.

In Turner-Bisset's (1999) version of the knowledge bases of the expert primary teacher, she has added a category of 'knowledge/models of teaching' to describe the teacher's beliefs about teaching. Synthesis of research (e.g. Calderhead, 1991; Zeichner *et al.*, 1987; Leinhardt, 1988) shows that teachers' perceptions of what teaching is, impact on what they do in the classroom and the strategies they select to do it. Turner-Bisset justifies this as warranting a separate knowledge base but it is difficult to specify what distinguishes this from general pedagogical knowledge in the sense that, in practice, all pedagogical knowledge will be inextricably bound up with the individual teacher's view of teaching and classroom strategies utilised for different purposes will undoubtedly be influenced by this. In this sense, an individual's beliefs about teaching are clearly important but, for this research, will be considered as an element of general pedagogical knowledge rather than a separate knowledge base.

iii) Curriculum knowledge

Curriculum knowledge is defined by Shulman (1986: 10) as knowledge and understanding of the 'tools of the trade'. These include the curricula but also the associated materials such as texts, practical resources and software. Shulman also cites the importance of lateral (or horizontal) curriculum knowledge – understanding what is being taught in different classes/subjects in the same age group – and vertical curriculum knowledge – what is being

taught in preceding and subsequent years. This can be interpreted for the primary teacher as their knowledge of how the curriculum progresses within and between years in the age phase. Critical evaluation of teaching materials, including curricula is specified as another aspect of curriculum knowledge by Turner-Bisset (1999). This is an important addition to the knowledge base given the inherent pitfalls of teachers relying too heavily on prescribed curricula; often the complex conceptual frameworks behind the signposting summaries in curriculum documents are not appreciated (see p18). The national curricula for ITT adopted as policy in 1997 (DfEE Circular 10/97, DfEE, 1997; revised DfEE Circular 4/98, DfEE, 1998b) attempted to map out this connection between knowledge at the trainee teacher's own level and how it related to the primary national curriculum for Key Stages 1 and 2, even though it is a virtually impossible task to capture the true nature of its complexity. However, as discussed in relation to the policy context of ITT, there have been no such attempts since and with recent levels of central prescription, the need for teachers to critically evaluate curriculum materials is of increasing significance.

iv) Pedagogical content knowledge

Shulman coined this phrase to describe the subject matter knowledge needed *for teaching* as a distinct phenomenon representing the amalgam of a teacher's content knowledge and general pedagogical knowledge required for effective teaching. He included in this 'the most useful forms of representation of ideas, the most powerful analogies, illustrations, examples, explanations, and demonstrations – in a word, the ways of representing and formulating the subject that make it comprehensible to others' (1986:9). It is important to note that Shulman describes it as 'pedagogical understanding' (p10) of the subject matter rather than a body of knowledge and suggested that pedagogical research offers much to better inform teachers' understanding of children's preconceptions and conceptions, to illuminate which teaching strategies might be best to reorganise their understanding. The key feature of this knowledge base is that it is subject-specific in nature. For example, the pedagogical strategies best suited to teaching children to read and interpret a geographical map would be quite different to those used to develop their ability to read and interpret a table of data linked to a scientific investigation. Each would also draw on quite different frameworks of content knowledge.

Because Shulman's concept of pedagogical content knowledge was highly significant, it stimulated a plethora of studies that re-examined and subjected it to multiple analyses

(e.g. Cochran *et al.*, 1993; McNamara, 1991; McEwan and Bull, 1991). Some of these will be discussed in a later section (Chapter 2.8, p40) in relation to the influence of context on teachers' knowledge. The studies that focused on clarifying the precise components of pedagogical content knowledge will now be considered. The common aims of this body of work focus on translating Shulman's idea of pedagogical content knowledge into ever-increasingly precise details relating to specific disciplines in education, with a view to being better informed to support learners. Particular studies focused respectively on, for example, the teaching of English Literature (Grossman, 1990), science (Tamir, 1988; Magnusson *et al.*, 1999), mathematics (Marks, 1990) and language teaching (Andrews, 2001). What is noticeable, however, is that the identified knowledge components of pedagogical content knowledge vary from study to study to such an extent that Abell (2008) questions their usefulness. Several attempts have been made to summarize the range of evidence and ideas about pedagogical content knowledge (e.g. van Driel, Verloop and de Vos, 1998; Park and Oliver, 2008), but the lack of consistency with some elements of specific subject matter knowledge being categorised as pedagogical content knowledge remains problematic.

For example, Grossman's (1990) model of pedagogical content knowledge is referred to widely in studies on this subject. She identifies the following categories of knowledge as being components of PCK:

1. Conceptions of the purpose for teaching the subject matter as an overarching concept;
2. Knowledge of students' understanding, including students' conceptions and misconceptions of particular topics in a subject matter;
3. Curricular knowledge, including all the ideas represented in Shulman's similarly-named category but for highly subject-specific aspects of curricular knowledge;
4. Knowledge of instructional strategies and representations for teaching particular topics.

The inherent difficulties of such re-categorisation are evident in this example. The first category of 'conceptions of the purpose for teaching the subject matter' is a genuinely different idea that would warrant inclusion as an illuminating expansion of Shulman's depiction of PCK. However, the second and fourth categories would already be encompassed within the scope of Shulman's PCK so it is difficult to see any significant

difference. The third category of 'curricular knowledge' is only intended by Grossman to include highly subject-specific aspects of curricular knowledge. Whilst this certainly has conceptual validity, in practice this detail might be overlooked. This could result in the category being homogenised with other generic forms of curriculum knowledge, thus losing its direct relevance to PCK.

Hu (2014) performed a re-analysis of key studies that re-examined Shulman's PCK and identified that the common feature of the models was that neither content knowledge nor general pedagogical knowledge are ingredients of PCK. The key principle that unites them is that all the components are combinations of subject matter knowledge and pedagogy or other knowledge components for teaching. In reality, this principle matches the core essence of Shulman's definition: PCK is the transformation of subject matter knowledge to the knowledge with a pedagogical dimension which is understandable and accessible to learners. When compared to Shulman's definition of PCK, Hu (2014) identified only two truly new additions to further clarify the scope of the knowledge base. These were Grossman's (1990) conceptions of purpose for teaching the subject matter and Tamir's (1988) knowledge of evaluation, meaning knowledge of subject-specific assessment strategies. On this basis, these will be incorporated into the essence of PCK to support data analysis.

v) Knowledge of learners and their characteristics

Shulman's category is relatively self-explanatory in relation to a teacher needing to understand the specific nature of the learners and their backgrounds. Turner-Bisset (1999) expands helpfully on Shulman's description to include sub-categories of cognitive and empirical knowledge of learners. Cognitive knowledge of learners is practice informed by theoretical knowledge of child development, translated into practice through regular contact with a particular group of learners. This is the knowledge that informs a teacher's ability to differentiate and adapt activities and representations to meet the needs of particular learners. Empirical, or social, knowledge of learners comprises knowledge of the general characteristics of children of certain ages, their likes/dislikes, interests, nature of their behaviour in the classroom and relationship with the teacher. Turner-Bisset (1999) gives the example of understanding how 'weather or exciting events' (p45) might affect children's response to an activity.

vi) Knowledge of educational contexts

The knowledge base references the character of educational communities and cultures in all contexts for learning, ranging from the workings of the individual classroom or groups

within it, to entire education systems and beyond. Also incorporated would be the influence of all aspects of national educational policy at each level of the system, including finance and management. The specific nature and role of educational contexts will be examined in a later section in relation to situated models of professional knowledge (Chapter 2.8, p40).

vii) Knowledge of educational ends, purposes and values, and their philosophical and historical grounds

Within this category, Shulman incorporates the socio-cultural, historical and philosophical foundations of education as an important basis of teachers' knowledge. He recognises that teaching is concerned with ends as well as means, and proposes that the knowledge base must, therefore, also deal with the purposes of education as well as teaching methods and approaches.

This category overlaps to a certain degree with knowledge of educational contexts. In this research, I have made a distinction, for the purpose of data analysis, between knowledge of the context (e.g. adopting a particular teaching approach to align with a school's policy) and knowledge of purposes and values underpinning teaching that are rooted more deeply in 'bigger picture' ends (e.g. seeing knowledge and learning as empowering and emancipatory).

viii) Knowledge of self

Shulman proposed these categories of the knowledge base of teachers as a minimum. To this, 'knowledge of self' has been added by several authors (Elbaz, 1983; Grossman, 1995; Turner-Bisset, 1999) as an important knowledge base for teaching. As self-evaluation through reflective practice (Schön, 1983) has been central to the majority of teacher training courses in England for decades (Edwards *et al.*, 2002; Pollard, 2014), then teachers' knowledge of self is instrumental to the learning processes of initial teacher education. Turner-Bisset (1997) found that knowledge of self was essential for reflection at higher levels (e.g. McIntyre, 1992) and that this, in turn, supported the student teachers' development. The role of self-understanding in teachers' epistemological orientations is also well documented (e.g. Hillocks, 1999; Kelchtermans, 2009) and will be discussed in depth in a later section (Chapter 2.9, p48). On this basis, knowledge of self is considered to be a potentially important knowledge base to include in this research study.

ix) Craft knowledge

One of the sources of teachers' professional knowledge is referred to by Shulman (1987: 11) as the 'wisdom of practice.' This seems to correlate with Polanyi's (1983:22) use of the

term tacit knowledge to describe how ‘we can know things, and important things, that we cannot tell.’ Eraut (1994: 111) elaborates on this form of knowledge as ‘something that is not easily explained to others or even to oneself.’ The spirit of tacit knowledge is encompassed in the knowledge base of ‘craft knowledge’ proposed by Grimmet and McKinnon (1992) to refer to the knowledge that teachers develop in relation to the natural aptitude they feel for their teaching and the children they work with.

2.4 Locating *subject knowledge* within the knowledge bases

The knowledge base of teachers is multi-faceted and complex; defining and understanding its nature has been argued as pivotal in supporting the education of teachers (e.g. Calderhead, 1991) and in elevating the status of the profession in the perceived sense of it necessitating years of specialist study and training. Focusing more specifically on the notion of *subject knowledge* within this, as framed in the changing context of initial teacher education policy, there are identifiable connections between the terminology of teacher education in the 1970s and 1980s of knowledge of the subject and ‘subject applications’ and Shulman’s categories of content, or subject matter, knowledge and pedagogical content knowledge respectively. The version of *subject knowledge* associated with detailed lists of knowledge requirements in the core subjects of English, mathematics and science that had to be audited as part of the National Curricula for ITT (DfEE, 1997) correlates with an overriding emphasis on substantive aspects of content knowledge. The intended meaning of *subject knowledge* in subsequent policies has been relatively ambiguous and open to interpretation. For example, the TDA (2007a) published a framework for students’ subject knowledge for teaching. The document, perhaps cautiously, indicated that it was *one way* of looking at subject knowledge for teaching. The framework comprised four elements considered to be essential to trainees’ development of subject knowledge for teaching. The elements were:

- Subject knowledge *per se* (described as the essential knowledge and understanding needed to teach a subject effectively);
- Pedagogy: subject, theory and practice (teaching skills and strategies needed to teach all pupils effectively);
- Pupils’ development (understanding of how learning is linked to pupils’ development and their social, religious, ethnic, cultural and linguistic backgrounds and contexts);

- Attitudes (positive attitudes to pupils' learning that underpin subject knowledge, skills and understanding).

Each element comprised a range of knowledge, skills and understanding. The proposed model took the form of a Venn diagram of the first three elements, all encapsulated within the outer circle of 'attitudes'. The influence of the professional standards in use at the time (TDA, 2007b) is apparent throughout the wording of the exemplar model provided in the document. So, for example, under the 'attitudes' element, 'working as part of a team, learning from others and contributing to the learning community' are detailed, coinciding with standard Q32 (*Work as a team member and identify opportunities for working with colleagues, sharing the development of effective practice with them*). The attitudes that trainee teachers must adopt appear to be prescribed externally in the framework, rather than drawing on 'knowledge of self' (Elbaz, 1983; Grossman, 1995; Turner-Bisset, 1999) as a notion of more honest self-awareness to inform reflective practice.

What is of interest is the fact that the element 'subject knowledge *per se*' included aspects of subject matter knowledge, curriculum knowledge and some references that could be considered to represent aspects of pedagogical content knowledge (e.g. assessment of pupils' achievements with the subject area). From this framework, it would suggest that the TDA's conception of subject knowledge for teaching constituted more than just propositional knowledge of a subject, however as the title of the document states, the model was only offered as '*a way of looking at subject knowledge for teaching*', thus leaving room for alternative interpretations.

What is evident from the identification and analysis of the knowledge base for teaching via the literature is that the term *subject knowledge* does not derive directly and unequivocally from any category of knowledge defined therein. Interpretations will undoubtedly depend on epistemological orientation.

2.5 Teacher thinking about knowledge

Different types of knowledge needed for teaching cannot be considered in isolation from teacher thinking. Although teacher knowledge and teacher thinking are not completely distinct, it is useful to consider the terms separately to represent different kinds of knowing (Davis and Sumara 2000; Ellis, 2009). Analysis of the knowledge-bases of teachers will naturally incorporate different orientations to knowledge. For example, an objectivist

perspective regards knowledge as ‘some third thing – to be grasped, held, stored, manipulated and wielded’ (Davis and Sumara, 1997 :110). In relation to teacher education, this might be interpreted as a constant and stable body of knowledge that is *given* to teachers and students. The assumption for teacher education that has followed from this epistemological stance is that this prerequisite body of knowledge can be converted into a teachable form of knowledge (Labaree, 1992). This does not, however, capture the dynamic nature of subject disciplines. Alexander (2010: 248) urges us to view the knowledge domains ‘not as collections of inert or obsolete information but as distinct ways of knowing, understanding, enquiring and making sense.’

At the other end of the spectrum, a subjectivist epistemology asserts that individual experience is the foundation for all knowledge. When applied to teacher education, this would relate to prioritising experience in the classroom through employment-based apprenticeship models of training whilst dismissing intellectual, knowledge-based elements of learning to teach. From this perspective non-codifiable forms of knowledge have significant value such as Calderhead’s (1988) ‘practical knowledge’ or the tacit knowledge associated with ‘craft knowledge’ (Grimmett and MacKinnon, 1992).

The dualism inherent in these epistemologies is problematic in the discourse of subject knowledge in teacher education. Objectivism promotes a notion of knowledge being acquired by individuals piece by piece, and gives rise to context-free approaches such as the auditing of content-focused aspects of subject knowledge as promoted in the 1997 National Curricula for ITT (DfEE, 1997, Circular 10/97; revised DfEE1998b, Circular 4/98) and its associated narrative of ‘gap’ filling. Alternately, the context-bound nature of a relativist perspective allows no place for theory and research-informed practice, with the inherent danger of teachers adopting simplistic, under-theorised approaches in their place.

A third epistemology, which has dominated narratives in teacher education in England for decades, is the reflective perspective. This is strongly associated with Dewey’s pragmatism and the work of Schön and his concept of ‘ordinary practical knowledge’ (Schön 1983: 54), gained through knowing-in-action via the technique of reflection-in-action focused on practical problem solving. Knowing is viewed as an on-going process of developing understanding in practical situations, therefore dependent on the context. Schön argues that reflection in action solves the paradox of how we come to know something that we do not know (Plato’s Meno paradox). Edwards *et al.* (2002) prompt consideration of how the paradox applies to teaching because even beginning teachers have experienced a wide

variety of teaching situations as students and, therefore, already possess multiple understandings of what teaching is, that they draw on to make sense of educational theory and practice. Edwards *et al.* (2002) point out that there is no need for individuals to tie themselves in 'reflective knots' (p37) as there are existing theories of knowledge to accommodate teaching in practice. Edwards (1995) found scant evidence in the literature to suggest that reflection on practice in ITT is an opportunity to connect any sort of pedagogical theory with practice, due to the intensification of practice. The issue here is actually that common sense theories will be used by teachers to explain cases without the associated disciplines being brought into the reflective arena.

Edwards *et al.* (2002) offer a fourth perspective for teacher education - the contextualist perspective. This bridges the dichotomy of the objectivist (context-free) and subjectivist (context-bound) perspectives. They draw on the work of Wittgenstein, who argued that it is the social system we operate in that provides the criteria against which we judge whether something is perceived as being knowledge or falsehood (Wittgenstein, 1949 cited in Edwards *et al.*, 2002: 38). His ideas are the foundation of social constructivism. Accordingly, Edwards *et al.* (2002) describe how the practice of teaching reveals 'interconnected sets of rule-governed behaviour which vary from social context to context' (p39). They re-frame Schön's (1983) ideas in relation to teacher education as student teachers being 're-socialised as they reconceptualise what they understand teaching to be' (p40). They argue that the 'game' of teaching needs practice and then understanding of the criteria that guide practice, which would include grappling with the shifting nature of the educational landscape.

2.6 Expert teachers

Diverse evidence from the findings of ten years of work of the ESRC (Economic and Social Research Council) Teaching and Learning Research Programme (TLRP) comprising multiple individual studies focused on improving outcomes for learners across the United Kingdom, have been synthesised to formulate ten evidence-informed principles of effective pedagogy (James and Pollard, 2011). Although all of the principles are inter-connected and therefore relevant, the second principle directly concerns the specific forms of knowledge that underpin effective pedagogy.

Principle 2: effective pedagogy engages with valued forms of knowledge. Pedagogy should engage learners with the big ideas, key processes, modes of discourse, ways

of thinking and practising, attitudes and relationships, which are the most valued learning processes and outcomes in particular contexts. They need to understand what constitutes quality, standards and expertise in different settings. (James and Pollard, 2011: 284)

Relating this principle particularly to the notion of teachers' *subject knowledge*, it could be interpreted as encompassing substantive and syntactic knowledge structures of content knowledge, in combination with pedagogical content knowledge. These must combine with other forms of knowledge about learners and the educational contexts within which learning is situated. Principle 3 denotes the importance of the recognition of prior experience and learning in planning next steps, whilst Principle 4 underlines the significance of well-informed scaffolding to support learners intellectually, socially and emotionally. Clearly, these principles require combinations of teachers' knowledge that would necessarily include well-developed understanding of conceptual frameworks of subject matter and a repertoire of pedagogical strategies to make it accessible and understandable to children, along with knowledge of the evidence that justifies their selections of knowledge, skills and techniques. The need for all those involved in teaching to continue learning to develop their knowledge and skill, especially through practice-based inquiry is highlighted in Principle 9: 'effective pedagogy depends on the learning of all those who support the learning of others' (p306). The principles are comprehensive and coherent in their articulation of effective pedagogy and the underpinning role of knowledge, including subject-specific knowledge, in enabling the teacher to draw together multiple forms of knowledge to inform their teaching decisions and actions.

Alexander (2010: 408) notes that whilst many primary teachers who contributed as witnesses to the Cambridge Primary Review argued that subject knowledge is much less significant in primary education than dispositions and relationships, the child witnesses located 'expertise' in subjects to be taught. The children's views aligned with the TLRP's second principle of effective pedagogy engaging with valued forms of knowledge. If subject-specific knowledge is a crucial component of effective pedagogy but primary teachers do not necessarily recognise this, it suggests it might be an example of the theory-practice gap in education. It raises an interesting question of how expert teaching is conceptualised and characterised. Connected to this, it becomes important to understand the role of subject-specific knowledge in the trajectory from novice to expert teacher. As Sternberg and Horvath suggest (1995: 9), 'to know what we are developing teachers

toward, we need a model of teaching expertise.' They make a key distinction between teachers who are experienced and those who are experts; whilst expertise generally increases with experience, it is not a given that experienced teachers are expert teachers.

Conceiving such a model is difficult because 'there exists no well-defined standard that all experts meet and no non-experts meet' (Sternberg and Horvath, 1995: 9). This is where their notion of a prototype model proves useful in capturing the central tendencies of the category. They identified three prototype features of expert teachers relating to knowledge, efficiency and insight. In general, experts are sensitive to the deep knowledge structures and the underlying principles of the problems they solve, whereas novice teachers tend to be more sensitive to surface structures. Expert teachers possess knowledge that is understood through integrated propositional structures and schemata that connect with other types of knowledge, to fully take account of the socio-cultural contexts in which their teaching is enacted. Experts are more efficient; they can do more in less time than non-experts and their superior performance appears to require less effort. Sternberg's and Horvath's (1995) third feature of teaching expertise relates to insight. Expert teachers can understand the same situation more deeply. They argue that 'whereas novices and experienced non-experts seek to reduce problems to fit available methods, true experts seek progressively to complicate the picture, continually working on the leading edge of their knowledge and skill' (p13). The depth and complexity of teachers' knowledge conceptualised in this prototype model of expertise, and its underlying connection to different aspects, is fully apparent.

Wood (1988) also identifies contingent teaching as being a significant factor in effective teaching and its dependence on the teacher's ability to identify and respond appropriately to a learner's needs on a moment by moment basis. It requires the teacher to draw, simultaneously, on their understanding of the conceptual framework being developed and knowledge of how it can be made accessible and meaningful to children. Tochon and Munby (1993) similarly emphasise the fact that expert teachers operate in the moment, pulling together multiple aspects of their knowledge and understanding in a situated context, in one well-informed action. They found that novice and expert teachers worked with different 'time epistemologies' in the classroom. Expert teachers held mainly a synchronic notion of teacher time, focusing on the intensity of particular moments where different elements of teaching come together. In contrast, novice teachers operated within a diachronic time epistemology which emphasises a linear approach through

predetermined planning and use of time in the classroom. They are far less likely to respond contingently to learners' individual needs. Tochon and Munby (1993: 216) refer to the combination of the expert teachers' thoughts and actions as a pedagogic 'wave function' that 'merges didactics into pedagogy and vice versa'. This enables the teacher to work synchronically in a particular context to interpret the cues from the individual learner, and combine them with their understanding of the framework of concepts underpinning the subject matter, the theory of how best to represent these concepts in their teaching and their understanding of how children learn.

Glaser (1999, pp. 91–92) highlights six generalisations about experts which are summarised by Eade (2014: 5):

1. Experts' proficiency is very specific, derived from the specialised knowledge that drives their reasoning, though some task domains may have transferable forms of expertise.
2. Experts perceive large meaningful patterns, with 'pattern recognition occur(ring) so rapidly that it appears to take on the character of intuition' (p. 91).
3. Experts' problem solving entails selective search of memory or use of general problem-solving tactics, with an 'efficiency that derives primarily from their knowledge being structured for retrieval, pattern recognition and inferencing' (pp. 91–92).
4. Experts' knowledge is highly procedural and goal-oriented since their concepts are bound to procedures and the rules and conditions for their application, and closely tied to the goal structure of a problem.
5. Experts' knowledge enables them to use self-regulatory processes with great skill, which enables them to step back at appropriate points and observe their solution process and the outcomes of their performances. Their self-awareness is shown in the allocation of attention and sensitivity to information feedback, which may slow them down in the initial encoding of the problem, though they are likely to be quicker overall.
6. Experts' proficiency can be routinised or adaptive, such that, under some conditions, maybe most, experts' performance becomes routinised, efficient and accurate, but they can adapt and exercise opportunistic planning.

Berliner (1994a; 1994b) asserts that a particular sub-set of Glaser's (1999) propositions about the characteristics of expertise, including those described here, is supported also by the research on expert teachers. Sternberg's and Horvath's (1995) themes of the expert teachers' knowledge, efficiency and insight are clearly evident within Glaser's (1999) generalisations. Expert knowledge is structured in the most useful conceptual frameworks and can be retrieved and utilised with great efficiency in ways that show deep insight into particular situations.

Berliner (2001) raises the problem of the role of talent in expertise in relation to teaching. Ericsson and Charness (1994) claim it is motivation and interest that give rise to expertise, rather than a specific talent or genetic disposition for expert levels of performance, whereas Gardner (1995) argued that talent cannot be overlooked, whilst acknowledging the role of extensive practice. Berliner (2001) highlights the problematic nature of the notion of 'talent' in relation to researching teaching due to the fact that it is 'probably an extremely complicated interaction of many human characteristics' (p465). He asserts that extensive, deliberate practice is needed and attention needs to be paid to the role of context. Teachers will achieve different levels of productivity depending on the conditions in the setting in which they work (McLaughlin and Talbert, 1993; Cohen, 2000). Tied to contexts, is the role of culture. Alexander (2001) demonstrates that culture affects teachers and teaching and notions of quality. This makes it difficult to judge what expert teaching looks like. There tends to be a focus on measuring the outcomes of teaching in terms of pupil achievement, which is a valid measure, but judgements of the quality of teaching are also needed. Fenstermacher and Richardson (2000) make a distinction between 'good' and 'successful' teaching to incorporate these two important elements. Both of these aspects were incorporated into the following research which examined features of teacher expertise.

In the United States, the National Board for Professional Teaching Standards began a programme of research in 1987 to support its mission to establish a national voluntary system to identify and certify teachers who met their high and rigorous standards. The Board and its consultants specified what teachers should know and be able to do to meet the standard of expert, or master, teachers (National Board for Professional Teaching Standards, 1994). The standards were challenging, requiring extensive preparation of evidence and pass rates were low. Bond, Smith, Baker and Hattie (2000) embarked on research to determine whether these teachers assessed by the Board demonstrated in the

ways they worked, the prototypical features of expertise defined in the literature (e.g., Berliner, 1994a, 1994b; Shulman, 1987; Sternberg and Horvath, 1995) and whether they affected student achievement in a positive way. The research included generalist elementary teachers as well as middle and upper school subject-specialists. The 13 prototypical features hypothesised to be held by expert teachers were:

- better use of knowledge;
- extensive pedagogical content knowledge, including deep representations of subject matter knowledge;
- better problem-solving strategies;
- better adaptation and modification of goals for diverse learners and better skills for improvisation;
- better decision making;
- more challenging objectives;
- better classroom climate;
- better perception of classroom events and better ability to read the cues from students;
- greater sensitivity to context;
- better monitoring of learning and providing feedback to students;
- more frequent testing of hypotheses;
- greater respect for students;
- display of more passion for teaching.

In the research, these features were correlated with measures for outcomes of teaching in areas such as students' higher levels of achievement, deep rather than surface understanding of subject matter, higher motivation to learn and feelings of self-efficacy.

Berliner (2004: 209) describes the results of the research as 'quite remarkable'. The board-certified teachers excelled in each of the prototypical features of expert teaching with statistical significance. Berliner (2004: 209) concludes that:

The features with the greatest ability to discriminate between the expert and non-expert teachers were the degree of challenge that the curriculum offered, the teachers' ability for deep representations of the subject matter and the teachers' skilfulness in monitoring and providing feedback to his or her students.

Those teachers who demonstrated these features of expertise had their greatest impact with younger children and with low-income students. The findings are, therefore, particularly significant for primary education.

The prototypical features identified above, therefore, offer a valid typology of teacher expertise and have been used as a theoretical framework to support data analysis in this research. The findings discussed by Berliner (2004) demonstrate the pivotal role of pedagogical content knowledge in enabling teachers to provide 'deep representations of the subject matter'; this links directly to *subject knowledge*. This was identified as one of the most significant features of expert teaching, concurring with the importance already highlighted in relation to the literature.

Having arrived at a research-informed view of what expert teachers know and do, it is then useful to return to the nature of teachers' trajectories from novice to expert. The developmental model of Dreyfus and Dreyfus (1986) adapted by Berliner (1994a; 1994b), describes characteristic behaviour of five stages of development as teachers move from *novice*, to *advanced beginner*, to *competent performer*. A smaller sub-set of teachers will then move on to *proficient* and *expert* stages of development. The novice works to a set of context-free rules and behaviour tends to be rational and inflexible, conforming to set procedures. Minimal teaching skill is expected at this stage. For advanced beginners, case knowledge gained through experience, enables similarities across contexts to be recognised. Their practical knowledge builds and this guides their practice rather than theory. Most advanced beginners will become competent performers through experience, but not all. They are characterised by being more in control of their circumstances and their ability to make decisions to prioritise aspects of curriculum, use of classroom time and when rules and procedures apply and when they do not. The proficient stage is estimated to be reached after approximately five years for a small number of teachers. The stage is characterised by teachers' intuitive ability to anticipate and respond to classroom situations. Fewer teachers still, will move to the expert level where teaching is effortless and fluid. Glaser (1999) describes the process in terms of a change in agency over time with the individual moving from *externally supported* to *transitional*, where scaffolding is decreased and guided practice is increased. The third stage is *self-regulatory*. A combination of the two provides a useful heuristic for examining the characteristic behaviour at different stages of development from rule-governed, supported teaching to fluid, self-regulated and intuitive teaching. Given the crucial role of pedagogical content

knowledge in teaching expertise, its development must also be part of the trajectory from novice teacher to expert.

What is clear from the evidence about expert teaching is that it is highly complex, involving deep intellectual knowledge and understanding combined with practical activities, in situated communities of practice. The significance of expert teachers possessing a synchronic time epistemology, where all of these complex forms of knowledge converge successfully in a teaching moment, that appears effortless and intuitive, sits in stark contrast to the manner in which professional standards for teaching are used to assess the quality of teachers' pedagogy in educational policy and practice. Whilst it could be argued that the revised Teachers' Standards (DfE, 2012) may identify elements of pedagogy that allude to the prototypical features of expert teaching (e.g. the importance of 'good subject and curriculum knowledge'), the semantics of the standards in combination with ritualistic and mechanistic application of them to the assessment of teaching quality and success, are unlikely to capture the synthesis that underpins effective pedagogy.

2.7 The role of *subject knowledge*

As already discussed, the term subject knowledge, as used throughout initial teacher education in England, does not necessarily translate directly to the literature. In order to ensure conceptual validity in a research context, this general term needs to be defined explicitly and with much greater specificity. This is frequently managed with reference to Shulman's categories (1987), parts of his categories (e.g. substantive content knowledge) or natural developments of categories (e.g. Turner-Bissett, 1999), because it provides a language and vocabulary through which to communicate the researchers' interpretations. There is no universally accepted correlation between particular knowledge bases and the term *subject knowledge*.

Numerous studies have examined the possible impact of teachers' subject-specific knowledge for teaching on the quality of their teaching and classroom practice (e.g. Grossman, 1989; Wragg *et al.*, 1989; Rovegno, 1992; Aubrey, 1997; Medwell *et al.*, 1998; Poulson *et al.*, 2001; Goulding *et al.*, 2002; Heywood, 2005). Some trends are evident in the body of research. Firstly, Poulson (2001) identifies that the deficit model of teacher subject knowledge that is often portrayed, highlighting what teachers appear not to know (Bennett and Carré, 1993; Aubrey, 1997), is often accompanied by the assumption that topping up that knowledge base will improve teaching, with an implicit assumption of a

transmission style of teaching. Secondly, ways of identifying and quantifying teachers' knowledge of a subject are problematic, as highlighted by Askew *et al.* (1997). Following from that, it needs to be recognised that the knowledge required to teach primary children may not be the same knowledge of a subject required to attain formal academic qualifications. Where this definition of subject knowledge is applied, findings need to be interpreted with caution.

Studies where teachers' subject knowledge has been framed as their formal academic knowledge of a subject *per se* have mixed findings. For example, Bennett and Turner–Bisset (1993) found that music specialists perform at a higher level of competence in classroom teaching of the subject and in relation to teachers' mathematical knowledge of the subject matter, Goulding *et al.* (2002) found a clear link between this subject matter knowledge (assessed via audit scores) and teachers' competence in teaching number. Low audit scores, indicating poor subject matter knowledge, were also found to be associated with weaknesses in planning and teaching primary mathematics. Brown *et al.* (1999) and Green and Ollerton (1999) have identified primary trainees' anxiety about mathematics as a major issue, which would appear to link to the findings of Goulding *et al.* (2002).

In contrast, Medwell *et al.* (1998) and Poulson *et al.* (2001) found no clear relationship between primary teachers' explicit academic knowledge of English and their effectiveness in teaching literacy. However, this does not suggest that teachers' knowledge of the subject is unimportant. Medwell *et al.* (1998) actually found that rather than effective teachers of literacy possessing a body of formal knowledge (content knowledge) that undergoes a process of transformation to make it teachable to children (pedagogical content knowledge), they understood this subject matter in the form that they would teach it to children. In other words, their knowledge base *was* pedagogical content knowledge. Medwell *et al.* (1998) acknowledge that at some time in the past the teachers might have understood this knowledge in another form, but that through their teaching experience, their knowledge had become completely embedded in, and shaped by, their teaching practice. Askew *et al.* (1997), in their parallel study of effective teachers of numeracy, also found that a model where teachers' prior subject matter knowledge and its structure was then transformed into pedagogical content knowledge to make it accessible to pupils, appeared not to be applicable. Again, their content knowledge seemed to be pedagogically situated in its nature. This evidence suggests that pedagogical content knowledge might be more important in influencing quality and effectiveness of teaching.

Golby *et al.* (1995) criticise research that focuses on teachers' weaknesses in science subject matter knowledge and the suggestion that this can be addressed by provision of additional subject knowledge to be transferred to children, because this approach implicitly encourages a transmission view of the teaching and learning of science. Parker (2004) argues strongly for the synthesis of content knowledge and pedagogical content knowledge as being crucial in the science education of primary teachers. This is echoed in Heywood's (2005) research which, through the exemplar context of trainee primary teachers' learning about the phenomena involved in the teaching of the topic of 'light', highlighted the emphasis that is often placed on knowledge over understanding in curricula. He draws out the implications as trainees having, at best, a tenuous understanding of the rationale that underpins the basic ideas embedded in the prescribed curriculum for science and, as a result, are not necessarily able to articulate an explanation of phenomena. The potential impact of this on teachers' self-images is clear, and Appleton (1995) emphasises the need for care to be taken to enhance this alongside development of subject knowledge. McKeon (2004) is insistent that increased confidence must be fully grounded in correct scientific understanding for it not to be misplaced confidence. He underlines the need for teachers' knowledge of science to be linked to better procedural understanding of investigations, as suggested by Duggan and Gott (1995) and Warwick *et al.* (1999). He argues that investigations clarify the meanings of concepts to children so teachers' development needs to focus on enabling this. These ideas relate to improving teachers' procedural understanding of the discipline of science, i.e. syntactic elements of science content knowledge, in order to support the development of teachers' pedagogical content knowledge which, in turn, is linked to confidence.

The significance of pedagogical content knowledge in primary geography teaching is highlighted by Catling and Morley (2013), who cite a key point reiterated by Ofsted (2008, 2011), that whilst primary teachers generally have good generic teaching skills, for many they are not clear about what constitutes good geographical learning for and by children, i.e. pedagogical content knowledge of geography. This often results in missed opportunities to extend children's learning and challenge their misunderstandings. In practice, addressing these weaknesses is an issue due to the low priority of geography in primary ITT and teachers' continuing professional development.

Likewise, the limitations of current practices in school in relation to the teaching of physical education are impacting on teachers' pedagogical content knowledge. Ward (2013) found

that when personal experiences of pedagogy and content knowledge relating to the teaching of physical education (PE) are left unchallenged, very narrow topic-specific pedagogical content knowledge results. He describes this as being characterised by 'inseparable pairing of constricted pedagogical strategies and limited content knowledge' (p562), which has repercussions for the curriculum and learning experiences offered to pupils. The source of this in the research was teachers attaching significant value to the practice of sport coaches employed by schools to deliver PE lessons. This type of provision was associated with narrow breadth of curriculum experiences for children. The teachers, however, considered the coaches to be subject specialists and therefore, they emulated the very sport-specific content knowledge and pedagogical practices associated with developing specialised sporting performances through coaching. This does not represent pedagogical content knowledge for the different purpose of teaching PE to primary children. This is compounded by pressurised primary ITT courses that have limited opportunities to develop student teachers' knowledge and understanding of PE teaching.

A long-standing debate exists about the role of 'subject knowledge' in school-based elements of initial teacher education spanning the last two decades. Student teachers with well-developed *subject knowledge* (in this case relating to the students' prior subject matter knowledge), were found to use the observed practices of the supervising teacher rather than drawing on their own (Calderhead, 1998; Maynard and Furlong 1993; Furlong and Maynard 1995). Maynard and Furlong (1993) and Furlong and Maynard (1995) also provided evidence of the low priority accorded to subject knowledge in planning, teaching and discussion of the content of lessons. This evidence links to the previous discussion of the importance of pedagogical content knowledge rather than content knowledge, as embodied in formal qualifications.

There is also evidence of a lack of focus on subject-specific aspects of lessons in the student-mentor interactions during school-based learning experiences. For example, Brown, McNamara, Jones and Hanley (1999) found that post-observation meetings between students and their mentors typically focused heavily on organisational features of the lesson, with very little attention to mathematical aspects of mathematics lessons. Primary school-based mentors tended to prioritise classroom management and professional issues, and did not provide quality subject-specific feedback to support trainees in the effective application of their subject knowledge (Brown and McNamara, 2005). Strong and Baron (2004) found through their research that only 2% of mentors'

suggestions to beginning teachers related to the subject matter being taught. Trainees begin to perceive some disparity between the principles presented to them in universities and the practice that they witness in schools (Eisenhart *et al.*, 1991; Smith, 1999). This is a key example of what Wubbels (1992: 137) has called 'the problematic gap between theory and practice in education.'

In their analyses of student and mentor conversations, Edwards and Ogden (1998) applied a model of subject knowledge as content knowledge that undergoes a process of transformation (Tochon and Munby, 1993) into 'school knowledge' (Banks *et al.*, 1999), similar to pedagogical content knowledge. They found a very small proportion of talk associated with that process of transformation in mentoring conversations and, within this, there was variation between subjects. They found twice as many occurrences of such conversations in relation to science teaching than mathematics, for which this was prescribed by published schemes. In a parallel study, Edwards (1997) confirmed the importance that students attached to mathematics schemes in conversations about their teaching. Edwards and Ogden (1998) uncovered another difference in relation to conversations about the teaching of religious education (RE), for which there was a large proportion of talk about the knowledge of the subject. Interestingly, the knowledge discussed by both parties was already in a pedagogical form, in a similar manner to the findings of Medwell *et al.* (1998) and Askew *et al.* (1997) in their respective studies of literacy and numeracy teaching. In relation to discussions of the design and implementation of classroom tasks, differences were observed again between subjects. There was much more talk about the scope and focus of learning in mathematics and RE, supported by the schemes for the former and the narrative structure of the subject matter for the latter. Mentoring conversations highlighted 'the didactic linearity of curriculum delivery rather than the intelligently adaptive pedagogic responses of teachers' (Edwards and Ogden, 1998:745). There was a general lack of attention to pupils' engagement with the discourse of the focus subject, other than attention to student teachers' use of appropriate language. Edwards and Ogden (1998) also highlight a significant point that, in relation to designing tasks to transform content knowledge, the nature of student-mentor discussions actually raised questions about teachers' own understandings of this. As a result, they question the reliance on post-observation conversations between students and mentors as a means of constructing professional knowledge.

In conclusion, Edwards and Ogden (1998) claim that some of the analyses of the nature of teachers' professional knowledge appear to take primary teachers' subject matter knowledge for granted in a manner that is not always appropriate to the scenario of learning to teach the primary curriculum in schools, and warned that school-based initial training in primary schools remained dangerously under-theorised. The partnership between universities and schools did not take into account the subject knowledge demands being made on mentors in schools, hence the lack of focus on subject-specific knowledge in mentoring conversations. The lack of attention to more general principles of practice or a more sophisticated critical evaluation of the complexities of practice meant that student teachers were not being helped to acquire the 'generality of knowing' which Greeno (1997) argues is central to learning in real life situations.

Some possible solutions to bridge the theory-practice gap have been proposed. For example, in response to the lack of subject-specificity of student-mentor post-observation conversations in mathematics, Rowland *et al.* (2005) have identified four key dimensions of student teachers' subject-specific knowledge development to frame these conversations. Their knowledge quartet tool comprises: foundation (characterising the trainees' theoretical background and beliefs); transformation (representing the conversion of content knowledge to pedagogical content knowledge); connection (concerning the coherence of the planning or teaching demonstrated across sequences of learning); and contingency (readiness to respond to children's ideas and preparedness to deviate from their planned lesson agenda). The tool has been designed to better support subject-specific mentoring dialogue and to direct it away from generic elements of teaching.

From her research about student teachers' beliefs and values towards their teaching of literacy, Twiselton (2000) was able to identify broad categories of developing teacher identity: Task Managers, Curriculum Deliverers and Concept/Skill Builders. She found that the conceptual connections made between pieces of information are what enable the transference of what we have learned from one situation to another (Clayden *et al.*, 1994). Those student teachers who were 'delivering the curriculum' without fully understanding the theory underpinning it were less likely to be helping children to make these connections, because they had not done so themselves. In her recommendations arising from the research, Twiselton (2000) identified the school-based mentors as being crucial in developing student teachers' scaffolding strategies to enable children's understanding. In this, she recognises, like Edwards and Ogden (1998), the demands this places on mentors in

supporting student teachers to do this across the whole primary curriculum. She also recommends mentors working much more alongside student teachers to model strategies and using this as the basis for discussion afterwards. Another key recommendation was the need for student teachers to spend time and be supported to develop their understanding of the underlying frameworks for subjects away from the immediate demands of the classroom, but with the opportunity to transfer learning back to it in a timely fashion. This has implications for the design of ITT courses.

Edwards and Ogden (1988: 737) argue that subject knowledge is not something 'merely to be applied in classrooms, or woven into activities.' They identified the importance of examining how teacher knowledge is constructed in the socio-cultural roots of the communities of practice in primary school teaching. With the current policy agenda of significantly increasing the proportion of school-led ITT, some of the evidence discussed here in relation to the development of primary teachers' knowledge in practice, needs careful consideration. As Hargreaves (2000: 153) states:

Moving teachers' professional learning and preparation more towards the school site [which] may increase its collaborative and practical potential, but in excess, if it is severed from the academic world altogether, this strategy will de-professionalise the knowledge base of teaching and dull the professions' critical edge.

This leads to consideration of the influence of settings and contexts on *subject knowledge* within the professional knowledge base of teachers.

2.8 Influence of context

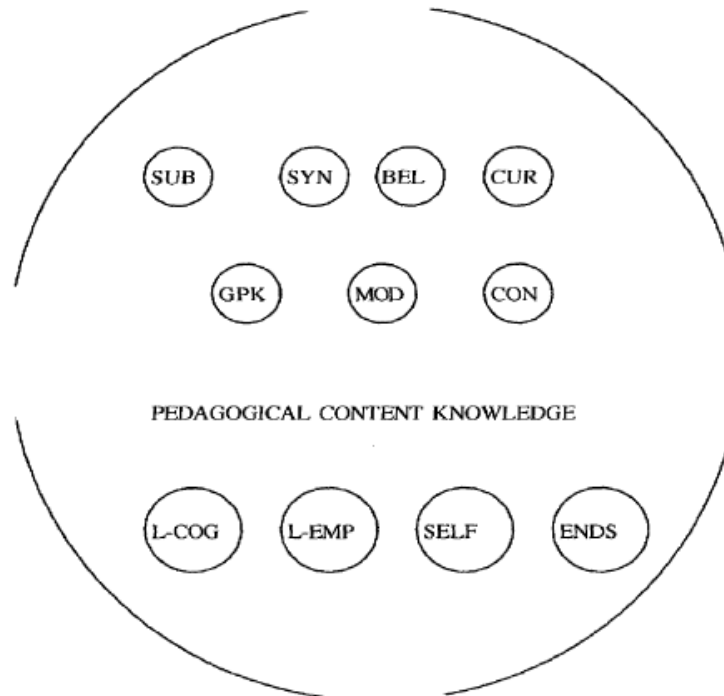
According to Eraut (1994:20), the 'context affects what [professional] knowledge gets used and how.' Shulman's model, whilst providing a coherent conceptual framework of the knowledge bases for teaching, does not reflect the interaction between theory and practice for teachers in different contexts. Stones (1994:279) argues that by default, Shulman therefore accepts a 'delivery view of teaching.' The perceived static nature of Shulman's concept of pedagogic content knowledge as a combination of knowledge bases is also challenged by Cochran *et al.* (1993), who propose that it is an active process, based on a constructivist view of learning. They present a development model of pedagogical content knowledge which stresses the dynamic and interrelated nature of 'pedagogical content *knowing*'. Inherent difficulties in the notion of being able to separate subject matter

knowledge from pedagogical content knowledge in practice have also been identified (McNamara, 1991; McEwan and Bull, 1991). McEwan and Bull (1991) go further in stating that all knowledge is pedagogical in some way when related to the act of teaching.

The role of educational contexts has been highlighted as being particularly significant for beginning teachers who have to relate their subject knowledge to school 'communities of practice' (Banks *et al.*, 1996, after Lave and Wenger, 1991): school schemes of work and policies, interpretations of curriculum documents and commercial schemes, for example. A range of alternative models of the knowledge bases of teaching have been developed in response to such criticisms and as a natural development of Shulman's original model (e.g. Grossman, 1987; Marks, 1990; Silberstein and Tamir, 1991; Cochran *et al.*, 1993, Meredith, 1995, Banks *et al.*, 1996, Ellis, 2007).

One example is the re-worked model proposed by Turner-Bisset (1999) (Figure 1) in which the list of knowledge bases has been extended, as discussed, in relation to types of teacher knowledge. In Turner-Bisset's model, an overarching knowledge base houses all of the other knowledge bases which are represented as sets. Pedagogical content knowledge is the set that contains all of the other sets. The model is potentially helpful in relation to the early development of teachers, in that only some of the knowledge bases are combined at different stages of their learning. Turner-Bisset (1999) describes the example of a teacher with good subject knowledge in science but undeveloped knowledge of learners and limited general pedagogical knowledge, so she may not be able to share her scientific knowledge with learners. The strength of the model is the comprehensive treatment of the knowledge bases which brings together a range of research literature and empirical evidence (Turner-Bisset, 1997) on the matter. The model is not intended to be a static representation but incorporates Cochran *et al.*'s (1993) notion of pedagogical content knowing as an active process with teachers' professional knowledge under constant revision. This model differs from others in the fact that it has been devised through the lens of primary teaching, rather than secondary. It is notable, however, that Shulman's category of PCK was subject-specific and this is represented in other models. Turner-Bisset's model appears to completely re-conceptualise PCK as contextualised in the teaching of a subject but, perhaps, not so firmly bounded by the subject matter through the inclusion of knowledge bases of a generic nature within it. This might be interpreted as simply representing teacher knowledge in action rather than PCK. The term *subject knowledge*, as commonly used in relation to ITT, does not appear explicitly in Turner-

Bisset's model. Instead, she refers to the phrase 'subject matter knowledge' that comprises the substantive and syntactic elements of Shulman's content knowledge. To this, she adds 'beliefs about the subject.'



KEY TO CODES
 SUB - Substantive Knowledge
 SYN - Syntactic Knowledge
 BEL - Beliefs about the Subject
 CUR - Curriculum Knowledge
 CON - Knowledge of Contexts
 SELF - Knowledge of Self
 MOD - Knowledge/Models of Teaching
 L-COG - Knowledge of Learners: Cognitive
 L-EMP - Knowledge of Learners: Empirical
 ENDS - Knowledge of Educational Ends
 GPK - General Pedagogical Knowledge
PCK - Pedagogical Content Knowledge

Figure 1 Turner-Bisset (1999:47) Knowledge bases for teaching: the model (permission to reproduce this figure has been granted by John Wiley and Sons)

An alternative model of teachers' professional knowledge is offered by Banks *et al.* (1999), illustrated further by Leach and Moon (2000) (Figure 2), that is a synthesis of 'school knowledge', 'subject knowledge' and 'pedagogic knowledge'. The model is intended to emphasise teachers' knowledge as a dynamic process that is significantly influenced by context. Their 'subject knowledge' category is identical to Shulman's category of content knowledge; the renaming is intended purely to shift its nature from static to 'process-driven' (Banks *et al.*, 1999: 94). However, the ingredients in this category equate directly to Schwab's (1964, 1978) substantive and syntactic structures of knowledge. 'School

knowledge’, they suggest, is a category in its own right which subsumes Shulman’s curriculum knowledge category. Banks *et al.* (1999) draw particular attention to the fact that this category does not relate to knowledge of school contexts. Instead, it signifies the transposition of ‘subject knowledge’ to formulate ‘school knowledge.’ In this, they draw on Verret’s (1975) notion of didactic transposition, which highlights the idea that school knowledge is sequenced in ways that knowledge in general cannot be, and this learning process is not usually linear. It is subject to constant interpretation on different levels. Tochon and Munby (1993) interpret this as the ‘diachronic anticipation of contents to be taught’ (p206). This is transformed into a dynamic process by the third element of the model: ‘pedagogic knowledge’. This third category includes the generic set of beliefs and practices that inform teaching and learning, but also goes beyond this to denote an understanding of the relationship between ‘subject knowledge’ and ‘school knowledge’. The teacher’s personal constructs are placed central in this model. This represents ‘a complex amalgam of past knowledge, experiences of learning, a personal view of what constitutes ‘good’ teaching and belief in the purposes of the subject’ (Banks *et al.*, 1999: 95).

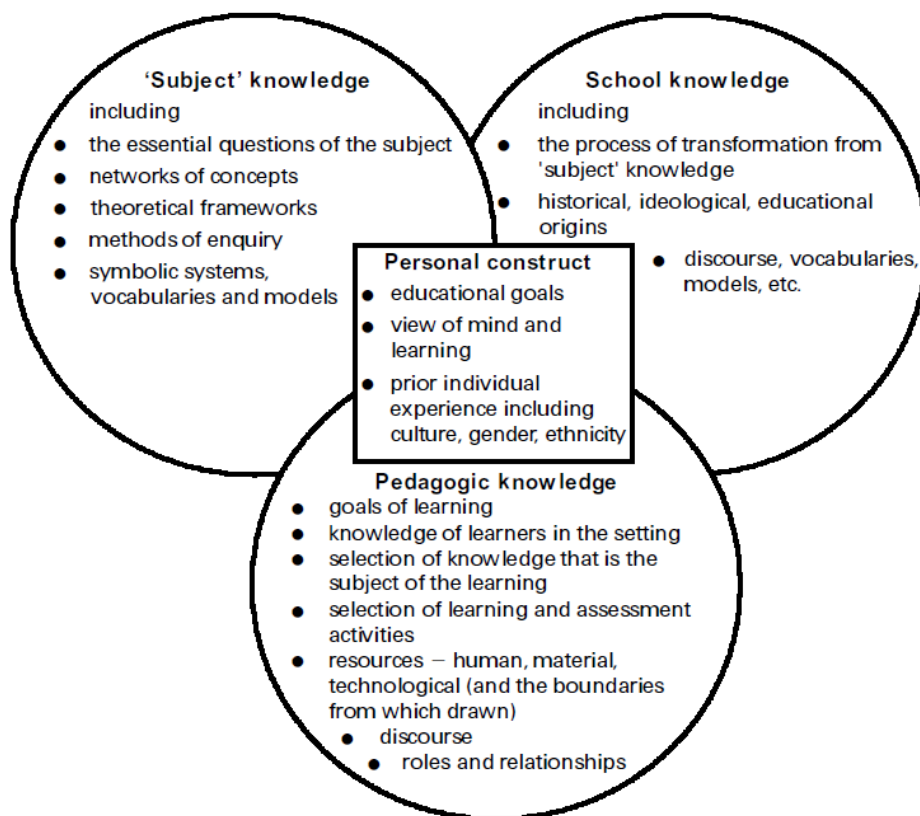


Figure 2 Leach and Moon (2000: 396) Teacher knowledge used in creating a pedagogic setting (permission to reproduce this figure has been granted by Taylor & Francis)

This model makes an important contribution in its incorporation of Lave and Wenger's (1988) key concepts of arena and setting to capture the complexity of teachers' knowledge creation in practice. 'Arena' exists at the cultural level of practice, and 'setting' is the regularly experienced and 'personally ordered and edited version of the arena' (Lave, 1988: 151). In this sense, the model attempts to incorporate the interactive nature of knowledge, context and identity. It perhaps does not manage to do this with sufficient clarification though. It is not immediately evident how the renaming of Shulman's content knowledge base to 'subject knowledge' actually changes the nature of it. The ingredients are identical and therefore, the same criticism could be levelled towards it, of presenting the category of 'subject knowledge' as a static entity of knowledge which runs counter to the model's authors' aims. The components of the model also have clearly recognisable similarities with Shulman's categories (e.g. knowledge of educational ends, purposes and values, knowledge of learners, knowledge of contexts) and Shulman's model similarly emphasised the significance of teachers' personal biographies. Banks *et al.* (1999), state that aspects of pedagogical content knowledge are split between 'school knowledge' and 'pedagogic knowledge' with the aim of getting a 'greater hold on this important epistemological construct' (p94). It is unclear how the model achieves this as some elements could fit equally well in either of the two categories (e.g. discourse, selection of the knowledge that is the focus of learning). The same difficulty can be imagined for the categories of 'subject knowledge' and 'school knowledge' where some aspects could be attributed to either category, thus revisiting the proposition that it is difficult to separate the elements of subject matter knowledge and PCK in practice (McNamara, 1991; McEwan and Bull, 1991).

The relatively simplistic presentation of 'subject knowledge' in the model has the potential to belie its true complexity, particularly when applied to primary teachers, for whom this has to span a wide range of subjects and curriculum areas with which prior knowledge and experience varies tremendously. Medwell *et al.* (1998), in their research on effective teachers of literacy, found that it was not possible to separate their knowledge into a body of content that was transformed in order to represent it to the children they were teaching. In reality, their knowledge base was only apparent as pedagogical content knowledge, totally embedded in their pedagogy. In the same way that it presents difficulties to identify the knowledge in Medwell *et al.*'s (1998) example in relation to Shulman's distinct categories, it would present a similar challenge via the model of Banks *et al.* (1999). Linked to this, Ellis (2007: 454) adds to the critique of the model in relation to teachers' biographies, which he suggests are represented too individualistically and separated from

contexts. He proposes that a situated model would perhaps need to present them as ‘personal trajectories of participation in social practices that might inform certain kinds of knowing (Dreier, 1999).’ This idea of ‘kinds of knowing’ would, perhaps, help to take account of the exemplar scenario found in Medwell *et al.*’s (1998) research, where primary teachers’ knowledge of literacy was evident only in a pedagogic form of knowing.

In summary, the model represents an important step forwards in capturing the situated nature of teachers’ knowledge creation and it might be considered that its presentation is, on the surface, user-friendly for application to learning in ITT. However, an overriding concern is that the simplistic presentation of ‘subject knowledge’ belies its complexity and might encourage an objectivist view of content knowledge that is the antithesis of the model’s authors’ intentions.

Another significant model that is worthy of detailed attention is one developed by Ellis (2007) (Figure 3), which represents a situated view of subject knowledge to take account of subject knowledge being developed in practice by teaching in schools and the complexity of this, thus addressing the central points discussed in relation to the previous model. The model picks up on Banks *et al.*’s (1996) and Leach and Moon’s (2000) attention to the overriding importance of educational contexts in teachers’ learning. Ellis’s model focuses on the conditions needed for subject knowledge development in the real-world context of schools as communities of practice (after Lave and Wenger, 1991), through the lens of the teaching of English in secondary schools. Ellis’s model attempts to reflect the complex and dynamic social systems within which teachers’ subject knowledge is accessed and developed. Three interdependent connected areas of ‘Culture’, ‘Practice’ and ‘Agents’ are enclosed in an outer circle to indicate that the system itself is in motion. Knowledge potentially emerges in the relationships between the three areas. Arrows emanating from the outer circle indicate that knowledge itself is changing over time. As Ellis explains, ‘the conditions for knowledge and the grounds for its verification exist within the particular social system, but the system itself—and the conditions and rules for evaluation—changes over time and across contexts’ (p456). The areas of ‘Culture’, ‘Practice’ and ‘Agents’ will be considered in greater depth.

i) Culture

Ellis (2007: 456) argues that ‘the arena for practice for English teaching is dialectically constituted in relation to its practices in multiple settings’ (e.g. schools, universities, local authorities). The arena, or field, is created in relation to practice in these settings and it is

this that determines the boundaries and rules of the field for validating knowledge (in this case English teaching in secondary schools). This by no means suggests a consensus of agreement within the field, but rather incorporates the claims and counter-claims originating out of practice that are contested within the field. They are at the heart of its dynamic nature, linking culture and practice. The model also denotes resources – both physical (e.g. texts, pens) and conceptual (e.g. metaphor, syntax) – as existing at the cultural level. The cultural component of the model also provides the grounds for the cultural identity of the system, including the ‘Practice’ (English teaching) and ‘Agents’ (English teachers) within it. So knowledge creation connects to the development of identity through Lave’s and Wenger’s (1991) conceptual process of legitimate peripheral participation in a community of practice.

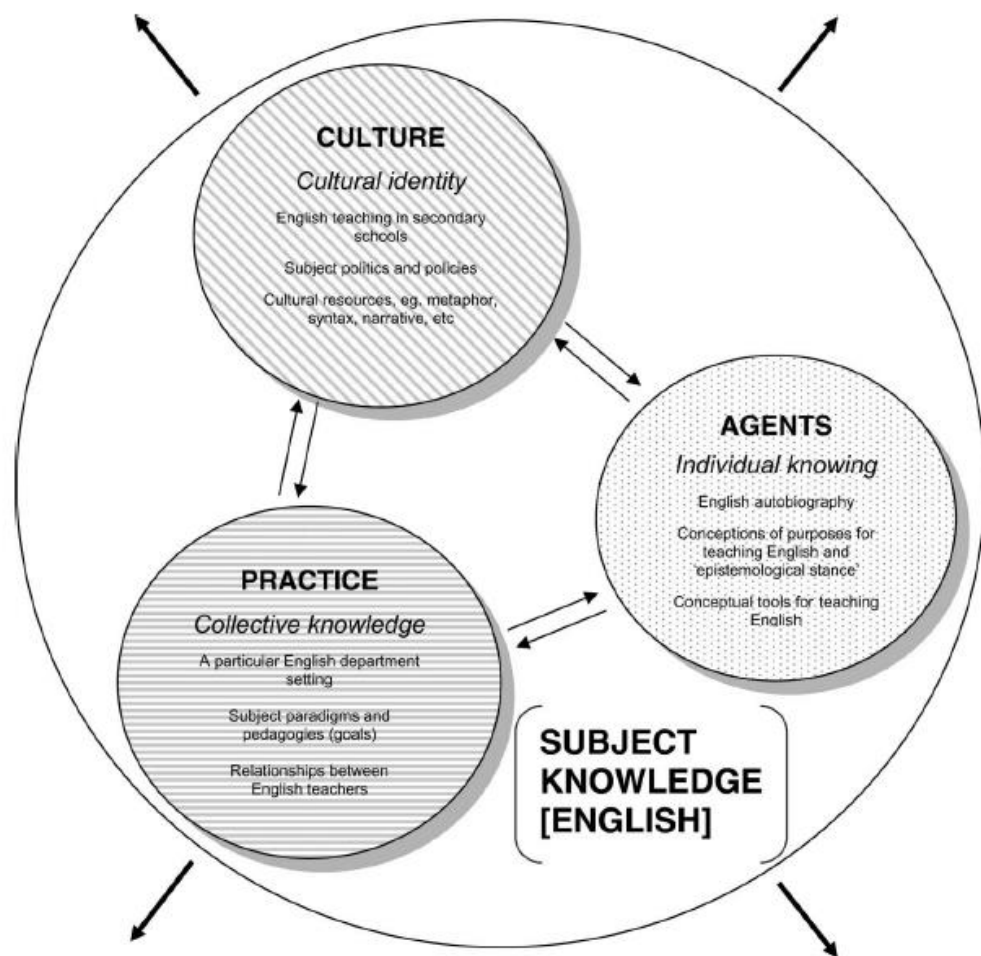


Figure 3 Ellis (2007: 456) Dynamic social systems within which teachers' subject knowledge is accessed and developed (permission to reproduce this figure has been granted by Taylor & Francis)

ii) Practice

Teachers working alongside one another in a department will not necessarily share identical values and beliefs in relation to the subject (Ball and Lacey, 1980), but this is the nature of the community of practice (Lave and Wenger, 1991) and collective knowledge is developed through it (Hodkinson and Hodkinson, 2005). This collective knowledge represents a form of compromise that is shaped by the shared goals of practice in the setting and its 'rule-governed behaviour' (Edwards *et al.*, 2002: 39). This links clearly to the cultural arena. Ellis (2007: 457) summarises it thus: 'practice as a concept provides the social space for the communal conceptual development of the system... that arises out of the relationships between its participants.'

iii) Agents

The 'Agents' in the system are the individual learners and their 'potential for action' (Ellis, 2007: 458). Their individual perceptions, values, beliefs and motivations are interdependent with the 'Culture' and 'Practice' components of the model. How an individual interprets settings, participates within them and is able to interpret the shared goals of the community of practice are of particular importance. The individual's subject-related autobiography, their epistemological stance (Hillocks, 1999) and their understanding of how learning occurs are all influences on which resources (physical and conceptual) that will be taken up as 'tools' in their practice. Agents' participation within contexts contributes to their creation in terms of culture and practice.

Although Ellis readily acknowledges the possible limitations of this two-dimensional representation, it offers a useful conceptual framework for the consideration of the forces at work in a dynamic and social process of knowledge creation. The lens of English teaching in secondary schools can readily be replaced with that of primary teaching and, more particularly, primary ITT. When one begins to contemplate the process of the creation of subject knowledge for teaching the whole primary curriculum in the context of this dynamic model, encompassing the immense potential variety in 'Culture', 'Practice' and 'Agents' within the system, the sheer complexity of it becomes sharply focused.

Some parallels can be drawn between the components of Ellis's (2007) model and Bourdieu's (1977) analyses of context and identity within social and work practices, through which he explores the relationship between habitus and field. Bourdieu's concept of habitus expresses the way in which individuals develop their attitudes and dispositions, and the ways in which those individuals engage in practices. This links to Ellis's (2007) 'Agents' and their learned ways of being. A cultural field can be defined as a series of

institutions, rules, conventions and the interactions between them which produce and authorise certain discourses and activities (similar to Ellis's 'Culture'). It is constituted by, or out of, the conflict involved in competing arguments of groups or individuals in relation to what constitutes capital, or value, in that field (which produces Ellis's 'Practice'). Habitus and field are entirely interdependent and are fluid and dynamic in nature.

In summary, it is clear that teacher knowledge, and conceptions of *subject knowledge* as part of this, cannot be considered without examination of the cultural influences that shape it, and teacher identity that emerges from these dynamic systems. This leads naturally to consideration of individual values and beliefs and their influences.

2.9 Subject knowledge and the individual

In the process of examining collective conceptualisations of *subject knowledge*, it is important to also consider the individual perspectives of teachers. Knowledge is 'stretched over' (Lave 1988) individuals, communities of practice and contexts over time so the nature of individual sense-making is a significant element. Through their participation in communities of practice, teachers are socialised into a set of beliefs about the nature of knowledge and the subjects that they teach. For primary teachers, this has the potential to be deeply complex given the wide range of subjects encompassed by their roles.

Evidence of the influences of individual values and beliefs on teachers and their teaching, is well-established. For example, Wilson and Wineburg (1988) determined that different teachers of the same subject hold very different conceptions of that subject.

Gudmundsdottir (1991) established that the value orientation of teachers to the subject matter influenced their choice of content, pedagogical strategies, use of textbook and their perceptions of students' learning needs. In their study of effective teachers of literacy, Medwell *et al.* (1998) found that these teachers had coherent systems of belief about literacy. Twiselton (2000) determined that from student teachers' beliefs and values towards their teaching of literacy, it was possible to identify broad categories of developing teacher identity which were: Task Managers, Curriculum Deliverers and Concept/Skill Builders. Implicit in the names of the categories are different orientations towards knowledge of the subject, relating to the teachers' perceptions of its purpose in the processes of teaching and learning.

Hillocks (1999) researched teachers' epistemological beliefs about what constitutes knowledge in their field and their beliefs about the likelihood of their students

understanding what they teach. The research was framed by two opposing epistemologies – objectivist and constructivist – and two sets of teachers’ beliefs classified as optimistic, or pessimistic. He found that teachers with non-optimistic beliefs about their students tended to simplify both the teaching and what was taught. Conversely, teachers with optimistic beliefs focused on procedural knowledge with plentiful opportunities for interaction and construction of new learning and understanding. Differences in attitudes affected the goals set for students, the content taught and the teachers’ decisions in the micro-curriculum, i.e. the minute-by-minute selections made in a teaching session. Hillocks determined that categories of knowledge were constructed by each teacher and were influenced by life experience. Linking to Shulman’s (1987) typology, a teacher’s content knowledge will, therefore, be informed by their beliefs about the subject and what they consider to be valued knowledge. The reorganisation of this content knowledge into pedagogical content knowledge to make it meaningful to pupils is directly influenced by teachers’ beliefs and values, not just about the subject matter but also about their pupils’ potential to understand what they teach. In this sense, Hillocks adds weight to a conceptualisation of pedagogical content knowledge not as a static body of knowledge but knowledge constructed by the teacher in light of their values and beliefs, similar to Cochran *et al.*’s (1993) pedagogical content *knowing*.

What is clear from the evidence is that subject knowledge is not a separate entity; it cannot be readily separated from teachers and their teaching. It is part of a complex process of situated collective and personal learning. Davis and Sumara (2000) propose a ‘nested’ model of ‘individual knowing, collective knowledge and cultural identity’ (p834). They acknowledge the fuzzy boundaries, the overlap and interplay between the layers. How each individual teacher experiences different settings will depend on the nature of the individual’s participation within it and the way their individual biography influences this. Individuals’ attitudes, values and beliefs will affect and be affected by these interactions and, in turn, they will affect the settings. Lave and Wenger (1991) describe this process of participants also shaping the setting as the continuity-displacement contradiction. Britzman (2004: 249) notes the complexity of the chronologies of learning to teach and draws specific attention to the fact that teacher identities are not produced through ‘an orderly continuum’. Dreier (1999: 22) harnesses the idea of the individuals’ epistemologies orientating their participation in settings across contexts and captures the dynamic nature of this process as ‘personal trajectories of participation in structures of social practice.’

Returning to some of the situated models of teacher knowledge discussed previously in relation to the influence of context on conceptualisations of subject knowledge, the role of the individual is also incorporated in acknowledgement of the evidence of its significance. The model proposed by Banks *et al.* (1999) has 'personal construct of the teacher' at its centre. This represents the importance of personal beliefs and values about the nature of the knowledge of the subject, its purpose and how it is to be understood by learners. In Ellis's (2007) model, he couples Dreier's (1999) notion of personal trajectories of participation within permeable layers of 'Culture', 'Activity' and 'Agent' and indicates the highly reflexive interactions between these layers. The models contribute important ideas in relation to the situated, collective and personal nature of teacher knowledge and, embedded within this, conceptions of *subject knowledge*.

In this research, I seek to explore individual conceptualisations of *subject knowledge* held by student teachers, in addition to collective conceptions across settings. In acknowledgement of the difficulty of separating epistemology from personal beliefs and values, an analytical framework devised by Kelchtermans (2009) will be employed to support examination of these interconnected influences and ideas. Grounded in his narrative-biographical research of teachers' thinking about themselves and their teaching, Kelchtermans (2009: 260) argues that teachers develop a personal interpretative framework that 'operates as a lens through which teachers look at their job, give meaning to it and act in it'. It simultaneously guides their interpretations and actions in particular contexts whilst being altered by and resulting from those situated interactions. As such, it is dynamic in nature. Kelchtermans's (2009) conceptual model connects personal factors and biographies to teachers' professional self-conceptualisations, their beliefs about teaching and their actions. It is rooted in the socio-cultural nature of their working conditions in educational settings and his central tenet is that teaching is a personal, social and public act, making it difficult to separate the teacher as a person from the act of teaching. It is therefore essential to include a teacher's sense of self in any conceptualisation of teaching, including the relationship between the subject-matter, teacher and pupils.

The first domain of the framework is *professional self-understanding*. Kelchtermans (2009) specifies this term to emphasise its dynamic and biographical nature in a way that the alternative term 'identity' might discourage. Self-understanding has five components; self-image, self-esteem, job motivation, task perception and future perspective. Self-image is the descriptive component based on the way individuals see themselves as teachers. It also

reflects the feedback that others (e.g. pupils, colleagues, parents) mirror back to teachers, linked to the evaluative component of self-esteem. Self-esteem is intertwined with the teacher's idea of his/her professional programme or the necessary tasks and duties to do a good job – task perception. This is underpinned by beliefs about the purpose of education. Job motivation refers to the reasons for choosing to become a teacher. Future perspective is the final component of self-understanding; it refers to a teacher's expectations of their future career, once again highlighting the ongoing nature of self-understanding. Kelchtermans (2009:263) emphasises that self-understanding is both an integrative and differentiated concept.

The second domain of the framework is a teacher's *subjective educational theory*, i.e. 'the personal system of knowledge and beliefs about education that teachers use when performing their job' (Kelchtermans, 2009: 263). This incorporates knowledge derived from formal pre-service or in-service training but also includes informal knowledge gained through personal experience of what has worked well for them as individuals in different contexts. Beliefs refer to personal convictions formulated through experiences. Knowledge and beliefs are intertwined in teacher thinking. 'The *content* of the subjective educational theory is largely idiosyncratic and based on personal experiences' and the 'epistemological status of the subjective educational theory is that its content 'holds true' for the teacher involved' (Kelchtermans, 2009: 264). The subjective educational theory is framed and re-framed over time and across contexts and will inform teachers' judgements.

Professional self-understanding and subjective educational theory need to be considered as 'two interwoven domains' (p265). On this basis Kelchtermans recommends that for research purposes, teachers' professional knowledge and teacher identity would benefit from an integrated approach. For this reason, Kelchtermans's (2009) model will be used as a conceptual framework to support the interpretation of qualitative data to consider how student teachers' self-understanding informs, and is informed by, their conceptualisations about *subject knowledge* in their initial training.

Teachers do not, in reality, experience total autonomy and agency in how they choose to work and the success of its outcomes. In recognition of this, Kelchtermans (2009) incorporates the notion of *vulnerability* as a 'structural characteristic of the profession' (p265). It represents the fact that teachers are not in full control of their working conditions and, increasingly, have to comply with externally prescribed policies and measures of performance. This vulnerability is also embedded in the fact that teachers can

‘only to a very limited degree, prove their effectiveness by claiming that pupils’ results directly follow from their actions’ and their pedagogical decisions are always open to challenge (p266). The notion of vulnerability must be considered alongside professional self-understanding and subjective educational theory in developing understanding of how teachers make sense of their work and themselves across different contexts. *Subject knowledge* will be considered as part of the teacher’s subjective educational theory.

Summary

The term *subject knowledge* approximates for a complex concept that is not defined clearly in the policy context of ITT. It does not derive directly from, or align with, any particular category of knowledge for teaching defined in the literature, and explicit conceptual specifications of *subject knowledge* adopted for the purposes of research, tend to vary between studies. The complexities of the dynamics between collective knowing in particular contexts and individual interpretations will be used as a series of lenses through which to consider conceptions of subject knowledge.

The conceptual framework guiding the research (see Figure 4) is underpinned by Shulman’s (1986, 1987) theoretical knowledge bases for teaching, which have been extended/developed further by, for example, Turner-Bisset (1999), Grossman (1987) and Tamir (1988). It also draws significantly on the conceptual tools of culture and practice in educational settings, provided by Ellis’s (2007) situated model of subject knowledge, which incorporates teachers as agents, as one of its three components. This focus on the individual is developed further by utilising Kelchtermans’s (2009) personal interpretative framework of professional self-understanding, subject educational theory and vulnerability as key concepts. An additional lens is provided by the external political context, within which primary ITT is located, and the pressures generated as a result of key educational policy directives, Ofsted inspection frameworks and professional standards for teachers. At the nexus of these diverse forces conceptualisations of subject knowledge for primary teaching are examined by adopting an interpretivist perspective, which is informed by constructionist epistemology and relativist ontology.

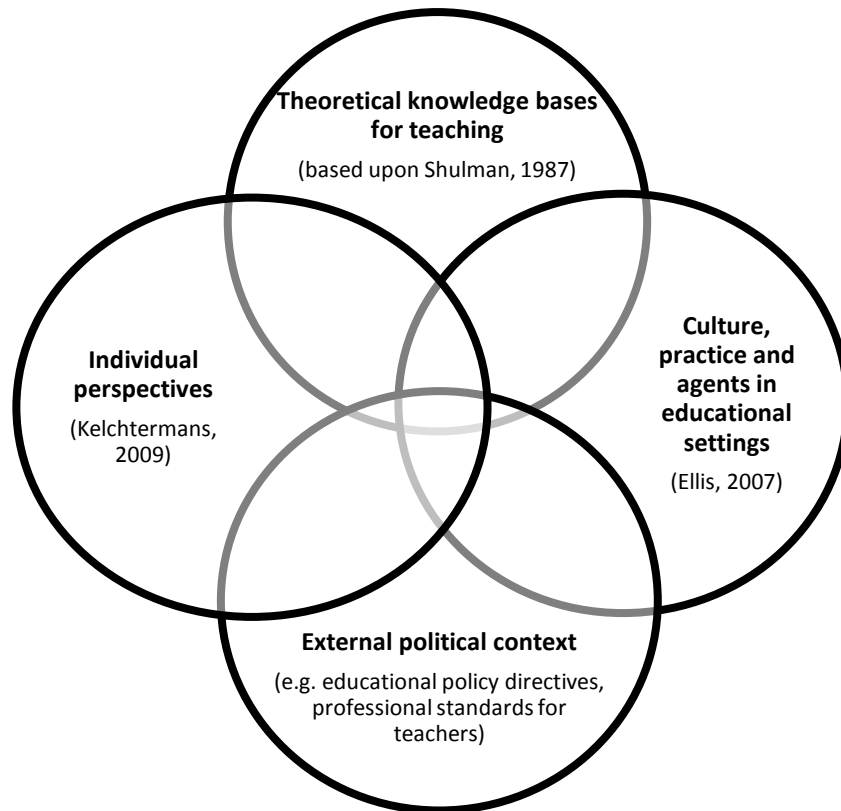


Figure 4 Conceptual framework guiding the research

3. Methodology

As discussed in the literature review, *subject knowledge* has long been a prominent component of policy and practice in ITT. Differences in epistemology and conceptualisation are apparent in the literature and there is no universally accepted definition of the term *subject knowledge* established in the context of ITT. My study sets out to examine this phenomenon in the specific context of undergraduate primary ITT. The key objectives of the study are detailed in the introduction (p7). The research seeks to gain an understanding of the complexities surrounding *subject knowledge* in primary ITT by studying the perspectives of student teachers, their university tutors and school mentors. It therefore adopts a predominantly interpretative approach.

The objectives can be implemented through the following specific research questions:

1. What is the nature of student teachers', school mentors' and university tutors' conceptions and interpretations of the term *subject knowledge* in the context of undergraduate primary initial teacher training?
2. What are the views of student teachers, school mentors and university tutors about the position and role of subject-specific knowledge for teaching (*subject knowledge*) in a) the process of learning to teach in the primary phase and b) expert primary teaching?
3. What are the perceived influences of culture and practice in the university, school and partnership contexts in which primary ITT is situated, on student teachers, school mentors and university tutors in relation to *subject knowledge*?
4. How might student teachers' personal conceptualisations of *subject knowledge* differ according to the interplay between their biographies, personal interests and emerging professional identities in participation in cross-contextual settings?
5. a) How is *subject knowledge* represented in:
 - i. the professional standards for teachers (Teachers' Standard 3);
 - ii. key documentation and guidance used in ITT to support the assessment of student teachers in practice;
 - iii. feedback provided to student teachers in completed lesson observation paperwork?b) How might these specific documents/tools, that provide a framework for supporting partnership processes, contribute to conceptions of *subject knowledge* and associated culture and practice?

3.1 Theoretical perspective

My approach to the research is interpretivist and as such adopts a perspective that ‘looks for culturally derived and historically situated interpretations of the social life-world’ (Crotty, 1998: 67). This is resonant with my research aims to explore the conceptions of *subject knowledge* that student teachers, school mentors and university tutors bring to, and develop from, their involvement in the initial teacher education of primary teachers. I am interested in how personal (Kelchtermans, 2009) and contextual factors (Lincoln and Guba, 1985) influence these conceptions within and between groups and individuals.

My interpretivist perspective is underpinned and informed by constructionist epistemology and relativist ontology. Accordingly, I acknowledge that realities are multiple, constructed and holistic; they are bound by time and context (Lincoln and Guba, 1985). The participants in the research inhabit different realities with diverse ways of knowing and sense-making. Constructionism represents the view that there is no objective truth waiting to be discovered (Denzin and Lincoln, 2003). Instead, meaning is constructed. Different people will construct meaning in different ways within a community or set of communities. Crotty (1998: 42) summarises:

Constructionism is the view that all knowledge, and therefore all meaningful reality as such, is contingent upon human practices, being constructed in and out of interaction between human beings and their world, and developed and transmitted within an essentially social context.

Guba and Lincoln (1994) similarly emphasise how reality is constructed inter-subjectively through social and experiential contexts. The social rules observed within such communities, shape and sustain the construction of shared meanings which contribute to social reality (Greenwood, 1994). It is important to view culture as ‘a set of control mechanisms’ that govern behaviour, rather than culture being the result of human behaviour (Geertz, 1973: 44).

The study attempts to construct what Denzin and Lincoln (2003) describe as a bricolage - that is, ‘a pieced-together set of representations that are fitted to the specifics of a complex situation’ (p5). The process draws on the metaphor of the stitching together of a patchwork quilt by the researcher as bricoleur. The bricolage is an ‘emergent construction’ (Weinstein and Weinstein, 1991: 161) that takes shape through the use of eclectic tools, methods and techniques in a manner that draws them together in a reconceived

interpretation. It is not possible to capture an objective reality, but instead, the aim of the bricolage is to create representations of multiple, simultaneous realities through an interactive and interpretive process. Kincheloe (2001:324) asserts that in relation to researching the social world, 'the task of the bricoleur is to attack this complexity, uncovering the invisible artefacts of power and culture and documenting the nature of their influence.' This is a central guiding principle that I have used to steer my interpretation and presentation of findings.

In constructing the bricolage, I recognise that the process is shaped, not just by the personal histories, values and beliefs of the research participants in the settings in which they operate, but also by me. I am not an objective bystander in the research process. My personal experiences as a primary teacher, a school mentor and, now, as a university-based teacher educator mean that I have prior knowledge that has shaped my own opinions about *subject knowledge* in the context of primary ITT. I am also a stakeholder in the contexts under examination. Due to the interactive nature of the process of construction of the bricolage, it will undoubtedly be influenced by my framing of the research questions and the methodological choices made in relation to data collection, analysis and interpretation of findings. All of these selections are value-bound (Lincoln and Guba, 1985: 37).

Whilst I embrace the relativist nature of individual sense-making and the multiplicity of differing realities, I acknowledge the potential criticism of the tendency of social constructionism to 'circle around in endless interpretations and [...] infinite deconstructions' (Kvale, 1996: 248). As this study focuses on the problematic nature of the less than coherent discourse concerning *subject knowledge* in primary ITT, I believe it is a responsibility of the researcher to draw together some coherent coalescence of consensus in representing these multiple truths so that the illuminative knowledge gained from the research might be utilised to instigate some changes in practice, even though intervention is not the aim of the research. In this sense, I support Bassey's (1999: 10) proposition of the value of the notion of 'fuzzy generalisations' to enable educational research to have more direct impact on policy and practice. He describes this as 'the kind of statement which makes no absolute claim to knowledge, but hedges its claim with uncertainties' (p12). In the place of scientific generalisations, Bassey suggests a tentative, qualitative measure of the likelihood of the similar findings being replicated in similar situations elsewhere, for example: 'In *some* cases, it *may* be found that... (p12). Bassey explains that fuzzy

generalizations are 'neither likely to be true in every case, nor likely to be untrue in every case: [they are] something that may be true' (p10). When accompanied by a research report containing thick description (Geertz, 1973) of the study and its context, it becomes possible for a recipient of the research to judge transferability to another similar setting about which they have comparably detailed data (Guba and Lincoln, 1981).

3.2 Research approach

The research adopts a flexible, inductive, qualitative design in the sense that it has evolved and unfolded from data collection and analysis at different stages of the study through an interactive process. Whilst the research began with a generally well-defined focus for the research questions, the sample and data collection methods, considerable refinement occurred through an iterative and responsive process between data analysis and the literature (Huberman and Miles, 2002). The research direction has also been influenced by changes in policy context (e.g. revised teachers' standards) and practical considerations (e.g. extension of the sample to a second ITT provider when the opportunity arose). Multiple methods are used within the research design, to provide richness, depth and thick description (Geertz, 1973) to construct the bricolage (Denzin and Lincoln, 2003).

The study of the perspectives of student primary teachers, school mentors and university tutors takes a grounded, inductive approach (Glaser and Strauss, 1967; Strauss and Corbin, 1990; Charmaz, 2006). The rationale for this rests upon the argument constructed in the literature review about the lack of a universally accepted conceptualisation of *subject knowledge* in the context of primary ITT. In seeking to explore perspectives, it was important to gain an understanding of theory emerging from my engagement with the field and the data. The grounded theory approaches proposed by Glaser and Strauss (1967) and Strauss and Corbin (1990) are rooted in positivist assumptions that the researcher is a neutral, passive observer, who is not influenced by prior experience and knowledge of theory. Clearly, this is not the case in this study; I am not a value-free expert. As previously discussed, my experiences as a teacher, mentor and university tutor provide me with some existing insight into the issue of *subject knowledge* in primary ITT, along with prior knowledge of associated theory through engagement with the literature. I am known to the participants and have a previously established relationship with most of them through my role as a tutor on the undergraduate programmes under examination. A number of scholars (e.g. Bryant, 2002; Charmaz, 2000; Clarke, 2003; Seale, 1999) moved grounded

theory away from positivism, transporting the inductive, emergent approaches and iterative logic across epistemological and ontological boundaries to develop a constructivist approach to grounded theory. The emphasis on mechanical application of procedures is replaced with an emphasis on the flexibility of the method. The multiple, constructed nature of social realities is recognised in this approach, along with acknowledgement of the researcher's position and perspective. This fosters greater reflexivity in the construction of the research (Charmaz, 2014). The inductive approach used in the study, aligns with this constructivist perspective.

3.3 Research methods

Data collection involved mixed methods of a predominantly qualitative nature with some minor quantitative elements. They comprise semi-structured questionnaires with student teachers (n = 104) and school mentors (n=9); semi-structured interviews (incorporating the production of visual data) with student teachers (n=18), school mentors (n=11) and university tutors (n=12); one group interview with mentors/university tutor (n=3); and content analysis of relevant documents, including samples of lesson observation feedback (n=427).

3.3.1 Questionnaire surveys

Questionnaires were selected as a straightforward, efficient approach to studying the attitudes, values and beliefs of a large sample of participants. As Robson (2011) highlights, they enable a high degree of data standardisation to generate generalizable information about a population. Although, Denscombe (1998) expresses caution about the lack of opportunity to check the truthfulness of answers, the anonymity afforded by the questionnaire might also encourage frankness of expression. A further aim of the questionnaire was to identify the distribution of beliefs and characteristics across the population to support selection of the interview participant sample.

i) Student teachers

Self-completion questionnaires were given to all final year undergraduate primary education student teachers in the sample cohorts at the beginning of their last academic year of study. The survey employed a combination of closed questions relating to demographics, open questions to probe beliefs about the nature and significance of *subject knowledge* in relation to their training and a Likert scale question to end the survey to provide quantitative comparison of attitudes, beliefs and values across the student teacher

populations in the sample. An initial draft of the questionnaire was piloted with a small group of students from a different programme cohort to check its suitability for purpose to inform refinement of the final questionnaire (see Appendix 3). The questionnaires were completed at the end of sessions based in the university contexts to maximise return rates but there was no requirement for, or expectation of, participation.

ii) School mentors

During the same time period as the survey process with the first cohort of student teachers, similar questionnaires were distributed to school mentors with whom the student teachers were working during their final school placements. The questionnaire was adapted to capture the demographics and biographical details of the established primary teachers, along with their beliefs and views in relation *subject knowledge* in the context of their involvement with primary ITT (see Appendix 6). Questionnaires were distributed in hard copy, in person, during a briefing meeting for school mentors at the beginning of the school placement. Stamped addressed envelopes were provided for direct return or, alternatively, they could be collected during university tutors' visits to the schools. Response rates were poor (6%). A second wave of questionnaires was distributed electronically to school mentors to see if a different approach resulted in a higher completion rate. This strategy enabled me to identify that, although a good number of mentors began the questionnaire, they dropped out at the point where they were asked for their opinions about the nature of *subject knowledge* in primary ITT. It was noticeable that the sample of nine completed questionnaires consisted of school mentors with whom I had some prior personal contact and established relationship. They had all identified themselves in the last question of the survey as willing to be interviewed. This suggests that an issue of trust might be the reason for the low response rate due to the lack of opportunity afforded by the survey method to establish a rapport with the individual participant. The questionnaire survey method for school mentors was not pursued beyond this point in the research.

3.3.2 Interviews

The interview method was selected because I was interested in gaining an in-depth understanding of the meanings that participants attached to *subject knowledge* in the context of primary ITT, and their beliefs, values and opinions about its position and role in the process of learning to teach. I was interested in their perceptions, which are most commonly expressed through language. I used the interview as a negotiation of shared

understanding (Kvale, 1996) and meaning (Fontana and Frey, 2005) through a process of co-elaboration (Miles and Huberman, 1994). The complex nature of attempting to understand participants' conceptualisations of *subject knowledge* meant that straightforward information-gathering was too simplistic an approach. The participants needed time to think through their responses and explain further, to establish their intended meanings, as much for themselves, as for me as the interviewer. An example of a technique that was productive in achieving this was in summarising my interpretation of what the respondent had said, or drawn. This prompted further responses from them to agree or disagree with my summary, or to clarify specific aspects which they had not communicated to me as they intended to. This formed an extended dialogue rather than a simple question and answer pattern. The interviews enabled the follow-up of non-verbal cues and underlying motives, providing rich and illuminating material, as suggested by Robson (2011). The interactive nature of the interviews provided opportunity to achieve 'intersubjective depth' and 'deep mutual understanding' (Miller and Glassner, 2011:133). Parts of the interview involved participants articulating their conceptions of *subject knowledge* in depth and detail. It is important to note that ideas evolve as they are researched and conceptualised, meaning that the interview becomes a construction site for knowledge (Kvale, 1996). It was important to build trust during the interviews through maintaining a respectful relationship (Connelly and Clandinin, 1990) to encourage participants to reveal authentic insights into how they 'organize views of themselves, of others, and of their social worlds' (Orbuch, 1997: 455).

Elements of narrative inquiry (Clandinin and Connelly, 1996) were incorporated into the interviews, where I asked participants to recall episodes that involved *subject knowledge* in relation to their roles and/or experiences. 'Retrospective story-telling' (Chase, 2005: 656) helped to illustrate their practice, interpret it and justify the choices they had made in relation to the episode, revealing the embedded narrative knowledge (Lyotard, 1984). All interviews were audio-recorded.

i) Student teachers

I adopted a semi-structured interview style for all the interviews in the study. The key themes and related questions were identified in advance but the exact sequence and depth of questioning was responsive to each individual. In particular, elaboration through probing questions was used to help to clarify intended meanings in relation to *subject knowledge* where needed. The pre-determined themes to be explored in the interview schedule (see

Appendix 4) arose from my initial research questions that stemmed from the literature and my practical working experiences in primary ITT. The key themes for exploration were:

- motivations for becoming a primary teacher and changes over the duration of their training
- views about expert primary teaching
- conceptions of *subject knowledge* and opinions about its significance and role
- changes in thinking about *subject knowledge* over time
- key influences – contextual and personal
- recounts of experience where *subject knowledge* enhanced/impaired practice
- evaluation of personal *subject knowledge* at the end of training
- future perspectives

Embedded in each interview was the opportunity for the individual to create a visual representation of their conceptualisation of *subject knowledge* for primary teaching (see Section 3.3.3, p63).

The co-constructed one-to-one dialogue nurtured in the interviews, appeared to create an intimate listening space which many of the student teacher participants reported finding cathartic at the end of an intense final year of study. They reported enjoying the opportunity to think through their experiences and ideas in depth. The process led to some candid conversations that revealed personal triumphs, frustrations and doubts that went beyond the planned scope of the interview schedule but alerted me to the highly individualistic responses to similar concepts and experiences. Kleinman *et al.* (1994: 43) create a pertinent argument of the value of the interview that resonates strongly with the student teacher interviews in this study:

Respondents may reveal feelings, beliefs and private doubts that contradict or conflict with ‘what everyone thinks’ [...]. In other cases, interviewers will discover the anxiety, ambivalence and uncertainty that lie behind the respondents’ conformity.

This emphasis on personal influences was followed up intuitively through the interviews as its growing significance emerged in the data.

ii) School mentors and university tutors

Initially, one group interview was conducted with two mentors alongside one university tutor. Having encountered difficulties with engaging school mentors with the questionnaire

survey, this method was employed to enable the exploration of the norms and dynamics around the topics I wished to investigate, as suggested by May (2011). Robson (2011) also advocates that the group interview can be useful in gathering data from a few people at a time with the benefit of the group dynamic creating a less inhibited, enjoyable scenario. It is important to note the distinction between the group interview, which is steered closely by the interviewer, and the focus group, which is a more open-ended discussion that emphasises the collective response (Denscombe, 1998). The group interview questions mirrored the planned interview schedule for the individual semi-structured interviews with school mentors (see Appendix 7) but the group scenario allowed me to gauge how the questions might be received by other school mentors and flag up any potential sensitivity in this relaxed environment.

Following this, individual semi-structured interviews were conducted with school mentors who volunteered their involvement. All were interviewed on their school premises by choice, with the exception of one individual who opted to be interviewed at the university when she was attending a mentor development event. The interviews followed the same structure and style as the student teacher interviews, including the visual data creation activity as part of it. The interview schedule was amended to suit the role of the school mentor (see Appendix 7). Key themes to be explored included:

- personal background – route into teaching; teaching career journey; roles and responsibilities
- mentoring – how they got involved; experience; motivations
- views about outstanding trainee primary teachers and expert primary teaching
- conceptions of *subject knowledge* and opinions about its significance and role in primary ITT
- recounts of mentoring experiences involving *subject knowledge*
- strengths/challenges/issues in developing student teachers' *subject knowledge* and perceptions of responsibility
- *subject knowledge* in the context of partnership processes, including associated documentation
- perceptions of the role and impact of the university-based training and the school-based training components of the programme
- interpretations of messages from policymakers about *subject knowledge* (e.g. Ofsted, new primary national curriculum)

It was noticeable that the interviews with the school mentors were generally shorter in duration than the other participant groups due to the practicalities of their time restrictions in schools and, as a result, were of a less in-depth nature.

The same semi-structured interview approach was used with the university tutor participants. The pre-determined themes for exploration were the same as detailed above for school mentors, but the interview schedule was adapted slightly to suit the university tutor role (see Appendix 9). All interviews took place on university premises.

3.3.3 Participatory visual method

As part of each semi-structured interview with all participant groups, the respondents were asked to create a visual representation of their conceptualisation of *subject knowledge* for primary teaching. This could take whatever form they wished (e.g. mind map, diagram, picture etc.). This strategy was incorporated to provide another mode of exploration of personal conceptions of *subject knowledge* as some respondents might find drawing a useful means of supporting their articulation of abstract concepts and ideas. The inspiration for adopting this method came from Grossman's (1990) research into subject knowledge which incorporated a diagrammatic element and, later, Ellis's (2009) less clinical approach to using the technique as part of his study of secondary English teachers' subject knowledge. According to Prosser (2011:484), participants can feel less pressured when discussing sensitive or difficult topics through 'intermediary artefacts.' Weber (2008:47) asserts that visual data can be produced by participants as a means to elicit or provoke other data. It can also be a useful part of the audit trail to document the research process and adds another comparative data source for triangulation. The drawing method provided a break in the interviews to switch modes of activity which caused participants to pause and really think through their conceptualisations of *subject knowledge*. The mutual focus on the drawing enabled me to clarify their intended meanings of elements of the visual representation and probe the rationale behind the approaches taken and elements incorporated. The discussion and narrative accompanying the drawing process was captured as part of the interview audio recording.

3.3.4 Documentary data

As part of the emergent research design, in response to recurrent themes in the interviews with each of the participant groups, some key documents were included in the data set. Frequent references to the Teachers' Standards (DfE, 2012) were apparent, with Teachers' Standard 3 cited as a key driver for ideas and practice relating to *subject knowledge*.

Connected to this theme, were practices involving the assessment of Teachers' Standard 3 via lesson observation analysis and feedback and the guidance document (North West Consortium of Universities & TeachFirst, 2012) used in the ITT partnerships to scaffold this process for student teachers, school mentors and university tutors. Textual analysis of these documents was added to the mix of research methods, taking into account Atkinson's and Coffey's (2011) assertion that, whilst documents are not accurate portrayals of the social world, they can be used as valid evidence about the research setting if they are approached as texts.

Denscombe (1998) highlights the disadvantages of using secondary data with regard to the fact that the documents have not been produced for the research, but for other purposes. They are constructions of the interpretations of those who produced them. However, the intertextuality between the three types of documents was particularly noticeable in the interview transcripts, suggesting a resemblance to Atkinson's and Coffey's (2011:90) observation that 'in literate bureaucratised settings in particular, one may identify a semi-autonomous domain of text and documents that refer primarily to another.' The extent of cross-referencing between the documents in the interviews relating to their content, use and function, suggested a contribution to social realities that warranted further exploration and analysis. As Prior (2008) suggests, it can be useful to examine how documents can drive and fashion episodes of human interaction. Cooren (2004) asserts that, in this sense, text can display agency.

3.4 Sampling

The data were collected from two post-1992 university providers of initial teacher education located in the North West of England. More specifically, the research centred on final year student teachers from the four-year undergraduate B.A./B.Ed. (Hons) Primary Education programmes in both institutions. This programme-type was selected for two key reasons. Firstly, the student teachers had a relatively long period of four years to develop their understanding and experience of *subject knowledge* in the context of their training. Secondly, they were not entering primary teaching from a subject-specialist perspective as is the case with postgraduate trainee teachers who have already studied a particular discipline at degree level. As the aim of the research was to look at conceptions of *subject knowledge* in primary ITT in a holistic sense, this seemed most appropriate.

The two institutions constituted an opportunity sample (Cohen *et al.*, 2007) as I was employed as a teacher educator by both over the course of the research. I, therefore, had ready access to participants. The participants were drawn from final year student teacher cohorts of the undergraduate programmes, school mentors who work with the student teachers on school placements and university tutors who taught on the programmes.

The sample of student teachers who completed the questionnaire survey is summarised below in Table 1:

Table 1 Questionnaire sample of primary student teachers

	Total number	Female	Male	Age range			
				21-22	23-24	25-26	27-30
Institution A	63	61	2	59	3	0	1
Institution B	41	34	7	36	3	2	0
Overall	104	95	9	95	6	2	1

As described previously, in the first year of data collection, questionnaires were distributed to all school mentors associated with the undergraduate programme at Institution A (n=122) but only 9 were returned completed fully. No further mentor questionnaires were distributed beyond this point.

Purposive sampling was employed to select the student teacher participants to be interviewed from within their final year cohorts. The final survey question provided opportunity for student teachers to indicate if they were willing to be interviewed. From this pool, initial sampling was guided by questionnaire responses to include a range of beliefs and opinions about *subject knowledge*. The purpose of this was to increase the scope and range of data exposed, as well as the likelihood that an array of multiple realities would be uncovered (Lincoln and Guba, 1985: 40). Interviews were conducted in small batches punctuated with periods of data analysis to inform selection of the next batch of participants. Participants were selected on the basis of their questionnaire responses being indicative of representing typical, extreme or important cases, with a view to ensuring maximum variation sampling (Patton, 1980). The grounded theory approach taken to data analysis helped to identify novel, underdeveloped or saturated categories in the theory emerging from the data to direct serial selection of participants with continuous focusing of the sample (Lincoln and Guba, 1985). Data collection continued until no new properties of the core categories were being revealed (Glaser, 1998).

The sample of university tutor participants was drawn from an opportunity sample of volunteers in both institutions. The sample included representation of a range of primary subject-specialisms, departmental roles and experience in primary ITT. The school mentor participant sample was generated wholly by convenience sampling of willing volunteers. It was notable that they were all school mentors with whom I had some degree of established relationship and rapport with. The overall interview sample is summarised in Table 2 below:

Table 2 Interview sample of participants

	Student Teachers	University Tutors	School Mentors
Institution A	10	7	n/a
Institution B	8	5	n/a
Total	18	12	11

Whilst student teachers were clearly allied to one specific institution, school mentors were not. The sample, therefore, has not been specified in relation to Institution A or B because the mentors work quite fluidly, according to market forces, with multiple institutions simultaneously, or over time. This includes other universities that are not part of this study. The university tutors were specified according to which institution they were employed with at the time they were interviewed. The sample includes a number of individuals who have worked at both institutions during their careers and for other university ITT providers. For the purposes of reporting, however, no indication of institutional affiliation is denoted for the university tutors to protect their anonymity. For the purposes of reporting findings, the system of labelling shown in Table 3 was used to identify participants whilst maintaining their anonymity.

Table 3 Labels used to represent individual participants in the reporting of findings

Acronym	Meaning	Notes
ST A1-10	Student Teacher from Institution A participant number (1-10)	Pseudonyms are used for those individuals featured in the pen portraits.
ST B1-8	Student Teacher from Institution B participant number (1-8)	Pseudonyms are used for those individuals featured in the pen portraits.
UT 1-12	University Tutor participant number (1-12)	No institution included to prevent identification and protect anonymity
M 1-11	Mentor participant number (1-11)	n/a

The sample of documents examined was selected on the basis of emergent theory from analysis of the semi-structured interviews. The sample comprised:

- Teachers' Standards (DfE, 2012);
- North West Consortium Trainee Teachers' Standards Assessment Descriptors (NW Consortium of Universities & Teach First, 2012);
- Working with the Teachers' Standards in Initial Teacher Education: Guidance to support assessment for Qualified Teacher Status (UCET/NASBTT/HEA, 2012);
- Written feedback on lesson observations provided to student teachers (n=427). (This included all lesson observations submitted by final year undergraduate student teachers from the two institutions as their 'best' evidence for Teachers' Standard 3 for the cohorts participating in the research.)

3.5 Ethical considerations

The British Educational Research Association ethical guidelines (BERA, 2011) were considered in relation to the specifics of this research project through what Robson (2011:197) describes as a 'situational relativist' approach. The major considerations were informed consent, privacy and responsibilities to participants, arising from my underlying concern with respect for the dignity of all throughout the research process. Due to the fact that I have the dual role of researcher and tutor in the ITT departments at the centre of this

study, it was naturally important that those who participated in the research did so without any duress, either real or perceived. Ethical permission for the research was sought from the Liverpool John Moores University research ethics committee. Access to each institution featured in the research was sought via official permission from the gatekeepers (i.e. University Heads of Department). Student teacher participants were initially approached at the end of particular sessions in the two universities to facilitate communication with whole cohorts. University tutor participants were recruited via initial e-mail contact. School mentors were first introduced to the research during partnership development events, followed up with e-mail contact and personal requests during regular contact visits with schools that form part of my day-to-day role.

Voluntary, informed consent was sought in advance of each episode of data collection. Participant information sheets, specific to each group of stakeholder participants (i.e. student teachers, university tutors and school mentors), were provided in advance (see Appendices 1, 2, 5 and 8). This was to ensure that all those approached, understood the nature of the research focus, the process in which they would be engaged and how the data would be used and reported. They were advised of their right to withdraw from the research at any time, for any or no reason. The potential detriment of the demands on their time to participate in the interviews was made clear. Time was allowed to enable potential participants to consider the information in advance and have opportunity to seek further guidance from me, as the researcher. This aligned with four principles of informed consent outlined by Diener and Crandall (1978, cited in Cohen *et al.*, 2007: 350) which include: competence (in having the capacity to comprehend the request), voluntarism, access to full information about the study and comprehension of the nature of the research project.

The questionnaire surveys included a statement to indicate informed consent and the final question allowed individuals who were willing to be interviewed, to identify themselves. In this, they consented to being approached. Prior to all interviews, signed consent forms were obtained from each participant (see Appendices 4, 7 and 9). As advised by Cohen *et al.* (2007), the researcher must show due regard to minimise the potential for participants to lose dignity, self-esteem or trust. Interviews with the final year student teachers took place after all assessed elements of their programmes had been completed, just prior to qualification, when I was no longer in a position of influence. Similarly, school mentors were interviewed at the end of academic years when no student teachers were officially

placed with them. This meant that I was not part of any formal triangulation processes in the assessment of student teachers at the time. All reasonable steps were taken during the interviews to reduce intrusion and put them at their ease. University tutor participants are my peers and, therefore, I held no particular influence over their decision to participate, or not.

Ryen (2004: 231) highlights that the researcher is responsible for protecting the participants' privacy. This was maintained by confidential and anonymous treatment of their data. Pseudonyms have been used in the reporting of the research to ensure anonymity. In relation to the university tutor and school mentor participants, I have not specified to which of the two institutions they are predominantly affiliated. As they have been drawn from much smaller populations, this step might have rendered the individuals identifiable. Hard copy questionnaires were stored in a locked filing cabinet and all other data were stored securely in password-protected computer files, in accordance with the Data Protection Act (Great Britain, 1998). Participants consented to their data being stored in this way.

3.6 Analysis

3.6.1 Questionnaire survey

The data generated by the questionnaire surveys were analysed using several techniques. The biographical information gleaned from initial closed questions was collated and analysed using Excel. Open question responses were coded via a grounded inductive approach adopting thematic analysis (Lincoln and Guba, 1985). Open coding was used to interpret and label meanings arising from my interaction with the text. Codes were then refined into categories, or themes, in response to each question (see Appendix 10a). Descriptive statistics for the survey cohorts were collated in relation to the final Likert scale question (see Appendix 10b). As this question captured the attitudes and beliefs of the cohorts from the two different institutions in a form with a high degree of standardisation, the data generated by it was subjected to a Mann-Whitney U-test to compare the means of each population for each statement in question 11. This statistical test was selected as the non-parametric equivalent of the unpaired two-group t-test for data for which one cannot assume normal distribution and where the data is in a ranked form. The test generates Z scores, expressed in standard deviation units and associated probabilities. The results (see Appendix 10b) indicated no statistical difference between the two populations except in

relation to their relative levels of confidence to teach all subjects of the primary curriculum. Student teachers from Institution A were significantly less confident in this respect than those from Institution B. The results indicated that it was appropriate to pool data from across the two institutional populations, rather than present it separately.

3.6.2 Semi-structured interviews (including visual data created during the interviews)

I transcribed each interview verbatim from the audio recordings. This was an important stage in the ongoing process of analysis, as advocated by Kvale (1996: 168), in order to pay close attention to the 'linguistic constitution of reality' and the 'contextuality of meaning.' I began memo writing from the outset to capture my initial responses, questions and emerging interpretations. The initial coding phase was undertaken immediately following transcription of each interview, using a line-by-line strategy. As Charmaz (2014:113) explains, 'through coding you define what is happening in the data and begin to grapple with what it means.' The codes begin to shape the analytical framework from which you build the process of analysis. Star (2007:84) describes codes as 'transitional objects' that 'connect fragments of data.' This was a lengthy process that required Glaser's and Strauss's (1967) technique of constant comparison between the data and the conceptualisation. This was aided by frequent memo writing. At this point, I aimed to remain open to all possible theoretical directions emerging from the data. The use of gerunds (e.g. asking, mentoring, assessing etc.) for coding helped to maintain focus on processes rather than labelling content, as recommended by Glaser (1998) and Charmaz (2008). The bricolage approach (see Section 3.1, p55) also enabled me to move between different forms of data, thus discouraging one-dimensional thinking. My use of Nvivo10 as a data storage and retrieval tool assisted this process significantly due to the readily accessible nature of the whole data set.

Initial coding was followed by a focused coding phase that used the most frequent and/or pertinent codes to synthesise and organise the data. Some codes were discarded, combined or re-worded at this point and the data were re-examined against the reformulated codes. Interaction with the data was not linear; it was an active process of constant revisiting each interview regularly, which aided further data collection. For example, the decision to incorporate documentary data in the research design stemmed from the recurrent themes emerging from the data relating to particular documents which warranted further exploration.

The next phase adopted the essence of axial coding (Strauss and Corbin, 1998) to link sub-categories of data and identify central categories. My approach was emergent rather than procedural, after Charmaz (2014). Theoretical coding followed in the sense of applying various analytic schemes to the data; according to Glaser (1978: 72), theoretical codes 'weave the fractured story back together.' At all stages, I aimed to be aware of the hidden assumptions in my use of language, as well as the participants' and to maintain a reflexive stance about how I see the world and the data. Regular memo writing captured the potential influence of this on the process of analysis and interpretation to maintain focus.

3.6.3 Working with pre-existing theory

My reflexive memos led me to notice that embedded within my emergent categories of coded data, were readily recognisable parallels with existing theory in the literature. This led me to relate my emergent categories from the raw data, with the literature-based framework of categories of knowledge bases for teaching (see Chapter 2.3 p17). I discovered that, not only did they align very well, but also that the combination with my emergent categories provided a more nuanced picture of how the categories from the literature were understood by the research participants in context.

The only knowledge base that I did not locate in my coded data was craft knowledge (Grimmet and McKinnon, 1992), which refers to teachers' tacit knowledge. As tacit knowledge represents knowledge that cannot readily be articulated, it is unsurprising that it did not appear in the data emerging from linguistic and visual methods. If observation of teaching had been conducted, it would be more likely to emerge as a category rooted in observed actions. As this was the only exception, I was satisfied that the theoretical framework offered a useful common language to organise categories, in a way that had arisen inductively from the data. I counter-checked using Glaser's (1978) criteria to establish that these theoretical categories were warranted. In summary, they aided understanding of what the data indicated by providing a more readily communicable form of organisation and they demonstrated the patterns in the data to indicate where there were areas of consensus in the highly complex qualitative information. This step helped to move the development of theory from the data forwards.

In a similar way, the emergent codes relating to respondents' ideas about expert primary teaching focused on affective qualities of teachers and there was a noticeable gap in the data in relation to other features that might distinguish expert from non-expert teaching, such as subject-specific knowledge. The work of Bond *et al.* (2000) and Berliner (2004)

provides a comprehensive overview of prototypical features of expert teachers that has been empirically tested (see Chapter 2.6, p31-33). I related the codes emerging from my data with these categories of prototypical features to see to what extent they were reflected in participants' viewpoints. In addition to the features of expert teachers that were recognised by participants, identification of the relative absence of particular features (e.g. deep representations of subject knowledge) aided both analysis and communication of the findings significantly.

3.6.4 Pen portraits

As part of the construction of the bricolage (Denzin and Lincoln, 2003), to distinguish between an individual and collective level of interpretation, I created a series of pen portraits, drawing on elements of narrative inquiry (Connelly and Clandinin, 1999) in the process. Campbell, McNamara and Gilroy (2004: 142) cite this approach as being a useful device to 'illustrate and disseminate participants' perceptions, experiences and feelings in a lively, authentic, meaningful and accessible way.' In order to avoid simply constructing biographical accounts rather than subjecting them to systematic analysis, I sought to use a conceptual framework as a heuristic. I selected Kelchtermans's (2009) personal interpretive framework (see Chapter 2.9, p50) with which I was already familiar through my practice as a teacher educator. Methodologically, an adapted version of the model has been used effectively by Peiser and Jones (2013) to investigate teachers' perceptions of the significance of intercultural understanding in the modern foreign languages curriculum, which recommended its applicability to my examination of participants' conceptions of subject knowledge. The literature review identifies and explains the components of Kelchtermans's (2009) model (see p50-52). Data for each of the student teacher participants were coded according to the elements of the personal interpretive framework.

In their research of the identities of teachers and nurses, Stronach *et al.* (2002) uncovered dynamic identities of individuals, rather than 'types' of teachers and nurses. The findings of their research (discussed in Chapter 2.2, p16) resonated strongly with the individual accounts located in my data, which echoed the fragmented and, sometimes, contradictory values, beliefs and attitudes reported in Stronach *et al.*'s (2002) study. For this reason, I took the methodological decision to create pen portraits of some of the real participants, rather than 'fictional' ones developed from amalgams of individual characteristics across the entire data set. The individuals selected, demonstrated differing epistemological

orientations towards, and conceptualisations of, *subject knowledge* in combination with a variety of contrasting motivations, attitudes and influences. They illustrate the diversity in the data in relation to similar influences resulting in quite different realities and responses, even where there are areas of commonality. I do not claim that they encapsulate the entire data set, but they offer what I consider to be important and interesting insights about individuals that arise directly from the data and maintain its original essence.

3.6.5 Documents

For the selected sample of documents (see Chapter 3.4, p67), content analysis was performed by coding the text according to the theoretical framework developed in relation to the types of knowledge for teaching. To recapitulate, this was derived from the emergent codes that were grounded in the raw data, combined with the categories of knowledge bases developed from the literature. For this data, I was seeking connections between the emergent grounded theory and the precise content of the documents that had been referred to on a recurrent basis throughout the participant interviews. I analysed the texts from both a quantitative and qualitative perspective in relation to the theoretical framework of knowledge bases. As well as supporting triangulation of the data, the technique enabled me to make inferences from the texts to the contexts in which they were used (Krippendorff, 2004: 18). The documents alone are of limited value due to their inherent bias and distortion in not having been produced for the purposes of the research, however, in combination with the extensive data from other sources they formed an important connecting bridge.

Summary

The use of Nvivo 10 for data storage and retrieval, allowed me to see the range of themes emerging and the weight of evidence to support them as part of a developmental process (see Appendix 10c for exemplar material). The software also supported the drawing together of diverse qualitative data to visualise connections through tools such as matrix coding queries (see Appendix 10d for examples) and visual modelling. In presenting the findings of an inductive process of analysis, at times I have used descriptive statistics to underpin any claims I make about areas of consensus mapped across the two institutionally-based populations to provide a clear audit trail.

3.7 Quality issues

Defining the reliability and validity of a qualitative inquiry presents some challenges, as it inherently rejects essentialist notions of epistemology and the existence of an external reality. Bryman (2008:31) defines reliability as the term used to describe to what extent the 'measures that are devised for concepts... are consistent.' This is most usually demonstrated through replication. Lincoln and Guba (1985:299) suggest that for naturalistic inquiry, the term 'dependability' is more appropriate to describe the process of showing that findings are consistent and could be repeated. I adopt this term in relation to this study, given that statistical replication of findings is not appropriate due to the highly contextualised and situated nature of the research. I aim to demonstrate dependability in my findings by creating a clear audit trail (Lincoln and Guba, 1985: 319), to enable the route by which I have reached my interpretation of findings to be traced. Lincoln and Guba (1985) use the term audit in a metaphorical sense, based on the fiscal auditor examining the books of a company to determine whether the accounts have been kept satisfactorily. In this chapter, I have outlined the research process to act as a reference point or guide to the methodological journey taken as the research has unfolded.

As part of this audit trail, I have reported the small sample size of completed questionnaires from school mentors (n=9). Clearly, this is too small a sample for the data generated from them to be considered to be dependable. As such, they have only been used to provide biographical information about some of the school mentors in combination with the data generated from interviews. They have been included in the audit trail to demonstrate the difficulties experienced in recruiting school mentors to the study in the absence of some level of personal acquaintance with me, as the researcher. This indicates the importance of trust between the researcher and participants in the process, which is more likely to be achieved in a face-to-face scenario. This could be due to perceived power relationships between university and school staff. From the frank interview responses I gathered, it is evident that this was not a perceived difficulty with the mentors who volunteered to participate. Again, this is most likely due to pre-existing professional relationships between me and almost all of the school mentors interviewed.

Validity is taken by Bryman (2008: 31) to mean the 'integrity of the conclusions that are generated from a piece of research,' whilst Hammersley (1990: 57) suggests it is 'the extent to which an account accurately represents the social phenomena to which it refers.' The challenge is in managing the tension between reality and representation (Gubrium and

Holstein, 1997: 114). In this study, I reject the assumption of an external reality and, instead, acknowledge that realities are multiple and socially constructed. To take this into account as an inherent characteristic of naturalistic inquiry, Lincoln and Guba (1985:290) suggest the alternative term 'trustworthiness', which I adopt as being more appropriate to this research. I aimed to enhance the credibility (Guba & Lincoln, 1994) of my findings through prolonged engagement with the research context and raw data. All interviews were transcribed verbatim to enhance confidence in the findings (see Appendix 10c for an exemplar extract). Triangulation is embedded in the research design as an alternative to validation, as recommended by Flick (2002: 227) to display multiple, refracted realities simultaneously. In this study, some of Denzin's (1988) classic modes of triangulation are employed: triangulation by data source, method and theory. Triangulation by data source included gathering data to reflect the perspectives of individuals representing different groups of stakeholders (student teachers, university tutors and school mentors) across two central institutions, but also incorporating multiple school sites. Different methods of data collection have been used for comparison: questionnaire, interview, participatory creation of visual data and content analysis of documents. The emergent theory was compared with a number of theoretical schemes to enhance and inform interpretation of findings, thus achieving triangulation by theory. Miles, Huberman and Saldaña (2014) add triangulation by data type to Denzin's distinctions. Different data types have been examined as part of this study, for example: quantitative data, audio recordings, drawings and qualitative texts. These approaches were taken to enhance the credibility of the findings in increasing confidence in their truth value. As Flick (2002: 229) asserts, triangulation adds rigour, breadth, complexity, richness, and depth to any inquiry.

Trustworthiness also includes the confirmability and transferability of the findings (Guba and Lincoln, 1994). Confirmability refers to the extent to which the findings are shaped by the respondent and not researcher interest or bias. The use of verbatim transcripts of interviews, prolonged engagement with participants and the contexts in the study and a clear audit trail, all support the confirmability of the findings. In this chapter, I have recognised my influence in the research process in the construction of meanings through interpretation and acknowledged the issue of 'human as instrument' (Guba and Lincoln, 1981b: 283). Throughout the process, I have aimed to engage in reflexivity, i.e. reflecting critically on the self as researcher. Data analysis included regular writing of reflexive memos to interrogate the ways in which my interests, positions and assumptions might influence the inquiry (Charmaz, 2014: 344). This stance has informed not only how the

research has been conducted, but also how research participants have been represented in the written report. The thick description (Geertz , 1973) embedded in the findings provides sufficiently detailed information about the contexts to enable a judgement to be made about the transferability of the findings to another context for which there is similar data (Lincoln and Guba, 1985: 217). In other words, it is possible to show that the findings *may* have applicability in other similar contexts. As previously stated, however, I do not set out to imply broad generalisations due to the elements of the research that are particular to the given settings. Instead, I present a 'best estimate of trustworthiness' (Bassegy , 2001:19). This is built on the idea of Bassegy' s (1999:10) notion of 'fuzzy generalisations' representing the idea of something that may be true under certain conditions. In doing so, I recognise that because the findings are dependent on the interaction between the researcher and the respondents, they might not be duplicated elsewhere.

In summary, I adopt the alternative expressions of trustworthiness and dependability as the criteria of quality used to establish the worth of the research. Attention is paid to procedural validity and reflexivity is embedded in the research process.

4. Results and analysis

4.1 Conceptions and interpretations of *subject knowledge*

The evidence presented in this section responds to research question 1:

What is the nature of student teachers', school mentors' and university tutors' conceptions and interpretations of the term subject knowledge in the context of undergraduate primary initial teacher training?

Findings are based on the analysis of data from the following sources: student and mentor questionnaires; for key stakeholders (student teachers, university tutors, school mentors): visual data; semi-structured interviews.

4.1.1 Conceptions of *subject knowledge*: an overview

i) Questionnaire data

Open questionnaire responses relevant to the conceptual nature of *subject knowledge* (see Appendices 3 and 6 for survey questions) were analysed using an inductive approach to coding, as described in the methodology chapter (Section 3.6.1, p69). Codes were organised into categories (see Appendix 10a) and these categories were, later, related to the theoretical knowledge bases for teaching derived from the literature (see Chapter 2.3, p17). Identical processes were applied to student teacher and mentor questionnaires.

For student teachers, the categories created from the data across the whole sample correlated to the theoretical knowledge bases of: content (or subject matter) knowledge, curriculum knowledge and general pedagogical knowledge (GPK). There were individual variations as to whether GPK was included or excluded in the student teachers' conceptions of *subject knowledge*.

For school mentors, the categories created from the data across the whole sample also correlated to the theoretical knowledge bases of: content (or subject matter) knowledge, curriculum knowledge and GPK. One mentor included pedagogical content knowledge (PCK) in their interpretation of *subject knowledge*. It should be noted that this particular mentor spent a two-year secondment working in a university ITT department.

The broad findings from the questionnaires, therefore, indicated a consensus opinion of *subject knowledge* incorporating content knowledge, curriculum knowledge and general

pedagogical knowledge. Pedagogical content knowledge was virtually absent from conceptualisations of *subject knowledge* in the broad insights gained from this particular data set. Individual variations in interpretation were apparent.

ii) Interview data (incorporating visual data)

An inductive approach was similarly adopted in the analysis of the interview data and visual data, as described in the methodology chapter (Section 3.6.2, p70). To recapitulate, the categories that emerged from coding the raw data were aligned with the literature-based framework of categories of knowledge bases for teaching and combined to form a more nuanced analytical framework. When organising the data categories according to the theoretical framework of knowledge bases, exact matches in terminology were not necessarily the basis for coding, but rather text with an intended meaning that was a best fit within the scope of the theoretical knowledge base.

The findings summarised in Table 4, show, on a broad level, which theoretical knowledge bases for teaching were incorporated into the conceptions of *subject knowledge* held by the different groups of stakeholders represented in the data, and the relevant frequency of inclusion.

Table 4 Frequency of theoretical knowledge bases included in conceptions of *subject knowledge*

Knowledge bases included in stakeholders' conceptions of <i>subject knowledge</i> in primary ITT	No. of individuals in each stakeholder group		
	school mentors (n=11)	student teachers (n=18)	university tutors (n=12)
content knowledge (or subject matter knowledge)	11	18	12
curriculum knowledge	11	17	12
general pedagogical knowledge	8	13	8
pedagogical content knowledge	7	11	8
knowledge of educational contexts	6	15	3
knowledge of learners and their characteristics	6	10	3
knowledge of self	1	8	4
knowledge of educational ends, purposes and values	0	5	4
craft knowledge	0	0	0

The findings showed that across the sample of participants almost all of the knowledge bases represented in the theoretical framework, were incorporated into the participants' conceptions and interpretations of *subject knowledge*, indicating that there was wide

variety in the ways they understood the term. The only exception was craft knowledge (Grimmet and McKinnon, 1992), which refers to teachers' tacit knowledge. The most likely reasons for this are methodological in nature, and are discussed in Section 3.6.3 (p71). The most frequently occurring knowledge bases indicated a consensus interpretation of *subject knowledge* including content knowledge and curriculum knowledge. In addition, two thirds of participants included general pedagogical knowledge, and two thirds included pedagogical content knowledge. Two fifths of the participants included both PCK and GPK. This suggests that PCK is not as central to participants' conceptions of *subject knowledge* in practice as might be anticipated in relation to theoretical models and research that demonstrates its role in expert teaching (e.g. Bond *et al.*, 2000). Beyond the four most frequently occurring knowledge bases, inclusion of the other knowledge bases (e.g. knowledge of education contexts, learners etc.) varied from individual to individual, thus indicating the potential importance of personal interests, values and beliefs (e.g. Kelchtermans, 2009). Inclusion of knowledge bases in conceptualisations of *subject knowledge* appeared to encompass an element of idiosyncrasy.

There are some marginal differences in the knowledge base profiles of *subject knowledge* as conceptualised by the three groups of stakeholders. Student teachers were the most indiscriminate in the knowledge bases incorporated into their perceptions of *subject knowledge*. A higher proportion of both student teachers and school mentors included knowledge of educational contexts and knowledge of learners in their interpretations when compared with the university tutors. School mentors attached particular importance to context in their thinking about *subject knowledge*, which possibly reflects the highly situated nature of their roles in relation to initial teacher education. In contrast, student teachers and university tutors included with greater frequency, aspects of knowledge of self and knowledge of educational ends, purposes and values in their conceptualisations of *subject knowledge*, perhaps indicating that concern for these aspects is located to a greater extent in the university context of ITT. 'Knowledge of self' featured most significantly in student teachers' interpretations. The group of stakeholders that was most discriminating in their understanding of *subject knowledge* overall was the university tutors. It is interesting to note that the inclusion of pedagogical content knowledge was very slightly more frequent for university tutors and those tutors who did not include PCK, were newer to working in university-based teacher education. This perhaps reflects the transition period required for teacher educators to form establish new identities (e.g. Murray and Male, 2005; Boyd *et al.*, 2006).

This broad overview suggests that *subject knowledge* had no clearly identifiable and distinct shared meaning across the key stakeholder groups involved in the ITT partnerships. Although some minor trends can be observed, interpretations varied widely and seemed to be subject to personal idiosyncrasies.

4.1.2 Interpretations of theoretical knowledge bases represented in conceptualisations of *subject knowledge*

Understanding the exact nature and scope of the aspects of knowledge that were included in the participants' conceptualisations of *subject knowledge*, was illuminated by the more detailed and nuanced analytical framework that was developed through the combination of the emergent categories from the raw data, with the literature-based theoretical knowledge bases and their key components. Each theoretical knowledge base that was included in participants' conceptions of subject knowledge will be examined in turn.

1. Content knowledge (or subject matter knowledge)

All participants included this knowledge base in their conceptions of the term *subject knowledge* but when the detailed nature of their actual interpretations is examined, they are revealed to be relatively shallow and superficial in nature for the majority. Three sub-categories of content knowledge (Shulman, 1987) are derived from the literature: substantive and syntactic structures of knowledge (Schwab, 1978) and beliefs about the subject (Turner-Bisset, 1999). As outlined in the methodology chapter (Section 3.6.3, p71), the categories that emerged from the data were aligned with this theoretical framework. This is summarised in Table 5.

i) Substantive knowledge

As described by Shulman (1987), this category of knowledge extends far beyond simplistic notions of propositional knowledge in the form of facts (see Chapter 2.3, p17). In reality, however, the majority of participants' references to its contribution to the concept of *subject knowledge* skimmed the surface of its true nature. As Table 5 shows, the vast majority of interpretations related to knowledge of what they are teaching and/or what is prescribed by the curriculum and a corresponding personal 'level' or 'amount' of associated knowledge and/or skills. Within this, there was frequent reference to knowledge as 'facts', particularly from student teachers. Two students were open about their superficial approaches to familiarising themselves with the facts they are required to teach, which involved the use of mobile technology just prior to teaching. Several student teachers were

entirely fixated with *subject knowledge* equating to facts and they demonstrate a truly objectivist viewpoint of subject knowledge as a separate entity. Only one fifth of participants included understanding of subject matter at the conceptual level and the organisational framework of these concepts within the broader subject domain. A greater proportion of concept-based interpretations of *subject knowledge* were expressed by the university tutors. This aspect is a closer interpretation of Shulman's content knowledge base, but it was relatively unexplored in participants' conceptions of *subject knowledge*.

Table 5 Aspects of content knowledge included in conceptions of *subject knowledge*

Aspects of content knowledge included in conceptions of <i>subject knowledge</i>	No. of individuals in each stakeholder group		
	school mentors (n=11)	student teachers (n=18)	university tutors (n=12)
substantive knowledge:	11	18	12
knowledge linked to content of the curriculum	7	12	5
knowledge/understanding of what they are teaching	5	10	3
personal 'level'/'amount' of knowledge and/or skills	3	9	7
correct use of terminology	2	1	0
reference to facts	4	10	3
understanding of concepts	1	2	4
organisation of concepts	3	1	5
syntactic knowledge:	1	2	4
why a proposition is warranted within a domain	0	0	2
research method of the domain	1	1	2
critical perspectives within the domain	0	0	1
working practices of the domain	0	1	2
beliefs about subject	0	5	4

ii) Syntactic Knowledge

This sub-category involves knowledge of how propositions gain validity within a discipline (see Chapter 2.3, p17). Less than one fifth of participants made any link to syntactic knowledge in their ideas about *subject knowledge* and, again, most occurrences can be attributed to the university tutors. Only one school mentor included this aspect of content knowledge and, as already highlighted in relation to their inclusion of PCK, this particular

mentor worked in a university ITT department for two years, which is likely to have influenced their thinking.

Four participants discussed the research method of a domain as part of *subject knowledge*. In all cases this related to understanding the role of enquiry in the teaching of science. Two of the participants were university tutors who specialised in science education, so this relates to a key part of their work. Scientific enquiry is also specified in the national curriculum programmes of study for science, which naturally draws parallels with the nature of how ideas gain credibility in the wider scientific community. In this sense, its inclusion might signal awareness of curriculum requirements as much as it might indicate deeper thinking about content knowledge.

Two university tutors recognised the importance of unpacking the reasons why a particular proposition has value within the broader framework of the domain. Both happened to be English specialists, so this might indicate a particular need in their subject area when working with student teachers and school mentors. Only one university tutor included critical perspectives in the domain as part of *subject knowledge*. This could be expected to have a higher profile in university tutors' conceptualisations of *subject knowledge*, as they ought to be part of their subject communities within higher education, which is traditionally orientated towards knowledge creation via research. This perhaps reflects the experiences of teacher educators working in ITT departments of not becoming fully-fledged members of the academy in their academic roles (Brown, Rowley & Smith, 2016).

iii) Beliefs about the subject

Approximately one fifth of participants expressed ideas that suggested beliefs about the subject impacted on how they viewed *subject knowledge* in relation to that particular domain. It is noteworthy that no school mentors included this as an element of *subject knowledge*, perhaps demonstrating a lack of awareness of the pedagogy of teacher education in which this is well-established as an important part of the process.

Whilst some student teachers recognised the inclusion of beliefs about the subject as part of *subject knowledge*, some of their comments revealed some concerning beliefs which, perhaps, indicate the impact of the hidden curriculum of ITT in its weighting of subjects (Furlong *et al.*, 2000), both in university and school settings. For example:

Art's more of a skill – there's no subject knowledge for art. (ST A3)

I think for PE, your subject knowledge... not really sure that you need any. (ST A6)

*You don't really need to know about the history of art to be able to go and draw a picture. You don't need to know who Beethoven was to make some music. [...]
Science, I don't know, it's kind of in between because you don't really need to know about science to go and look at bugs but at the same time, you might need a bit of knowledge of what is science and looking through a microscope. (ST A4)*

Core subjects... it's drilled into you. That's what you have to know. (ST A5)

To summarise, although content knowledge was included in all participants' conceptions of *subject knowledge*, its interpretation was actually very shallow in nature and went little beyond some basic facts about what is detailed in the national curriculum and, therefore, what you have to teach. Some university tutors held deeper interpretations of content knowledge in relation to conceptual frameworks and modes of enquiry in the disciplines. Their interpretations are still not as fully developed as might be expected from an academic community of practice in ITT. School mentors' ideas about content knowledge mostly appeared to centre on knowledge involved in curriculum delivery.

2. Curriculum knowledge

All but one of the participants included curriculum knowledge in their conceptions of *subject knowledge* and this was, predominantly, understood in terms of the content of the curriculum (see Table 6). It was closely linked to the content knowledge base in their conceptions of *subject knowledge* for primary teaching. Specific aspects of curriculum knowledge that were incorporated included locating objectives, being up-to-date and understanding the rationale for the curriculum content.

Approximately three tenths of the participants included lateral and/or vertical curriculum knowledge, i.e. knowing what is taught in a particular year group and knowing what precedes and follows between year groups. Whilst this was identified by individuals from each of the stakeholder groups, more than half of school mentors gave this significance in their interpretations of *subject knowledge*. This might relate to their experiences of orientating student teachers to the curriculum requirements and expectations for particular year groups on school placements.

Table 6 Aspects of curriculum knowledge included in conceptions of *subject knowledge*

Aspects of curriculum knowledge included in conceptions of <i>subject knowledge</i>	No. of individuals in each stakeholder group		
	school mentors (n=11)	student teachers (n=18)	university tutors (n=12)
curriculum content	11	17	12
identify what you need to research prior to teaching	1	1	0
locate objectives	0	1	1
rationale for curriculum content	2	0	2
up to date	3	1	0
curriculum resources	1	5	0
lateral knowledge	6	4	4
vertical knowledge	6	3	4

The epistemological and pedagogical orientations of their meanings of curriculum knowledge are illuminated further when considered alongside the superficial interpretations of content knowledge discussed previously. Most inclusions of curriculum knowledge actually related to enabling curriculum delivery in its narrowest sense. Knowing what the curriculum prescribes that you teach to a particular year group, enables the teacher to know what information to research in advance. This exemplifies the most typical nature of the link between content and curriculum knowledge that was embodied in interpretations of *subject knowledge*. For example, a part-time university tutor whose work is mostly located in schools explained her viewpoint thus:

You need enough knowledge to be able to deliver the right information, at the right level for the lesson that they are dealing with, and I have to say 'lesson', because if you suddenly put me in Year 6, I'd only be one lesson ahead of them in certain subjects. [...] I'd have to swot it up (laughs). Sure you can't be expected to know everything, but you've got to know the pathway for that half term. (UT7)

A similar perspective was expressed by a student teacher who explained her insights into how lateral and vertical curriculum knowledge builds with time and experience.

So throughout your profession, you will change year groups... you then get an overall subject knowledge in order to teach Reception to Year 6. At the minute, I've done a lot of Key Stage One and I don't have a lot of subject knowledge for Year 6 because I didn't teach it, so I didn't really need to know the Year 6 stuff. So it just depends on your practice throughout your career. (ST B4)

Embedded in this, is a surface level interpretation of content knowledge connected to a short-term approach to knowledge development centred on curriculum delivery. The overall impact is the development of a piecemeal approach focused on the immediate curriculum content required for teaching a particular class at a particular point in time. In the majority of instances, references to lateral and/or vertical curriculum knowledge were included in conceptions of *subject knowledge* in this spirit. A slightly different aspect of this noted from within the same sample of participants, was for these identified elements of curriculum knowledge being used to inform differentiation via curriculum expectation, rather than on a conceptual basis.

A more conceptually orientated understanding of lateral/vertical curriculum knowledge was demonstrated by a smaller group of university tutors. One tutor used an example of a dialogue with a student teacher regarding a critical incident analysis assignment tutorial, to illustrate her point about the superficial nature of some student teachers' orientations to subject-specific knowledge.

When [name of student] came to see me this morning, he was talking about which critical incident should he do and he was talking about a lesson, and he kept saying..., "It was my pitching! My pitching was wrong." [...]He said that after the lesson the teacher was giving him feedback. The teacher had said, "Are you aware of the curriculum expectations for children in Year 1...the expectations around what they probably know and the kind of misconceptions that they may have because when that child asked you a question, you pitched it much, much higher?" He went really, really quiet...and said, "I didn't know." So I suggested that was his critical moment. (UT1)

In this instance, the student teacher had used the curriculum programmes of study to locate general content, but had not considered the science topic of plants from a conceptual viewpoint of the curriculum, which led to his difficulty.

Another university tutor described the interconnected nature of curriculum knowledge with other forms of knowledge encompassed by *subject knowledge*, in this case using mathematics as an illustration.

They also need to know about the curriculum and the progression of children's learning across the topics that they're teaching. It would be very useful if they knew a little bit about common misconceptions, so they feed that into their teaching. So, I think knowing the maths themselves, knowing the curriculum they've got to teach and the common areas of misconceptions. (UT9)

Curriculum delivery also dominated the reasoning behind the inclusion of curriculum resources as part of *subject knowledge* by some participants. One school mentor epitomised this viewpoint. She saw curriculum resources as key to *subject knowledge*, but understood in terms of archived units of work, plans, files (National Strategies for Literacy and Numeracy) and Assessing Pupil Progress (APP) guidelines even though they were no longer central to current curriculum policy and had been archived. Because her perceptions of content knowledge and curriculum knowledge are framed entirely by these documents, she expected student teachers to also be adept at locating and using them.

Ideally it would be great if they knew all of that so they had...right, I'm going into a Year 5 group in a really good school so I'm thinking about top Level 4 type of levels into Level 5. And I know that because I've got this in a file and I can go straight to it. [...]Underpinning that is government legislation or documents that give detailed analysis of what the children need to know to have reached a certain stage. (M2)

She held the view that the university's failure to address this as a requirement for student teachers' *subject knowledge* became a source of conflict during school placements. It suggests that she found it difficult to mediate between her own reliance on a state theory of learning (Lauder *et al.*, 2006) and alternative perspectives that student teachers might demonstrate.

Five of the student teachers also included curriculum resources as a component of *subject knowledge*. In addition to teaching resources, such as useful software for the interactive whiteboard/iPad, and real-life authentic resources, such as dental hygienists' equipment for a science topic, they emphasised knowing where to look for curriculum content and linked resources for researching related content knowledge. This most frequently took the form of using internet search engines.

Commercial schemes were viewed by student teachers as helpful scaffolding and, more strategically, as a means of avoiding having to develop understanding of how to work from a curriculum document to plan lessons and units of work, from scratch. One student teacher reflected on her observations of the apparent inequity in school mentors' expectations of student teachers on placements in relation to using commercial resources when planning.

It's also having knowledge of what you're teaching and what level you need to be teaching the children at, which I wouldn't say was something until third year that I had got the grasp of. I went to the fourth year placement where they would literally say, "It's fractions for two weeks." Now I had the knowledge of fractions quite comfortably but then I started to panic. Are we doing this? Are we doing this? And I was pulling my hair out and the other girls on placement had the Folens or the Collins things [commercially available schemes] so they were able to plan from them, whereas my teacher took it away, which is good and I don't blame her for doing it. (ST A7)

Whilst acknowledging that her mentor was trying to give her experience of planning without relying on 'off the peg' solutions, it is also apparent from the student's account that the mentor did not support this process with coaching and dialogue about how to go about this. Despite the personal difficulty she experienced, the student teacher fully recognised the limitations of over-reliance on commercial schemes on longer-term preparedness for teaching. She continued:

It wasn't until one of the girls on the course had an interview, and she had to do a lesson and she said, "They didn't give me a learning objective." And that kind of twigged with me and I said to her, "My whole placement, I was never given a learning objective. I was given a topic and I would have to go away and find what level they were working at and plan that way." And until my fourth year placement, I've never had to do that. I just thought, this other girl, she's going to qualify...but if she goes into school in September and they say, "This is what we want you to teach..." (She shrugs her shoulders and gestures to indicate she does not know what the outcome would be.) (ST A7)

Stronach *et al.*'s (2002:121) notion of professionals juggling between 'economies of performance' and 'ecologies of practice' is readily recognisable in this anecdote.

In conjunction with correlating epistemologies of content knowledge, curriculum content appears to drive which ‘facts’ or content need to be researched in advance to be able to teach lessons derived from the curriculum requirements for a particular year group. Beliefs and values that are bound to the nature of the curriculum and how it is enacted in the university ITT programme and in schools were evident in each of the groups of stakeholders. Some individuals showed a conceptual orientation towards notions of curriculum, but they were in the minority. For the vast majority of participants, notions of curriculum knowledge as a component of *subject knowledge* linked closely to narrower versions of curriculum delivery embedded in a culture of compliance, to such an extent that requirements that are no longer part of educational policy, persist in practice. This echoes with Strathern’s (2003) observation of the enduring nature of audit culture. Whilst some mentors encourage the use of commercial schemes and archived curriculum documents, others enact the complete removal of any scaffolding for the student teacher. In either case, difficulties will be created for student teachers who have to meet their school mentors’ expectations on placement in their dual role of learner and performer (Edwards, 1997) and this will undoubtedly influence their interpretations of *subject knowledge*. Critical understanding of ‘curriculum’ as a wider concept appeared not to be well-developed.

3. Pedagogical content knowledge

Shulman’s (1987) category of pedagogical content knowledge has been extended to include Grossman’s (1990) contribution of knowledge of purposes for teaching the subject matter and Tamir’s (1988) knowledge of subject-specific assessment strategies (see Chapter 2.3, p20). University tutors added most depth to the landscape in relation to this knowledge base and its inclusion in their conceptions of *subject knowledge*. Those university tutors who did not include PCK were relatively new to ITT, and one tutor did not have a full lecturing role, but simply supported visits to schools on a part-time basis. Student teachers’ conceptions featured PCK to a lesser degree and school mentors very little. Those students whose conceptions of *subject knowledge* were focused on delivery of facts and those who were particularly child-centred had generally omitted PCK from their perspectives of what *subject knowledge* is. Table 7 summarises the frequency with which different aspects of PCK were included within participants’ conceptions of *subject knowledge*.

Table 7 Aspects of PCK included in conceptions of *subject knowledge*

Aspects of PCK included in conceptions of <i>subject knowledge</i>	No. of individuals in each stakeholder group		
	school mentors (n=11)	student teachers (n=18)	university tutors (n=12)
subject-specific pedagogies	3	6	7
application of subject-specific knowledge and pedagogy in combination	2	6	5
identifying misconceptions	1	2	3
addressing misconceptions	2	3	3
knowledge of children's understanding	0	1	4
conceptions and pre-conceptions that children bring with them	0	1	4
conceptions of purposes for teaching the subject matter	2	1	3
what makes learning specific topics difficult	1	1	2
strategies to recognise understanding of learners	0	0	0
subject-specific assessment strategies	0	0	0

Most references to PCK were in relation to subject-specific pedagogies, which were included by more than half of the university tutors, a smaller proportion of student teachers and few school mentors. For example, two university tutors who specialised in English and mathematics, respectively, explained the role of PCK in their development of student teachers' *subject knowledge*.

It's more about the best ways to help children to understand different concepts. You can't expect children to be able to write a story of their own invention, if they can't retell the story that somebody else has written first. You need to know the features of narrative writing but that's pure subject knowledge. You need to also understand when and where it'll be possible for children to do that in terms of their development and you need the pedagogical knowledge of how to get children to do that. How do I teach it? (UT8)

You're teaching them the written method, you're progressing along. They start making errors when they are perhaps doing some exchanging or decomposition. You unpick it to a point where you simplify it and don't put as much decomposition in. Then you're not challenging the learning. You've got to challenge the misconception to actually get the learning and see what the problem is... where

actually they do not understand the process of exchanging in the correct way, and sometimes you simplify it too much because you don't understand that progression.

(UT2)

Application of subject-specific knowledge and pedagogy in combination was the second most frequently included category, but again, in higher proportions of university tutors and student teachers in comparison to school mentors. Students appeared to find it notably more difficult to articulate their thoughts in relation to this knowledge base, even though their understanding was evident, thus suggesting that, perhaps, ITT has not provided them with an appropriate theoretical and conceptual vocabulary. One student had to think their way through their meaning when providing a commentary on their visual representation of *subject knowledge* even though their conceptualisation was dominated by PCK, to a greater extent than any other participant:

You have each individual subject domain and then I think those two...are completely combined. You need to know how to teach it. That might be like pedagogical knowledge – I suppose you could call it that – but I think that also comes under subject knowledge. You could call it pedagogical subject knowledge. (ST A2)

Identifying and addressing misconceptions formed part of *subject knowledge* for approximately one fifth of all participants. For example:

Year 1 children might say 'the root sucks up the water' and it's things like that that you have to be aware of so that you know whether to anticipate it, but also how to answer it and how to guide them and so on...take them onto the next steps. (UT1)

Once again, university tutors were most likely to include this as part of *subject knowledge*, student teachers slightly less likely and school mentors least likely. Having an understanding of the pre-conceptions and conceptions that children bring with them when learning about a particular aspect of subject matter, and how children come to understand it, was only recognised as an aspect of *subject knowledge* by five participants – four university tutors and one student teacher. This was not recognised at all by school mentors in their interpretations.

The student teacher, who showed deep understanding of PCK as *subject knowledge*, explained her reasoning of how knowledge about the nature of children's understanding informed her teaching decisions. It is interesting to note how she connected this seamlessly with her conceptually-focused ideas about content knowledge. She was the only student

teacher to incorporate into her interpretation of *subject knowledge*, knowledge of how concepts are organised into a broader framework within a discipline. She drew on this connectionist thinking in relation to children's emergent conceptual understanding.

You need to be aware of how concepts perhaps link together and how children might understand them. You need to be aware of children's ways of thinking... and then you need to be aware of misconceptions that can arise and also how concepts link together, because without that you're never really extending their learning. So I think you need also to be very aware of not just having the concepts, but being able to address how the children might interpret those concepts initially. (ST A2)

A specialist mathematics university tutor explained her approach to trying to draw student teachers' attention to the importance of recognising how children's understanding of concepts develops and where difficulties might arise.

What are the misconceptions that children might come across? If you're good at maths, and it's a bit of a generalisation, but I do find the ones who have done A-level maths really struggle to relate back to a point where they can understand why children can't understand tens and units. It's only perhaps when I get them to do some calculations in base-8, they suddenly start going, "Oh now I get it!" (UT2)

This example illustrates how the university tutor uses her own pedagogical content knowledge related to teaching mathematics education to adult learners, to initiate their understanding through deep representations of the subject matter, of how children might come to understand the fundamental concept of place value. It indicates the complexity of the process of initial teacher education for primary teachers that is not necessarily captured in some of the participants' conceptions.

Knowledge of conceptions of purposes for teaching the subject matter (Grossman, 1990) received fewer inclusions as part of *subject knowledge*. A university tutor who specialised in English explained her frustration with the pervading culture of test results being cited as the purpose for teaching particular aspects of subject matter, rather than purposes located within the discipline itself.

I hate the thought of telling children what a noun is, just so they know what a noun is. I can see the advantage of having that knowledge, knowledge about your language is important but it's also why you're using them and it's not to get a level

5...which absolutely drives me round the twist! Subject knowledge is more than just the curriculum isn't it? It's... how to get children to get to grips with it. (UT8)

The common thread running through examples of PCK as an integral part of *subject knowledge* was that the individuals were focused on developing children's conceptual understanding through their teaching, rather than curriculum delivery. It is this grappling with the nature of ideas that leads them to consider how this guides their teaching decisions. It did not form part of the language of individuals who expressed short-term, piecemeal approaches towards researching bits of content knowledge just prior to teaching, however.

Despite the significance of Shulman's (1986) category of pedagogical content knowledge in research about the subject-specific knowledge base for teaching and its key role in elevating the status of teaching as a profession, it remained relatively under-developed in the stakeholders' conceptions of *subject knowledge*. Its location in culture and practice tended towards the university setting. The inclusions of aspects of knowledge that approximated to elements of PCK in interpretations of *subject knowledge* were relatively few for school mentors. Some student teachers had incorporated ideas about PCK into their thinking about *subject knowledge*, whilst others have not. Even those who did have a highly developed understanding of PCK and its role in their practice, struggled to find the vocabulary to explain their meaning. This raises the question as to whether PCK is given sufficient explicit treatment in ITT. In particular, the data demonstrated that its nature and importance is not part of a shared understanding of *subject knowledge* of all university tutors in the sample, particularly those newer to ITT, and it appeared not to be a key part of school mentors' thinking. Individualised thinking about PCK seemed to be linked closely with teacher identity and individual beliefs about the purpose of education. Those concerned with developing children's conceptual understanding of subject matter were more likely to include PCK in their ideas about *subject knowledge*. Therefore, this suggests a strong link between PCK and epistemologies of content knowledge.

4. General pedagogical knowledge

Approximately two thirds of mentors and student teachers included GPK within their conceptions of *subject knowledge*, whilst only half of the university tutors did. The exact nature of this is broken down in the Table 8.

Table 8 Aspects of GPK included in conceptions of *subject knowledge*

Aspects of general pedagogical knowledge included in conceptions of <i>subject knowledge</i>	No. of individuals in each stakeholder group		
	school mentors (n=11)	student teachers (n=18)	university tutors (n=12)
teaching methods and approaches	6	11	7
assessment	2	3	0
personalised learning	3	3	0
classroom management	1	1	3
planning	1	2	1
differentiation	1	0	0
evaluation via reflection	3	0	0
behaviour management	0	0	2
natural ability	0	1	0
pastoral	0	1	0
communication	0	1	0

The vast majority of references to GPK as part of *subject knowledge* were in relation to generic teaching methods and approaches that are not bound to the subject matter. However, whilst the teaching methods are not bound by subjects, epistemologies of content knowledge appeared to be intertwined. To illustrate this, the examples below demonstrate how a student teacher and a university tutor both place more significance on GPK than other knowledge bases in their interpretations of *subject knowledge*. This appeared to be influenced by their objectivist orientations towards content knowledge as a separate entity to be possessed and transferred to children:

If you just know the knowledge and give all these facts to the children, that's not really going to develop anything. It's how you're going to teach them. (ST A1)

You can have very little actual knowledge per se. I think it's more the underpinning pedagogy and how to deliver that in an effective way, so I think there's two sides to it. I think there is the content but also the process whereby you can deliver that. (UT11)

This contrasts directly with the association between PCK and teaching for conceptual understanding; here the association is between GPK and 'delivery'.

There were a small number of participants who included knowledge of generic models of teaching as part of *subject knowledge*. There were individual references to Bloom's taxonomy by a university tutor and to constructivism by a student. One student and one university tutor recognised their prior experiences as a learner as part of *subject knowledge*. The most frequent references within this sub-category, however, were in relation to cross-curricular teaching approaches and transmission teaching, mostly by student teachers. What is notable is that there was no depth to these references in relation to *subject knowledge*. Some student teachers, who conceptualised content knowledge as facts, also talk in terms of 'delivery' of those facts via teaching methods that equated with transmission teaching. In contrast, cross-curricular teaching seemed to be offered as a panacea to off-set all issues relating to *subject knowledge*, and students linked it closely to creativity and pupil engagement and enjoyment, but without justification. For example:

Being very creative is going to help children learn. I think that's more important than actually having the subject knowledge to be able to do it. (ST A4)

Creativity-focused, cross-curricular approaches and knowledge-focused, transmission teaching appeared to be positioned at opposite ends of a philosophical spectrum, despite the conceptual distinctions between them. Transmission teaching encapsulates a set of behaviours characteristic of a teacher-centred approach to pedagogy, whereas 'cross-curricular' simply describes a particular way of parcelling up different aspects of a curriculum. Conceptually they are quite different, but this is not well-understood. It seems fair to suggest that the sample of students appeared to have limited understanding and interpretations of notions of curriculum and pedagogy and fell into the trap of dichotomous thinking: cross-curricular approaches positioned opposite to transmission teaching; creativity opposed to knowledge. This raises questions about the coherence and clarity of the discourse in ITT around these key ideas, concurring with the findings of the Cambridge Primary Review (Alexander, 2010).

Conceptions of *subject knowledge* also included a range of generic technical aspects of the teacher's role: planning, assessment, personalised learning, classroom management etc. One university tutor (a science specialist) explained why he included behaviour management and classroom management as part of *subject knowledge*:

I think for instance that your behaviour management skills and classroom organisation...they would dictate what investigations you can do with your pupils.

Also your generic pedagogy will determine the outcomes of doing anything to do with research in your science lessons investigations, because if you've got a classroom where children are encouraged to ask questions, are rewarded for asking questions and evaluating themselves and talking properly and not just getting the right, expected answer from the teacher, then you're more likely to get that. You know it could be in history that that happens or art when that happens, but that will actually improve your science investigations. (UT6)

This is a sound argument in terms of the teacher creating the right classroom climate to facilitate pupils engaging in enquiry-based learning, but rather than seeing *subject knowledge* as an ingredient of the over-arching pedagogy, general pedagogy was viewed as part of *subject knowledge*.

In a similar way, one school mentor unpicked her reasons for considering classroom management to be part of *subject knowledge*:

I mean things like individual work, group, pairs...and you do that with lots of different subjects...so I'd do individual, paired and groups in PE and in maths, and in all those subjects. But then also, does art have to be based at a table or can you go and do it somewhere else? So thinking about classroom methods...different types of activities and where you do it, how you do it...all those sort of things. (M9)

Again, it is clear how knowledge of these classroom organisation strategies would combine with subject-specific elements of knowledge, but her reasoning for why this is a component of *subject knowledge* is less apparent, particularly as she emphasises the application of this generic knowledge to subject-specific contexts.

In relation to personalised learning as a different sub-category of GPK, one student teacher explained how her thinking about this being part of *subject knowledge* has been influenced significantly by the context of a prior school placement.

Well last year I did a placement in a special school but I feel like that sort of made it draw into the children's needs because, whilst you're there, the understanding of the subject knowledge was understanding the needs of the children and the background to that and how to access things like visual impairments and things like physical awareness. (ST B8)

This illustrates how, without clearer definition of the conceptual nature of *subject knowledge*, ideas are shifted with great malleability to fit with individuals' experiences.

A significant proportion of the different stakeholders included GPK in their conceptions of *subject knowledge* with student teachers being marginally more likely to do so. For these individuals, a generic discourse of teaching methods appears to replace a more nuanced, deeper discourse about subject-specific knowledge, curriculum and pedagogy. This is more explicable for novice teachers who are still in the earlier stages of the process of learning to teach (e.g. Berliner, 1988).

5. Knowledge of learners and their characteristics

The frequency with which knowledge of learners and their characteristics was included in participants' conceptions of *subject knowledge* is summarised in Table 9.

Table 9 Aspects of knowledge of learners included in conceptions of *subject knowledge*

Aspects of knowledge of learners included in conceptions of <i>subject knowledge</i>	No. of individuals in each stakeholder group		
	school mentors (n=11)	student teachers (n=18)	university tutors (n=12)
knowledge of learners: cognitive	6	9	1
knowledge of learners: empirical	1	4	2

i) Knowledge of learners: cognitive

Students and mentors included in *subject knowledge*, aspects of child development and understanding of what a group of learners can/cannot do. The latter generally informs strategies for differentiation in the classroom so seemed to be of greater significance to school mentors and students, in a more context-bound sense. The reasons why they considered this to be *subject knowledge* were not so apparent, but it obviously features in their approaches to knowing what to teach (from the curriculum), and then researching related content to teach via either generic pedagogies or subject-specific pedagogies, depending on perspective. As knowledge of how to 'pitch' this content relies on knowledge about learners' prior knowledge, skills, attitudes and difficulties, it seems that this knowledge base became not just associated with *subject knowledge*, but part of it for some participants.

One school mentor, who was also the school's Assistant Headteacher, described understanding children's capabilities as 'something to hang it on to' with reference to the subject matter he is trying to teach. He went on to explain further:

I think looking at the children in our school, unpicking their emotion you know, their background and how they deal with... especially when we are looking at maths...how they deal with things and if there is a problem, how do they start. (M4)

Building resilience in children's learning behaviour was a focus for this particular school at the time of the interview, and this focus was evident in the work being done by student teachers on placement in the school during this period. It appeared that the school's priorities for improvement might influence thinking about *subject knowledge* when mentoring students at the same time as working on this in a leadership role, thus suggesting a strong contextual influence (e.g. Eraut, 1994).

Similarly, the continuing Ofsted focus on pupil progress (Ofsted, 2016) was evident throughout interview data. In relation to her reasons for why she considered knowledge of learners' capabilities to be part of *subject knowledge*, one mentor considered:

Subject knowledge is knowing where some of them are at, what some of them need to work on to get to where most of them are at, and where the ones that are already there, how are you going to bring them forward. So, for example, if you were doing $34 + 34$... and the below [referring to lower attaining pupils] can't even do that, well...the low would be doing number bonds to 10... whereas the above [referring to higher attaining pupils], you could do three digit numbers addition. (M5)

For this mentor, this process was embedded in all of her thinking about *subject knowledge* when working with student teachers. She also held the role of Special Educational Needs Co-ordinator (SENCO) in her school, which might also contribute to her perspective. The only university tutor who included this specific category of knowledge in her definition of *subject knowledge* was also a former SENCO and part of her role in the university was to provide expertise in SEN. She explained:

You have to have knowledge of SEN and G and T [Gifted and Talented] of how they operate because obviously, they operate quite differently to the normal child... if you can have a 'normal' child. (UT3)

It appears that personal and professional identity might be a determining factor in how *subject knowledge* is viewed in this respect (e.g. Banks *et al.* 1999; Ellis, 2007). This presents certain challenges for providers of ITT to gain consistency in experience for student teachers and perhaps contributes to the wide variation in conceptions of *subject knowledge*.

ii) Knowledge of learners: empirical

This category referred to social and cultural aspects of children of a certain age as learners. There were fewer references to this specific aspect of learners in relation to definitions of *subject knowledge*, particularly from the university tutors. When compared with the numerous references to cognitive knowledge of learners, it appeared that perhaps understanding of SEN was considered as a 'subject' with its own *subject knowledge*. The Teachers' Standards (DfE, 2012) place great significance on understanding children's needs and overcoming barriers to learning in terms of SEN rather than more social aspects of learning behaviours, so this might be an influential factor.

6. Knowledge of educational contexts

Of those participants who included this knowledge base in their conceptions of *subject knowledge*, student teachers and, to a lesser extent, school mentors made most frequent references to it. Their comments included the following aspects:

- backgrounds of children
- changing population
- demands of the job
- different curriculum practices in schools
- different expectations of subject-specific knowledge
- faith schools
- policies and procedures
- school/classroom culture
- staff CPD

Frequencies of occurrence of some of these aspects were too small to warrant reporting with descriptive statistics, as they were highly individualistic. The majority of references to this category of knowledge, related to different curriculum practices encountered in different schools and school/classroom cultures. Unsurprisingly, it was mostly student teachers who included these as part of *subject knowledge*, most often noting how practices in school impacted on their opportunities and teaching experiences.

I really like teaching PSHE but I feel it gets pushed aside as well, in favour of these [core subjects] and then art, DT and music, I do like to teach but they also quite often are just one-off days or one afternoon every couple of weeks. (ST B2)

Maths, English and science... they're obviously more focused on in school as the main things that children need to learn. Everything else, it gets cut out... like on my placement we had maths and English in the morning but we couldn't do a maths and English lesson one day, so the afternoon lessons got cut out and the maths and English got replaced. (ST B4)

Student teachers are potentially more aware of the differences in the rule-governed behaviours when they enter different contexts for school placements. Due to their lower status, or cultural capital (Bourdieu, 1977), they usually have to adopt a pragmatic stance towards culturally-embedded practices to avoid conflict, as they are both learner and performer (Edwards, 1997) in these settings.

One university tutor noted the different agendas driven by Ofsted inspections that were in operation in the contexts of ITT in comparison with primary schools, as a reason she included knowledge of context as part of *subject knowledge*.

I think there's also an issue in the core with phonics. University has to go in the phonics way. I don't think the schools actually take that phonics, SSP [systematic synthetic phonics], as the only way to do it, nor do I think they should. So I think there is a bit of uni versus school there, because I think schools take a wider perspective on learning to read apart from phonics, because as Ofsted come to them they've got to show progression rather than we have to show that we're doing the phonics. (UT3)

In her management role in ITT, she appeared to be acutely aware of the impact this might have on student teachers' experiences in relation to systematic synthetic phonics. Clearly, it is closely linked in her practice to the point where she actually conceptualises it as part of *subject knowledge* for primary teaching. This illustrates the individualised component of how culture and practice are experienced in formulating personal values and beliefs, which will then influence interpretations of *subject knowledge*. The accountability agenda in ITT was also in evidence here, as this individual's performance will be judged on the basis of Ofsted inspections, of which systematic synthetic phonics is the subject of intense scrutiny

(Ofsted, 2015). Personal priorities were perhaps evidenced in her thinking about *subject knowledge*.

To summarise, context undoubtedly impacts on interpretations of *subject knowledge*, but it is interesting that some participants included it *as subject knowledge*. This highlights the intently situated nature of learning to teach, and the portrayal of *subject knowledge* within this.

7. Knowledge of educational ends, purposes and values and their philosophical and historical grounds

A small number of student teachers and university tutors included references to aspects of educational ends and values that were more deeply rooted in their philosophical and/or historical origins, as summarised in Table 10.

Table 10 Aspects of ‘Educational ends, purposes and values’ included in conceptions of *subject knowledge*

Aspects of knowledge of ‘Educational ends, purposes and values’ included in conceptions of <i>subject knowledge</i>	No. of individuals in each stakeholder group		
	school mentors (n=11)	student teachers (n=18)	university tutors (n=12)
Educational ends: accountability	0	4	2
Educational purposes	0	0	0
Educational values	0	3	2

The most frequent inclusion by student teachers was accountability, as the educational end to which they work in relation to *subject knowledge*. For example, even though this student teacher held a complex conceptualisation of *subject knowledge*, she was acutely aware of the political landscape of education:

The curriculum could be changing next year. If you’re not aware of that, then you’re not going to be teaching the children the... well not necessarily the ‘right’ things but according to government accountability, you’re not going to be teaching the children the right things. (ST A2)

Given that trainees had to engage in *subject knowledge* auditing practices in university and were assessed against the relevant Teachers' Standard in relation to *subject knowledge* during school placements, it is unsurprising that some of them related their interpretations of *subject knowledge* within a framework of accountability, to the point where it was incorporated into their conceptions. No school mentors considered this aspect of knowledge as part of *subject knowledge*. From the perspective of their work with student teachers, they do not have any accountability in the process of training teachers in terms of Ofsted inspections. All accountability, including with regard to *subject knowledge* of trainees, sits with the university ITT providers. What is clear is that this culture influences student teachers, who felt a high degree of personal accountability within this system.

Also included in some individual conceptions of *subject knowledge* were a few references to educational values that were rooted in personal philosophies of education. (See Chapter 2.3, p23 for the distinction made between this category and more general beliefs about teaching.) For example, one university tutor and one student teacher both had a strong moral purpose behind their reasons for teaching and the importance of developing children's spiritual, moral and social awareness and skills were central to their practice. They both included this within their interpretations of *subject knowledge*. Some other values had a more coherent and direct connection with *subject knowledge*. For example, a university tutor expressed strong beliefs in the power of knowledge to enrich lives beyond the immediate political ends of the system, instead suggesting that the purpose of education was to create individual agency through the emancipatory nature of knowledge.

8. Knowledge of self

The inclusion of this knowledge base in conceptions of *subject knowledge* was naturally individualistic in nature. The only aspect which shared any commonality amongst the student teachers was awareness of their personal strengths and weaknesses and they included this as part of *subject knowledge*.

Being a primary school teacher... your strengths and weaknesses are all over the place. (ST B1)

I think you're expected to know most things for literacy and numeracy but for science, I probably wasn't secure in my science subject knowledge. Obviously I'd done science at GCSE but that's a different type of subject knowledge that I would need. It's more basic skills in the primary school that I'd forgotten. (ST A6)

Awareness of strengths and weaknesses in *subject knowledge* potentially links to the auditing practices adopted in university departments that encourages students to audit where their 'gaps' in *subject knowledge* might be (see Chapter 2.1, p12). The 'gaps' narrative runs through much of the research data from all stakeholders in relation to aspects of practice in ITT in contexts other than auditing *subject knowledge*. It suggests, again, that the legacy of the audit culture promoted by the 1997 ITT National Curricula (DfEE 1997, circular 10/97; revised DfEE1998b, Circular 4/98) has endured.

One student mused on the fluid nature of how their *subject knowledge* has been judged on placements in school. She talked about the placement review forms she has received after completing different school placements:

You can go to one school and they're like, 'Yes, you've got great subject knowledge,' and then you go to another and they are like, 'Oh it's alright because you don't know everything.' That's not good enough! (ST B6)

She was discontented and frustrated with the lack of consistency in judgements made by school mentors in relation to *subject knowledge* as part of school placements but, at the same time, it highlights that *subject knowledge* is not a clearly defined body of knowledge but one that evolves in communities of practice with differing collective knowledge and values. It also emphasises the cross-contextual, fluctuating identity of the learner (Stronach *et al.*, 2002) in relation to *subject knowledge*.

Other aspects of 'knowledge of self' that were noted as being part of *subject knowledge* included: natural ability, emotional literacy, personal interests brought into the classroom, own experiences as a learner and tensions in values/beliefs. Individual identities and biographies clearly do link with prevailing conceptions of *subject knowledge*.

Conclusion

When considering the overall sample of participants, the findings suggest that subject knowledge appeared to be understood and utilised as an umbrella term to describe general teacher knowledge, rather than as a distinct and specific concept. Conceptions of *subject knowledge* were highly variable and individualistic in nature. Shared understanding of subject knowledge was very limited and elements of consensus focused on curriculum delivery in a narrow sense.

4.2 Perceptions of the position and role of *subject knowledge* in primary ITT

The evidence presented in this section responds to research question 2:

What are the views of student teachers, school mentors and university tutors about the position and role of subject-specific knowledge for teaching (subject knowledge) in a) the process of learning to teach in the primary phase and b) expert primary teaching?

Findings are based on the analysis of data from the following sources: student and mentor questionnaires; for key stakeholders (student teachers, university tutors, school mentors): visual data; semi-structured interviews.

4.2.1 Thinking about *subject knowledge* in the context of primary ITT

1. Student teachers

i) Changes in thinking about *subject knowledge* during training

From the interview data, it became apparent that for the vast majority of the student teacher participants, their thinking has moved from an objectivist orientation towards *subject knowledge* to a more pedagogically orientated perspective. The outcomes of this change in thinking can be categorised according to the following key themes:

- Deeper understanding of the complexity of *subject knowledge* for teaching.
- Increasingly critical self-evaluation of personal subject-specific knowledge and understanding.
- Development of a more shallow perspective underpinned by an attitude of ‘getting by’ in school.

For a proportion of student teachers whose thinking fell into the latter category, they have learnt from their time in schools that there is no real need to develop permanent knowledge about anything besides general pedagogy, and this has altered their attitudes and behaviours. For example:

I think when I first heard it I was like, "Oh, that's just knowing everything!" (laughs) and it was a bit overwhelming, because you've got to just know everything about all the subjects you've got to teach, whereas now I've sort of brought it down to knowing how to allow children to access and just, sort of, being able to research it before you go into the classroom. (ST B8)

This suggests that the student teacher has developed a highly pragmatic approach to *subject knowledge*. It has a routine and mechanistic technical role in her teaching practice. Another student had a shallow perspective of *subject knowledge* but was focused on propositional knowledge.

If your subject knowledge is... lacking in a certain area, if a child asks you a question, I don't think teachers should be afraid to go on Google and look it up and learn alongside the children. (ST A9)

This might 'work' for some simple factual content knowledge, but this individual showed no awareness of the limitations of 'Google' in relation to some deeper interpretations of *subject knowledge* that include PCK. Both of these examples demonstrate the impact of the ambiguous discourse concerning *subject knowledge* in primary ITT, in enabling impoverished views of pedagogy to thrive.

For four of the eighteen student teachers interviewed, there had been little change in their thinking about *subject knowledge* and they had retained an objectivist viewpoint. One of the four fluctuated between an objectivist and subjectivist viewpoint, depending on the context (see Ruth's pen portrait, Section 4.4.2, p171). Despite the lack of change in their overall definitions of *subject knowledge*, a similar theme of more critical self-evaluation was apparent in the data, for example:

Since the beginning, my idea of subject knowledge...it's probably not changed that much. I've always known [...]that actually subject knowledge is those hard facts and I've always thought that, but I think there are different ways of going about developing your subject knowledge [...] and my view of what subject knowledge I have, has changed since I started, I've now realised. (ST A6)

The notion that individual thinking is to a large extent idiosyncratic, emerges again in relation to this. For a good number of student teachers, pedagogical content knowledge was not central to their thinking about *subject knowledge* for teaching.

ii) Influences on their thinking about *subject knowledge*

Half of the student teachers interviewed cited university as being the key influence on their understanding of *subject knowledge*. Those in the sample exhibiting the most in-depth and distinct understanding of subject knowledge were most significantly influenced by the university-based elements of training, which emphasised combining the subject-specific content with how to teach it. Some of those with particularly child-centred views also attributed this to their university-based experiences of being encouraged to put themselves in the place of their pupils to consider learning from the children's perspectives.

All of the student teachers who exhibited an objectivist view of *subject knowledge* as being standalone factual content, cited school placements as being the key influence in this. Their reasons included their focus on researching what they needed to teach in advance of teaching. Feedback on lesson observations had also provided evidence of the correctness of their ideas. However, other student teachers who cited school placements as most influential in their thinking about *subject knowledge* did so for completely different reasons. For a few individuals, it was in school where they realised the difference between *subject knowledge* for passing A-levels and *subject knowledge* for primary teaching, i.e. they made a connection with the pedagogical elements. One individual expressed that they found content and pedagogy to be 'inseparable' when planning in school. For one student teacher, a placement in a specialist school for pupils with special educational needs and disabilities (SEND), had completely re-framed her thinking about *subject knowledge* towards understanding their needs (see Saskia's pen portrait, Section 4.4.2, p185). The way the individual participates in the community of practice clearly influences the outcomes rather than simply the location of learning, providing support for Ellis's (2007) model of subject knowledge development.

Ambiguities in the way *subject knowledge* is dealt with, in both university and school contexts, were highlighted as another influence on thinking. Whilst the prevalence of *subject knowledge* in university-related documentation had underlined its significance for many student teachers, one made the observation that in relation to this focus 'people say subject knowledge and then sort of...move on' to illustrate their feeling that it is often glossed over. Others commented on the different interpretations of *subject knowledge* that school mentors have, illustrated in practice by the different features they looked out for when carrying out lesson observations. For some, it caused them to call into question the consistency of the grading process. One individual outlined their personal strategic response to this in determining what each mentor understood by *subject knowledge*, and

then providing plenty of evidence of the related features in their teaching, so they could pass the placement.

iii) Evaluations of personal *subject knowledge* at the end of their initial training

Most student teachers felt that their *subject knowledge* (as they defined it) was strongest in English and mathematics, because they had experienced so much emphasis on these subjects in practice compared to the rest of the curriculum. Some apprehension was evident across the participants in relation to the themes of teaching an unfamiliar year group, teaching upper Key Stage Two and teaching Physical Education (PE). The latter mostly seemed to be due to lack of opportunity on school placements, as PE is increasingly taught by external sports coaches. The other concerns might relate to situations where the short-term strategy of researching before teaching does not work. Some student teachers were unconcerned about *subject knowledge* in relation to their first jobs for a variety of reasons. A few discounted worries about *subject knowledge*, because their first jobs were in Reception or Key Stage One, the inference being that *subject knowledge* is undemanding in this age phase. Others were unperturbed, providing they were not 'put on the spot' and always had time to research via 'Google' prior to teaching. In contrast, one student teacher who held a particularly deep conceptualisation of *subject knowledge* pinpointed that she still felt she had a lack of pedagogical content knowledge and was anxious that she would not have the time, means or opportunity to develop this further once she began her first full-time teaching job.

2. School mentors: influences on their thinking about *subject knowledge*

The majority of mentors cited teaching in different year groups and Ofsted school inspection criteria as the most significant influences on their thinking about *subject knowledge*, but some added the experience of mentoring students to this, and the need to analyse practice in a different way.

When we're in school, that's what I found is...we just do things and we don't give it labels and it's only when you get into this training aspect that you suddenly label things as certain things. (M8)

One school mentor had been heavily influenced by their own initial teacher training and the *subject knowledge* auditing processes that were high on the agenda at the time. He

specifically mentioned the influence of the DfEE Circular 4/98 (DfEE, 1998b) and a culture of 'ticking off' items of *subject knowledge*.

I think because the standards I worked to, to gain QTS...standards 4/98...you know when you're embedded in it, it was like a national curriculum in itself and there was lots of, 'Oh I've done that' [gestures ticking a box]. We used to do subject audits.

(M4)

Referring to a two-year period when they worked full-time in an ITT department of a university before returning to the classroom, one mentor specified how this experience changed her thinking, including a greater awareness of adult pedagogy (Jones and Straker, 2006).

I think a big part of it would be the two years working at [name of HEI]...and really having to think about where the students are, where you need to get them to, how you get them there. (M1)

It is clear that there were common influential themes but, once again, influences could be identified that were specific to the individual mentor.

3. University tutors: influences on their thinking about *subject knowledge*

Common influences on university tutors' thinking about *subject knowledge* included studying for a Master's degree in education, which is usually a requirement for ITT posts in universities. For one secondary education tutor working on the primary undergraduate programme, his own research interests had informed and influenced his thinking.

Research and teaching on all the courses perhaps have led me to this sort of idea that you can't really pull these too far apart [referring to content and pedagogy].

(UT6)

This engagement with critical analysis via further study and research distinguishes this group of stakeholders and is a contributing factor to some of the differences in the data.

A further reference to the lasting impact of the Circular 4/98 era in ITT was made by one university tutor who cited brainwashing by the Teacher Development Agency (TDA) as the most significant influence on their thinking.

I'm a bit brainwashed into a particular model...the old TDA stuff. I think that's had a strong influence on me because it allows you [...] to think quite clearly in different compartments. What wasn't perhaps so helpful is the emphasis that was placed on this [content knowledge] in the 4/98 standards and, although some of that stuff is still really useful and still embedded in my head, it seems that 4/98 was a push in this area [content knowledge] and seemed to be avoiding, or not really considering, these two aspects, the curriculum and how children learn. (UT9)

This tutor showed an awareness of the enduring impact of the audit culture that was introduced to ITT during the period she refers to.

One tutor who questioned the need for teachers to possess knowledge 'in their heads' because of mobile technologies, cited her influences as educational research and policy since the 4/98 Circular.

That early research when the standards came out and if you remember... even when the folders for the National Curriculum came out, bearing in mind what's happened since, they keep being reduced. They've never expanded again, which is indicative about something about subject knowledge. (UT10)

The views expressed suggest that this individual tutor conceptualises *subject knowledge* as content-focused propositional knowledge.

Others cited mentoring student teachers in school and teaching in school over time as having developed their thinking. Having a school leadership role for English and the need to research aspects of subject matter to support other teachers in the team has had a lasting impact on one tutor. Another, voiced similar experiences in relation to being involved in leading the implementation of the National Literacy Strategy in their school at the time.

Being involved in the National Literacy Strategy, for all it's criticised, it certainly opened my school up to a range of teaching strategies and assessment strategies that they never would have used, and there wouldn't have been any scope for using them in that school at that time. I would say half of the lessons were a cloze passage, so a really good teaching strategy used inappropriately, at inappropriate times... subject knowledge! (UT1)

An ex-head teacher expressed a key influence of some past observations of members of their staff in school not having sufficient knowledge to understand why they were employing certain subject-specific pedagogies.

There is a lack of understanding of why I'm doing this. "I think I'll give guided reading a miss this week," and part of me thinks, if you understood what the knowledge is and why, you would do it! So the book tells you, this is what you've got to do once a week...blah di blah..., and this is what you've got to say... but if you understood why you're doing that, and the impact that could make on the children if it was done effectively, you might operate differently. (UT4)

Her passion for helping to shape a future generation of teachers as part of her personal philosophy as a new teacher educator was clearly evident in relation to this.

Overall, what is apparent is that similar influences have led to diverse ways of thinking about *subject knowledge* which, again, emphasises the significance of individual interpretation.

4.2.2 Perceptions of the role of *subject knowledge* in the initial education of primary teachers

1. The student teachers' perspective

The questionnaire data showed that less than one fifth of student teachers (15%) viewed *subject knowledge* as being of *essential/vital* importance in their initial training. More than three-quarters (78%) believed it to be *important* or *very important*. A tiny proportion of the student teacher participants (0.01%) felt that it did not always seem to be important. The data suggested that whilst there was wide variability in individual conceptions of *subject knowledge*, a central message of its significance has been conveyed to trainees regardless of their interpretation.

The interview data represented a variety of views of *subject knowledge* ranging from it being considered to be an entirely separate entity, simply to be applied to classroom practice, to the other end of the spectrum, where subject knowledge was conceived as a complex integrated concept comprising numerous different knowledge bases. Within this data, student teachers' opinions of the importance of *subject knowledge* in their training spanned a similar range, from it being essential to it not mattering at all. The nuances of a

perceived hierarchy of *subject knowledge* were also highlighted, with the views that there is little or no *subject knowledge* for certain National Curriculum foundation subjects, whilst it is of utmost importance for English and mathematics.

The perceived role of *subject knowledge* was explained by interviewees to provide a rationale for their views of its significance. The following themes emerged, which also serve to highlight the differing epistemological stances encapsulated within them.

i) Impact on children

Student teachers, whose views of *subject knowledge* aligned with an objectivist stance, rated its importance in terms of being able to 'pass on' or 'give' the children correct knowledge via their teaching. One individual expressed the purpose of this was to ensure that the children 'have some sort of knowledge by Year 6.' They also recalled the embarrassment of having to rely on a child's knowledge about Tudors when their own was lacking. Enabling children to use 'correct' vocabulary was also high on the agenda. Those participants with child-centred views of *subject knowledge* justified its importance in relation to being able to 'help children' in a generic sense but also to personalise their learning and 'spark children's curiosity'. They did not analyse in any way how *subject knowledge* enables this, suggesting it might be a theoretical connection in their minds rather than a direct indication of what they have seen happening in schools, or what they, themselves, do as teachers.

Where interpretations of *subject knowledge* were more complex, its role was deconstructed in more detail at the subject-specific level. It enables you to learn how to 'break concepts down to the children's level' and to 'view the subject from different angles.' Where *subject knowledge* was not sufficiently well-developed, student teachers recalled specific examples of the impact, including not being able to explain how to do something, missing out a vital step in teaching the concept of multiplication of fractions so the children were confused, or not recognising that a right-angled triangle could also be an isosceles triangle and refuting a child's correct observation of this. These examples all centred on PCK.

Common across all views of *subject knowledge* was its role in enabling children to make progress and being able to take learning to a higher level, through understanding of the principles of progression and differentiation. This was raised most frequently in relation to teaching upper Key Stage Two and/or children who were particularly gifted or talented.

This emphasis on pupil progress aligns with the priorities for primary schools in relation to the Ofsted inspection framework (Ofsted, 2016).

ii) Influence on pedagogical approach

Regardless of interpretation, there was consensus in their views that where *subject knowledge* was more secure, it enabled the student teacher to engage with more enquiry-based learning. Some felt their classroom approaches were more creative in these circumstances and they were more likely to follow the children's interests, whilst others observed that it helped them to 'deliver' the curriculum. One participant felt that where they had a deep understanding of pedagogical content knowledge in particular, it caused her to be more critical of curriculum guidelines and to depart from them where she saw opportunities for additional valuable learning. This suggests that PCK enables the beginning teacher to start to act with greater autonomy and agency.

Improved practice in relation to specific aspects of pedagogy was another common theme of the role of *subject knowledge*. Examples included improved ability to apply understanding of progression to support planning lessons more easily, better differentiation and assessment of children's learning. They also cited the ability to use modelling in their teaching to a greater extent and to anticipate potential alternative directions in a lesson. Not teaching misconceptions to children, and improving to a point where they could anticipate children's misconceptions, were viewed as key indicators of where their *subject knowledge* was at its best, by those who had considered elements of PCK to be part of *subject knowledge*.

iii) Influence on teacher behaviour and self-image

Secure *subject knowledge* gives student teachers confidence, regardless of how they define it. They reported greater enjoyment of teaching and having more enthusiasm in these circumstances. 'You don't have to stop and look things up again' when planning and teaching; 'you don't have to worry' and 'you can relax'. One student teacher described how their personal lifelong attitude to mathematics had changed once they began to actually understand concepts that they had never previously understood at school, and they reflected on the improved experience that their epiphany will have on the children they teach in the future. Again, this reflects the empowering nature of improved conceptual understanding for the individual.

With regard to teacher behaviours in the classroom, *subject knowledge* was considered to support a wide range of key activities including being able to answer children's questions,

encourage classroom discussion and to 'teach the right stuff in the right way'. Flexibility in learning was believed to increase along with their ability to challenge children's learning further than they otherwise would and their explanations were much clearer. Interactions with other adults were also felt to improve as a result of secure *subject knowledge*. One student teacher explained that they felt much more open to collaborating with school colleagues. Confidence in talking to parents was another aspect that they felt was underpinned by their *subject knowledge*. These activities all suggest increasing participation within the arena of practice (Lave and Wenger, 1991) that, perhaps, gives the student teacher increased cultural capital (Bourdieu, 1977) in the setting and, therefore, increased agency.

When *subject knowledge* had evidently been weaker, some student teachers explained that they felt overwhelmed and unable to step in a short notice because of their reliance on 'good old Google' to look things up beforehand. One individual freely admitted to 'burying' their limitations beneath 'exciting' classroom approaches to attempt to detract from their shortcomings. Common anxieties were expressed around teaching Year 6 pupils and of teaching Physical Education. The impact of inadequate *subject knowledge* on self-image is clear. This was frequently expressed as finding it 'stressful' and one student teacher confided that she does not feel 'convincing' in the role of teacher at these times.

Interestingly, the behaviour of school mentors in relation to their *subject knowledge* and its role was also noted by the student teachers. They had observed that mentors with secure *subject knowledge* were able to model practice effectively to them as part of their training in school. Other mentors were more reticent to allow students to see them teach. This suggests that mentors might need to be selected on more distinctive characteristics than willingness to take on the role.

2. The school mentors' perspective

All the school mentors interviewed believed *subject knowledge* was an important or 'vital' aspect of the primary student teachers' training.

I think it's vital because if they don't get that in their training, if they don't build on their own education and they don't realise where they need to go off and do their own thing and where they need to learn a bit more and develop their own understanding, if they don't do it then, they are never really going to do it. They are always going to be

mediocre in some areas or poor because they'll never ever get the time. And if they don't recognise it at that point, then they'll get by in school. (M2)

Another school mentor raised a rhetorical question about the format of the university's lesson observation forms and placement report forms and how they appeared to position *subject knowledge* as an isolated entity.

All this is about teaching and then there's a box... subject knowledge becomes remote... distinct almost. You can't do any of a lot of the other things unless the subject knowledge is there... it becomes different doesn't it...? (M8)

She mused over whether this encouraged compartmentalised thinking and went on to question the university's policy of insisting that Teachers' Standard 3 was always a focus of every lesson observation and weekly review meeting with the student teacher. She wondered whether this actually reduced the impact of that standard because it seemed to promote a routine approach to it rather than an in-depth consideration.

The school mentors' perceptions of the role of *subject knowledge* in the initial training experience produced similar themes to the student teachers, although it is interesting to note that there were no comments relating to the impact on children. It might have been expected that they would have had an explicit focus on this.

i) Influence on pedagogical approach

All comments relating to this theme were fairly generic responses including *subject knowledge* enabling the student teacher to teach what is in the National Curriculum and needing it to 'be a good, solid teacher.' One mentor felt that it is embedded in all aspects of teaching and is therefore of paramount importance; 'without knowing what you are teaching, you cannot teach.' Another believed that it underpinned creative teaching. Similar to the student teachers, school mentors cited secure *subject knowledge* as enabling planning and correct modelling.

ii) Influence on teacher behaviour and self-image

The only individual factor that school mentors acknowledged as being attributable to *subject knowledge* was confidence. There was limited awareness of the relationship between *subject knowledge* and the student teacher as an individual, when compared with student teachers' perspectives.

Some limitations of initial teacher training with respect to *subject knowledge* were expressed. One mentor recognised that ‘the university cannot prepare them for everything’, whilst another recommended that ‘students have to bring knowledge of their own’. These comments suggest that these mentors do not see an explicit role for themselves in developing *subject knowledge*, but rather it is something that is imported to the school placement along with the student.

3. The university tutors’ perspective

The majority of university tutors firmly believed that *subject knowledge* is essential, because it gives confidence, is central to all teaching and it allows trainees to be critical about curriculum content. Views also included those at the other end of the spectrum who felt it is not so important and ‘pedagogy is more important’ (referring to general pedagogic knowledge). They expanded on this by suggesting:

Subject knowledge – you can get that from a book or read that from the Internet the night before. It’s not important in Key Stage One. (UT5)

This viewpoint aligned closely with a good proportion of the student teachers. Another tutor had a question mark over the need to retain knowledge for teaching, given the rise of mobile technologies.

I’m not sure they need knowledge in their heads any longer. (UT10)

Alexander (2010: 247) labels such a viewpoint as ‘educationally ... highly irresponsible’, but it was present here in a university department.

The priority given to mathematics and early reading was acknowledged as a by-product of the Teachers’ Standards. This emphasis caused foundation subject tutors to make difficult choices about the content of their teaching as it is squeezed (Furlong *et al.*, 2000). Speaking about geographical *subject knowledge*, one tutor explained their approach.

Where does it begin and end? We teach the things likely to trip them up. (UT10)

The perceived role of *subject knowledge* was also considered by the university tutors:

i) Impact on children

Secure *subject knowledge* was considered to prevent student teachers from teaching misconceptions to children due to lack of expertise. It also enabled children to make progress and benefitted their long-term learning and life changes.

ii) Influence on pedagogical approach

Improved understanding of the subject matter enables student teachers to understand connections between subjects and they can make informed decisions about curriculum initiatives based on this understanding. Understanding what they are teaching was a common reason. One tutor suggested that the role was to 'know enough to jump through the Ofsted hoops', perhaps displaying either their cynicism, or their pragmatic approach to dealing with external accountability.

University tutors identified similar aspects of practice to the student teacher participants, as being improved when *subject knowledge* is secure. This included planning, pinpointing learning objectives, differentiation and assessment. Understanding progression was considered to be positively influenced, as well the student teachers' abilities to identify and address misconceptions.

iii) Influence on teacher behaviour and self-image

In agreement with the school mentors, the majority of university tutors identified generally improved confidence for individuals in relation to their *subject knowledge*. One tutor believed that it 'makes you credible' in a classroom/school environment. The same tutor suggested that a mentor can 'trust' a student teacher with secure *subject knowledge* and they can perhaps help to train other staff in school. This, again, suggests that secure *subject knowledge* might increase a student teacher's cultural capital in some school settings.

In conclusion, it seems that although *subject knowledge* was widely considered by participants to be of great importance, reasons for this in relation to its role were diverse and reflected quite different epistemologies. For student teachers, their comments suggest a strong emotional element ranging from *subject knowledge* giving confidence simply to avoid embarrassment, to deeper understandings of PCK enabling greater criticality, autonomy and agency that can lead to increasing levels of participation in the community of practice. The findings suggest that it might potentially benefit school mentors and

university tutors to gain a deeper understanding of the influence of *subject knowledge* on student teachers' behaviour and self-image, to support their learning.

4.2.3 Perceptions of the role of *subject knowledge* in expert primary teaching

i) Participants' notions of what constitutes expertise in primary teaching

Based upon empirical evidence (discussed in Chapter 2.6), the prototypical features of expertise in teaching synthesised by Bond *et al.* (2000) from those located in the literature (e.g., Berliner, 1994a, 1994b; Shulman, 1987; Sternberg and Horvath, 1995) were found to accurately describe the characteristics of the ways expert teachers worked (Berliner, 2004). The prototypical features are described in the literature review (Chapter 2.6, p31-33). To recapitulate, 'extensive pedagogical content knowledge' was one of the three features that showed most ability to distinguish between expert and non-expert teachers and is directly relevant to teachers' *subject knowledge*. Some of the other prototypical features are undoubtedly informed by underpinning subject-specific knowledge (e.g. better use of knowledge, more challenging objectives, better monitoring of learning etc.).

Interview data generated directly from participants' perceptions of what distinguishes an expert primary teacher were analysed as described in the methodology chapter (Section 3.6.3, p71) and were subsequently related to the prototypical features of expert teachers detailed above. The aim was to determine how subject-specific knowledge was positioned in participants' notions of what constitutes expert primary teaching; these conceptions are highly likely to influence their ideas of what beginning teachers are working towards in principle. The findings are summarised in Table 11.

Table 11 Frequency of prototypical features of expert teachers identified in participants' ideas about expert primary teaching

Prototypical features of expert teachers	No. of individuals in each stakeholder group		
	school mentors (n=11)	student teachers (n=18)	university tutors (n=12)
greater respect for students	4	8	3
display of more passion for teaching	4	3	4
better use of knowledge	2	5	3
better classroom climate	3	5	1
greater sensitivity to context	6	1	2
adaptation of goals and improvisation	3	2	1
extensive pedagogical content knowledge	1	2	3
better monitoring of learning and feedback	0	2	0
perception of classroom events/cues from students	0	2	0
better decision making	1	0	0
more challenging objectives	0	1	0
better problem-solving strategies	0	0	0
more frequent testing of hypotheses	0	0	0

The data showed that the most frequently identified features of an expert primary teacher by participants were: greater respect for students; display of more passion for teaching and better use of knowledge. Slight differences between the perceptions of the different groups of stakeholders were observable. School mentors valued sensitivity to context most highly as a feature of expert teaching. For example, one mentor explained in relation to her own school setting:

[Expert teachers have] *a good understanding of the area and where the children are coming from... and because I work in [name of area] which is a very, very deprived area, and you've got to have an understanding of the background of the area and make the child feel safe and comfortable in school, and make sure they leave their worries at the gate.* (M7)

This links closely to the finding that school mentors had a stronger connection to context in their conceptions of *subject knowledge* than the other stakeholder groups (see Section 4.1.2, p98). Next most frequent features for this group were, again, affective features of teaching: greater respect for students and passion for teaching. Knowledge was an infrequent element in their ideas of expert teaching.

Student teachers most frequently attributed expert primary teaching to greater respect for students. For example:

...making the children feel like they can make mistakes and it's alright [...] they can just sort of go for it to be creative and they're not going to be judged. I think that the main thing is really just making sure that the children feel that they can just express themselves. (ST B8)

This might reflect the fact that, as learners themselves in classroom contexts, they are perhaps sensitive to teachers' attitudes towards their pupils. Better use of knowledge and better classroom climate were the next most frequently identified features of expert teaching. The focus on classroom climate might be a result of their stage in learning in the sense that they might not be deconstructing the elements that contribute to classroom climate, and this is their unit of observation when considering the differences that they observe between their own teaching and that of more experienced and expert teachers. They were still establishing their own teacher identities and were considering the type of classroom environment that they aspired to create:

It needs to be fun; it needs to be creative. Children need to be able to learn actively. (ST B4)

I think it's really key that the children enjoy what they're doing rather than just having to try and hit the targets and things like that. (ST B7)

With regard to better use of knowledge, they are possibly more aware as beginning teachers of how knowledge is used in planning, teaching and assessing, because they have to deconstruct these processes as part of their school-based learning for lesson evaluations and reflections.

The teacher being an expert [...] I thought it would be all pedagogy... but actually the expertise in subject knowledge to allow that creativity to come through. Children want to go off on a different route; you need to have that subject knowledge so you can. (ST A5)

I have to say that I think subject knowledge plays a big part. If you know a subject solidly then you can view it, I think, from different angles and different viewpoints. (ST A7)

For the university tutors, there was a detectable shift towards knowledge in their ideas about expert primary teaching. Whilst passion for teaching was most frequently identified, the next most frequent features were better use of knowledge and extensive pedagogical knowledge. Coupled to this was respect for students.

A university tutor explained how knowledge underpins the ability to view the curriculum and initiatives with a critical eye:

That's something else that makes an expert. You need to look at what the changes are that are coming in and say, "Is that really going to improve what I do or is it just a jump on the bandwagon because that's what we're told to do?" So being able to look at initiatives with a critical eye and be thinking, "Is that really what I should be doing?" but not being averse to change either. (UT3)

Another tutor, whose background was firstly in secondary education but has taught on some aspects of primary ITT programmes, cited expertise within the challenge of versatility of knowledge that is required in primary teaching.

You never know which way the emphasis is going to go this year. Is it going to be maths or is it going to be English? You've really got to have your finger in the pie of every one of the multiple subjects you've got to do and you've got to be prepared to step up. (UT6)

Pedagogical content knowledge is demonstrated through the decisions that expert teachers make:

An expert teacher does not just reach for the Scholastic photocopiable book but may use that Scholastic photocopiable book on occasions because he or she can tell which of those pages are useful, relevant and will support learning. (UT1)

There were also some features of expert primary teachers noted by some participants that did not relate to any of the prototypical features of expert teaching but, instead, related entirely to the agendas of prescription, accountability and compliance that have an overarching influence on education.

I think this is something that has taken me sort of the whole of the course to really get my head around. You've got just to be aware of current educational thinking and in terms of what the government want as well, because although it's horrible, it is Ofsted, Ofsted, Ofsted. (ST A2)

Two university tutors who were relatively new to ITT had expressed a cynical view of expert primary teaching.

An expert teacher means being outstanding in the classroom with 32 children and getting a great mark from Ofsted. (UT4)

If you were to take the government standards at the moment and you were to be Grade 1 in all those, beyond Grade 1 in all those... that would, in the government's eyes, make you an expert teacher. (UT5)

The prototypical feature of expert teaching that relates most directly to *subject knowledge* as generally conceived in the literature, i.e. extensive pedagogical content knowledge, was not high on the agenda for the stakeholders' notions of teaching expertise. Berliner's (2004) study found that PCK was one of the three most influential and impactful features that distinguished expert teaching from non-expert teaching. The more generally-focused prototypical feature of 'better use of knowledge' was recognised as one of the three most frequently identified features of expertise across the sample of participants. This mirrors the findings about participants' conceptions of *subject knowledge* in which content knowledge in a shallow sense was included by all, but types of knowledge corresponding with pedagogical content knowledge were less readily included. If PCK is not recognised more widely as being central to expert primary teaching during the initial teacher education of primary teachers, there are implications for the long-term outcomes of training programmes. In an outcomes-driven inspection system that places less emphasis on pedagogy, newly qualified teachers may not have access to a coherent model of teaching expertise to enable them to reach their full potential as teachers.

ii) Participants' contrasting perspectives of features of expert secondary teaching

Participants were also asked during interviews about their perceptions of expert secondary teaching and what is interesting to note in comparison, is that the prototypical feature of 'better use of knowledge' dominated responses for all groups of stakeholders. This represents a total shift in perspective away from the affective characteristics that they ascribed to expert primary teachers. This perhaps mirrors primary teachers' dichotomous thinking that 'we teach children, not subjects' reported in the literature (e.g. Alexander, 2010). All participants certainly viewed knowledge as being less significant to expertise in primary education. However, the shift in orientation towards knowledge when discussing expert secondary teachers does not extend to 'deep representations of subject matter via

extensive pedagogical content knowledge'. References to PCK are mentioned by one school mentor, two students, and two university tutors, suggesting that PCK is still perhaps undervalued in participants' notions of secondary teaching expertise, despite the increased significance they attached to secondary teachers' knowledge *per se*. It appears that understanding of PCK is so under-developed that it is simply not part of the fabric of discourse amongst the majority of participants.

iii) Participants' notions of expertise in relation to 'outstanding' trainee teachers

Interview participants' from the school mentor and university tutor groups were also asked about expertise in relation to what they view as the 'outstanding' trainee primary teacher. This was to determine to what extent the prototypical features of expert teaching were carried through into this context.

In relation to perceptions of outstanding trainee teachers, school mentors rated highly student teachers who demonstrated that they: were committed/hard-working; were open to advice/willing to take advice and act on it; related well to children; had enthusiasm; had authority/presence in classroom. Nothing related to knowledge (either content knowledge or PCK) or pedagogy featured in their responses. All descriptions of the outstanding trainee were generic and focused purely on attitudes and personal qualities that potentially made the job of mentoring easier in practice.

University tutors also rated students who were committed/hard-working and could relate well to children. They also recognised the individual strengths of trainee teachers that might make them 'outstanding'. Three university tutors recognised the significance of PCK in what distinguishes an outstanding trainee teacher from others. For example, one tutor explained:

The outstanding trainee is one who has almost got forward vision in terms of anticipating where children are going to be, potentially anticipating where the issues could be. To use a maths analogy, what the potential misconceptions could be and how your teaching can draw those out, through the examples you give. I think that in my mind, if a teacher can do that [...] can create that environment where they can pre-empt [...] this could potentially be a barrier. How am I going to challenge that barrier in terms of their learning, to either put the barrier there so that they think deeper, or create something that takes it away, or look on it in a different way? That makes an excellent trainee which perhaps isn't overly standards related. (UT2)

iv) Participants' notions of expertise in relation to mentoring

Similarly, when mentors and university tutors were asked about the features of the expert primary school mentor, the vast majority of mentors cited 'willingness' to take on the role of mentor as a measure of expertise.

Two mentors made mention of skills that could be considered to relate to PCK. One mentor described the expert mentor as:

...somebody that understands what they're doing and knows why they are doing what they're doing. I think... I'll be honest, sometimes ... (cringes and laughs) sometimes I will have taught a lesson and I've thought, "What on earth did I do that for? What was the learning purpose? It was a nice activity they did, but what did they actually learn from it?" [...] So understanding what you're doing and being able to explain to somebody else why you're doing it. (M9)

University tutors saw the expert mentor as someone who challenges student teachers' thinking, uses research-based evidence in their mentoring practice and is a good teacher themselves. These could all be considered to relate to some features of the expert teacher. The ability to articulate and analyse one's own practice critically was not cited by this group of participants, despite being pivotal to successful mentoring (e.g Edwards & Collison, 1996; Jones and Straker, 2006). It is interesting to note though that university tutors also included willingness to take on the role of mentor, as a feature of expertise. This perhaps highlights the issue of not having sufficient capacity in partnership schools to readily place all student teachers.

Conclusions

To summarise the findings relating to research question 2, similar influences on the participants' thinking about *subject knowledge* have led to diverse interpretations and differences in epistemological positioning. Student primary teachers' *subject knowledge* was perceived to impact on children, pedagogical approach, teacher behaviour and self-image in a variety of ways. Knowledge-related prototypical features of expert teaching were not given particular significance in stakeholders' ideas about expert primary teachers. Generic, affective qualities such as passion for teaching and respect for pupils were the most frequently identified indicators of expertise in primary teaching. There was very limited reference to aspects relating to extensive PCK and deep representations of subject matter. It was most noticeably absent from school mentors' perspectives.

4.3 Contextual influences and *subject knowledge*

The evidence presented in this section responds to research question 3:

What are the perceived influences of culture and practice in the university, school and partnership contexts in which primary ITT is situated, on student teachers, school mentors and university tutors in relation to subject knowledge?

Findings are based on the analysis of data from the following sources: student and mentor questionnaires; for key stakeholders (student teachers, university tutors, school mentors): visual data; semi-structured interviews.

Each of the undergraduate primary education programmes represented in the research data comprises four years of academic and professional study distributed between university-based learning and a substantial block of school-based learning in each year of the programmes. This section examines the perceived relative impact of aspects of culture and practice in these contexts on student teachers' subject-specific knowledge development over the course of their training. The questionnaire data provides an overview of student teachers' perceptions in relation to this (see Table 12). From this data, it appears that the majority of students recognised differences in interpretation of the term *subject knowledge* by those involved in their training, between university and school settings. They also attributed more impact on their subject-specific knowledge development to school-based training rather than university, although both sources of training are acknowledged overall as being helpful. Similarly, the student teachers perceived that they receive feedback on subject-specific knowledge to a greater extent via school-based activities compared with university. The exact nature of the relative impact of each element of training is illuminated further by the data gathered via the interviews with student teachers, school mentors and university tutors across the two institutions.

Table 12 Student teachers' perceptions of contextual influences on aspects of their subject-specific knowledge development during training

Statement	Frequency of response				
	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
The term 'subject knowledge' is used in the same way to mean the same thing by all the people involved in all aspects of my training.	6	50	19	22	7
The university-based element of my training has helped me to develop my subject-specific knowledge.	1	7	21	59	16
The school-based element of my training has helped me to develop my subject-specific knowledge.	0	2	2	37	63
I have received feedback on my subject-specific knowledge through university-based activities.	2	15	24	49	14
I have received feedback on my subject-specific knowledge through school-based activities.	0	3	9	46	46

4.3.1 The University Context

1. The student teachers' perspective

Interviews with the student teachers highlighted specific aspects of the university-based elements of their training that they believed had impacted significantly on their development of subject-specific knowledge for primary teaching.

i) Assignments

University assignments were specified by the majority of participants as being influential. A range of reasons were given to support this premise. Assignments were seen to provoke thinking beyond the immediate scope of the class they were teaching on school placement.

Assignments have shown me how knowledge expectations have changed over time. It's created a much bigger picture. It's definitely developed my knowledge of pedagogy and assessment. [...] The philosophy of teaching and learning has shown me that knowledge and skills are interrelated. (ST B1)

A significant part of assignments is the requirement for in-depth critical analysis of academic reading and research, along with practice-based theory. Some individuals recognised that they needed this driver to prompt them to research at the subject level.

I have used many of the books, like the Haylock book for maths, to actually know my subject knowledge. But I'd say I've never really done that just for something to do, just thinking, 'My subject knowledge is lacking a bit. I'll do it.' It's always been for a purpose whether it's been for an assignment or anything like that. (ST A1)

Others reported using the stimulus of an assignment to provide an opportunity for them to address subject matter of which their understanding was weaker. Some of the student teachers recognised how the assignments have challenged their beliefs about subjects and have deepened their understanding of subject-specific pedagogies to be used in the classroom. There was also a general appreciation of how assignments were designed to bring together elements of content knowledge, subject-specific pedagogies and knowledge of learners to apply to practice-based scenarios in preparation for teaching.

ii) Lectures/seminars/workshops

Almost half of the student teachers cited the impact of the taught university sessions as highly influential. University teaching was considered to be beneficial in introducing students to new ideas and directing them to relevant readings. It was also instrumental in building understanding of subject matter and how to teach it, raising their awareness of the complexities of subject-specific knowledge.

It has made me realise that there's more to it, that it's not just the basic knowledge. It's got to be very specific. [...] It's not just, 'This is division and this is how you do it.' It's, 'Division: this is what it means...this is why... this is how.' [...]You actually need to go into each little branch... and each little branch of each subject is then another complicated map of all the things you need to know. (ST B4)

University appeared to provide for student teachers, important time and space for reflection away from the performativity of the primary classroom environment that allowed them to discuss and challenge ideas. It created opportunity for individuals to address areas of weaker understanding in a supportive climate for learning. One student observed how their learning from university lectures was 'activated' when they had to teach the subject in school and put it into practice. This could be interpreted as being

reminiscent of the process central to Banks *et al.*'s (1999) transformation of *subject knowledge* (as content knowledge) into 'school knowledge'.

A variety of approaches to teaching and a slight shift in emphasis in sessions were experienced for different subjects with different tutors. Overall there was a general understanding that university cannot 'cover' everything in terms of the primary curriculum, hence, the perceived emphasis on how to teach a selection of exemplar concepts taken from across the curriculum.

iii) Issues emerging from the data

a) The individual nature of students' wants and needs from subject-specific teaching

In raising student teachers' self-awareness of their subject-specific strengths and weaknesses, it creates an issue of how to meet their diverse needs to their personal satisfaction. For example, some students expressed a dislike of session content that focused on subject matter knowledge but for contrasting reasons, including personal preferences, different educational philosophy or a more urgent need to address other aspects of subject-specific pedagogy.

I have been in lectures when they've just been like drumming subject knowledge at you [...] and I just switch off in those. (ST A1)

It was very, 'You need to know these facts. You need to know this to be a good teacher,' whereas I don't necessarily think it's the reason for being a good teacher. (ST A10)

When we've had lectures for different subjects, they've been very much focused on building up our subject knowledge of, not even how to teach them but what is the National Curriculum. [...] I feel like that has not helped me at all. [...] I've got the good subject knowledge; it's the rest of it that falls apart! (ST B6)

This last student teacher's comments related directly to an aspect of her teaching – explanations - that was highlighted as being weak on school placement, and she indicated that she would have appreciated a stronger emphasis on elements that would be categorised as pedagogical content knowledge.

A real problem for me is explaining stuff and it got to the point where I was teaching a lesson once, and the class teacher stepped in and took over because I

just wasn't getting anywhere and I felt really frustrated and really let down by the uni, that that was happening. [...] I think it could also come from when I was in high school and when I was in primary school. It was all learning to tests and you'd learn stuff, but you didn't know why. (ST B6)

It is interesting that she attributed this failure to the university and, to a lesser extent, her own schooling, but did not place any responsibility on the school mentor who was overseeing her learning.

In complete contradiction to these viewpoints, other student teachers wanted more focus on content knowledge.

I think in terms of pedagogy, university is fab but [...] I think subject knowledge in terms of, this is what the children need to know, could be a little bit clearer. (ST B6)

Meeting each of these diverse expectations would be a tall order for any programme of study.

b) Treatment of different subjects within the university-based training

Statistical analysis of relevant parts of the questionnaire data for the cohorts of student teachers from the two different institutions showed that there was no difference in attitudes and viewpoints expressed by the two populations with the exception of one aspect: their confidence to teach all National Curriculum subjects (see Appendix 10b). The majority of students from Institution A were not confident to teach all subjects whilst the vast majority of those from Institution B were. The difference between the population means for this aspect was statistically significant (see Mann-Whitney U-test results in Appendix 10b). This probably is due to the different programme content for the two institutions. Institution A focuses on the core subjects whereas institution B places significant emphasis on the breadth of the curriculum, including specialist teaching in foundation subjects.

Core subjects

Student teachers explained how the university teaching in the core subjects, in particular, had supported their subject-specific learning. It was noticeable in the data, that more of these comments could be attributed to Institution A. For example:

Obviously we've done a lot of the core subjects: English, maths and science...a lot on phonics as well. Those have been very helpful. We particularly remember loads of stuff that we used from first year maths. A lot of that was about our subject knowledge and all the time it's been underlined with subject knowledge on pedagogy. Here's how to multiply; here's how to teach multiplication. Different ways you can teach that, which has been massively helpful. (ST A5)

Science, for some reason, stands out and I just remember they taught the concepts perhaps and then we'd always have a go at 'this is a possible activity you could do with children' and I think in that way it has developed...it's made me realise the actual concepts and understanding goes hand in hand with how to teach them. I think that's what university has really made me develop in terms of my subject knowledge. (ST A2)

Foundation subjects

Many comments in the interview data demonstrated the dissatisfaction of student teachers from Institution A with its treatment of foundation subjects, illuminating the reasons why they did not feel comfortable to teach the whole curriculum by the end of their training.

For example:

We've done so much work on English, maths and science that actually it was only really first year when foundation subjects were on a par with those subjects...and not really on a par, but they were further in than the rest of the years. (ST A10)

We had PE, I think, in second year...I think we had a history one...but it's kind of faded. It would be better if there was more of it. (ST A8)

ICT is something that we have felt unsupported in... coming from university. We feel it's actually never touched upon. When you get in there [referring to school] and there are all these new ICT ideas, you're completely flailing and you're learning as the children are learning. (ST A5)

Requests for access to more pedagogical content knowledge in foundation subjects were also evident in the participants from this population.

Perhaps in the foundation subjects, maybe a little bit more of the pedagogies as well and knowledge around that. [...] I keep coming back to art...how to teach art because a lot of people I know don't know how to hold a paintbrush. I mean a lot of

people get quite creative holding the end of the brush - use it as a pencil! Silly little things like that, that if it was writing in English, you'd know off the top of your head, but because it's art, people don't know it. (ST A5)

The student teachers from Institution B felt more confident about foundation subjects at the end of their training. It was still evident, however, that some issues remained for them despite the increased focus.

I learnt a lot about PE but that was in second year and, although I'm a PE specialist, I've done nothing PE this year at all and didn't have chance on placement to teach PE so, technically, I'm a PE specialist but I haven't taught PE for two years. (ST B7)

For some students, the specialist tutors and their teaching approaches had actually been off-putting rather than beneficial. For example:

History and languages, it's been quite easy for me because I mostly enjoy that kind of stuff but then the rest of it, like drama and music and art (groans) that's been quite hard... because I've had to force myself into learning that on my own, because I did not enjoy that at uni at all. [...] I love those aspects when you're teaching them, but I don't like the kind of people who are like (puts on a theatrical voice), "Oh the arts! So fantastic! Drama can be taught through everything and music..." I hate music! (ST B3)

It seems that individual perceptions, again, dominated the nuanced response to specific aspects of university-based elements of initial teacher training.

c) How university tutors portray subject knowledge

The questionnaire data indicated that a minority of student teachers (28%) agreed with the statement: 'the term *subject knowledge* is used in the same way to mean the same thing by **all** the people involved in all aspects of my training,' whilst the majority (54%) disagreed or strongly disagreed. Less than a fifth of the students (18%) recorded a neutral response. The interview data shed further light onto this.

Institution A

An interesting finding that emerged was that student teachers interpreted university tutors' perceptions of *subject knowledge* in a manner that aligned with their own ways of thinking about it. For example, one of the students with an objectivist view of subject

knowledge as being purely content knowledge asserted that university tutors have portrayed her personal viewpoint.

I think you all mean the same thing. I think some of you might go around different ways of trying to develop our subject knowledge. [...] I think we get questioned, do we know enough and that's, do we know enough content. (ST A6)

The student teacher whose own conceptualisation of *subject knowledge* involved deconstruction of the multiple knowledge bases it comprises (see Olivia's pen portrait, Section 4.4.2, p165), applied the same analytical approach when considering differences between tutors' perspectives that might be apparent through their teaching.

I think a lot of the time it has been, this is what you need to teach, this is how you should teach it. That's mostly been it, but there have been times when it has been just very deep. Particularly in some of our maths lectures, it has been very much a case of just subject knowledge in terms of the actual understanding and knowledge of how to perhaps convert fractions or... you know a range of division and multiplication techniques. It has been just focused on that and hasn't so much been about the teaching. They've touched on the misconceptions in that bit, but they haven't really told us how to teach as much. (ST A2)

Where a child-centred approach dominated a student's viewpoint concerning the concept of *subject knowledge*, they did not interrogate tutors' perceptions in the same detail as others when asked if they had detected any differences. For example:

I think a lot of the lecturers on our course [...] have a similar perception and they know what a good primary teacher is. And so that's been really passed onto us. I don't think there's been any really great difference. (ST A10)

Institution B

The opinions of student teachers from Institution B took different reference points and they seemed to be more aware of distinct differences between their university tutors and how they portrayed *subject knowledge*. They speculated on the possibility of there being no general consensus.

I think if you did this with every single person in uni, no one would really know what it meant! I think there are differences in teachers. (ST B3)

It's so vague of a phrase for everyone to be using. You notice how broad it is [...] someone is asking you about your subject knowledge and it's like well, what do you mean? (ST B6)

This difference might be due to the fact that there was a larger team of lecturing staff teaching across the full range of curriculum subjects in Institution B which, perhaps, provides opportunity for more obvious comparison between approaches.

I can see that whoever taught me for RE went down very much the route of how you can teach the subject as subject knowledge, whereas I can remember like in second year in geography, it was very much this is what you need to teach. So I think they do present their opinions of what they think subject knowledge is... quite obviously now when you think about it. (ST B5)

Despite the fact that student teachers in each institution have experienced the same teaching input from their universities, there was no overall agreement about the specific nature of how their university tutors portray *subject knowledge*. Interpretations largely seemed to be aligned with each individual's personal interpretation of *subject knowledge* and student teachers tended to view *subject knowledge* through the lenses of their own experiences, priorities and beliefs. Where there was obvious dissonance between the student's own viewpoint and what had been presented in university, this was, in one case, rationalised by the suggestion that university tutors were simply hiding their real opinions (see Ruth's pen portrait, Section 4.4.2, p171).

2. The school mentors' perspective

The school mentors recognised that the university-based training had significant impact on student teachers' knowledge of the core subjects (English, mathematics and science), systematic synthetic phonics and the National Curriculum. They also viewed the university training as important in keeping students 'up-to-date' and 'fresh with what's on the agenda for education.' Dichotomous thinking was evident in some mentors' viewpoints, with some insisting that *subject knowledge* (defined as content knowledge) was located with the university whilst others firmly believed that the university provides the pedagogic knowledge, with school providing the content. Recognition of the university and school working together in partnership in relation to subject-specific knowledge development was a minority opinion.

There was evidence of certain mentors believing that the university should prepare student teachers with all the subject-specific knowledge they need for placement. For one mentor, as she was expressing this viewpoint she realised that in her school, a culture change was taking place with a distinct shift to school-led training with increasing involvement in School Direct routes. She adjusted her views accordingly mid-stream and, instead, suggested that a change was needed that placed responsibility for this onto the student teachers themselves, in the potential absence of university input.

Again, I think you [university] probably focus on the subject knowledge really and you have a maths lecture and a this lecture and a that lecture...which isn't wrong [...], but I think the emphasis might need to shift onto a broader idea of subject knowledge and for themselves to want to become more enthusiastic about improving their own, to become a better teacher as essentially that's what teaching is. (M3)

This is actually what the vast majority of student teachers reported that they already do when on school placement. What this mentor implies by a 'broader idea of subject knowledge' is unclear, but it possibly suggests an emphasis on general pedagogical knowledge. An unrealistic expectation of the university 'providing' all the knowledge that student teachers might require on placement, led another mentor to express disappointment and to blame the university for its failure in this respect.

From my perspective, I've been disappointed. I don't think they're properly prepared and I think we do them a disservice and then, if they come to a school like this...rigorous...checking and assessing of what they're doing, and they're stressed...and I don't like that. (M2)

This attitude shows no awareness that the school-based training has a stake in educating trainees whilst they are on placement, beyond providing opportunity for them to teach and giving feedback on teaching. Shared understanding across the partnership is, perhaps, lacking.

3. The university tutors' perspective

The university tutors also considered the university-based training to have good impact on subject-specific knowledge development in the core subjects with student teachers having

access to subject experts, but expressed more caution around foundation subjects. One tutor from Institution A explained:

*I think the impact, it's good. It's very good in the core subjects. I think it's up-to-date; it gives very good practical examples as well as a theoretical behind it. [...] I'm more worried about the foundation subjects because I don't think there's the rigour in there that there is in the core. [...] I think it's possibly that the core is put up there as the thing that they **have** to know but foundation, we don't really expect them to know much and I think it's also a bit of lack of subject knowledge of some of the people who are teaching on the foundation subjects... because we don't have experts as a Senior Lecturer in Geography or Art, or whatever, do we? (UT3)*

In Institution B, where there were specialist tutors in foundation subjects, one of these tutors explained the challenge that they are faced with as a result of limited contact time with students and the approach that has to be taken to prioritise 'the difficult bits, so they've got a basic understanding.'

University was believed to have a more significant and sustained focus on subject-specific knowledge, including emphasis on breadth of *subject knowledge*.

Schools are narrowing it down to that particular year group, at that particular moment in time, whereas we are constantly trying to keep reinforcing that breadth. (UT2)

Limitations in access to subject-specific learning during school placements were evidenced through tutors' tracking of student experiences via university subject knowledge auditing activities and assignments. Science has proved particularly problematic in primary schools in recent years and for a secondary science tutor who had begun doing some teaching on the undergraduate primary programme, this was a startling revelation.

Honestly in terms of this year [...] I don't think they'd have found much out about the science teaching in school unless they did the science modules. That's my take on what I read in the assignments and the audits. (UT6)

University input was viewed as impactful in terms of deepening students' understanding of other aspects of *subject knowledge* besides substantive knowledge. The evidence from student teacher data suggests that this was achieved for a good number, but the message was not understood by all. This was recognised by a tutor.

I see my role is to endeavour to develop a firm understanding of the subjects in terms of all of that [referring to multiple aspects of subject knowledge], so they can make professionally informed decisions when they are out on their own, but it's an ongoing process I think and I think that the nature of the job could lead to shortcuts and bad habits for lots of different reasons. (UT1)

The university tutors also picked up the issue of the difficulty of meeting the different development needs of individuals and diverse starting points. Another limitation of the potential impact of the university-based training was identified in relation to the nature of partnership.

I think it depends on the student and I think it depends if the school was saying the same thing as us [...] but I think overall the school has more influence because they see it as the factory floor. (UT1)

This perspective echoed the viewpoints of a very small proportion of student teachers who had rejected the importance of subject-specific knowledge on the basis of their perceptions of school practice. This underlines the importance of shared understandings across the university-school partnership.

An underpinning theme for some university tutors was the importance of the university providing a research-informed and current evidence base for its teaching that might perhaps be lacking in primary schools.

I think perhaps the thing that we should do here that schools don't do, is ensure that we are up-to-date with current research and current thinking nationally...that we understand where some of the ideas are coming from in terms of research that schools might not know, because they wouldn't be as specialised in one area. (UT9)

This is an aspect of subject-specific knowledge that did not appear in the data except for in association with university-based elements of training. This same tutor, however, expressed deep concern about decreasing opportunities for university tutors to engage in scholarly activity and research. This is a theme represented in the literature (e.g. McNamara et al., 2010).

4.3.2 The Primary School Context

1. The student teachers' perspective

i) Less subject-specific focus in school

A theme emerging from the data overall was the perception of student teachers that the emphasis of their training on school placement was much more generic, rather than subject-specific. Greater value appeared to be placed on aspects of general pedagogy, particularly as they moved towards their final years on the undergraduate programmes.

Whilst I've been on placement I've never had any INSET [In-Service Education and Training] training or had any discussion with my class teacher about anything related to the knowledge of a topic that I need to know to be able to teach. The emphasis with any staff training or any school-based mentor meeting is about how I've delivered the lesson. [...] I've never been pulled on, 'You didn't know the topic very well.' (ST A1)

In my first couple of years it was probably more on the knowledge...sort of like the terminology... and the actually knowing information about what you're teaching, whereas in the last couple of years it has been more... information about the children and how I should deliver it. (ST B8)

Student teachers had also picked up on the fact that different school mentors have varied interpretations of *subject knowledge* and look for very different things in the students' practice in relation to assessment of the relevant Teachers' Standard (TS3). There was a noted tendency for this, again, to be generic, rather than subject-specific. In some cases, this apparent lack of attention to subject-specific knowledge in school led to changed perceptions of the importance of *subject knowledge*.

ii) Subject-specific knowledge developed independently through practice

School placement offers the opportunity to apply the individual's subject-specific knowledge to the act of teaching.

It's not till you get out there that you apply everything and then perhaps sometimes you realise how much you really do know when you're teaching it. You realise, 'Yes I know how to teach this,' or you think, 'I haven't taught that very well.' And then you realise your actual understanding of each of the concepts. (ST A2)

A particularly impactful aspect of school-based learning was the synchronic nature of the act of teaching when the student teacher can feel the connectedness of different forms of knowledge required to teach successfully in the moment (Tochon and Munby, 1993).

All of a sudden everything is going on at once. I like thinking on my feet so when someone does go, 'I don't understand why $3 \times 3=9$.' All of a sudden I've got to sit there and go, 'Why is it?'... and break it down or draw diagrams or have physical objects and go, 'Right we've got three lots of three,'... and really break it down to a level that everyone can access. I really enjoy doing that now. There was a time when I really hated it because I was like, 'It's so obvious. Why don't you get it?' (ST B6)

The need to research topics that they were going to teach was the most significant driver for personal study of *subject knowledge*. It created a sense of urgency and purpose for them.

It's the actual, I'm in the room, I've got to teach this to these children and...it's the reality...I don't want to look like a fool. You want those children to respect you as a teacher and you want those children to learn. (ST A9)

Although they attributed subject-specific knowledge development in school to having to research topics prior to teaching, the student teachers also recognised some of the associated limitations of this approach. They acknowledged that independent research is very specific to the exact topics that you teach on placement, learning can be temporary rather than permanent, and placements can become repetitive in nature, and therefore limiting, when you are placed in the same year group for a longer period of time.

Other positive impact reported, included the identification of personal development needs that were highlighted through teaching.

That's what makes you realise or doubt your subject knowledge when you're actually teaching, rather than me just sitting here now thinking about my areas I could develop. It's when you actually start teaching that those areas of development or areas of strength, that you recognise these in the classroom. It made me realise actually that my subject knowledge was secure here, needed a bit of improvement there. (ST A6)

Students also believed that their understanding of the National Curriculum had improved through having to plan for practice, including developing their awareness of vertical

curriculum knowledge, i.e. expectations across the primary age range. Other situated learning included the chance to observe teaching, whether good, or not so good, and deciding which aspects they would like to emulate. Seeing different curriculum models in action was also beneficial to *subject knowledge*, as was the opportunity to attend continuing professional development (CPD) events with the school staff.

iii) Different school contexts

Student teachers experience placements in a wide range of primary schools with varied contextual characteristics. The perceived influence of these different contexts on development of subject-specific knowledge was similarly diverse. In relation to the schools' socio-economic circumstances, student teachers reported completely opposite effects on their *subject knowledge* development. In 'leafy' schools in more affluent areas, some students believed there to be greater emphasis on subjects and the 'higher ability of children means more demands are placed on the teacher.' From their perspective, schools in 'poorer areas' placed less emphasis on the subject and focused more on 'the child'. Other students reported precisely the opposite effect, for example:

In nice schools your knowledge doesn't have to be concrete [...] you're not faced with the different challenges that would require you to boost it yourself. (ST A9)

Others felt that in schools with challenging circumstances, their main focus always had to be on behaviour management and how to engage the children rather than subject-specific knowledge development. They found the differences in attainment between children of the same age in different schools quite startling. Placements in faith schools presented some challenges for student teachers who did not feel sufficiently well-prepared to teach Religious Education (RE) in these contexts. At the same time, they reflected that their knowledge and understanding of teaching RE improved significantly through these experiences.

Overall, some very broad, sweeping generalisations were evident in the data involving the categorising of 'types' of schools/children/parents/teachers in ways that might be judged to represent stereotyping based on fairly superficial assumptions. Much of this seemed to originate from staff room conversations in school.

Rather than the particular 'type' of school, a large proportion of student teachers felt that the year group had a more significant influence on the subject-specific knowledge they

developed on placement. Across all the student teacher participants, there was a perception that 'more' or 'more challenging' subject-specific knowledge is needed, the higher up the primary age range you teach. Anxieties associated with teaching Upper Key Stage Two pupils were expressed by even the highest attaining trainees. There was a general perception that they can 'avoid' subject-specific knowledge demands by teaching in Key Stage One. This shows a lack of awareness and understanding of the importance of PCK, regardless of the age group, and once again suggests a focus on delivery of curriculum content instead.

Mixed-age classes were also cited as being particularly challenging for a placement in terms of 'pushing you' regarding *subject knowledge*, and one individual explained that, difficult as it was to have a mixed Reception/Year 1/Year 2 class, it was instrumental in helping her to understand how to teach early reading, because she had to plan phonics sessions for each of those year groups, including for the teaching assistants involved. An issue that arose when a school had multiple classes per year group was that planning was shared between all the teachers for the year group. This meant that student teachers often had no opportunity to plan certain subjects for the duration of a placement; somebody else made the pedagogical decisions for them in these circumstances.

The ethos of the school was also influential because it affected the general style of teaching, approaches to curriculum organisation and what student teachers were 'allowed to try out' during the placement. The pressure to 'push' children's learning was identified as coming from the head teacher, and 'motivated children' encouraged student teachers to improve their *subject knowledge* to a greater extent. It was also impacted by the expertise of teachers in the individual school with whom they had regular contact.

For other student teachers, including those with an objectivist view of *subject knowledge*, they perceived that the school context made absolutely no difference to their subject-specific knowledge development during their placements. For some this was because 'what you teach does not change.' For others, it was simply because 'there is no attention to subject knowledge in school' and any development of subject-specific knowledge is done independently; 'school does not do this for you.'

iv) Impact of school-based mentors on subject-specific knowledge

Overall the data suggests that, from the student teachers' perspective, school-based mentors appeared to pay little attention to subject-specific knowledge and focused on general pedagogy instead. This aligns with the findings of Brown and McNamara (2005).

This was felt to be applicable even more so, to later school placements in the penultimate and final years of the undergraduates' training, where aspects such as classroom routines and legal requirements and responsibilities were more prominent.

I think they've not shown concern about my subject knowledge. It's maybe just...for example on my last placement, it was things for my professional development that they would offer suggestions or set targets for. It was never for my subject knowledge so they've had probably no impact on my subject knowledge whatsoever. (ST B2)

Where school mentors did comment on subject-specific knowledge, it was invariably in the form of flagging up a deficit for the student to 'go away' and sort out. This phrase was a recurrent theme in relation to *subject knowledge* issues on school placements in the interviews with both student teachers and school mentors.

They say, "This is your timetable. This is what the children need to know. Go away and do it how you like, but this is the end result that the children need to know...x, x and x." (ST B7)

In some cases school mentors might direct the student to other members of the school staff. Confident, pro-active trainees took the initiative and approached subject co-ordinators in school for advice themselves. It might be that those students with less personal agency, and perhaps with greater need, would not seek such support. The approach of subject-specific knowledge development being a personal issue to be worked on independently seemed to be widely acknowledged by the student teachers.

I think you're expected to go to school [...] and you're meant to know, even as a student teacher, I think you're just meant to know things. I've always been in that position. Maybe that's just the schools I've been in but it's always been something I've done on my own. (ST A7)

Despite accepting the practice on the surface, there was a subtle underlying dissatisfaction in the interview dialogues relating to this practice of lone learning in school and some students stopped just short of questioning it directly.

I just felt like it was my responsibility to have all that knowledge when it's... it is my responsibility to have knowledge, but if I'm struggling...I'm still a human being, and still a person who is still learning... [trails off after raising her voice]. (ST B4)

Some student teachers were able to describe examples of what they perceived was the school mentor supporting their subject-specific knowledge development. These included help in a generic sense with improving explanations, breaking down the elements that needed to be covered in a unit of work the student teacher was planning for English and directing them to useful websites. One student recalled the only episode of subject-specific mentoring she had encountered during her four-year course.

I'd say the Key Stage One leader this year coached me through a phonics progression and sat down and said, "This is where they are. This is what they need to do. This is how you should do it. This is the knowledge that you should have," ...but other than that... (ST B1)

Another student recalled being given a resource sheet to use as her only example of subject-specific mentoring.

My class teacher helped me with 3-D shapes in Year 2. She could see I was struggling with it so she printed me off a sheet from a dictionary which told me everything. And I still have that... and I'm going to use it for the rest of my career. (ST B4)

It could be assumed that observation of experienced teachers would be a key part of the student teachers' subject-specific learning, but this also appeared to be less common than might be expected.

It has only been very, very good mentors that have said, "Why don't you observe me doing this?" or, "Why don't you observe another teacher doing this?" [...] It's not been very often that that's happened. (ST A5)

The relationship between the student-teacher and the school mentor is of great significance in the learning process and this notion is embedded throughout the data. Where it was not good, it left the student-teacher seeking support from other sources.

She was really difficult to talk to, to the point where I'd be talking to her and she'd just have her back to me and she'd ignore me. It really upset me but she just was silent all the time [...] I think I learnt a lot more from the TAs [teaching assistants] than I did the class teacher. (ST B6)

In summary, subject-specific learning on school placements seemed to be located at the personal, individual level via student teachers' own research of what they were teaching.

This is driven by the urgency of having to teach a lesson and being put under pressure by having to face potential challenges from children. The approach seemed to encourage temporary learning rather than conceptual understanding. In general, the emphasis shifted in school away from subject-specific knowledge and general pedagogy became the focus. School mentors appeared to have minimal impact on *subject knowledge* from the student teachers' perspectives. It is interesting to return to the questionnaire data in which student teachers' believed that school had more influence on their subject-specific learning. It is clear from the findings that it is simply being in school and participating in the community of practice that impacts rather than any specific mentoring activities.

2. The school mentors' perspective

In relation to the impact of school-based learning on subject-specific knowledge development, there was no clear consensus amongst the school mentors, but the data revealed some interesting insights into assumptions that might be made and, ultimately, experienced by student teachers when on school placements.

Some of the mentors firmly believed that content knowledge comes from school and not university.

Well we give it. I don't see any other than we are giving the students what they know. (M2)

The 'how' children learn can come from the university but then they are going to see it in practice. The content is going to come from the schools when they're there and they're doing their practice. (M9)

Within this group, one mentor further expressed her frustration at having to deal with *subject knowledge* at all and believed that the university should be wholly responsible for anything subject-specific.

You know if we're trying to get outstanding teachers, we can't deal with subject-based as well as effective ways of teaching and assessing. I would like to see university on the subject knowledge. You take that mantel and we take... right, what do you do with that? (M2)

This viewpoint suggests that *subject knowledge* is a separate entity that can be delivered in one location and applied remotely to another. The mentor's subsequent comments clearly indicated that she did not view *subject knowledge* development as a shared responsibility across the partnership.

I find it a frustration...and I blame the university to the students...I feel if they were more prepared, we wouldn't be having to do that. We could be doing real...erm...erm...specific pedagogy [sic]...pedagogical discussion as to how to move with...the way you're sort of opening up opportunities. I don't think it should be the role of the mentor to be teaching them how to gain the subject knowledge. (M2)

Other mentors understood that school focused more on 'delivery' and generic aspects of school life rather than subject-specific matters.

I think probably school more with...delivery... I may be wrong. I thought my part was more delivery and trying to expose them to different areas of the school. (M8)

It's the whole experience of the school day isn't it? You know going to staff meetings, doing the playground duties. (M7)

I think my responsibility to them is to give them the plans, if we've got them. (M5)

A more nuanced view of school-based training combining with university-based training was expressed by some mentors, although in relation to helping student teachers to develop subject-specific knowledge, the interview data suggested a fairly passive, 'hands-off' approach to achieving this, including handing issues back to the university staff to deal with.

I would say it's a partnership between school and the college but with the student at the centre: I've heard what tutors told me and I'm going to use it in school. I think it's just trying to expose them to as much as you can when they're on the placement. For example, come to staff meetings where we might be having some INSET, or allow them to go and watch other teachers, especially lead teachers. (M8)

If a school highlights a gap then you [the university] would identify it and fill that gap, or be able to give access to something to help them with whatever area they need to access. (M3)

I think the school-based mentor's role there is to flag up and to say, "Do you think you need to do some work?" and communicate that to the university person so that somebody's aware. (M6)

One mentor's response aligned with the students' views of school placement highlighting their particular strengths and weaknesses.

I suppose it's because it's on the job, isn't it. It's where they are going to know what those strengths and weaknesses are in terms of which areas of the curriculum they feel strong with. There's a confidence because they've got their own knowledge or they've developed knowledge and the other ones where they go, "Ooh (sharp intake of breath), I'm not sure." (M4)

The phrase 'go away' that recurred in the students' recounts in relation to mentoring around subject-specific issues was also evident in the mentors' perspectives.

*The University's got some responsibility to make sure that they are pointing them in the right directions for the how children learn. The students themselves, they've got to **go away** and look what the content is and research it and to make sure they're really familiar with it, and the teacher's got to make sure that they're drawing it all together. [...] I suppose the school-based learning is more about them pulling it all together and seeing why learning about how children learn is important, not just the content. It's the tying it together that's important in school-based learning. (M9)*

*They've got to work... **go away** and do it themselves. [...] They've got to do it; you can only point them in the right direction. (M6)*

The variability from school to school in relation to the impact they have on student teachers' subject-specific knowledge development was acknowledged in detail by a mentor who had worked in a university ITT department for two years before returning to teaching in school. She identified a range of factors that she believed would determine the potential impact a school can have.

I think it varies widely from school to school depending on the quality of mentoring, time provided by mentors to actually get to know their students and devise a personalised programme for them, quality and availability of subject specialists in agreeing to be observed or meet with students. Time is at such a premium for

teachers that it can be hard to engage somebody who does not have direct involvement with the student, as they have so many other demands on their time and energy. (M1)

This suggests that, at times, mentoring in school might be a lone activity that makes such demands on a teacher's time that it becomes difficult to involve other members of school staff who are not directly responsible for the trainee.

Some assumptions on the part of the mentors were also evident in the interview data. It was clear that a proportion of them assumed that the student teachers arrived on their school placement fully equipped with all the subject-specific knowledge that they would require.

I think you have to assume that they would come knowing what they're doing. (M3)

I assumed quite rightly that when [name of student] came, he would know the importance of grammar. He would know how to teach spelling. He would know how to teach a guided reading session. (M8)

This links directly with the student teachers' feelings that there was an expectation from mentors for them to already know about, or to 'go away' and work on, subject-specific matters and an apparent lack of concern with *subject knowledge*.

It would be fair to draw the conclusion from the data that there are some widely varying perceptions of how the school impacts on subject-specific knowledge development during training and its role in the process. There is an underlying theme, however, of *subject knowledge* being located with the university and with the individual student teacher. There was a general reluctance to take responsibility for subject-specific training by mentors in schools.

3. The university tutors' perspective

Data from the university tutors' viewpoints triangulated most of the points expressed by both student teachers and school mentors. There was general recognition that a perception exists in schools sometimes that they have no responsibility for *subject knowledge* and communication about partnership needed to improve.

I almost think though that schools think it's our job to give them the subject knowledge and it's their job to get them teaching, so it's not their job to plan to impart the subject knowledge. It's our job. And I think there is that, you know, the line to get across and we're both responsible for both bits. (UT3)

School-based learning was thought to be a narrower experience in subject-specific terms.

I think that's more limited. I think that's focusing on their children in that situation so I think it's slimmer. It's not as broad, which is perhaps inevitable. (UT9)

But I think school's role tends to be that particular year group at that particular time. (UT2)

The impact of school on subject-specific knowledge is potentially greater, because the student teachers have to react to what they are teaching, so they really 'feel' the impact. This links to the students' viewpoint of having to teach, being the driver for their independent study on school placement and the reason they cited school as being particularly impactful, despite the lack of attention given to subject-specific elements by school mentors.

*I think it's got a big impact because it's... because they are there for longer periods of time and it's... it's seen to develop over that period of time because it's got that continuum. And they are responding...they are reacting to what they've got to teach so they **feel** that in the impact. It's higher. (UT11)*

Differences in the impact of school on learning in different subjects were also explained by the university tutors who have a particular interest in tracking experiences of student teachers in their subject areas. The general consensus was that impact was better in English and mathematics because there is such a focus on those subjects in school. This correlates exactly to the students' views. Impact in science, however, was believed to be extremely variable.

Factual science would be quite small because I see my mini-survey results. I know how many lessons of science took place during that particular period involving our trainees. I don't want to be disloyal to partnerships but... [shrugs shoulders] (UT6)

Variability in subject expertise of primary mentors in school was thought to be a limiting factor in the impact on learning in certain subjects.

One of the inconsistencies between mentors is their own subject knowledge...and I know that somebody who does their science with a science subject specialist in a primary school...they'll get a different experience to somebody who's, you know... And that came through the assignments because I could virtually tell who the mentors were, who were confident themselves in their own science. (UT6)

Student teachers found that mentors tended to focus on their own expert subjects in their mentoring activities, such as lesson observations, possibly to avoid the situation that the university tutor describes in relation to science.

One university tutor suggested that school might have slightly more impact, but firmly maintained that this is entirely dependent on the individual student and put it down to 'cognition' rather than anything particular about the context. This does appear to align with the underlying interpretation of the student teachers' views.

A tutor who was fairly new to her university role believed that a key aspect of impact from school on student teachers' subject-specific knowledge would be school mentors' openness about not knowing everything and how this would be reassuring to student teachers on school placement.

I do think what they've got from school is they've seen that not all teachers have it and you're constantly having to renew your own subject knowledge, and I think that's quite reassuring isn't it, that they've seen that the teacher's quite open as well. (UT8)

Whilst encouraging on-going subject development would be a positive outcome, these reassurances have also been seen in this study to influence student teachers' beliefs, in some cases, to such an extent that they eliminated subject-specific knowledge from their thinking and considered it to be irrelevant in primary education.

4.3.3 The Policy Context

School mentors and university tutors were asked for their opinions and interpretations of messages about *subject knowledge* coming from policymakers in relation to three key aspects of education policy context that impact directly on primary ITT: Ofsted inspections, the new primary national curriculum (DfE, 2013), and the agenda to rapidly expand school-led ITT since the publication of The Schools White Paper (DfE, 2010).

1. Ofsted

Without exception, the school mentors were only concerned with the Ofsted inspection framework for primary schools (Ofsted, 2016) and the fact that there is no focus on subject-specific knowledge from their perspective. They all cited the significance of outcomes of teaching in terms of pupil progress. One mentor explained, ‘how you get there does not matter’ in relation to the methods used to achieve pupil progress. This encapsulated the unanimous collective viewpoint. The essence of this does not appear to be compatible with the process of teacher education where ‘how you get there’ is central to its very nature. Mentors showed no awareness of the Ofsted inspection framework for ITT (Ofsted, 2015), despite their significant involvement in the sector. This probably reflects their lack of accountability in the system.

In contrast, university tutors felt that the message from Ofsted was that *subject knowledge* was of paramount importance in ITT. They were all aware of a relentless focus on early reading and early mathematics, and on evidencing the impact of training on trainee’s *subject knowledge* and, in turn, the impact of trainees on children’s progress. There were some differences in perceptions of the nature of *subject knowledge* in relation to Ofsted expectations though.

One tutor espoused that Ofsted focuses on *subject knowledge* because ‘it’s easy to assess whereas pedagogy is difficult.’ This strongly suggests an objectivist interpretation of *subject knowledge* purely in terms of substantive knowledge. This focus on content knowledge was echoed by a mathematics tutor:

We’ve got to track it [subject knowledge] to the nth degree... I think mostly this bit [referring to content knowledge] particularly with the fact that the skills test etc., the expectation’s there, but if you are not tracking subject knowledge then you can’t evidence it and you can’t evidence the impact. (UT2)

In contrast, another mathematics tutor interpreted a different message about *subject knowledge* from Ofsted.

It’s not just the knowing. It is about ways of working and discussion and working with other people is important for mathematics. It’s not just about getting questions right and wrong. I think that comes through from Ofsted. (UT9)

The theme of tracking *subject knowledge* beyond content knowledge was evident in an English tutor's viewpoint too.

When they come in, they're looking for evidence of subject knowledge because we have to show them how we track it and how it's developed because we have to show value-added. So that was certainly there in the last inspection. Obviously they are still coming to look at early reading. [...] I don't think they are just interested in the sort of nuts and bolts - the component parts - because they are interested in the impact that our trainees have on the children. We are tracking their ability to plan and to teach. (UT1)

Because of the need to evidence the impact of training on *subject knowledge* for Ofsted, almost every university tutor participant used audits in some form as a part of their roles. This will now be considered in more detail.

i) Use of subject knowledge audits in university tutors' roles

The nature of the audits ranged from simple baseline tests or self-assessed confidence audits against key elements of the subject, to more complex tracking systems used to demonstrate student teachers' progress over the duration of their training. They were administered in varying ways for different purposes. For example, a comparison of approaches can be observed in relation to English departments at the two institutions represented in the data. A tutor relatively new to ITT explained her approach:

I actually find my tests more useful, so I do a phonics test and a grammar test and they use that information to see where their areas of strength and weakness are. Anybody who performs particularly badly, we have a tutorial with them and I find that valuable. (UT8)

Both of the tests she mentions correspond with key focus areas for Ofsted inspections. Intervention is based on a deficit model. A more experienced tutor placed more emphasis on having evidence of tracking students' progress in response to the Ofsted inspection focus on early reading in ITT.

I use it to establish a baseline so the baseline indicates these areas and honestly... it's part of playing a game, so phonics, I have 'red' all the way down for all of them at the beginning [referring to a 'red', 'amber', 'green' rating system] and then I can show that they come out with ones or twos at the end of final placement. Value-

added...thank you! So there's that. If there were more staff, it would be interesting to see the impact in other areas, but I don't know because when I look at the QTS portfolios, I think that many of them are just reaching for the Scholastic sheets, doing the verb sheet, getting outstanding on the lesson plan and saying I've done that. (UT1)

Her comments suggest a slight frustration at not having the time to delve more deeply into student teachers' pedagogical content knowledge that would reduce their reliance on commercial resources. Science tutors explained that the audits focused more on content knowledge and were 'much less useful for pedagogy.' They were, nonetheless considered to be a 'necessary part of a teacher training course' in enabling the learner to make progress.

Institution B also made use of subject knowledge audits across the foundation subjects, unlike Institution A. One of the tutors explained:

We introduced it because [name of Foundation Subjects Leader] asked as to do it for Ofsted. Let's be honest! (UT10)

When asked how they would improve the subject knowledge auditing systems currently in use, a consensus opinion emerged of tutors requiring more time, and more staff in some instances, to have the capacity to engage with the auditing processes in a more meaningful way so that they had a clearer purpose for student teachers' learning. They felt that there was a tendency for the audits to become a tick-box exercise utilised to provide evidence to support ITT Ofsted inspections rather than to directly benefit student teachers' *subject knowledge*. Ideally, greater engagement from the student teachers would also be welcomed, with the audits being viewed as a key part of their professional development. Alternately, one tutor expressed their desire to simply 'get rid of them.'

ii) How do university tutors think student teachers perceive subject knowledge audits?

A range of viewpoints were expressed by the tutors in relation to this. Some could envisage that it would depend on the individual. Some student teachers would enjoy doing them and gain some value from them, whilst others might feel quite differently. They might view them as an 'onerous task' or struggle to see the relevance of them in the bigger picture of

their training. They believed they were most likely to take a 'strategic' approach and do them when they were asked to do so, but only look at them when they were 'made to.' Elaborating on this, it was pointed out:

When they first come in in first year and we give them those audits, I think it makes them think, 'Oh gosh... right okay... this is not what I was expecting!' I think then they very quickly see that we just don't have the time to do anything with it. We don't have the capacity to do anything. I think at first in first year they are very much in school mode and they think they have to hand it in and when they realise they don't, then they no longer do it. (UT1)

One tutor summed up the range of possible student responses succinctly.

I think that the students perceive them in the way a range of people in a microcosm of society would perceive anything. I think that you'll have very, very bright people who see them as a waste of time because they know it [the subject matter] and they know, they know it, and you'll have very bright people who see them as reassuring because they help them in some way, and you work your way through the continuum down to your weaker student, who doesn't see the point and they probably won't see the point and they don't know it. It's variable...it's very, very variable. (UT6)

Layers of strategic compliance appear to be driving this process for both student teachers and university tutors.

iii) School mentors' perspectives of subject knowledge audits

No mentors interviewed for this research knew what the subject knowledge audits were in the context of training students. Some were aware of having done audits themselves as part of their training, but student teachers had not shared them in a mentoring context. It can be concluded that auditing practices were located firmly and squarely within the universities and were not part of the ITT partnerships.

iv) Student teachers' perspectives of subject knowledge audits

As anticipated by the university tutors, a variable response emerged from the student teachers in relation to the impact of subject knowledge audits on their learning. For some individuals, they appreciated the audits in helping them to gauge their progress. They provided welcome reassurance in pinpointing where and how their confidence had increased in relation to specific aspects of subjects. For others, their initial response to the

audits had stuck in their minds and they recalled the slight shock of realising the knowledge demands of primary teaching for the first time.

Yeah! In first year, I thought, 'Oh my goodness! [clasping hands over face] I need to get all this knowledge. I need to be so, so good at subject knowledge. [...] I remember spending so much time going over, I think it was the science one. (ST A10)

Other beneficial aspects of the auditing processes included raising awareness of the on-going nature of *subject knowledge* development and the nature of *subject knowledge* itself.

I think they have a role in making you aware that...subject knowledge isn't something that's stagnant. It's not black or white. You don't have it or not have it. It makes you aware how it progresses. (ST B1)

There was also a theme in the data of students not seeing the value of audits at the time they were introduced to them, but by the time they reached the end of the course, they might see their purpose with greater clarity.

At the opposite end of the spectrum of opinion were the student teachers who saw no value in the subject knowledge auditing process. Reasons included not wanting to be reminded of their weaknesses, feeling that subject knowledge is developed through teaching in school rather than 'on a piece of paper' and failing to see their relevance.

Speaking honestly, I didn't really do the subject knowledge audits. I left them to one side because it had no meaning to me. I thought, 'Why am I doing this? Will I need this in the future? I've got assignments to write. I don't really think I'm gonna need this.' (ST A1)

Some genuine issues with the auditing processes were identified by student teachers, including those who had found them helpful. The difficulty in 'quantifying' knowledge on a scale was raised as being too simplistic due to the subjective nature of this approach.

I think it's completely invalid because obviously you're going to want to have good subject knowledge so, on a scale of 1-5, how strong are you in this? Well you want to be 5 but...it depends how self-critical you are. Someone like me sits there going, "1, 1, 1..." And that could go on my record forever and not move. (ST B1)

The culture of performativity in relation to Ofsted-driven processes means that the complex concept of *subject knowledge* is reduced in practice to a measurable form that can potentially skew collective understanding of it. In the example above, it seems that the student teacher's knowledge of self is acting in tension with the need for strategic compliance.

One student teacher was disgruntled about the different expectations for subject-specific knowledge between university and school. This viewpoint echoed the concern from one of the university tutors about schools and university needing to give the same messages for there to be any real impact. Student teachers also shared tutors' concerns about the audits predominantly focusing on content knowledge and that the audits were not always followed up in university, so there did not appear to be a tangible outcome, again reducing their motivation to engage with them.

For those students who were sceptical about the usefulness of subject knowledge audits, the majority adopted a strategy of 'going through the motions' when they were asked to.

I'll do it if I'm asked but then it doesn't get looked at again until I need to. [...] I did them and I highlighted parts but I did them not for my benefit, but for the university's benefit. (ST A6)

I think that's one of those things that you do because you're asked to and you don't put a great deal of thought into it. I wouldn't say I lied on it but I wouldn't say I sat there and thought, 'Do I know about this?' I thought, 'Yes, I think I know.' (ST B2)

In summary, the findings demonstrate that neither university tutors nor student teachers were entirely satisfied with subject knowledge audits and tracking processes. Whilst some apparent benefits were identified by both groups of stakeholders, there was an underlying disquiet about their effectiveness. Some student teachers entirely rejected them; this represents another focus on *subject knowledge* in their training that was eliminated through their negative interpretations. School mentors were not even aware of subject knowledge audits, suggesting a failing in partnership to develop shared understanding of these processes, reinforcing their location within the university and not school.

2. New primary national curriculum (DfE, 2013)

The school mentors were concerned about the focus on increased demands of substantive knowledge associated with the new curriculum. Views expressed included that it was more

'factual', 'required more knowledge' and that 'schools were still grappling with it'. Some expressed frustration that primary teachers are 'expected to be experts in everything' and that the demands placed on them are not 'realistic'. One mentor described the need for increased focus on knowledge as 'disheartening'. The feelings expressed reinforce the findings about the tightly coupled nature of *subject knowledge* and curriculum for school mentors. One mentor went as far as to suggest that they had lost their collective *subject knowledge* as a school community by the introduction of the new curriculum.

We are all traditionally quite established here so our subject knowledge was excellent. It isn't now with the new curriculum of course. (M2)

In complete contrast, the university tutors were entirely unperturbed by the introduction of the new primary curriculum and seemed to be simply accommodating it into their practice through a process of critical analysis. They voiced some opinions about changes to vertical curriculum knowledge with certain concepts being directed to younger year groups than previously, but they did not report it having any major effect on what they teach and how they teach it. Their sense of agency as individual professionals was notably stronger than for the school mentors, whose identities as teachers seemed to be directly connected to the curriculum. This links to their conceptions of *subject knowledge* as being driven by curriculum. Another factor is that the university tutors generally only have to focus on particular subjects within the curriculum, whereas primary teachers have to consider the full range, which presents greater challenge.

3. Expansion of school-led ITT

School mentors held mixed views about the agenda for expansion of school-led ITT. In a general sense, they welcomed it but, in relation to *subject knowledge* they indicated continuing reliance on the university. For example, one mentor recognised the political motivation to 'devalue universities' in teacher education, adding 'there's a reason for that.' This mentor expected student teachers to possess all the subject-specific knowledge they might need in advance of placements in school and, by her own acknowledgement, it caused conflict in her mentoring when this was not the situation. In the absence of university input, it is reasonable to assume that the blame for failings in this respect would, most likely, be transferred to the trainees.

Other mentors expressed the likelihood for *subject knowledge* to be given a very surface treatment, if located entirely in schools. It was recognised that trainees gain 'narrow

experience in schools' and there is 'a danger of skimming the surface'. 'Deep understanding and knowledge could be missed'. There was a general sense of the university providing a wide range of expertise with subject-specialists, who are very much still needed in the system in a 'supporting role' to 'plug gaps in subject knowledge'. One mentor who was also leading the development of School Direct training in her school typified these mixed views.

I think if you are School Direct you learn on the job and you learn quickly and you make mistakes and you rectify them, but I also see that the university is plugging some of the massive gaps that maybe students have when they come to you, and you're preparing them so... in terms of subject knowledge...I don't know. (M3)

There was also a feeling that not all school experiences are good ones and that university is needed for when 'it goes wrong' and learning needs are not met.

If you're in school and you're not having as good a time, you need somewhere to go to, to...you know...and the library is really good...there are really good professionals and if they're stuck on anything and they don't want to go to the teacher. (M3)

Mentors recognised how school-led ITT might suit some learners but not others, and there was the potential to lose good future teachers.

We've had quite a mature teacher come in to do it and just not coped, so it depends on the sort of person it is. I think there's a place for it but I still think there's a place for very structured university learning as well. (M8)

Another mentor recognised that their School Direct trainee had been treated as an 'unpaid supply teacher from Day One' by the school and there were no mechanisms in the system to protect trainees from this without the university's role.

There was a lack of awareness amongst the participants of the threat to the sustainability of university departments in this future landscape. There was a general expectation that schools could take on the responsibilities of ITT but still have the universities in the background to rely on when needed.

I think school-based is the way to go because you do learn more when you're in school, in the thick of things. So I think it's a good direction for the university to go in but still have that contact with all the other stuff that you do. (M7)

This perhaps suggests that the implications for teachers' additional responsibilities in relation to this agenda are not being articulated with sufficient clarity by policymakers.

The same themes were apparent in the university tutors' perspectives. The lack of time in school for attention to subject-specific knowledge development was identified, along with having access to a potentially narrower range of pedagogies than student teachers are exposed to in the specialist environment of the university.

I actually still think that there's a place for university-based training because of the big picture because we are specialised in a way that primary teachers and heads will not be. (UT10)

The cultural location of *subject knowledge* development in university departments and the apparent reluctance of school mentors to take a greater share of this responsibility were also ideas that were recognised.

I think there's a job for schools and universities to work closer together. This is a joint training programme. We are not responsible for subject knowledge and they do the teaching bit; we are both responsible for both, and I think that's a long way to go to get there. (UT3)

It's early days with School Direct but I think with the way it's going, they [school] have started to see that they are plugging gaps. I think moving through to now where they either have to buy into subject knowledge in our model or not, and by buying into subject knowledge or not buying into it, they are starting to see that actually the more time that they are in school, they can't just be relying on what we are doing. They need to be doing more themselves, so it will need time to filter through. I think it'll be an interesting few years. (UT2)

One tutor reflected on the trends she had observed amongst School Direct trainees in relation to *subject knowledge* compared to undergraduates on traditional routes.

Now you're constantly on the shop floor and I'm not sure whether they are developing subject knowledge as opposed to getting through each lesson, and each morning, and each day, and each week. (UT1)

This trend would suggest that surviving and performing were, perhaps, replacing learning in the context of school-led ITT. A growing lack of interest or concern with subject-specific knowledge had also been observed.

They increasingly want to know top tips but they are not interested in how 'the how' relates to 'the why' or the final product if you like, for want of a better word. [...] Actually some of them have complained recently that they don't want any of the other. They don't want to know why...I do it because I have to, because it's in the national curriculum and if they have got a subject knowledge gap there, what they are saying to me is well, I can look that up on the Internet the night before. I just want to know what I'm going to give them to do. So they are very much about keeping children busy rather than thinking about their learning. (UT1)

These observations concur with the findings about *subject knowledge* in relation to the perceptions of certain undergraduate student teachers and suggest that the more superficial ways of understanding it, might be becoming the dominant perspective with the postgraduate School Direct cohorts.

The significance of the individual was also highlighted, both in relation to the trainees and the mentors.

Do you know, it comes down to the quality of the example that you're getting doesn't it? I worry that is just going to be so dependent on which teachers you've got as role models. (UT8)

This raises a question as to whether school-led ITT as a collective community of practice can develop sufficient common knowledge and understanding to scale-up successfully in a rapidly expanded system.

Conclusion

To summarise, similar influences on subject-specific knowledge development embedded within the university and school-based elements of training, were identified by student teachers, however, the nature of the impact of these influences and the associated reasoning was a highly individualistic response. The pressure of having to teach in a public arena on school placements was the most significant driver for student teachers to work on improving aspects of subject knowledge. School mentors were found to have a minimal role in this though. Ofsted inspections were found to be a major driving force that shapes the landscape of ITT in different ways for university-based aspects of provision, in comparison with school-based elements.

4.4 Subject knowledge and the individual

The evidence presented in this section responds to research question 4:

How might student teachers' personal conceptualisations of subject knowledge differ according to the interplay between their biographies, personal interests and emerging professional identities in participation in cross-contextual settings?

Findings are based on the analysis of data from the following sources: semi-structured interviews with student teachers and corresponding visual data; questionnaire responses for the individuals who were also interviewed.

4.4.1 The personal perspective

The individualistic nature of some of the data has been demonstrated in the findings presented in previous sections. Conceptions of *subject knowledge* were found to be highly variable between individuals. Similar influences on thinking about *subject knowledge* have been identified but they led to diverse conceptualisations, thus emphasising the personal interpretative element. Similarly, student teachers agreed that specific activities embedded in university-based training had impacted on their development of subject-specific knowledge, but the exact nature of impact and the reasoning behind it was largely individualistic. It is, therefore, necessary to examine and explore the interplay between personal and contextual influences.

Kelchtermans's (2009) analytical framework was previously presented in the literature review (Chapter 2.9, p50-52). It connects personal factors and biographies to teachers' professional self-conceptualisation, their beliefs about teaching and their actions. It is centred on the difficulty of separating the teacher as a person from the act of teaching, which is enacted in the socio-cultural nature of educational settings. Numerous authors have examined the role of teacher identity (e.g. Wilson and Wineburg, 1988; Gudmundsdottir, 1991; Hillocks, 1999) but Kelchtermans's (2009) research differs in the fact that it is distilled into a conceptual framework that serves as a useful heuristic to explore the complexities of personal and professional aspects of the teacher.

To recapitulate, the first domain of the interpretative framework is *professional self-understanding*, which comprises *self-image, self-esteem, job motivation, task perception and future perspective*. Applied to this research, self-image describes the way that student

teachers see themselves as novice teachers and how they perceive that others see them. Self-esteem is derived from this. Job motivation encompasses their reasons for wanting to become a teacher and future perspective relates to their expectations of their future careers. Task perception represents the student teachers' ideas about what is involved in being a good teacher and the associated core tasks/duties.

The second domain of the framework is a teacher's *subjective educational theory*, i.e. the teacher's personal system of knowledge and beliefs about education. 'The content of the subjective educational theory is largely idiosyncratic and based on personal experiences' (Kelchtermans, 2009: 264). In this research, the subject educational theory has been re-focused specifically on *subject knowledge* in the context of primary teaching as a representation of this part of a teacher's epistemology and beliefs. Kelchtermans's (2009) framework finally includes the notion of *vulnerability* to represent aspects of the job that teachers cannot control.

The framework has been used to illustrate how student teachers make sense of their work and themselves across different contexts through the presentation of five pen portraits. The individuals were selected because they illustrated particular characteristics that illuminated the variety of sense-making that occurs at the individual level. The pen portraits do not represent an exhaustive list of typologies of student teachers. The data actually suggested pluralities of identities within individual narratives, reminiscent of Stronach et al.'s (2002: 109) 'identities in flux' which were shifting, fragmentary or sometimes contradictory in nature. The pen portraits are, therefore, presented as offering illumination into different examples of student teachers' cross-contextual, personal and professional sense-making. The components of Kelchtermans's (2009) framework are identified in bold within the individual narratives.

4.4.2 Pen portraits

1. Jason: Aspirational role model

Subject knowledge as stand-alone facts defined by the curriculum

Age: 29

Highest Qualification in English: GCSE Grade C

Highest Qualification in mathematics: GCSE Grade B

*Highest Qualification in science: GCSE equivalent double award Grade B, B
HNC Business Studies*

Prior career: Civil servant for 7 years; 3 years in a management role

Jason's long-standing ambition is to be a primary teacher. He entered teacher training via a non-traditional route as a mature student after working as a civil servant for seven years (**personal commitment**). He recognises it as being a cliché but says that he likes working with children. His **job motivation** is the reward he experiences through having an influence on a child beyond the academic aspects of education. He relates this to his biography of enjoying the interaction he has with his young nieces and nephews as they are growing up. His enthusiasm has increased over the duration of his training because he has seen the impact he has on children in a personal, social and emotional capacity. This has reinforced his commitment to teaching as his chosen profession. Clearly, he is proud of pupils looking up to him and his narrative suggests that he wants to be seen as an influential role model. This ambition fuels his purpose for improving his knowledge in relation to becoming a 'really good teacher'.

I now...if I come across something I'm not sure about, I Google it to understand it. I think I have to now because you're going to be a teacher whereas I think before the course, if you came across something you didn't understand, you just didn't bother with it as much. It wasn't... of enough importance whereas now it is, because now I want to be a really good teacher so I know I have to.

This approach exemplifies Jason's thinking about the place of *subject knowledge* in primary teaching (**task perception**).

I don't think subject knowledge is a massive thing. I really don't, because a lot of the stuff that you teach, you can learn and you can revise before you actually teach it.

Jason views communication and relationship-building as important aspects of teaching. Characteristics of teachers that he valued as a pupil have become part of his **self-image** as a teacher.

I think that being able to [...] relate to the child and the child feels comfortable with you, y'know... you can remember the teachers that you couldn't get on with, or they weren't very friendly, or they weren't very warm, and you didn't think you could go to them about anything. I think you need to be approachable to children. I think that's one of the most important things.

His need for this positive reinforcement from the children is illustrated in Jason's account of a time when his *subject knowledge* enhanced his practice. He explains his approach to teaching the science topic of 'Space' to a Year 5 class.

I was like, 'Oh brilliant!' [...] I had a good root in the store cupboard and there were these inflatable planets [...]. I got the planets out and blew them all up and the kids were all standing round and, because it was something that I was interested in, I was quite confident with my subject knowledge. I think then the kids, the children, were all excited [...] and then for the next lesson I hung them from the ceiling so when they come up there were all the planets on the ceiling, and they absolutely loved it and then...I taught them the rhyme about planets and the next day they were all rhyming the planets off to me, because they were all on the ceiling.

He links the children's enjoyment of naming planets to him being confident with the related *subject knowledge*. In essence though, his approach represents rote learning rather than developing conceptual understanding through scientific enquiry. He appeared to be unaware of this, despite the fact that his approach is not one that had been promoted to student teachers through the university-based science teaching. However, his approach had 'worked' for him in the context of gaining the children's attention and admiration, so it has been recounted as a successful example.

With specific regard to his **subjective educational theory** of *subject knowledge* for primary teaching, Jason's conceptualisation can be distilled down to facts to be taught, derived from the content of the National Curriculum thus exhibiting an objectivist viewpoint. The only knowledge bases for teaching that are firmly incorporated into his pictorial representation (Figure 5) and accompanying narrative are content knowledge and curriculum knowledge. The scope of his interpretation is both shallow and narrow. His

meaning in relation to content knowledge is predominantly substantive knowledge in the form of 'facts'. He begins to deconstruct literacy into its constituent components but quickly draws a blank and stops that train of thought. References to curriculum are limited to the National Curriculum indicating the factual content that you need to teach. He expresses some beliefs about subjects that are similarly reductionist in nature:

Maths, literacy, science, ICT are probably the most important.

There's no subject knowledge for art. Art would be if you look at the history of art.

He gives no justification or rationale for his beliefs; they seem to be stated as established fact rather than his opinion. For these 'important' subjects where he is confident of his knowledge of the facts he is teaching, he makes reference to 'giving' children the subject knowledge, that could be interpreted as him subscribing to a transmission model of teaching. He places the responsibility for learning on the children: 'it depends if they have an interest in it as to whether or not they will learn it.' However, for aspects of the curriculum where he is less confident of his knowledge, in the classroom he takes the role of bystander, or hands-off facilitator.

I think again that maths, literacy and science, ICT has to be taught. I think they're really important. The other ones you teach them how to find out themselves and, sort of, encourage them. So the subject knowledge in those subjects isn't as important.

This might suggest an unstructured discovery learning approach but, alternatively, might simply indicate the absence of pedagogy.

Jason, therefore, seems to have a dichotomous approach to the pedagogy he employs to teach the facts. For core subjects, where he is confident of his knowledge, he seems to adopt a teacher-centred transmission of the curriculum-based facts. His knowledge of foundation subjects is less secure, so he encourages the children to find out the facts for themselves through research, thus directing attention away from himself as the teacher. He believes that there is 'more of a pressure on you' for subject knowledge the higher up Key Stage 2 you go.

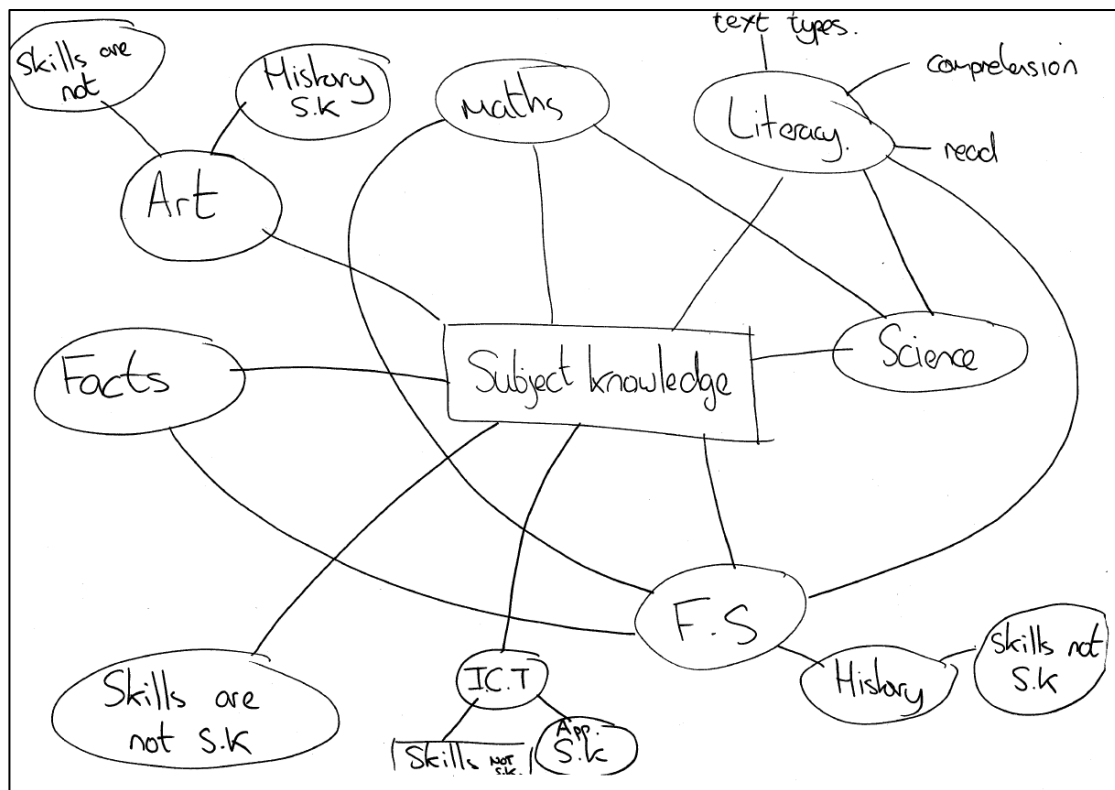


Figure 5 Jason's visual representation of his thinking about *subject knowledge*

Jason locates his understanding of *subject knowledge* within school practice and cites this as being most influential on him, even though university lectures have been 'useful'.

I would have to say the experience of practice. It's the experience. I mean because subject knowledge, it's so wide you can't be expected to know it all, and you shouldn't be expected to know it all. So when you're on placement [...] having a topic that you have to do for two or three weeks is good because then you can learn what you have to learn for that.

Jason is confident and self-assured in his beliefs and in his abilities (**self-esteem and self-image**). He cites himself as being central to his success in teaching and attributes little to other people, including the school-based mentors who have worked with him on placements.

I don't think they've had a big impact. The only things that I've learnt, I've learnt myself. Sometimes the teachers, even if they're your school based mentor....your class teacher, they're busy doing other things. They don't have time [...]. Sometimes they'll point out a good website to use but it's up to me to go and have a look at it,

and take what I want from it. I don't think they've had a massive impact. I think it's maybe been myself.

He does not actually mention many other people in his dialogue and makes a point that he prefers to look up information himself, rather than rely on support from others. The pressure of being sure what he is teaching is right, is the driver for his individual approach to study. This perhaps gives a hint of Jason's possible **vulnerability**: opening himself up to scrutiny from others.

I think for me it's the pressure of being sure it's right. I think I'm a bit of a perfectionist, so if I'm teaching something I want to make sure that what I'm teaching is right.

This vulnerability is exposed at times during the interview where he momentarily realises that his understanding might be limited (e.g. starting to deconstruct the components of literacy unsuccessfully), or that he has revealed possible shortcomings (e.g. expressing his fears that he would not be able to manage behaviour as a secondary teacher). His response on almost every occasion is to avoid exploring alternative possibilities, preferring instead to shut it down even when it is just his own thought process that he terminates prematurely. When discussing his reasons for not finding university subject knowledge audits useful, a chink in his armour of confidence is revealed.

I answered the questions and I was given the answers, but if I'm honest I didn't...I think...me personally, I know my own weaknesses anyway so filling out an audit [...]and being reminded you're not very good at this, for me personally... you know your own weaknesses so...[shrugs shoulders].

When asked to share an example of *subject knowledge* impairing his practice in some way, Jason describes a teaching episode from a previous school placement in a Year 1 class. The mathematics lesson focused on teaching number bonds to ten. He recalls:

...before I taught it I thought 'Oh I've got this wee ladybird up on the thing. I've got the spots and stuff,' and I thought that, 'Oh I'll be ok, it's only teaching number bonds. I'll be fine.' But it wasn't... it wasn't fine. But I don't know whether that's... [trails off as he starts to question whether than relates to subject knowledge as he has defined it].

When asked to explain why it was not fine, he says:

They just didn't... they just didn't get it. I mean, the children sitting on the carpet, they enjoyed coming up [...]. There was a ladybird on the board and the children come up with the spots and I says, 'Let's think of different ways to make ten. How many do we put here and how many do we put here?' But I thought they got it, but when they sat down and they started doing it individually, y'know, some of them didn't know what they were doing, and maybe that's my teaching. If my subject knowledge... I think was more secure...? But then again it's how you teach it maybe, as well that's probably the issue.

As he realises that he has just contradicted his own very black and white view of *subject knowledge* and perhaps how you teach the subject matter might be part of it, rather than exploring this idea, he recovers his original narrative of self-assured confidence.

Erm...but I think, I mean, if my subject knowledge had been better, I would have been more confident in how to approach it and stuff. But then obviously I was able then after that, because you adapt your plan and you change and try something else and they did get it in the end.

It seems to be of central importance to Jason's self-image as a teacher that he is perceived positively by the children and his school-based mentors, perhaps in relation to his desire to achieve and sustain role model status in the school context. This self-reassurance strategy emerges again in relation to his thoughts about *subject knowledge* in the context of beginning his first teaching job, secured in the school where he completed his final teaching placement in the same Year 5 class (**future perspective**). For a moment, his assured approach to learning in advance the facts relating to the topics that he has to teach his class, and not thinking beyond that, appears to become unstuck.

But being school-specific, obviously if I'm in school all the time, say in a year 5 class, you won't get to know everything you have to teach.

He begins to see the limitations of his future knowledge in relation to his understanding of teaching the primary age phase as a whole, but, once again, resumes his confident composure.

It might sound a bit big-headed, but I'm quite confident in the subject knowledge at the minute, probably some subjects, the same as everybody, more than others.

2. Olivia: Concept/skill builder beyond the classroom and curriculum

Subject knowledge as a critically differentiated concept

Age 22

Highest Qualification in English: A-level Grade B

Highest Qualification in mathematics: GCSE Grade A

Highest Qualification in science: GCSE Physics Grade A; GCSE Chemistry Grade A; GCSE Biology Grade A; Biology AS-level Grade C

A-levels: Psychology Grade A; English Grade B; Performance Studies Grade B

No career prior to teaching

Olivia recalls saying the typical things at interview about ‘wanting to make a difference’ and ‘giving children opportunities’ to be accepted onto the undergraduate primary education course. In reality, her initial motivation for becoming a primary teacher was simply thinking, ‘that would be a lovely job.’ She realised quickly that ‘it’s not all as easy as you think.’ She now sees primary teaching as a real challenge and her **job motivation** is to be able to give children the skills for lifelong learning. At times she has grappled with this challenge:

It’s funny actually, I swapped between thinking, “Yes, the challenge!” to, “No, no, it’s too hard!” [...] It’s almost like something I want to, not conquer, but I want to be able to be a successful teacher. [...] I think it’s changed to giving them the skills for lifelong learning. That’s why I want to be a teacher, not just because I like being with children. I think I can do it.

This growing understanding is reflected in Olivia’s **task perception** of primary teaching which demonstrates a mature and contextualised viewpoint.

*I think you have got to be very aware of [...] individual needs, background, culture, religion, language. [...] You’ve got to be aware of current educational thinking and in terms of what the government want as well, because although it’s horrible, it is Ofsted, Ofsted, Ofsted! [...] You have to know how to teach and you have to know the curriculum and what the children should be learning [...], and also what **you** think the children should learn as well, I suppose. That’s important.*

Her ideas about primary teaching reflect subtle and complex interactions involved in balancing the challenges of personalising children's learning according to their needs and negotiating the cultural and political landscape of education. Whilst citing the Ofsted agenda as 'horrible', she appears to accept that this is part of the job and is already showing how she navigates her way through this landscape, and mediates between competing priorities (**personal commitment**). She goes on to explain the influence of her personal philosophy further:

*There are certain skills which I think children need [...] just skills of being able to interact with other people and being able to be self-sufficient and confident. I suppose you'd call it the hidden curriculum [...], those sorts of skills as well as the actual English and maths. I always think as well, an expert teacher, they know how to teach in a way to motivate children, but they also know when things need discrete teaching, like skills for life. Not only to just teach them like, say the early reading, but then how to apply those in more meaningful contexts which encourage children to **want** to read and **want** to utilise maths knowledge.*

This depth of analysis extends to Olivia's **subjective educational theory** of *subject knowledge* for primary teaching. She includes aspects of all knowledge bases for teaching in her pictorial representation of *subject knowledge* (Figure 6) and accompanying narrative, but these are applied in a critically distinct fashion, demonstrating comprehensive understanding and articulation that perhaps belie her age and experience. Her conceptualisation of *subject knowledge* is multi-faceted, complex and integrative, aligned with a contextualist perspective. She places emphasis on understanding and organisation of concepts in relation to substantive elements of content knowledge. She identifies these concepts as being linked to the National Curriculum, but not limited to it, and demonstrates an understanding of the role of lateral and vertical knowledge of the curriculum to support teaching for progression, alongside this content knowledge. Aspects of pedagogical content knowledge feature more frequently and significantly in Olivia's narrative than for any other participant, including school mentors and university tutors. She notes the importance of understanding children's conceptions and pre-conceptions, and then how to identify and address misconceptions through application of subject-specific knowledge and pedagogies in combination.

*You need to be aware of children's...I suppose ways of thinking and then you need to be aware of misconceptions that can arise, and also how concepts link together, because without that, you never really extending their learning. [...] So I think you need also to be very aware of not just having the concepts but being able to address how the children might interpret those concepts initially [...] and, although **you** know a concept, if you're not aware of what ideas the children might already hold about that concept, then you won't ever be able to address their underlying issues and develop their learning.*

Olivia illustrates how her thinking about *subject knowledge* has been influenced with an example from an early school placement, when she was teaching a Year 3 mathematics lesson about reading analogue clocks, and encountered a child with a particular misconception for the first time.

She said, "Oh it's two minutes past twelve," and I said, "Well no, it's not two minutes past twelve. Why?" And I was able to recognise she had a misconception, that she thought the minute hand was pointing to the two, therefore it was two minutes past, and I had to take it back and I had to say, "Well, actually if the hour hand is pointing there, then it's two, but how many minutes is it?" And I had to link it in with her knowledge of the five times table a little bit, because you can say, okay well, one is five minutes past, two is ten minutes past and I did it like that...but if I hadn't known, if I hadn't had the subject knowledge and the understanding of what she thought then, and been able to interpret it, I would never have been able to correct that misconception that she had. [...] So I think you need also to be very aware of not just having the concepts, but being able to address how the children might interpret those concepts initially.

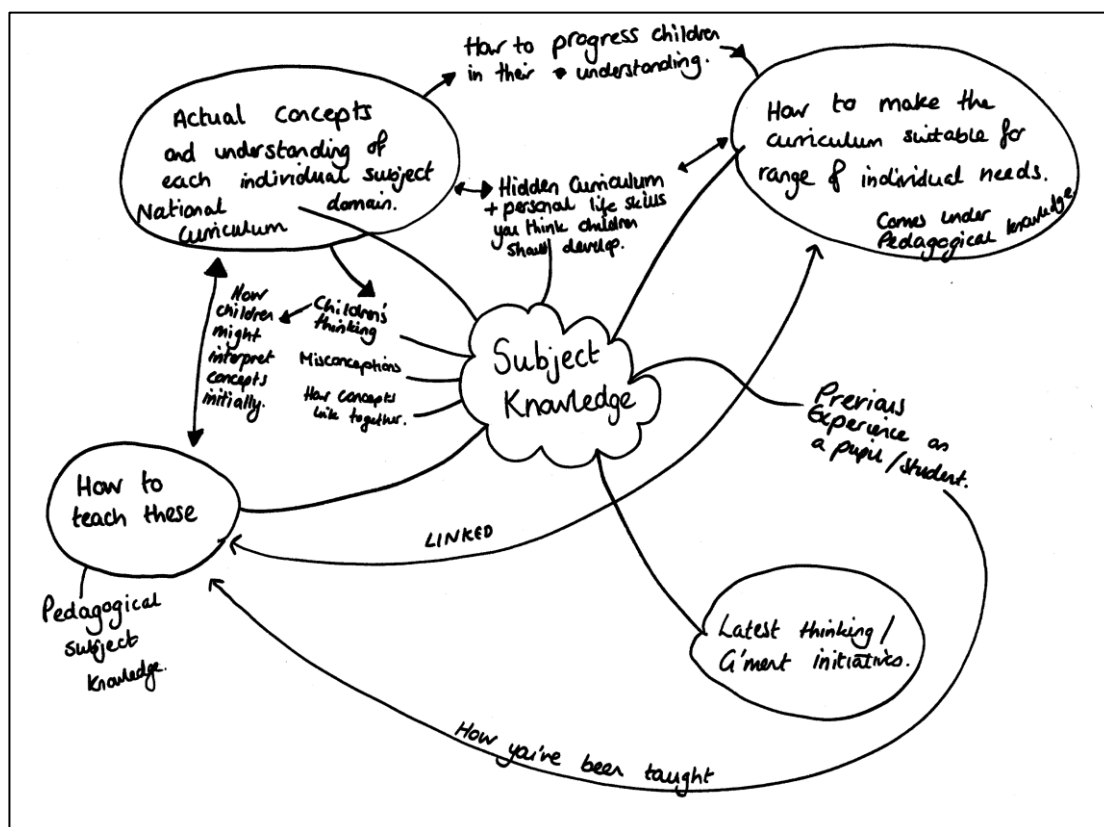


Figure 6 Olivia's visual representation of her thinking about *subject knowledge*

Olivia explains how, for her, *subject knowledge* also draws on general pedagogical knowledge in relation to generic teaching methods and knowing how to personalising learning, when applied to a subject-specific context. She identifies the influence of context on *subject knowledge* and recognises how the workings of different classrooms, different perspectives on the purposes and values of education and the accountability agenda, all impact on the prevailing ethos in relation to *subject knowledge in situ*.

Multiple elements of her initial teacher training have influenced Olivia's thinking about *subject knowledge* and she readily acknowledges the key role of the university, combined with her own approaches to planning and teaching, in leading her to the point where she finds she cannot separate content from pedagogy. The inclusion of her prior experiences as a learner as a component of *subject knowledge*, arose directly due to a reflective university assignment that followed an enrichment placement in school linked to a specific module. She explains what happened when her group of second-year student teachers had planned to teach a cross-curricular design and technology/science topic in school. They had decided

to make the children complete a design sheet prior to engaging with any making, and it did not work particularly well for those children.

I wanted them to do the design sheet. When I look back I think, why? And I think whenever I was in design and technology [referring to being a pupil herself in school], we always did, this is what you're going to make, design it and then you'll make it. And that was what I did with everything. That was my experience of the subject. I didn't really think [...] it just seemed like the right thing to do. [...] The children hated it.

She recalled abandoning the idea and responding more intuitively to the children's learning needs at that point in time, but is still reflecting on the experience two years later.

Maybe it's because I didn't have enough experience of primary teaching of design and technology. [...] There again, it could have been because I didn't have enough understanding of the actual concepts that I wanted the child to develop, which...(laughs) it's funny saying that, because the actual concepts I wanted her to develop were science skills, science knowledge and understanding of forces of push and pull, and by getting her to do the design sheet, really didn't even...now I'm thinking about it...it didn't even link so perhaps....my subject knowledge just wasn't good enough in that sort of situation.

This exemplifies Olivia's critically reflective approach to her continuing development as a teacher. She is a high-achieving, diligent student teacher who is confident and articulate with an out-going personality. She has clear views and beliefs that she expresses without hesitation through logical and reasoned thought processes, based on evidence. Despite the fact that her subject-specific knowledge has never been identified as an issue of any kind on school placements, she says that she feels unsure of her own ability in some areas (**self-image and self-esteem**).

Sometimes being with the older years, because I've never really had a long placement there where I've done a lot of teaching, I sometimes do feel like before I went to teach them a concept, I would have to really just make sure I always, really, really knew it. Say for example, I know I have never liked division or multiplication.

It's always been something that I've just, going back to my previous experience as a pupil, I couldn't do it. I just couldn't! It's something I've had to learn at a later stage and so I've always been a bit wary of my own ability there, so that might impinge on my teaching.

Glimpses of anxieties are also evident in relation to the teaching jobs she feels able to apply for (**future perspective**). Through her recount of a recent pre-application visit to a particularly high-achieving school in an affluent village in the suburbs, it is apparent that she felt too apprehensive about teaching more able Year 6 children and the pressure to perform well in this context, to follow through with an application.

At this point in time, if I'm completely honest...[...] it was for a Year 6 class and the moment he said that [referring to the Headteacher], I was like, "Uh oh!". I just thought no. [...]As he was showing me round he said, "This is our Year 6 class and [...] this year we're on track for 100% level 4s and 70% level 5s." And I was just like, "I can't do that." [...] I'm thinking to myself, well, actually, I don't feel I have the pedagogical knowledge, pedagogical subject knowledge or the actual knowledge of how to progress those children, to get them to their Level 5s.

It would appear that her depth of understanding and analysis of the purpose and process of teaching, and the conception of *subject knowledge* she believes is required to do that well, might also be her **vulnerability**. Her purpose as a teacher is to enable deep learning and to make a lasting impact on building children's conceptual understanding. She is unsure at this point of her efficacy as a teacher to enable children to make sufficient progress to meet the public demands of the educational system that she seems to understand so well.

I just don't feel in my first year I could... I've had enough experience, enough experience of teaching and experience... in the actual techniques and...the knowledge and understanding to teach that Year 6 class and get them to achieve success.

Olivia is aware of what she does not yet know enough about. Because she has not taught Year 6 for an extended period of time, it remains an unknown for her. She does not yet have the evidence for herself that she can succeed in this context, but remains resolutely

logical and self-aware in her thinking about the future. In response to this feeling, Olivia is volunteering in a school with a Year 6 class working on focused preparation for end of Key Stage Two Standard Assessment Tasks (SATs) (**personal commitment**) and is gaining the reassurance that she needs in order to validate her own acceptance that, in her own words, “I’m okay.”

Olivia is concerned that she does not yet have the knowledge and understanding to ‘achieve success’ with a high-performing Year 6 class. Her interpretations of ‘success’ are bound to incorporate her own view of teaching. She views this as enabling children’s deep, lifelong learning, via a complex repertoire of pedagogical knowledge and understanding. However, this is already mediated by her critical awareness of the accountability culture of the outcomes-led school system. This awareness leaves her unsure of her personal efficacy. In contrast, Jason’s emphasis on creating an image of professional competence that is underpinned, in reality, by highly superficial pedagogical knowledge and understanding, causes him no such concerns. He has secured employment on the basis of his practice in his placement school, and presents a confident exterior. What is clear within their overarching narratives, however, is that Olivia, actually, is already developing much greater agency in her decision-making and autonomy as a teacher that is likely to support her longevity in the profession. Jason, on the other hand, relies on Googling facts on a topic-by-topic basis in his bid to be a ‘really good teacher’. His reluctance to examine his potential weaknesses or to open himself up to scrutiny through collaboration might hinder his long-term development.

3. Ruth: Child-centred pragmatist

Subject knowledge as generic topic teaching

Age 22

*Highest Qualification in English: AS-level English Language and Literature
Grade C*

Highest Qualification in mathematics: GCSE Grade C

Highest Qualification in science: GCSE double award Grade CC

A-levels: Psychology Grade B; French Grade B; History Grade B

No career prior to teaching

Ruth has never wanted to be anything other than a primary teacher and describes it as an 'instinctive choice' that began through role-play at a very young age and continued through doing work experience in primary schools later in secondary school and applying to university for the undergraduate degree course in primary education. Her initial **job motivation** was just 'to be involved in the education of young children' but explains that this has now become more specific to wanting to 'see the children making progress.'

It's the same underlying theme but when you actually do it, you realise it's actually very different to playing the game and marking the register that you used to do when you used to play (laughs).

For Ruth, the most important aspect of her teaching role is having a good relationship with the children (**task perception**). Her reasons for this belief link back to negative memories of her own secondary school teachers.

I think that primary school teachers need to know the individual child. When you explain to family and friends they don't seem to understand that we don't just teach, you have to understand the whole child and what comes as part of the child in order to teach them, whereas my experience of secondary school teachers and from observing them, they don't really even know your name. [...] They don't really respond to you. [...] You get your report through and you think, "Well, that's not me!"

She also perceives that the role entails being able to 'effectively deliver something' and to 'test the knowledge you have 'given' to the children' via end of topic tests. She includes reference to the importance of multi-tasking and time management by being able to 'juggle all the plates at the same time.' Her perspective appears to juxtaposition child-centred learning against pragmatic compliance.

Ruth's **subjective educational theory** of *subject knowledge* for primary teaching is simple and uncomplicated. She is sure of her thoughts and demonstrates no hesitation in expressing them. Knowledge bases that are firmly represented in her pictorial representation and narrative are content knowledge and general pedagogical knowledge. Both are treated superficially. In relation to content knowledge, Ruth limits this to understanding the topic you are teaching with reference to factual information. She views the topic as something new to be learnt each time she teaches. Of greater significance for

Ruth is how you teach the topic via application of generic teaching methods. She highlights this importance on her diagram of *subject knowledge* (Figure 7). She makes no reference to curriculum or individual subjects. She talks in terms of generic 'topics'. There is no mention of anything relating to pedagogical content knowledge. She makes passing reference to accountability in schools via testing but does not expand on this.

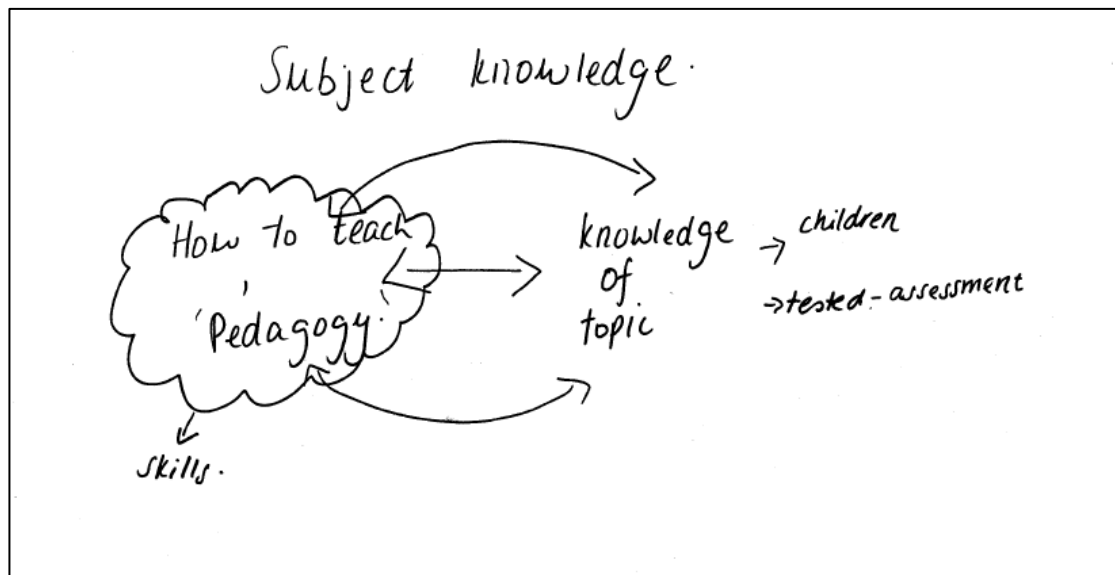


Figure 7 Ruth's visual representation of her thinking about *subject knowledge*

Ruth's thinking does not align clearly with one theoretical perspective. Her narrative about the importance of the 'whole child', general pedagogy and the context-bound practices of schools, suggest empathy with a subjectivist viewpoint. In contrast, when discussing the process of planning and teaching, she talks in terms of temporary learning of information prior to teaching and 'giving' knowledge to the children to be 'tested', alongside 'feeding them skills', all of which suggest a transmission approach to teaching with an objectivist viewpoint. It seems that Ruth's perspective is fluid, as she shifts between these perspectives in relation to different topics of discussion.

Knowledge of educational contexts is implicit in her narrative, which is dominated by the influence of the reality of school culture and practices on her thinking in relation to *subject knowledge*, and her rejection of some ideas promoted by the university-based training. She reflects on the impact of being given subject knowledge audits at the beginning of the course and how her feelings have changed based on school experience.

The audits...I just had alarm bells going in my head. I've never been an academic person for science and maths and they just scared me. I just thought, "I don't know any of this but I'm expected to go out on placement in a couple of weeks' time and be able to teach this," and I was so panicked that I almost just put it to one side and didn't think about it, and it's only whilst going out onto placement and seeing that you will be okay. You will be able to learn the subject knowledge before you go out, before you teach it in the classroom. I've never gone to a lesson and thought I don't know what I'm doing at all. I just learn it before.

She is candid about subject knowledge audits; she has never used them and sees no point in them. Instead, she uses her teaching experience to highlight 'gaps' in knowledge. She says that she needs a clear purpose to spend time researching to develop her knowledge of topics. This 'purpose' is typically a university assignment or the urgency of having to teach something on school placement. Without these drivers, she sees no point (**personal commitment**).

In terms of the knowledge of the topic, even though I've passed my skills tests, I still don't feel that if you gave me a GCSE science exam tomorrow that I was going to be able to pass it. The same for maths. [...] Literacy I'm a bit more confident. I'm not confident in terms of that, but I'm not unconfident to teach any of those subjects. I've always had positive feedback when teaching any of those subjects. [...] On my last placement I was teaching 'Gases Around Us' and I didn't have a clue but a bit of, you know...Googling, looking on the Internet, planning it, looking at schemes of work and learning it myself, but in terms of my subject knowledge of how to teach it. So I feel that I could effectively deliver a science lesson. I'd know the elements that need to go into it [...] whereas the knowledge of the topic is something I still don't feel very confident about.

She has 'listened more' in some practical sessions in university that have focused on how to teach but is less attentive in others.

I have been in lectures when they've just been like drumming subject knowledge at you or algorithms of how to teach maths and I just switch off in those.

She does not seem to relate any 'gaps' in her knowledge that she says she identifies via her teaching to an inability to perform in the role of a primary teacher.

I mean mental maths is something I just... I can't do it... and even with my Year 5 class when they're doing the questions, I think under that pressure I wouldn't be able to do that but yet I'm still stood in front of them supposedly as their role model being able to do that.

Her reasoning behind this aligns with the thinking and practice of teachers she has worked with on school placements, who, she perceives, are unconcerned with such details. Any feedback that Ruth has received about her teaching has purely been about the delivery of a lesson. She claims that she has never been 'pulled up on subject knowledge' or been given any advice relating to it. Emphasis has been placed on using real-life contexts for teaching and children learning skills, but never *subject knowledge*. Ruth detects no differences between the school contexts in which she has taught on placements. The emphasis has always been on general pedagogy and 'how to get the best results from the children.'

Teachers have admitted to her that they do not know what they are teaching and simply look it up the night before. This has influenced her thinking significantly and assured her that she can do the same.

I've had conversations with experienced teachers who've been teaching for ten years or more, who've said, "Oh I'm teaching sound in science tomorrow. I don't know about that. I've moved to this year group this year. I've never taught that." And they've openly told me that I'm going to have to do my research on this before I teach it but that person doesn't doubt that they're an effective teacher. [...] That's quite in line with the way I think.

The nuances in this example perhaps illustrate the fact that the teacher is unfamiliar with one particular science topic rather than everything they are teaching in general. Ruth does not seem to have made any possible distinction in her blanket interpretation of the teacher's comments. She has taken refuge in the notion that this is the reality of how teachers work. When reflecting on the influence of school-based training on her thinking about *subject knowledge*, she re-states the reassurance it has given her, that her pragmatic approach is correct.

It's confirmed to me that you can't possibly know everything that you're ever going to be able to teach. If anyone could ever do that I think you'd be asking miracles of everybody. You're never going to know that but you're always going to know how to teach and how to develop an effective relationship with the child.

Similarly, she dismisses the expertise that school subject co-ordinators are purported to bring to their roles in supporting staff development.

There's always like a co-ordinator and then they're deemed to be the person who is the 'expert' in the subject knowledge, although I think in reality they tend not to be. They don't seem to be any more knowledgeable than anybody else but they have this title and are deemed to be this expert in this subject area.

Ruth detects a difference between university and school contexts in relation to messages given around *subject knowledge*, with the university staff placing much greater emphasis on it and having higher expectations of trainees. Rather than taking these ideas on board, she remains unshakeable in her belief in her approach to teaching. Instead, she suggests that the university would not be allowed to suggest that this is acceptable but, because she sees it in practice, that is how it is.

Being in school has reinforced that, because I don't think the lecturers are going to say that you know, "Don't worry, you don't need to know it," but in school you can see that for yourself, that that is in practice how it will work. [...] I think that if they [university tutors] were to give their true opinion I think it could be in line with the opinion that I've given.

It is clear that Ruth's **self-image and self-esteem** are very strong. She is particularly confident in her French specialism. She highlights that by being able to speak fluently to children on her recent Year 5 placement, they really improved because it increased their exposure to the language.

Because I'm more confident with it, it enhances practice. I feel I can model things effectively to the children.

This insight seems to contradict her comments about teaching other subjects with limited and superficial understanding and, yet, she does not appear to have drawn any parallels. She expresses no doubts or anxieties about taking on the full-time class teacher role, despite admitting to some major deficiencies in her knowledge and understanding across the curriculum (**future perspective**). She assumes that everyone secretly thinks and acts like she does. This unwavering assumption blinkers her thinking and gives her false reassurance that, ultimately, will not provide a firm basis for her professional decision-making. This is her **vulnerability** as she embarks on her teaching career.

Ruth's subjective educational theory shows some similarity to Jason's. They both have short-term, piecemeal approaches to researching teaching content; for Jason this is facts derived from the curriculum and for Ruth, it is topic-based content. Neither shows Olivia's deeper understanding of the complexities of pedagogical content knowledge, nor her apprehension. One of the key distinctions between Jason and Ruth is in how he has created and sustained a persona of professional competence in the school context. Even when he occasionally 'leaks' his awareness of his potential shortcomings, he draws a veil over them. In contrast, Ruth has no such awareness and is resolute in her subjective education theory which, she believes, is representative of primary teachers in general.

4. Helen: Dedicated critically reflective practitioner

***Subject knowledge* as a complex theoretical concept given personal meaning through practical applications**

Age 22

Highest Qualification in English: GCSE Grade A

Highest Qualification in mathematics: GCSE Grade B

Highest Qualification in science: GCSE Double Award Grade AB

A-levels: Psychology Grade B; Philosophy Grade C; Geography Grade C

No career prior to teaching

Inspirational Key Stage Two teachers were the role models who shaped Helen's chosen career path. As a Year 6 pupil, she enjoyed experiences of helping pupils in younger year groups and the satisfaction she gained through this, combined with her admiration of her own teachers, provided the motivation for her to become a primary teacher. As Helen explains, "Everything I chose to do after that sort of led to being here." She comments that it was 'her first real decision' in life. She still aspires to emulate those good teachers who made such an impression on her at a young age and is relieved that she still wants to do the job, in spite of the workload demands that she now appreciates more fully through her school placement experiences compared to when she signed up for the course (**task perception**).

I feel like it's not the sort of thing that you'd do if you didn't love it. After the first placement I understood what it would be like, but I think as long as you don't procrastinate with it and just do a bit every night, that's much easier. In fourth year that's what I did, but in first and second year I'd do it all at the weekend and use all my weekend doing stuff that I could have done at school, so I think it's just getting the balance right.

She fully intends to continue with these habits when she returns to her hometown to take up her first teaching post. She is eager to get started and, whilst she acknowledges that the responsibility is 'a bit scary', she exudes tangible excitement in her anticipation of having her own class (**future perspective**).

Helen aims to be the kind of teacher who she responded well to as a child herself:

'somebody who really understands and likes children [...] and treats them fairly as well.'

Her **job motivation** remains rooted in the feelings that her favourite teacher engendered.

I don't even remember the sort of lessons she taught, I just knew whatever lesson she taught, I wanted to do it whether it was maths or geography or art. It wasn't just the fun lessons I wanted to do, I wanted to do everything just to make her happy (laughs). I think if you can get that feeling then you're an expert. [...] I think if you can get the children on side, everything else comes a lot easier.

Knowing how to teach the curriculum in a 'fun, engaging way' is of central importance to her personal philosophy of teaching (**task perception**). Ideas presented through the university-based training have influenced Helen's approach significantly. She appreciates the expertise that tutors have shared and cites it as helping her in 'understanding where you are in the grand scheme of things and what you believe is the best way to teach.' The support from university has given her confidence to try out different approaches on school placement where sometimes 'it feels like we're out there all on our own.' In particular, assignments and the associated reading for them have challenged her thinking and helped her to make links between theory and practice. Helen gives an example of the impact.

I think it's all interlinked because after doing an assignment...say the RE one, before I did that I had almost no comprehension of enquiry in RE. I didn't even know that you could do an enquiry in RE and then it completely opened my eyes and I thought, "Wow! Why wasn't I doing this in RE last year?" [...] I didn't know how creative you could be with it [...] and the questions you could ask as well.

Self-belief and resilience have also developed positively as a result of the training and development she has experienced. For her final school placement, Helen was faced with the challenge of teaching a Year 5 class, having taught a mixed Foundation Stage/Key Stage 1 class for her previous school placement. However, she noticed a significant difference in her feelings about tackling this 'jump' in age group.

When I think back to first year and how overwhelming it was and how amateur I felt when I walked in compared to fourth year, where I've had all the support. I walked in and, because I went from Reception to Year 5, I thought, "This is going to be different but I've done it before. I can do it." (Self-esteem and self-image)

Helen's **subjective educational theory** of *subject knowledge* for primary teaching centres on her self-assessment of the extent of her knowledge and differing personal attitudes towards curriculum subjects, drawn from her own education and experiences of planning lessons. Having a passion or interest in a subject helps her to 'hold information' and means she does not have to 'stop to look things up.' Her conception of *subject knowledge* incorporates the knowledge bases of content knowledge, expressed in terms of level of personal knowledge and skills; curriculum knowledge as understanding the content of the curriculum; and pedagogical content knowledge illustrated via examples of subject-specific pedagogies. She links these to general pedagogical knowledge via planning for teaching. The relative ease, with which she is able to plan sequences of lessons for a particular subject, is used as her gauge of her individual *subject knowledge* in that domain.

Well, let's take science for example. I feel like I've got good subject knowledge in science because I was good at it at school and if I'm teaching a unit, I can look quickly at the guidance and think of lots of things that come along with it that I can teach and different lesson ideas, learning outcomes and things like that and then probably... opposite there are things like maybe English. I feel that my subject knowledge, because it's so much of a broader subject, it's weaker. It takes me a bit more time to formulate ideas and learning outcomes especially, that are going to benefit the children so I'm not sure it's necessarily being really good at a subject but being really good at being able to plan for teaching. I think that's the difference between subject knowledge if you're doing your GCSE, or subject knowledge in the classroom, being able to execute it confidently.

Knowledge of educational contexts is also embedded in her thinking; she demonstrates awareness of different curriculum practices in schools that influence *subject knowledge* as experienced in these settings, with particular reference to the prominence of some subjects and the marginalisation of others. She views *subject knowledge* as an integrated concept with knowledge of content and pedagogy combined, and sees the act of teaching as something that arises out of the *subject knowledge* rather than teaching being part of it. Her viewpoint aligns with a contextualist perspective with *subject knowledge* being located within and between contexts but not bound by them. Her individual knowing appears to dominate her conception but is not objectivist in nature.

To illustrate the transferability of personal *subject knowledge*, she recounts how a placement in a mixed-age class of Reception/Year 1/Year 2 children fast-tracked her understanding and expertise in planning and teaching systematic synthetic phonics across all phases. On a later placement with a Year 5 class, she was able to devise and implement a successful intervention for a child who joined the class significantly below age-related expectations.

Her pictorial representation of *subject knowledge* for primary teaching (Figure 8) details curriculum subjects that are positioned in arrangements that signify specific meanings that are personal to Helen. She places maths and English centrally and bordered by boxes that represent the 'restriction' she associates with these subjects. She associates 'restriction' with being 'difficult to be creative'. Science is grouped alongside maths and English but bordered by 'more of a circle'. Helen explains this is because 'it's still a core subject but for me but there's a lot more flexibility for it to be fun and engaging.' Religious Education is one of Helen's 'top favourites to teach' so has positioned it with the core curriculum subjects. She muses that not everyone would share her perspective.

Maybe if someone else was doing this they would put RE over here because it gets pushed aside a lot, but because I like it so much I try and...not push it aside.

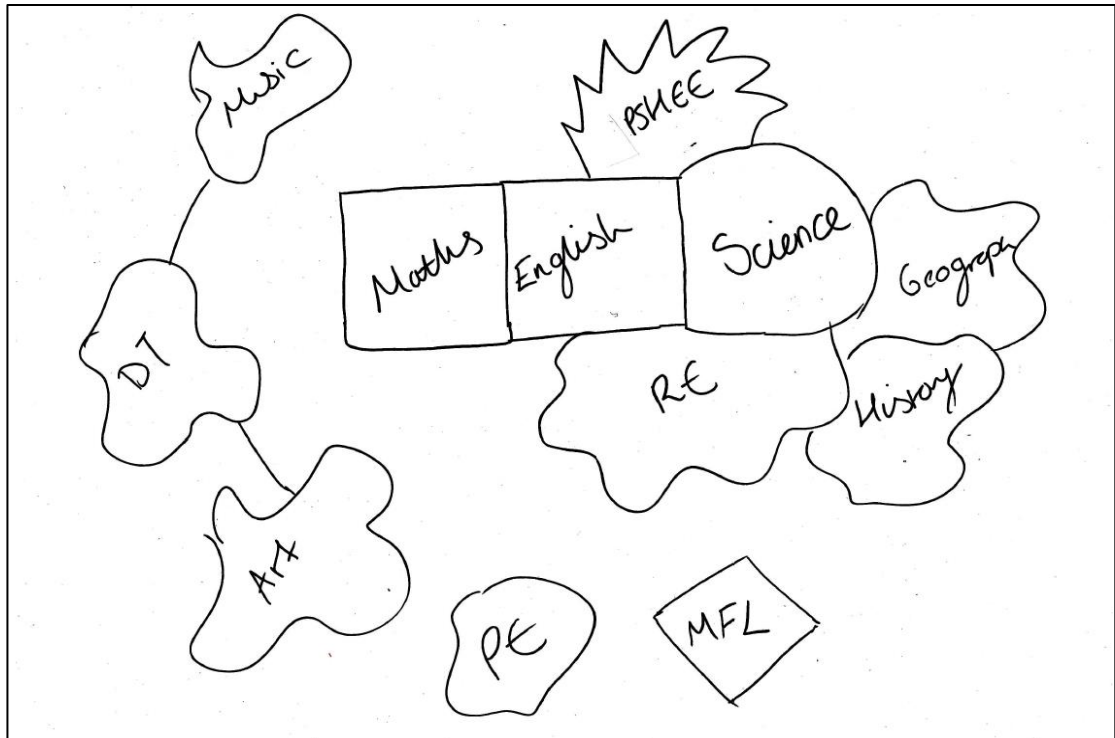


Figure 8 Helen's visual representation of her thinking about *subject knowledge*

Other subjects that Helen enjoys teaching are grouped centrally too; she cites geography and history as being 'important' and having 'flexibility' in the teaching approaches you can experiment with. PSHEE (Personal, Social, Health and Economic Education) is given a prominent position and framed with a noticeably distinct outline.

PSHEE, I've put over here, but I put it spiky because I think sometimes this has a tendency to get lost or not have the impact it could have, so that's more of a like 'notice me'. I really like teaching PSHEE but I feel it gets pushed aside as well in favour of these [indicating the core subjects].

Art, Design and Technology (DT) and Music are housed in 'wobbly shapes' because Helen sees them as being 'open to interpretation'. She positions them to one side because 'they also quite often are just one-off days or one afternoon every couple of weeks.'

I think it's a hard thing to pin down subject knowledge in these, because it's about your design and your ideas so you can't really teach someone their ideas. You have to give them the tools to create their own ideas. [...] You can tell them who wrote the piece of music, but you can't tell them how to feel about it. In the same way you can't tell them how to feel about art.

Helen positions Physical Education (PE) and Modern Foreign Languages (MFL) in isolated shapes at the bottom of her drawing. This signifies her disconnection from these subjects because of a lack of confidence. She shares that she has never actually taught MFL during school placements due to the subject always being taught by specialist visiting teachers. This has affected her perspective.

Because they've always got a specialist teacher in, I never think it's very...impactful. It always seems quite... (pauses) sort of disconnected. Every lesson, they're not really interlinked. The children don't seem - even though they can retain it - they don't ever use it in any other context except repeating it to another woman [the external teacher]. So even though I think I've got like a bank of ideas that I could use, I haven't had the... because someone comes in and teaches it, they say, "Oh no but we want you to teach geography and not MFL."

Overall, Helen's thinking about *subject knowledge* has changed considerably over the course of her training from an objectivist perspective to a pedagogically orientated viewpoint.

Four years ago I'd have probably said, "Well, it's knowing what's in the national curriculum off by heart and just making sure that you know all the key parts to do with it." [...] I think there's more depth to everything than I thought there was originally, and deeper meanings, especially in RE and historical contexts. I just saw it as the basic, this is what you learn, this is what happened, but I think now it's really getting children to think about it is important and that's probably how it becomes more difficult because it would be easy to just get them to learn a list of facts but actually getting them to engage with it, is the thing.

Where she feels confidence and passion about the subject matter she is teaching and her ability to plan creative lessons from it, she believes that she takes more risks and uses enquiry-based approaches where possible. Her **self-esteem and self-image** are boosted by feeling confident about what she is teaching and how she is teaching it. Conversely, where she lacks this confidence in her personal *subject knowledge* due to limited experiences for development in school, it seems to damage her usually positive self-image as a teacher. Helen's **vulnerability** is that she believes she has no 'credibility' as a teacher in these instances.

In first and second year, they had people in to teach PE and I only got to teach one or two lessons, and in third year actually, so in fourth year after all that time, it was the first sort of time that I actually took PE as a unit and [...] it sounds silly to say it but I didn't feel convincing. I didn't feel like I had conviction in what I was saying because I wasn't 100% sure. It didn't help either that my class teacher was in a job share [...] and we had an NQT as well and she'd take them for PE usually while the class teacher took the geography. They swapped because she was a PE specialist. She had a degree in PE and doing that in front of her, as I've never done it before, I didn't feel like I... was convincing but she thought it was good. I obviously played the part well but that's definitely something where I feel, "God, PE!" and I know a lot of teachers feel that way. [...] You actually have to be good at jumping or... putting your arm in a running position (laughs).

Helen explains further that although the PE specialist teacher who was observing her thought she did well, Helen herself did not feel 'convincing'. This affected her attitude towards the subject.

I don't think it impacts my teaching but it impacts my confidence... and I just didn't look forward to teaching PE. I didn't really enjoy it. It was stressful for me and it's quite a chaotic environment anyway and, even though I kept them all in line and they did what they were supposed to do, I feel much more at ease teaching something like RE.

Helen's **personal commitment** to lifelong learning as a teacher is unquestionable. She participated in a voluntary enrichment placement in Sweden which has provided her with an interesting comparative perspective in relation to curriculum and pedagogy. She takes full personal responsibility for 'continually keeping up with everything' and believes that there is 'always more to learn' especially 'in subjects like ICT which are changing all the time.' She observes that things she knew when she left school are already outdated and comments:

Imagine what it's going to be like when I'm ten years in. I think you have to keep up with whatever's going on.

For this reason, Helen rejects the 'gaps' narrative that she has noticed as a characteristic of the discourse around *subject knowledge* during her training.

You always have to identify your 'gaps' in subject knowledge. Where are your gaps? What are the gaps for this? Especially on the course, it's like... where are the gaps in teaching phonics? Where are your subject knowledge gaps in maths? What do you need to revise? That sort of thing. We're always told to fill the gaps. [...] It's sort of language that goes with the course. I don't think it's a gap because we all went through primary school, didn't we? So if it was a gap, it would be something we were never taught. A gap suggests a complete absence... and I don't think anybody has got a complete absence.

Her critical reflections extend from this to the *subject knowledge* auditing processes that have formed part of her professional development on the course. She questions the validity of grading confidence as part of this system on a scale of 1-4 where 1 represents feeling very confident to teach the particular aspect of a subject under scrutiny.

You could easily justify yourself staying a two for the whole four years because you could just go, "Well, I learnt a bit there and a bit there but nothing to make me outstanding," and then you could opposite to that go, "Well, I must have gone up at least one stage in the four years and, if I haven't, it's going to look like I haven't learnt anything."

She expresses a concern that if you are realistic in your estimation then it might give the impression that you have not made any progress in *subject knowledge* but casts aspersions on this mechanistic way of thinking.

I think it's a bit silly to think that somebody can go from 4 to 1 across one placement [...] just because it's so hard to assess yourself. I don't think it's a very true reflection of how everyone's actually doing.

It is only the narrative that Helen has rejected. She is dedicated to improving her understanding of the subject matter she is teaching and revises thoroughly in areas where she feels 'rusty'. She always links this simultaneously to pedagogy, locating and refining age-appropriate teaching resources alongside her own personal study which aligns with her pedagogically-orientated thinking about *subject knowledge*, judging her proficiency by how readily she can plan her lessons.

Helen's narrative overlaps with some aspects of Olivia's with respect to thinking deeply about *subject knowledge* as a concept and having an equal regard for theoretical and practice-based elements. Helen is equally self-aware but demonstrates a much higher degree of personal reflection in the construction of her subjective educational theory. Whilst Olivia differentiates the components of *subject knowledge* and relates them to her own experiences, Helen's narrative suggests that, for her, *subject knowledge* is much more deeply connected to personal factors. She focuses on how she feels about particular subjects and judges how secure her *subject knowledge* is in relation to how efficiently she can plan. It seems fair to deduce that Helen's overwhelming passion for primary teaching in practice provides the lens through which she interprets ideas about knowledge and pedagogy. Unlike Ruth, this does not involve dismissing theoretical ideas; on the contrary Helen embraces them but makes sense of them through her own teaching experiences.

5. Saskia: Inclusive nurturer

Subject knowledge as understanding of learners' individual needs... and a box to be ticked

Age 22

Highest Qualification in English: A-level Grade A

Highest Qualification in mathematics: GCSE Grade A

Highest Qualification in science: GCSE Grade A

A-levels: English Language Grade A; French Grade A; Music Grade C

No career prior to teaching

I wanted to make a difference to children's lives...specific children, and I wanted to be the person that they would have as a basis all the time.

Saskia describes her original motivation for wanting to become a primary teacher as being firmly embedded on the 'pastoral side of things' but added as an afterthought that she was interested in the 'academic side' as well. Her particular interest was in working with younger children because she believed she would be integral in 'setting their basis for the future'. Over the four years of the course, her **job motivation** has become even more robustly rooted in the pastoral role.

I've worked with a lot of different children. I've worked with SEN children and mainstream and I feel like I'm definitely into the caring side, [...] looking after children and especially ones who've come from difficult family situations and things like that. It's good to be a constant person in their lives.

This philosophy is mirrored in how Saskia perceives the role of the teacher. She prioritises skills of 'knowing how to make the children feel comfortable and create a safe environment for them,' along with establishing a welcoming and approachable style of communication with parents. Her **task perception** suggests that she values children's opportunities for experiential learning.

I think making the children feel like they can make mistakes and it's alright [...] to feel like they can just sort of go for it to be creative and they're not going to be judged. I think that the main thing is really just making sure that the children feel that they can just express themselves and they can learn through their own means to a certain extent as well.

In relation to *subject knowledge* for primary teaching, Saskia's **subjective educational theory** comprises a melange of ideas that seem to have emerged directly in response to her different school placement experiences and how they have related to her personal ethos. She associates *subject knowledge* with the 'academic side' of teaching that she seems relatively detached from, and explains that you need to 'make sure that you've got enough knowledge to provide children with the knowledge they need to progress...challenge themselves further and go on in future years.' Saskia elected to complete her third year school placement in a school for children with special education needs and disabilities (SEND). Her central belief is that 'those children need to learn and they deserve the same rights as everyone else.'

Saskia's conception of *subject knowledge* represented pictorially (Figure 9) and in her accompanying narrative, is dominated by knowledge of learners and their characters, both cognitive and empirical, and personalised learning (general pedagogical knowledge). When she drew her map of *subject knowledge* (Figure 9), she began with 'knowing your children' and 'understanding how they learn.' She justifies this approach in relation to her placement experience in the special school where *subject knowledge* was actually related to 'understanding the needs of the children and the background to that and how to access things like visual impairments and things like physical awareness.'

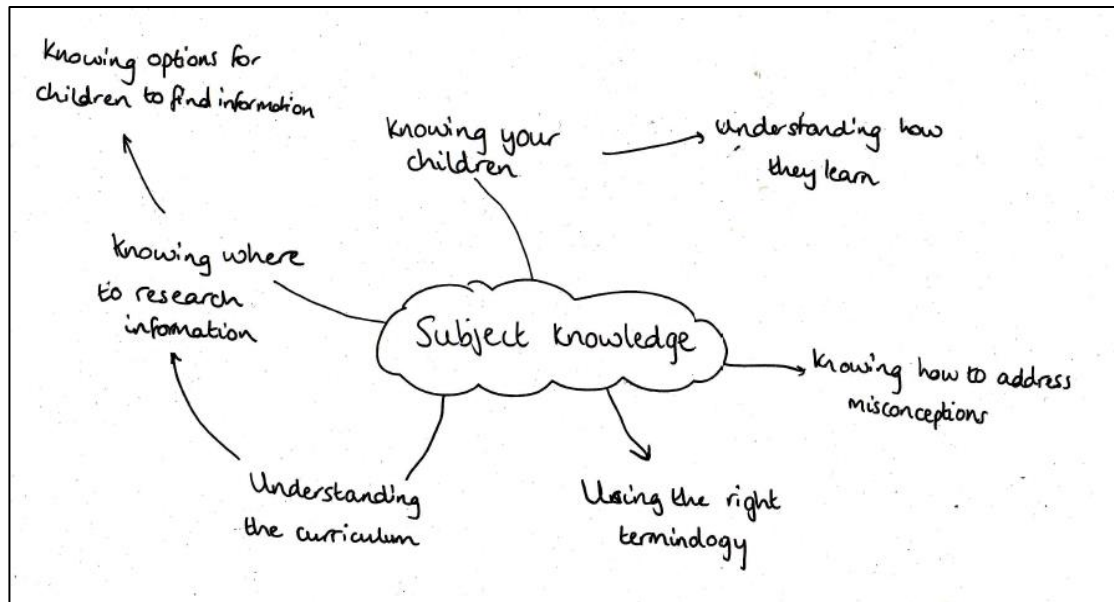


Figure 9 Saskia's visual representation of her thinking about *subject knowledge*

Unlike other student teachers, Saskia makes barely any reference to content knowledge in relation to *subject knowledge* besides generic mentions of what is in the curriculum and using correct terminology. Similarly, she makes the briefest of nods towards pedagogical content knowledge with 'knowing how to address misconceptions.' She does not elaborate further or illustrate with any examples. These elements only seem to make an appearance via her candid analysis of different contexts in relation to practices associated with lesson observations and grading against the Teachers' Standards as part of her initial teacher training. She explains that what she presents on placements in relation to *subject knowledge* in the context of Teachers' Standard 3 varies strategically according to the different conceptions held by school mentors, in order to match their ideas.

I think after the first couple of observations, you work out what they're looking for and focus on that (laughs) because that's what you want to do. You want to pass. So what you know they're looking for, you are going to cater what you were doing to that. [...] I've adapted to suit different mentors [...] like some are looking for you to say the right terminology, some are looking at you to answer children's questions in a certain way, some are looking for how you understand the children's needs so...everyone's different [...] I think when you're on placement you just want to get the grades and you just try and work out what the mentor wants.

In summarising the pattern she has experienced regarding school mentors' views of *subject knowledge*, she explains the development she has perceived over time. In her first couple of years, mentors focused on terminology and knowing the information you were teaching, whereas in the last couple of years, the focus switched to understanding children's needs and being able to personalise learning. Her subjective educational theory of *subject knowledge* is an amalgam of what she believes personally about inclusion, what she has come to understand are the rules of the game in relation to the hoops she needs to jump through in order to pass school placements, and how she tackles this in practice. Her overall viewpoint aligns with a contextualist perspective.

Saskia is noticeably self-assured when she talks with pride about her experiences of working with children with profound and multiple learning difficulties and the understanding that she developed from this placement (**self-image and self-esteem**). She considers this to be *subject knowledge*.

I had to know how to make it accessible to the children and things like multisensory learning and objects of reference and that sort of thing. So it was still subject knowledge I think, but it wasn't academic, it was more allowing the children to access information.

It is her fundamental belief that 'everyone should have to spend at least some time' in this type of setting.

When I say I've done that, people say, "Oh I wouldn't want to do that." It's like... well inclusion means that those children should really be in mainstream schools. I don't know if I agree with that or not but that's the way it's going so you can't just hide from it.

However, she raises the issues that she experienced on her final placement in a mainstream school that she thinks were partly caused by the 'year out of mainstream teaching.' Early in this final placement, it was flagged up to Saskia by her school mentor that she might not have the potential to achieve a grade of 'good' against all the Teachers' Standards by the end of the twelve-week placement. This judgement knocked Saskia's confidence and self-belief as a teacher, but not in relation to *subject knowledge*.

I think I've got areas where it's better and areas where I'd need more information. Obviously you teach a lot of maths and English so I feel like my subject knowledge is probably best in those areas and I did English as an A-level as well, so that's given

me quite a good basis and sometimes I'll know more than the other teachers already in the school, which is surprising. And I also did music and French so I feel like my subject knowledge with them is good and I'm a French specialist so that's probably my area that I would know most about.

Saskia recalls that she experienced some issues with teaching mathematics early in the course on her second year placement. She describes her weakness as 'maths...generally!'

My second year placement, I did a block on chunking [a technique for division of large numbers] and obviously I'd never heard of chunking before. I don't know... we just didn't do that in my primary school and I was like, "What is that?" So I had to go away and like look at loads of things on it and I used a PowerPoint to teach it in the end. I knew I could do it but explaining it to the children, I didn't want to get confused so it went, alright, but it took me a couple of lessons to get my head around it because it was completely alien.

She adds quickly that it did not impact on the children, but 'it would have been better if I'd understood it more.' This experience made her feel overwhelmed because she just could not think in the necessary way for it to become a fluent process for her. When similar issues emerged during her final year placement, she felt more resilient to deal with them because her attitude to teaching had changed by that point. She is no longer concerned about understanding *subject knowledge* in that sense.

As long as I know that it is coming up and I wasn't sort of thrown into the situation, because it would be different if I was on supply or something, but yeah, if I knew it was long-term in the plan, I would just make sure I knew what was going on.

She says she had learnt to 'tick the right boxes' in relation to the mentor's ideas of *subject knowledge* for this final placement to enable her to resolve the mentor's initial concerns and to finish the placement with a grade of 'good' overall. This experience has increased Saskia's cynicism about teaching in mainstream classrooms and the artificial dialogue around quality of teaching and learning that she has observed. In reality, despite completing the course successfully, Saskia feels that she is not impacting on children's lives in the way she intended when she decided to enter the profession (**vulnerability**). There is dissonance between her task perception and the reality of the role of primary teacher in a mainstream classroom and she has struggled to meet the performance demands in this

context, whilst experiencing none of the satisfaction she gained from working with children with SEND.

Saskia still demonstrates a steadfast **personal commitment** to supporting and nurturing children's well-being in a pastoral role. She does, however, display cynical disengagement from some aspects of formal teaching in mainstream primary schools. This has been influenced significantly by practices associated with being graded against the Teachers' Standards on what she perceives to be 'shifting sands.' Temporarily, she has acted as she needed to in order to pass the course, but will ultimately pursue an avenue that will enable her to fulfil her commitment to caring for children's welfare (**future perspective**). Saskia has not been applying for teaching jobs; she is reticent in light of experiences on her final school placement. She intends to be selective about any post she might apply for, and would prefer to work in a special school setting or specialist unit within a mainstream school. She reveals finally that she might teach for a couple of years, but her longer-term ambition now is to become a foster carer. Teaching does not fulfil her motivation in the way she thought it would.

Saskia's practical approach to researching *subject knowledge* prior to teaching is similar to Jason's and Ruth's, but Saskia's narrative is unique in the sample of participants. By her own admission, she has taken a highly strategic approach to gaining qualified teacher status, but her strong personal beliefs and values outweigh all else. These differ from those of the other individuals presented in the pen portraits, because she has been unable to reconcile the mismatch between her motivation for becoming a teacher and the reality of her experiences in mainstream schools. Working in a specialist SEND setting is the closest approximation. It is likely that she will not be retained in the profession long-term, but this is due to dissatisfaction with the culture and practice in primary schools rather than a failing of the ITT provider to 'train' her adequately, as Ofsted's judgments based on retention figures in inspections of ITT, might otherwise suggest.

Conclusion

The five student teachers' pen portraits demonstrate different orientations towards *subject knowledge* and its positioning within their emerging professional practices. Kelchtermans's (2009) interpretative framework has proved to be a useful heuristic in illustrating the interconnected factors affecting individual sense-making. It has highlighted a particularly close connection between job motivation/task perception and perspectives on *subject knowledge*.

4.5 Subject knowledge in mediating documentation, guidance and partnership processes

The evidence presented in this section responds to research question 5:

5a) How is subject knowledge represented in:

- i. the professional standards for teachers (Teachers' Standard 3);***
- ii. key documentation and guidance used in ITT to support the assessment of student teachers in practice;***
- iii. feedback provided to student teachers in completed lesson observation paperwork?***

b) How might these specific documents/tools that provide a framework for supporting partnership processes, contribute to conceptions of subject knowledge and associated culture and practice?

Findings are based on the analysis of data from the following sources: *Teachers' Standards* (DfE, 2012); *North West Consortium Trainee Teachers' Standards Assessment Descriptors* (NW Consortium of Universities & Teach First, 2012); *Working with the Teachers' Standards in Initial Teacher Education: Guidance to support assessment for Qualified Teacher Status* (UCET/NASBTT/HEA 2012); written feedback on lesson observations provided to student teachers; semi-structured interviews with school mentors and university tutors.

As established in previous sections, there was wide variation in how *subject knowledge* was conceptualised by individual participants across contexts. This section examines elements of key documentation that were involved in the assessment of the trainee primary teachers' *subject knowledge*. Through deeper exploration of how *subject knowledge* is presented in these mediating frameworks, implied interpretations can be extrapolated and their potential influence identified.

4.5.1 Professional Standards for Teachers

1. Teachers' Standards (DfE, 2012)

In the current Teachers' Standards (DfE, 2012), *subject knowledge* is aligned most directly with the third standard, which comprises an overarching descriptive statement accompanied by a series of bullet-pointed statements which exemplify the scope of the standard.

Teachers' Standard 3

Demonstrate good subject and curriculum knowledge

- *Have a secure knowledge of the relevant subject(s) and curriculum areas, foster and maintain pupils' interest in the subject, and address misunderstandings*
- *Demonstrate a critical understanding of developments in the subject and curriculum areas, and promote the value of scholarship*
- *Demonstrate an understanding of and take responsibility for promoting high standards of literacy, articulacy and the correct use of standard English, whatever the teacher's specialist subject*
- *If teaching early reading, demonstrate a clear understanding of systematic synthetic phonics*
- *If teaching early mathematics, demonstrate a clear understanding of appropriate teaching strategies.*

As this standard is central to practices in initial teacher training relating to the formative and summative assessment of trainees' *subject knowledge*, it warrants closer interrogation through analysis, to explore its meaning and how it might relate to the theoretical framework of knowledge bases for teaching that has been used in the analysis of other forms of data in this research.

The main thrust of the standard is summarised thus:

TS3: Demonstrate good subject and curriculum knowledge.

The 'subject knowledge' and 'curriculum knowledge' components of the standard are relatively ambiguous and left open to interpretation, but the intention in the wording of the statement to link the two, is clear. This association was observed in the definitions of

subject knowledge expressed by the research participants. This took the form of *subject knowledge* being derived from the content of the national curriculum. The accompanying bullet points of the standard provide further illumination of deeper meanings to be conveyed by it.

- ***Have a secure knowledge of the relevant subject(s) and curriculum areas, foster and maintain pupils' interest in the subject, and address misunderstandings.***

Knowledge *of* the subject and curriculum areas connects most obviously to content knowledge of a substantive nature. The use of the adjective 'secure' offers a couple of possible and relevant meanings in the context of a teacher's knowledge of the subject/curriculum area: i) 'fixed or fastened so as not to give way, become loose or be lost' and ii) 'feeling confident and free from fear or anxiety' (Oxford English Dictionary Online). The former might suggest the impression that a teacher gives to their pupils through a range of teaching activities, such as explaining, illustrating, modelling, asking and answering questions. If their knowledge is 'secure', the implication is that it will be able to withstand the challenges of a stimulating, interactive learning environment to support children's growing understanding. The latter might describe the self-image and self-esteem (Kelchtermans 2009) of the teacher who has 'secure' knowledge of the subject. The essence of this notion links strongly to the emotional component of *subject knowledge* expressed by the student teachers in this study in relation to it giving them confidence. The use of the adjective 'secure' might alternatively encourage an interpretation of it being an indication of a measurable level or degree of knowledge of the subject on a continuum.

The requirement of the teacher to 'address misunderstandings' is self-explanatory and directly represents a distinct aspect of pedagogical content knowledge. The inclusion of the phrase 'foster and maintain pupils' interest in the subject' appears straightforward on the surface, but the influences on a teacher's capacity to do this are potentially multiple and complex. The focus is subject-specific so the standard should not relate to a general pedagogy, but instead to a multi-faceted link to content knowledge and pedagogical content knowledge in particular. To 'foster and maintain pupils' interest in the subject' would require good substantive knowledge of the subject matter in terms of a depth of understanding of the concepts being taught and how they are organised in the subject. It could be argued that the teacher's underpinning beliefs about the subject would need to

be positive to provide motivation to enthuse pupils about the area of learning. The teacher's ability to convey the subject matter in a meaningful way for those learners would be paramount in enabling pupils to develop understanding that sustains their interest. Well-developed pedagogical content knowledge is the vehicle for this. The teacher's application of subject-specific knowledge and pedagogies enables them to apply deep representations of the subject matter and to select the most appropriate resources, illustrations and analogies to facilitate this for their learners. The teacher must, therefore, also possess a repertoire of strategies to enable them to recognise understanding of the learners, including their conceptions, pre-conceptions and misconceptions, supported by a similar array of subject-specific strategies to address these through their teaching. Accompanying this process for the teacher would be an explicit understanding of the purpose of teaching the subject matter to be communicated with pupils.

An interesting feature of the wording of this bullet point of the standard is the implied link to syntactic elements of content knowledge. Maintaining an interest in the subject *per se* alludes to learners being able to access critical perspectives within the subject area and understanding how certain propositions have gained credence in the subject community. This would necessitate developing an understanding of the research methods and working practices of the domain. This part of the standard has the potential to indicate much greater depth than simply keeping children interested during a lesson.

All aspects of curriculum knowledge are represented in this part of the standard too, including curriculum content and progression within, and across, age groups (lateral and vertical curriculum knowledge) and understanding how to select the most appropriate resources for teaching through a process of critical evaluation. Operating in parallel for the teacher would be knowledge of learners (cognitive and empirical) to enable them to make pedagogical choices that would best promote learning in the subject for each particular group of pupils. General classroom approaches would be underpinned by the teacher's selection of particular models of teaching to guide their practice, and they would draw on their general pedagogical knowledge to maintain an enabling environment for pupils to maximize their opportunities for learning.

- ***Demonstrate a critical understanding of developments in the subject and curriculum areas, and promote the value of scholarship.***

This aspect of the standard promotes the notion that a valid purpose of education is scholarship (i.e. learning at a high level that is of an intellectual nature) as an end itself. The suggestion seems to be that this should be actively modelled and encouraged by the teacher. The emphasis in the wording of the standard on a 'critical understanding of developments in the subject' suggests that the teacher needs to update their substantive knowledge of a subject/curriculum area via on-going engagement with innovations and research in the subject community, to keep pace with current thinking. A teacher's knowledge of self and their beliefs about a subject will undoubtedly influence their orientation to updating their own understanding. This aspect of the standard has explicit links to syntactic forms of content knowledge with regard to being able to 'demonstrate a critical understanding of developments.' Depth of syntactic knowledge will influence the teacher's ability to deconstruct research processes and evidence via the working practices of the subject domain, to establish which ideas have gained acceptance and why. This goes hand in hand, again, with their pedagogical content knowledge which would enable them to translate developments in the subject in meaningful ways for each particular group of learners, and seamlessly embed these into their teaching, to give their pupils the tools to facilitate their own scholarship. This is entirely interwoven with the previous bullet point of the standard relating to fostering and maintaining interest in the subject.

- ***Demonstrate an understanding of and take responsibility for promoting high standards of literacy, articulacy and the correct use of Standard English, whatever the teacher's specialist subject.***

Central to this part of Teachers' Standard 3 is the teacher's own substantive knowledge of Standard English, modelled via all aspects of their teacher behaviour involving oral and written forms of communication. A link to knowledge of self is a plausible proposition in relation to the teacher's monitoring of the quality of their own reading, speaking and writing in their professional role. Beliefs about the subject matter (i.e. correct application of the English language) are also pivotal in how rigorously a teacher will promote 'high standards' in relation to this. It could be argued that the teacher will need to appreciate the intrinsic value of its pursuit and perhaps, therefore, view the key tenets of literacy,

articulacy and correct use of Standard English as important elements of the ends, purposes and values of education. Pedagogical knowledge required to promote to pupils accurate and effective forms of communication using Standard English, encompasses both subject-specific elements and generic. The former would comprise pedagogical content knowledge of how best to teach particular aspects of reading, writing and oracy, embedded across the teaching of other curriculum areas. It would also draw on general pedagogical knowledge to guide how best to integrate this with other teaching and learning foci, with different groups of learners.

- ***If teaching early reading, demonstrate a clear understanding of systematic synthetic phonics.***

The teacher's understanding of systematic synthetic phonics (SSP) incorporates both substantive and syntactic elements of content knowledge. For example, key substantive components include concepts such as correct articulation of phonemes and grapheme-phoneme correspondence. Syntactic knowledge would include a critical understanding of how and why the teaching of SSP has been adopted as a valid proposition, and embedded in government educational policy above other methods of teaching reading. The teacher should also have an awareness of the debate in the subject community about the strengths and criticisms of the focus on SSP, in conjunction with other aspects of literacy, such as reading for meaning and reading for pleasure. An understanding of the different phases of phonics teaching would align with curriculum knowledge, along with working knowledge of different published schemes and resources widely available to support SSP teaching. 'A clear understanding' of SSP would also be demonstrated through the teacher's pedagogical content knowledge, for example, the teacher understanding and making use of a range of relevant subject-specific teaching strategies made appropriate for the needs of the group of learners (i.e. knowledge of learners – cognitive and empirical). Knowledge of how children's understanding of SSP progresses, coupled with the teacher's capacity to identify and address children's misconceptions, are essential to successful teaching and learning episodes.

- ***If teaching early mathematics, demonstrate a clear understanding of appropriate teaching strategies.***

As for the previous bullet point of the standard, this aspect has a narrow subject-specific focus and can be subjected to a very similar analysis of associated knowledge bases. In the wording of this part of the standard, there is a slight shift in emphasis towards the teacher's understanding of 'strategies' for teaching mathematics, in contrast with early reading, where the teaching strategy of SSP is defined. This denotes pedagogical content knowledge as being of utmost significance, directly linked with substantive and syntactic elements of mathematics content knowledge and well-developed curriculum knowledge (lateral and vertical). Beliefs about the subject and the purpose and values of mathematics education will also be strong influences in the way a teacher approaches this in the classroom. Clearly the teacher will also draw on their knowledge of learners, curriculum knowledge and models of teaching and general pedagogy.

Table 13 shows a summary of the knowledge bases most closely associated with this interpretation of each aspect of Teachers' Standard 3.

Table 13 Knowledge bases implied in the wording of Teachers' Standard 3

<i>TS3: Demonstrate good subject and curriculum knowledge</i>	Knowledge bases for teaching identified from analysis as being key to the standard
Have a secure knowledge of the relevant subject(s) and curriculum areas, foster and maintain pupils' interest in the subject, and address misunderstandings.	Content knowledge: substantive, syntactic, beliefs about subject Pedagogical content knowledge Curriculum knowledge: lateral and vertical Knowledge of learners: cognitive and empirical
Demonstrate a critical understanding of developments in the subject and curriculum areas, and promote the value of scholarship.	Content knowledge: substantive, syntactic, beliefs about subject Pedagogical content knowledge
Demonstrate an understanding of and take responsibility for promoting high standards of literacy, articulacy and the correct use of standard English, whatever the teacher's specialist subject.	Content knowledge: substantive, syntactic, beliefs about subject Pedagogical content knowledge Knowledge of self Knowledge of learners Knowledge of educational ends, purposes and values General pedagogical knowledge
If teaching early reading, demonstrate a clear understanding of systematic synthetic phonics.	Content knowledge: substantive, syntactic, beliefs about subject Pedagogical content knowledge Curriculum knowledge Knowledge of educational ends, purpose and values
If teaching early mathematics, demonstrate a clear understanding of appropriate teaching strategies.	Content knowledge: substantive, syntactic, beliefs about subject Pedagogical content knowledge Curriculum knowledge Knowledge of learners Knowledge of educational ends, purpose and values Knowledge/models of teaching

2. Professional Standards for Teachers: Qualified Teacher Status (TDA, 2007)

It is also worth considering the positioning of *subject knowledge* in the previous version of the Professional Standards for Teachers for Qualified Teacher Status (2007) for comparison. The standards that aligned most closely as being equivalent to Teachers' Standard 3 in the 2012 version were:

Q14: Have a secure knowledge and understanding of their subjects/curriculum areas and related pedagogy to enable them to teach effectively across the age and ability range for which they are trained.

Q15: Know and understand the relevant statutory and non-statutory curricula and frameworks, including those provided through the National Strategies, for their subjects/curriculum areas, and other relevant initiatives applicable to the age and ability range for which they are trained.

Q16: Have passed the professional skills tests in numeracy, literacy and information and communications technology (ICT).

Q17: Know how to use skills in literacy, numeracy and ICT to support their teaching and wider professional activities.

In comparison to Teachers' Standard 3 in the 2012 version, including the illustrative bullet-points, Q14 is relatively generic in its treatment of 'related pedagogy' enabling teachers to 'teach effectively'. The more recent incarnation cites an explicit focus on the content knowledge and pedagogical content knowledge of English and mathematics in particular, thus, in essence, prioritising the quality of teaching in literacy and numeracy above other subjects in the primary curriculum. The same is implied by Q15's directive to know and understand the frameworks provided through the National Strategies alongside other curricula, but is perhaps framed less explicitly. The specific references in the 2012 Teachers' Standards that connect directly to syntactic knowledge (e.g. the focus on scholarship and having a critical understanding of developments in the subject), are absent from the 2007 Professional Standards. This might be interpreted as the 2012 standards raising expectations of primary teachers from being technicians administering the National Strategies, to individual professionals, who draw on their own repertoire of subject-specific knowledge and pedagogies to develop children's understanding in the subject matter. The obvious exception to this philosophical direction of travel is in relation to early reading, which is reminiscent of the National Strategies in dictating both content and pedagogy to primary teachers, reinforced and monitored by the national phonics screening check for Year 1 pupils. In this sense, the current 2012 standards give the impression of greater professional autonomy but, in reality, similar elements of prescription are still present.

Q17 emphasises the use of literacy, numeracy and ICT in relation to wider professional activities rather than in the specific context of classroom practice. Q16 ensures compliance

with passing the skills tests to gain QTS which, again, focus on the use of literacy, numeracy and ICT in the wider workplace. The specific references to English and mathematics in the current standards, in contrast, do place the emphasis on pedagogical activities.

What is clear overall is that, in comparison, Teachers' Standard 3 (2012) undoubtedly places pedagogical content knowledge at the heart of teachers' subject knowledge, however, this is not stated unequivocally in the wording of the standard and its interpretation relies, paradoxically, on the recipient's depth of theoretical understanding of the concept of *subject knowledge* for teaching and its associated complexities at the subject level. The risk is that a superficial understanding of *subject knowledge* will inevitably lead to a shallow interpretation and treatment of the requirements of 'subject and curriculum knowledge' for teachers and this will be applied to the assessment of trainee primary teachers. This highlights why clarity in discourse concerning *subject knowledge* is of such importance in initial teacher education.

The next sections examine documents that have been devised by organisations directly involved in initial teacher training, to support trainees and their assessors in interpreting the Teachers' Standards (2013). They provide exemplification of characteristics demonstrated at different stages of attainment for each of the Teachers' Standards, via assessment descriptors designed to scaffold trainees' development during their initial training and promote consistency in judgements made by school mentors and university tutors when grading trainees.

4.5.2 Teachers' Standards Assessment Descriptors and Guidance Documents

1. North West Consortium Trainee Teachers' Standards Assessment Descriptors (NW Consortium of Universities & Teach First, 2012)

This document was first developed in 2012 by the North West Consortium of Universities and TeachFirst and is used by a number of ITT departments in the North West of England. Some institutions have since updated and modified the document. During the data collection period covered by this research, Institution A was using the original document and Institution B was using a slightly modified version of it. See Appendix 11 for the complete assessment descriptors for Teachers' Standard 3 extracted from these versions of the documents (Institution A: Appendix 11a; Institution B: Appendix 11b).

2. Working with the Teachers' Standards in Initial Teacher Education. Guidance to support assessment for Qualified Teacher Status (UCET/NASBTT/HEA, 2012)

At the same time, an alternative guidance document was produced by the Universities' Council for the Education of Teachers (UCET) and the National Association of School-based Teacher Trainers (NASBTT) in conjunction with the Higher Education Academy (HEA). This, too, set out typical characteristics of trainee teachers achieving at different levels in relation to the standards to support the assessment process. See Appendix 11c for the complete guidance provided for Teachers' Standard 3 in this document. This version of guidance was not used by either of the two institutions involved in this research, although it was considered by Institution A alongside the North West Consortium/TeachFirst document and a decision was taken to use the latter, for the reasons that it was simpler to use and had already been adopted by the TeachFirst programme. The remainder of the ITT programmes in the institution followed suit.

Although the aims of the two guidance documents are identical, the content differs considerably. Because the North West Consortium Assessment Descriptors are used by the trainees, school mentors and university tutors who were participants in this research, and were mentioned recurrently throughout their interviews, it is likely that the document has influenced their thinking about *subject knowledge* and its assessment via Teachers' Standard 3 during trainees' school placements. It is, therefore, pertinent to examine them closely to further illuminate related findings and identify the nature of their probable influence. The alternative assessment guidance provided by the UCET/NASBTT/HEA (2012) document will also be analysed to compare the quality of the tools in deconstructing Teachers' Standard 3 in relation to the theoretical framework of knowledge bases for teaching.

3. Comparative analysis of the assessment guidance documents

The North West Consortium Assessment Descriptors document breaks down Teachers' Standard 3 and treats the bullet-pointed illustrative aspects as explicit sub-standards labelled a) to e) (see Appendices 11a and 11b). The UCET/NASBTT/HEA guidance document does not take this approach and, instead, leaves the standard in its complete form (Appendix 11c). Holistic assessment via 'best fit' of the characteristics of the whole standard is encouraged rather than grading isolated aspects of the standard. For the purposes of analysis of components of the standard, aligned sections will be extracted from

the latter document to facilitate direct comparison with the North West Consortium descriptors (e.g. see Tables 14a and 14b).

At the time of the data collection, Institution A's version of the North West Consortium document applied a grading system of: Inadequate (grade 4); Requires Improvement (grade 3); Good (grade 2); Outstanding (grade 1). This utilises a grading framework similar to that used by Ofsted with the term 'requires improvement' replacing 'satisfactory'. Institution B had a modified grading framework applied to the North West Consortium document that is worded more positively, to indicate a developmental process and avoid the imposition of Ofsted grading language and its connotations. It simply applies the following labels with no numerical grades attached to them: Beginning; Developing; Good; Outstanding. In contrast, the UCET/NASBTT/HEA document describes the minimum requirements to support recommendation for the award of Qualified Teacher Status (QTS) as the first descriptor for the standard. It then builds on what a trainee teacher who exceeds these minimum requirements might additionally demonstrate to justify a 'good' grade for the standard, followed by a higher level of characteristics that would support a grade of 'outstanding'. A summary of these differing structures can be seen as part of Tables 14a and 14b.

Another key difference between the complete documents is their layout. The North West Consortium descriptors are set out as a grid layout with the intention of encouraging the tracking of trainees' progress by highlighting statements as they are achieved. The final published version of the UCET/NASBTT/HEA guidance document is presented in the form of continuous prose. This, again, encourages a holistic treatment of the standard rather than a tick-box approach by those using it.

The characteristics described in the documents for each aspect of Teachers' Standard 3 (*TS3: Demonstrate good subject and curriculum knowledge*) will now be examined more closely.

i) Have a secure knowledge of the relevant subject(s) and curriculum areas, foster and maintain pupils' interest in the subject, and address misunderstandings.

The guidance documents' descriptors for this first bullet-point of the standard are summarised in Tables 14a and 14b for illustrative purposes. The North West Consortium descriptors for this first part of the standard denotes 'appropriate', 'good level', 'highly confident and proficient' level of subject and curriculum knowledge (Institution A) or 'appropriate', 'competent level', 'highly confident and competent level' for Institution B's

version. It repeats the wording of the overall standard, without deconstructing the terms subject and curriculum knowledge, and places them on a sliding scale of attainment to determine the grade. Curriculum knowledge is reduced to the ‘place’ of the subject ‘in the wider curriculum’ for the lower grades. This might be interpreted as reflecting the status of certain subjects especially in relation to the primary curriculum, which is not strictly what the term curriculum knowledge denotes.

Table 14a Have a secure knowledge of the relevant subject(s) and curriculum areas, foster and maintain pupils’ interest in the subject, and address misunderstandings (NW Consortium of Universities & Teach First, 2012)

North West Consortium Trainee Teachers’ Standards Assessment Descriptors (NW Consortium of Universities & Teach First, 2012)				
Institution A’s version				
Standard Prompts	Inadequate (4)	Requires Improvement (3)	Good (2)	Outstanding (1)
a) Have a secure knowledge of the relevant subject(s) and curriculum areas, foster and maintain pupils’ interest in the subject, and address misunderstandings	Requires significant and constant support with subject and curriculum knowledge when planning lessons in order to meet the needs of their pupils. Unable to maintain any pupil interest due to lack of subject knowledge and inability to address misunderstandings .	Appropriate subject knowledge in relation to their specific subject area and its place within the wider curriculum . Can maintain pupils’ interest by delivering effective teaching episodes, supporting learner progression and addressing misunderstandings .	Good level of subject and curriculum knowledge. Is able to foster and maintain increasing pupil interest in subject and curriculum area as well as addressing misunderstandings .	Highly confident and proficient in subject and curriculum knowledge. Is able to foster maintain increasing pupil interest in the subject by teaching engaging teaching episodes/lessons and ensuring progression is made by all learners and addressing misunderstandings .
Institution B’s version				
Standards	Beginning	Developing	Good	Outstanding
a) Have a secure knowledge of the relevant subject(s) and curriculum areas, foster and maintain pupils’ interest in the subject, and address misunderstandings	Developing understanding and use of subject knowledge in relation to their specific subject area and its place in the wider curriculum Demonstrates developing ability to foster and maintain pupil interest in the subject by delivering effective teaching episodes, supporting learner progression and addressing misunderstandings .	Appropriate subject knowledge in relation to their specific subject area and its place within the wider curriculum . Is able to foster and maintain pupil interest in the subject by delivering effective teaching episodes, supporting learner progression and addressing misunderstandings .	Competent level of subject knowledge related to both their specific subject area and to the wider curriculum. Is able to foster and maintain increasing pupil interest in their subject and the wider curriculum as well as addressing misunderstandings .	Highly confident and competent level of subject knowledge related to their specific subject area and the wider curriculum. Is able to foster maintain increasing pupil interest in the subject by delivering engaging teaching episodes, ensuring progression is made by all learners and addressing misunderstandings .

Similarly, the wording of the standard relating to ‘maintain pupils’ interest’ and ‘address misunderstandings’ is repeated in the descriptors. ‘Maintaining interest’ is directly linked to

‘delivering effective/engaging teaching episodes’ and ‘supporting learner progression’ for some, but not all, levels of attainment. ‘Address misunderstandings’ is, once again, repeated in the words of the standard and tagged onto the end of each descriptor with no further distinction. Links between the different aspects of this part of the standard appear to be lost in the descriptors because they separate subject and curriculum knowledge from the impact they might have on pupils’ interest and understanding. The latter, is instead linked to effective or engaging delivery, which orientates interpretation towards general pedagogical knowledge rather than subject-specific knowledge and pedagogy. ‘Address misunderstandings’ is clearly related to pedagogical content knowledge but it is under-emphasised in the context of the generic tone of the descriptors.

The UCET/NASBTT/HEA (2012) document (see Table 14b) also applies categories or levels of knowledge but describes it as ‘sufficiently secure’, ‘well-developed’ or ‘in-depth’ which, perhaps, are clearer in definition than terms such as ‘appropriate’ and ‘competent’ which are more closely dependent on the perspective of the individual teacher.

Table 14b Have a secure knowledge of the relevant subject(s) and curriculum areas, foster and maintain pupils’ interest in the subject, and address misunderstandings (UCET/NASBTT/HEA, 2012)

<i>Working with the Teachers’ Standards in Initial Teacher Education. Guidance to support assessment for Qualified Teacher Status (UCET/NASBTT/HEA, 2012)</i>			
3 Demonstrate good subject and curriculum knowledge	By the end of the programme of ITE, all those trainees recommended for the award of QTS will have demonstrated that:	Those trainees graded as ‘good’ at the end of the programme of ITE may have demonstrated additionally that:	Those trainees graded as ‘outstanding’ at the end of the programme of ITE may have demonstrated additionally that:
-have a secure knowledge of the relevant subject(s) and curriculum areas, foster and maintain pupils’ interest in the subject, and address misunderstandings	They have sufficiently secure knowledge and understanding of the relevant subject / curriculum areas to teach effectively in the age phase for which they are training to teach. They know how learning progresses within and across the subject / curriculum age phases they are training to teach, in terms of the development of key concepts and of learners’ common misconceptions. They are able to respond appropriately to subject specific questions which learners ask and they use subject specific language accurately and consistently in order to help learners develop knowledge, understanding and skills in the subject.	They have well developed knowledge and understanding of the relevant subject / curriculum areas they are training to teach and use this effectively to maintain and develop pupils’ interest. They make good use of their secure curriculum and pedagogical subject knowledge to deepen learners’ knowledge and understanding, addressing common errors and misconceptions effectively in their teaching.	They draw on their in-depth subject and curriculum knowledge to plan confidently for progression and to stimulate and capture pupils’ interest. They demonstrate very well-developed pedagogical subject knowledge, by anticipating common errors and misconceptions in their planning.

In contrast to the North West Consortium descriptors, the UCET/NASBTT/HEA document does attempt to deconstruct subject and curriculum knowledge. For example:

‘They have sufficiently secure knowledge and understanding of the relevant subject/curriculum areas to teach effectively in the age phase for which they are training to teach. They know how learning progresses within and across the subject/curriculum age phases they are training to teach, in terms of the development of key concepts and of learners’ common misconceptions.’

This example draws out the elements of substantive content knowledge and pedagogical content knowledge that would be demonstrated by the trainee teacher understanding the progression of key concepts in the subject (substantive knowledge) and learners’ misconceptions (PCK), in relation to the breadth and depth of the curriculum for the age phases they are training to teach (lateral and vertical curriculum knowledge). The latter also draws on knowledge of learners in relation to their cognitive and social development.

Direct links are created between subject-specific knowledge and pedagogies and stimulating pupils’ interest in the subject, by describing how this might be achieved. Unlike the North West Consortium descriptors, the guidance does not treat this in generic terms. Instead it defines that a trainee teacher might demonstrate this if:

‘They respond appropriately to subject specific questions which learners ask and they use subject specific language accurately and consistently in order to help learners develop knowledge, understanding and skills in the subject.’

At a higher level of attainment:

‘They make good use of their secure curriculum and pedagogical subject knowledge to deepen learners’ knowledge and understanding, addressing common errors and misconceptions effectively in their teaching.’

Substantive content knowledge and pedagogical content knowledge are key emphases in the descriptors. Depending on the nature of learners’ questions and the way in which learners’ understanding is deepened, syntactic knowledge of the subject would be included and knowledge of learners would also be drawn upon.

‘Address misunderstandings’ is similarly deconstructed from a general ability to ‘help learners develop knowledge, understanding and skills in the subject’ to ‘addressing

common errors and misconceptions effectively in their teaching,’ and beyond this level to actually ‘anticipating common errors and misconceptions in their planning.’

The strong subject-specific focus is carried through the whole of each descriptor. The wording leaves no ambiguity that might orientate a user’s interpretation towards general pedagogical knowledge. The theoretical knowledge bases for teaching that are emphasised in the guidance documents are summarised below in Table 15.

Table 15: Analysis of knowledge bases emphasised in assessment descriptors for TS3: first bullet point

Have a secure knowledge of the relevant subject(s) and curriculum areas, foster and maintain pupils’ interest in the subject, and address misunderstandings.	Knowledge bases for teaching emphasised in assessment descriptors	
	North West Consortium Assessment Descriptors	UCET/NASBTT/HEA Guidance
	Subject and curriculum knowledge – not exemplified General pedagogical knowledge Pedagogical content knowledge	Content knowledge: substantive Pedagogical content knowledge Curriculum knowledge: lateral and vertical

ii) Demonstrate a critical understanding of developments in the subject and curriculum areas, and promote the value of scholarship.

Table 16 shows a comparison of the assessment guidance provided in the different documents in relation to this bullet point of the standard. In Institution A’s version of the North West Consortium assessment descriptors ‘critical understanding of developments’ has been replaced with ‘awareness of developments and changes’. The distinction between the grades is made by the level of ‘awareness’ demonstrated. This substitution serves to oversimplify the intellectual content and demand of the standard. ‘Critical understanding’ implies that the individual can demonstrate comprehension of new research evidence supporting changes in thinking within a subject community. ‘Awareness’, on the other hand, alludes to the individual simply possessing some perception of developments. The two are quite different in their depth and complexity. In Institution B’s version, ‘critical understanding’ appears in the criteria for higher grades of attainment for this standard, in addition to the different levels of ‘awareness’. It is not clear from the phraseology of the descriptors which knowledge bases are involved in demonstrating this standard in practice, although curriculum knowledge is perhaps alluded to by the reference to ‘changes in subject and curriculum areas.’

Table 16: Demonstrate a critical understanding of developments in the subject and curriculum areas and promote the value of scholarship

<i>North West Consortium Trainee Teachers' Standards Assessment Descriptors (first developed 2012)</i>				
Institution A's version				
Standard Prompts	Inadequate (4)	Requires Improvement (3)	Good (2)	Outstanding (1)
b) Demonstrate a critical understanding of developments in the subject and curriculum areas, and promote the value of scholarship	Demonstrates no awareness of developments in the subject and curriculum areas. Unable to promote the value of scholarship.	Can demonstrate critical awareness of developments and changes in subject and curriculum areas. Promotes scholarship amongst pupils within subject and curriculum areas.	Demonstrates awareness of developments and changes subject and curriculum areas. Promotes scholarship and further study to all pupils within subject and curriculum areas.	Demonstrates a high level of awareness of developments in both subject and curriculum areas. Promotes high levels of scholarship and the value of further study to all pupils within their subject and curriculum areas.
Institution B's version				
Standards	Beginning	Developing	Good	Outstanding
b) Demonstrate a critical understanding of developments in the subject and curriculum areas, and promote the value of scholarship	Is developing understanding and shows some awareness of developments and changes in the subject and curriculum area.	Demonstrates awareness of developments and changes in the subject and curriculum area. Promotes scholarship and further study within their subject and curriculum area.	Demonstrates good awareness and critical understanding of developments and changes in both the subject and the curriculum area. Promotes scholarship and further study to all pupils within their given subject and curriculum area.	Demonstrates a high level of awareness and critical understanding of developments in both the subject and curriculum area. Promotes high levels of scholarship and the value of further study to all pupils within their subject and curriculum area.
<i>Working with the Teachers' Standards in Initial Teacher Education. Guidance to support assessment for Qualified Teacher Status (UCET/NASBTT/HEA 2012)</i>				
3 Demonstrate good subject and curriculum knowledge	By the end of the programme of ITE, all those trainees recommended for the award of QTS will have demonstrated that:	Those trainees graded as 'good' at the end of the programme of ITE may have demonstrated additionally that:	Those trainees graded as 'outstanding' at the end of the programme of ITE may have demonstrated additionally that:	
- demonstrate a critical understanding of developments in the subject and curriculum areas, and promote the value of scholarship	They recognise the need to extend and update their subject and pedagogical knowledge as a key element of continuing professional development and have shown the ability and readiness to do so.	They are critically aware of the need to extend and update their subject, curriculum and pedagogical knowledge and know how to employ appropriate professional development strategies to further develop these in their early career.	They are astutely aware of their own development needs in terms of extending and updating their subject, curriculum and pedagogical knowledge in their early career and have been proactive in developing these effectively during their training.	

There is a similarly ambiguous treatment given to the promotion of the value of scholarship described in the standard. The term 'scholarship' is simply repeated without further deconstruction or explanation and the difference between levels of attainment can be summarised as whether the trainee teacher does or does not promote scholarship at the lower grades. This is extended to include the promotion of further study to pupils and 'high levels' of scholarship for the higher grades. The focus seems to have been shifted towards the scholarship of the pupils rather than the teacher, thus once again serving to reduce the intellectual demand on the teacher at the subject level. It is not obvious which knowledge bases are indicated by the content but can, perhaps, be best described by the promotion of further study as a valuable goal of education itself (knowledge of educational ends, purpose and values), combined with general pedagogical knowledge to find ways to encourage pupils in this activity. The substantive and syntactic elements of content knowledge combined with pedagogical content knowledge that are implied by the wording of this part of Teachers' Standard 3 are not emphasised at all in the assessment descriptors.

An entirely different interpretation is detectable in the UCET/NASBTT/HEA guidance relating to this part of the standard (see lower part of Table 16). The phrasing emphasises the trainee teacher's self-awareness of the need to 'extend and update their subject, curriculum and pedagogical knowledge' as part of their continuing professional development. The distinction between the different levels of attainment is made by the individual's readiness to do this and proactivity in beginning to address this during their training. The terms 'subject, curriculum and pedagogical knowledge' have been exemplified earlier in the descriptor in relation to the first bullet point of the standard. Emphasis is maintained on the subject-specificity of the standard, and scholarship is firmly directed at the teacher, rather than the pupils. Undoubtedly, pupils' own learning would benefit from this and is inextricably linked to the previous bullet point's content relating to fostering and maintaining pupils' interest in the subject. The descriptors link straightforwardly to content knowledge (substantive, syntactic and underpinned by beliefs about the subject), pedagogical content knowledge and curriculum knowledge. Knowledge of self is central to the idea of the individual's awareness of how, when and why they should update their subject-specific knowledge.

The theoretical knowledge bases for teaching that are emphasised in the guidance documents are summarised in Table 17.

Table 17 Analysis of knowledge bases emphasised in assessment descriptors for TS3: second bullet point

<i>Demonstrate a critical understanding of developments in the subject and curriculum areas, and promote the value of scholarship</i>	Knowledge bases for teaching emphasised in assessment descriptors	
	North West Consortium Assessment Descriptors	UCET/NASBTT/HEA Guidance
	Knowledge of educational ends, purpose and values General pedagogical knowledge	Knowledge of self Content knowledge: substantive, syntactic Pedagogical content knowledge Curriculum knowledge

iii) Demonstrate an understanding of and take responsibility for promoting high standards of literacy, articulacy and the correct use of Standard English, whatever the teacher’s specialist subject.

Table 18 shows a comparison of the assessment guidance provided in the different documents in relation to this bullet point of the standard. A phrase has been inserted into the wording of the assessment descriptors in the North West Consortium document resulting in the requirement of the individual to ‘...demonstrate understanding of **strategies for promoting** high standards in literacy, articulacy and the correct use of standard English,’ rather than the original requirement prescribed by the standard for the teacher to demonstrate an understanding of the stated aspects of literacy and oracy themselves. This insertion redirects the emphasis of the standard away from the teacher’s substantive content knowledge of the English language and their ability to model this accurately in all their activities. Instead, it highlights the general pedagogical knowledge of strategies for promoting high standards of English to pupils. ‘Taking responsibility for promoting high standards’ of English is translated in the descriptors into putting the ‘range of strategies...into practice.’ Again, this serves to reduce the intellectual demands placed on the teacher, in both their own knowledge and usage of the English language and their ability to embed this teaching into all their lessons. ‘Strategies for promoting high standards’ leaves the descriptors open to being interpreted in a more generic sense; the standard is essentially re-orientated towards general pedagogical knowledge.

Table 18 Demonstrate an understanding of and take responsibility for promoting high standards of literacy, articulation and the correct use of Standard English whatever the teachers' specialist subject

<i>North West Consortium Trainee Teachers' Standards Assessment Descriptors (first developed 2012)</i>				
Institution A's version				
Standard Prompts	Inadequate (4)	Requires Improvement (3)	Good (2)	Outstanding (1)
c) Demonstrate an understanding of and take responsibility for promoting high standards of literacy, articulation and the correct use of standard English, whatever the teacher's specialist subject	Has no understanding of strategies for promoting literacy, articulation and the correct use of standard English and hence limited or no ability to put these into practice.	Can demonstrate understanding of strategies for promoting high standards in literacy, articulation and the correct use of standard English.	Demonstrates an understanding of strategies for promoting high standards for literacy, articulation and the correct use of standard English and is able to use a range of strategies to put these into practice.	Demonstrates a well-established and thorough understanding of strategies for promoting high standards for literacy, articulation and the correct use of standard English and is able to use a wide range of strategies to put these into practice.
Institution B's version				
Standards	Beginning	Developing	Good	Outstanding
c) Demonstrate an understanding of and take responsibility for promoting high standards of literacy, articulation and the correct use of standard English, whatever the teacher's specialist subject	Demonstrates a developing use and understanding of strategies for promoting high standards of literacy, articulation and the correct use of standard English, in the teacher's specialist subject	Demonstrates the necessary understanding of strategies for promoting high standards in literacy, articulation and the correct use of standard English and is able to put these into practice	Demonstrates an established understanding of strategies for promoting high standards for literacy, articulation and the correct use of standard English and is able to use a range of strategies to put these into practice.	Demonstrates a well-established and thorough understanding of strategies for promoting high standards for literacy, articulation and the correct use of standard English and is able to use a wide range of strategies to put these into practice.
<i>Working with the Teachers' Standards in Initial Teacher Education. Guidance to support assessment for Qualified Teacher Status (UCET/NASBTT/HEA 2012)</i>				
3 Demonstrate good subject and curriculum knowledge	By the end of the programme of ITE, all those trainees recommended for the award of QTS will have demonstrated that:	Those trainees graded as 'good' at the end of the programme of ITE may have demonstrated additionally that:	Those trainees graded as 'outstanding' at the end of the programme of ITE may have demonstrated additionally that:	
-demonstrate an understanding of and take responsibility for promoting high standards of literacy, articulation and the correct use of standard English, whatever the teacher's specialist subject	They demonstrate an understanding of the need to promote high standards of communication, reading and writing for all learners and begin to build this into lessons.	They model good standards of written and spoken communication in all professional activities and encourage and support learners to develop these skills in their lessons.	They model very high standards of written and spoken communication in all professional activities. They successfully identify and exploit opportunities to develop learners' skills, in communication, reading and writing.	

In contrast, the UCET/NASBTT/HEA guidance document (see lower part of Table 18) places the key emphasis on the teacher’s own substantive content knowledge of English and the correct modelling of this via their ‘written and spoken communication’ in their professional duties. There is also an indication of the involvement of pedagogical content knowledge to ‘support learners to develop these skills in their lessons.’ This is extended further at the highest level of attainment to:

‘They successfully identify and exploit opportunities to develop learners’ skills, in communication, reading and writing.’

This suggests active subject-specific teaching of elements of English within their lessons, perhaps drawing on curriculum knowledge and general pedagogical knowledge to identify these opportunities. Knowledge of learners will undoubtedly be applied to these situations too.

Table 19 summarises the knowledge bases indicated by the different documents.

Table 19 Analysis of knowledge bases emphasised in assessment descriptors for TS3: third bullet point

<i>Demonstrate an understanding of and take responsibility for promoting high standards of literacy, articulacy and the correct use of standard English, whatever the teacher’s specialist subject.</i>	Knowledge bases for teaching emphasised in assessment descriptors	
	North West Consortium Assessment Descriptors	UCET/NASBTT/HEA Guidance
	General pedagogical knowledge	Content knowledge: substantive Pedagogical content knowledge Knowledge of learners

iv) If teaching early reading, demonstrate a clear understanding of systematic synthetic phonics.

Table 20 summarises the assessment guidance relating to this bullet point of the standard provided by the different documents.

Table 20 If teaching early reading, demonstrate a clear understanding of systematic synthetic phonics

North West Consortium Trainee Teachers' Standards Assessment Descriptors (first developed 2012)				
Institution A's version				
Standard Prompts	Inadequate (4)	Requires Improvement (3)	Good (2)	Outstanding (1)
d) If teaching early reading, demonstrate a clear understanding of systematic synthetic phonics	Has no understanding of the role of systematic synthetic phonics in the teaching of early reading and hence limited or no success in doing this.	Can demonstrate understanding of the role of systematic synthetic phonics in the teaching of early reading to develop pupils' reading skills.	Demonstrates a good understanding of the role of systematic synthetic phonics in the teaching of early reading to develop pupils' reading skills.	Demonstrates a thorough understanding of the role systematic synthetic phonics in the teaching of early reading and applies this knowledge to provide engaging and challenging learning opportunities to develop pupils' reading skills.
Institution B's version				
Standards	Beginning	Developing	Good	Outstanding
d) If teaching early reading, demonstrate a clear understanding of systematic synthetic phonics	Demonstrates a developing understanding of the role of systematic synthetic phonics in the teaching of early reading to develop pupils' reading skills.	Demonstrates sufficient understanding of the role of systematic synthetic phonics in the teaching of early reading to develop pupils' reading skills.	Demonstrates a good understanding of the role of systematic synthetic phonics in the teaching of early reading to develop pupils' reading skills.	Demonstrates a thorough understanding of the role systematic synthetic phonics in the teaching of early reading and applies this knowledge to provide engaging and challenging learning opportunities to develop pupils' reading skills.
Working with the Teachers' Standards in Initial Teacher Education. Guidance to support assessment for Qualified Teacher Status (UCET/NASBTT/HEA 2012)				
3 Demonstrate good subject and curriculum knowledge	By the end of the programme of ITE, all those trainees recommended for the award of QTS will have demonstrated that:	Those trainees graded as 'good' at the end of the programme of ITE may have demonstrated additionally that:	Those trainees graded as 'outstanding' at the end of the programme of ITE may have demonstrated additionally that:	
-if teaching early reading, demonstrate a clear understanding of systematic synthetic phonics	In relation to early reading: All primary trainees will demonstrate sufficient knowledge and understanding of the principles and practices of teaching and assessing reading and writing, including the use of systematic synthetic phonics, to be able to apply this effectively across the specific age phases they are training to teach. (See 'Systematic Synthetic Phonics in ITT: Guidance and Support Materials' for further information).	In relation to early reading: primary trainees have a very secure knowledge and understanding of synthetic systematic phonics and its role in teaching and assessing reading and writing in the context of the age-phases they are training to teach.	In relation to early reading: primary trainees draw on their very strong understanding of synthetic systematic phonics and its role in teaching and assessing reading and writing to teach literacy very effectively across the age-phases they are training to teach.	

‘Understanding **of** systematic synthetic phonics’ is changed to ‘understanding **of the role of** systematic synthetic phonics’ in the North West Consortium assessment descriptors. Once again, this transfers the emphasis of the standard away from the individual’s substantive knowledge of the subject matter - in this case SSP - and re-orientates it in the direction of curriculum knowledge of which aspects of the English curriculum are taught using SSP. No substantive knowledge is exemplified. Pedagogical content knowledge is alluded to in the criterion for only the ‘outstanding’ grade:

‘Demonstrates a thorough understanding of the role systematic synthetic phonics in the teaching of early reading **and applies this knowledge to provide engaging and challenging learning opportunities to develop pupils’ reading skills.**’

Equally, this requirement to provide learning opportunities to develop pupils’ reading skills could, instead, be given a generic interpretation relating to general pedagogical knowledge because it does not emphasise the subject-specific nature of the teaching strategies to be employed.

In contrast, the UCET/NASBTT/HEA guidance specifies that all primary trainees will:

‘...demonstrate sufficient knowledge and understanding **of the principles and practices of teaching and assessing reading and writing, including the use of systematic synthetic phonics.**’

This statement immediately suggests direct links to both the substantive content knowledge and the pedagogical content knowledge involved in the teaching and assessment of reading and writing. Syntactic knowledge is alluded to by the phrase ‘including the use of SSP,’ suggesting that the trainee teacher needs to demonstrate understanding of how the key principles of SSP teaching fit within a repertoire of broader pedagogies involved in the teaching and assessment of literacy. This necessitates some familiarity with, and understanding of, the working practices of the domain of literacy education.

Unlike the other document’s assessment descriptors, the UCET/NASBTT/HEA guidance stipulates effective application of this knowledge and understanding to practice as part of the minimum requirement for evidencing the standard thus emphasising, once again, the key role of pedagogical content knowledge in this. The contextual reference to doing this ‘across the age phases they are training to teach’ implies the need for primary trainees to demonstrate the capacity to teach reading and writing across the 5-11 age range. This

draws on the content knowledge and pedagogical content knowledge already referenced but also introduces elements of curriculum knowledge, both lateral and vertical, across the age phases. The highest grade descriptor outlines the ability of the trainee teacher to draw on their ‘very strong knowledge of SSP’ to embed it within ‘effective literacy teaching’ across the age phase. This signals the seamless integration of content knowledge, pedagogical content knowledge and curriculum knowledge. Further guidance material for SSP is referenced within the descriptor to encourage the trainee and their assessors to research beyond the basic guidance. Table 21 summarises the knowledge bases implied by the differences in wording.

Table 21 Analysis of knowledge bases emphasised in assessment descriptors for TS3: fourth bullet point

<i>If teaching early reading, demonstrate a clear understanding of systematic synthetic phonics.</i>	Knowledge bases for teaching emphasised in assessment descriptors	
	North West Consortium Assessment Descriptors	UCET/NASBTT/HEA Guidance
	Curriculum knowledge At ‘outstanding’ level only: Pedagogical Content Knowledge <i>or</i> General Pedagogical Knowledge (depending on interpretation)	Content knowledge: substantive, syntactic, working practices of the domain Pedagogical content knowledge Curriculum knowledge

v) If teaching early mathematics, demonstrate a clear understanding of appropriate teaching strategies.

Table 22 summarises the assessment guidance provided in the different documents for this bullet point of the standard. In the North West Consortium descriptors, the emphasis is placed on demonstrating ‘understanding of strategies for teaching early mathematics.’ This places the descriptor in the territory of pedagogical content knowledge. The absence of any expectation regarding associated substantive content knowledge might, however, also permit a more generic interpretation of ‘teaching strategies.’ Application of this knowledge is included in the descriptors, signalling pedagogical content knowledge, with some distinction between grades in the frequency with which it is applied to practice rather than the depth of knowledge, or skill in translating this into teaching. The intended outcomes are expressed as the ability to ‘deliver engaging and challenging learning opportunities to develop pupils’ mathematical skills.’ Because ‘engaging’ learning opportunities are accentuated rather than the effectiveness of the subject-specific knowledge and pedagogy in deepening pupils’ understanding, this could be interpreted as a tendency towards general pedagogical knowledge.

Table 22 If teaching early mathematics, demonstrate a clear understanding of appropriate teaching strategies.

North West Consortium Trainee Teachers' Standards Assessment Descriptors (first developed 2012)				
Institution A's version				
Standard Prompts	Inadequate (4)	Requires Improvement (3)	Good (2)	Outstanding (1)
e) If teaching early mathematics, demonstrate a clear understanding of appropriate teaching strategies.	Has no understanding of strategies for the teaching of early mathematics and hence limited or no success in doing this.	Can demonstrate an understanding of early mathematics and appropriate teaching strategies. Applies this knowledge to devise appropriate learning opportunities to support pupils' developing mathematical skills with some success.	Demonstrates a good understanding of strategies for the teaching of early mathematics Increasingly applies this knowledge well to prepare and deliver engaging and challenging learning opportunities to develop pupils' mathematical skills.	Demonstrates a thorough understanding of strategies for the teaching of early mathematics Consistently applies this knowledge to prepare and deliver engaging and challenging learning opportunities to develop pupils' mathematical skills.
Institution B's version				
Standards	Beginning	Developing	Good	Outstanding
e) If teaching early mathematics, demonstrate a clear understanding of appropriate teaching strategies. NB. For 'Early maths' read Early and Primary.	Demonstrates a developing understanding of strategies for the teaching of early mathematics. Increasingly applies this knowledge to devise appropriate learning opportunities to support pupils' developing mathematical skills	Demonstrates sufficient understanding of strategies for the teaching of early mathematics. Applies this knowledge to devise appropriate learning opportunities to support pupils' developing mathematical skills.	Demonstrates a good understanding of strategies for the teaching of early mathematics Increasingly applies this knowledge to prepare and deliver engaging and challenging learning opportunities to develop pupils' mathematical skills.	Demonstrates a thorough understanding of strategies for the teaching of early mathematics. Consistently applies this knowledge to prepare and deliver engaging and challenging learning opportunities to develop pupils' mathematical skills.
Working with the Teachers' Standards in Initial Teacher Education. Guidance to support assessment for Qualified Teacher Status (UCET/NASBTT/HEA 2012)				
3 Demonstrate good subject and curriculum knowledge	By the end of the programme of ITE, all those trainees recommended for the award of QTS will have demonstrated that:	Those trainees graded as 'good' at the end of the programme of ITE may have demonstrated additionally that:	Those trainees graded as 'outstanding' at the end of the programme of ITE may have demonstrated additionally that:	
-if teaching early mathematics, demonstrate a clear understanding of appropriate teaching strategies.	In relation to early mathematics: all primary trainees will know and understand the principles and practices of teaching and assessing early mathematics, to be able to apply this effectively across the specific age phases they are training to teach. (See: 'Understanding Arithmetic in ITT Mathematics' for definition and further information).	In relation to early mathematics: primary trainees have a very secure knowledge and understanding of the principles and practices of teaching early mathematics and employ effective teaching strategies across the age-ranges they are training to teach.	In relation to early mathematics: primary trainees draw on their very strong knowledge and understanding of the principles and practices of teaching early mathematics to select and employ highly effective teaching strategies across the age-ranges they are training to teach.	

In the same way as for the previous bullet point of the standard relating to early reading, the UCET/NASBTT/HEA guidance gives attention to ‘knowledge and understanding of the principles and practices of teaching and assessment of early mathematics’, thus, once again, highlighting both the substantive content knowledge and the pedagogical content knowledge involved in the teaching and assessment of mathematics. These aspects are linked directly to effective employment of teaching strategies, leaving no ambiguity for a generic interpretation. The subject-specific focus is sustained in the phrasing. The distinction between the grades lies in the depth of the individual’s knowledge and understanding (content knowledge and pedagogical content knowledge), and the effectiveness of the teaching strategies they employ (pedagogical content knowledge). Once again, the guidance contains reference to using effective teaching strategies ‘across the age phases they are training to teach’ which sets the expectation quite clearly for primary trainees to demonstrate to teach and assess mathematics effectively across the 5-11 age range. Curriculum knowledge (lateral and vertical) is therefore drawn into the context of this aspect of the standard. Reference to further guidance material is contained within the descriptor to encourage the trainee and their assessors to research beyond the basic guidance to deconstruct what ‘appropriate teaching strategies’ for mathematics might be, depending on the content and context. Table 23 summarises the differences between the knowledge bases implied by the wording of the different documents.

Table 23 Analysis of knowledge bases emphasised in assessment descriptors for TS3: fifth bullet point

If teaching early mathematics, demonstrate a clear understanding of appropriate teaching strategies.	Knowledge bases for teaching emphasised in assessment descriptors	
	North West Consortium Assessment Descriptors	UCET/NASBTT/HEA Guidance
	Pedagogical content knowledge <u>with</u> possible interpretation towards general pedagogical knowledge	Content knowledge: substantive Pedagogical content knowledge Curriculum knowledge

vi) Summary of analysis of the assessment guidance documents

A comparison of the knowledge bases for teaching that are emphasised in the different versions of the Teachers’ Standards assessment guidance is summarised in Table 24. This highlights the recurrence of content indicative of general pedagogical knowledge in the North West Consortium assessment descriptors and the absence of this in the UCET/NASBTT/HEA guidance. In contrast, there is an unswerving focus on distinct aspects of content knowledge, pedagogical content knowledge and curriculum knowledge in the

latter. This guidance document appears to offer better alignment with the foci elucidated from the original wording of Teachers' Standard 3 (see Table 13).

Table 24 Summary of analysis of Teachers' Standards assessment guidance documents

TS3 Demonstrate good subject and curriculum knowledge	Knowledge bases for teaching emphasised in assessment descriptors	
	North West Consortium Assessment Descriptors	UCET/NASBTT/HEA Guidance
Have a secure knowledge of the relevant subject(s) and curriculum areas, foster and maintain pupils' interest in the subject, and address misunderstandings.	Subject and curriculum knowledge – not exemplified General pedagogical knowledge Pedagogical content knowledge	Content knowledge: substantive Pedagogical content knowledge Curriculum knowledge: lateral and vertical
Demonstrate a critical understanding of developments in the subject and curriculum areas, and promote the value of scholarship.	Knowledge of educational ends, purpose and values General pedagogical knowledge	Knowledge of self Content knowledge: substantive, syntactic Pedagogical content knowledge Curriculum knowledge
Demonstrate an understanding of and take responsibility for promoting high standards of literacy, articulacy and the correct use of standard English, whatever the teacher's specialist subject.	General pedagogical knowledge	Content knowledge: substantive Pedagogical content knowledge Knowledge of learners
If teaching early reading, demonstrate a clear understanding of systematic synthetic phonics.	Curriculum knowledge At 'outstanding' level only: Pedagogical Content Knowledge <u>or</u> general pedagogical knowledge (depending on interpretation)	Content knowledge: substantive, syntactic, working practices of the domain Pedagogical content knowledge Curriculum knowledge
If teaching early mathematics, demonstrate a clear understanding of appropriate teaching strategies.	Pedagogical content knowledge <u>or</u> general pedagogical knowledge (depending on interpretation)	Content knowledge: substantive Pedagogical content knowledge Curriculum knowledge

4.5.3 Feedback on Teachers' Standard 3 (subject and curriculum knowledge) in completed lesson observation paperwork

1. Sampling

Both institutions had templates for lesson observations that prompted observers to provide feedback in a specific section on student teacher's *subject knowledge* in relation to Teachers' Standard 3 (TS3). The sample comprised all lesson observations (n=427) submitted by final year undergraduate student teachers from the two institutions as their 'best' evidence for Teachers' Standard 3 for the cohorts participating in the research.

The specific emphasis within this standard on promoting literacy, teaching early reading (systematic synthetic phonics) and teaching early mathematics is reflected in the weighting of the subject focus of the lesson observations in the sample (Table 25). The wording of the professional standard is clearly a driver for which lessons are taught and observed on school placements, along with the schools' own accountability to Ofsted and via statutory assessments for the quality of teaching and learning in corresponding domains. For 45 lesson observations, it was impossible to distinguish which curriculum subject was the focus of the lesson under observation, from the feedback. It was noticeable that Institution B did not have a prompt for the subject name on their lesson observation pro-forma which goes some way to explain the difference between the two institutions in relation to this. The difference in actual number of observations scrutinised per institution can be attributed to the quantity and range of evidence that each ITT provider stipulated must be presented by student teachers at key review points.

Table 25 Subject foci of lesson observations in the sample

Subject	Institution A	Institution B	Total
mathematics	88	60	148
English	51	39	90
phonics	53	9	62
cannot tell	3	42	45
science	25	6	31
PE	10	1	11
RE	7	1	8
history	6	0	6
ICT	6	0	6
geography	5	0	5
PSHEE	4	1	5
art	3	1	4
music	2	0	2
'topic'	1	1	2
D&T	0	1	1
MFL	1	0	1
Total	265	162	427

2. Analysis

Content analysis of the text of the lesson observation feedback comments was conducted by coding the text according to the theoretical framework that was developed in relation to the knowledge bases for teaching, as outlined in the methodology chapter (Section 3.3.4, p63). To recapitulate, this framework was derived from the emergent codes that were grounded in the raw data, combined with the categories of knowledge bases developed from the literature. The stages are broken down in the next sections, to provide a clear procedural audit trail.

i) Stage 1

The comments written in the sections for 'Teachers' Standard 3 – subject knowledge' on the lesson observations were initially coded holistically, according to whether they were wholly subject-specific, entirely generic with no subject-specificity, or a combination of the two. The overall breakdown is shown in Table 26. Only a very small proportion of observers' comments about *subject knowledge* (5.1%) were wholly subject-specific in nature. The vast majority of comments (71.9%) were entirely generic.

Table 26 Overall breakdown of degree of subject-specificity in feedback comments in relation to TS3

	Generic comment	Subject-specific comment	Combination – generic with some subject-specific element	TOTAL
Institution A	198	7	60	265
Institution B	109	15	38	162
Overall	307 (71.9%)	22 (5.1%)	98 (23%)	427

ii) Stage 2

Content analysis of the written feedback comments for TS3 was utilised to categorise the text within observers' comments according to the theoretical framework of knowledge bases for teaching drawn from the literature. Analysis was then extended to examining the quality and nature of the feedback within each identified knowledge base included in the comment and coding it as 'specific' in nature or 'general' (see Table 27). For example, the following comments were categorised as shown below:

Children were using a 'tension' graph to help them to plan and structure their own myth. (specific)

Resources were appropriate for the activities. (general)

Table 27: Frequency of occurrence of text relating to each knowledge base in observers' comments on TS3

Knowledge base	Specific comment	General comment	Overall frequency of occurrence
general pedagogical knowledge	14	515	529
content knowledge	77	106	183
curriculum knowledge	10	126	136
pedagogical content knowledge	39	50	89
knowledge of learners	2	9	11
knowledge of educational contexts	4	0	4
knowledge of educational ends, purpose and values	0	0	0
knowledge of self	0	0	0

As Table 27 shows, more than half of text (56%) in observers' comments in relation to TS3 – subject and curriculum knowledge - actually referred to general pedagogical knowledge. Within this, the overwhelming majority of text (97%) was of a purely general nature. For example:

Planning followed the correct structure.

Good pace – didn't keep them on the carpet for too long.

You promoted positive behaviour throughout.

Make the 'I can' statement child-friendly.

It is of significant interest that observers commented on such generic elements in response to the prompt to analyse 'subject and curriculum knowledge'.

In contrast, less than a fifth of the analysed text (19%) referred to content knowledge, with a greater proportion of specific comments than for those relating to general pedagogy, although more comments overall were, again, of a general nature. The most frequent general comments related to use of terminology, for example:

Used subject-specific language

Promoted the use of scientific terminology

Don't be afraid to check on language to use. We all need to confirm correct terms – use a maths dictionary.

More specific comments included the exact context of the content knowledge that was being acknowledged or questioned by the observer.

Your knowledge of GPCs [grapheme phoneme correspondence] at Phase 5 is excellent.

When one of the learners offered the adjectives 'rumble' and 'rush' you didn't correct that these were verbs and the adjectives describing the wind were actually 'warm' and 'oily'.

Fewer observers' feedback comments (14%) related to curriculum knowledge and, once again, this was predominantly of a general nature.

Planning followed National Curriculum for science

Trainee has a sound understanding of the geography curriculum.

It might be expected that comments about *subject knowledge* stemming from practical lesson observations would focus on pedagogical content knowledge, as this is the vehicle

for successful subject-specific elements of teaching where content knowledge is transformed into a pedagogically orientated form through the teachers' representations of the subject matter. However, similar to the data from questionnaires and interviews, pedagogical content knowledge did not feature as significantly as it might, in feedback about TS3. In fact, less than one tenth (9%) of the text from feedback comments against this Teachers' Standard contained reference to pedagogical content knowledge. It was noticeable in the data that there were a higher proportion of specific comments categorised in this knowledge base compared to the previous three. For example:

eu/ew compared and contrasted well. Good regular comparison of the day's new grapheme with the previous grapheme producing the same phoneme.

Very little of the text in observers' comments (1%) made reference to knowledge of learners, perhaps because there is a greater focus on this knowledge base for other Teachers' Standards (e.g. TS2, TS5) which might also have been the focus of feedback for the lesson observation. Comments most frequently included reference to meeting the needs of learners, for example:

There are children in this group who need to be stretched further and moved on at a faster pace.

Observers' comments that relate to knowledge of educational contexts all, without exception, refer to the student teacher's understanding and use of specific school policies.

Activity to support school's sentence policy included as starter.

Use our school policy – red for tricky words and sound.

Some comments defied clear categorisation according to knowledge base, as their meanings could not be interpreted faithfully. These comments fell into a distinct group; they all indicated a comparative scale or level of *subject knowledge* without further elaboration (e.g. 'good subject knowledge'). The frequency of such comments represents a substantial proportion of observers' feedback on *subject knowledge* (Table 28). In total 143 comments fell into this separate category which, when compared with the data in Table 27, shows it to be the third most common category of comment in relation to Teachers' Standard 3. These comments mirrored the style of wording in the North West Consortium Assessment Descriptors (see Appendices 11a and 11b).

Table 28: Observers' comments relating to TS3 that defy reliable categorisation in relation to knowledge bases

Generic comments not categorised according to knowledge base	Frequency of occurrence		
	Institution A	Institution B	TOTAL
Excellent/outstanding subject knowledge	20	1	21
High level/standard/quality of subject knowledge	3	0	3
Good/super subject knowledge	45	18	63
Secure/sound/clear subject knowledge	20	24	44
Fair subject knowledge	1	0	1
Appropriate subject knowledge	1	6	7
Increasing /more secure subject knowledge	2	0	2
Increasing confidence in subject knowledge	2	0	2
TOTAL			143

A further category emerged from comments that repeated the phrasing of parts of Teachers' Standard 3 (e.g. 'you fostered and maintained pupils' interest'; 'you promoted scholarship'). 29 such comments were recorded across lesson observations from both institutions (Institution A - 12; Institution B - 17). Once again, the same pattern of wording is present in the North West Consortium Assessment Descriptors.

iii) Stage 3

The final layer of analysis involved coding the comments corresponding to each knowledge base into the more nuanced codes that had emerged from the interview and questionnaire data, to reveal finer detail and depth within each knowledge base category. Frequency of comments in each sub-category was recorded (see Table 29) and examples of comments were recorded verbatim for illustrative purposes (see Appendix 10e).

The findings from this additional stage of analysis illuminated further the data from Stage 2, which established that the vast majority of text in observers' comments about TS3 actually related to general pedagogy. Within this knowledge base, it was evident that observers mostly commented on planning and teaching methods in an entirely general sense.

Be clear with objectives.

Well planned – a good, varied range of activities

Plan to engage children instantly – maybe dress up as a chef with two plates of ingredience [sic].

Stopped the children for a mini-plenary

A proportion of comments related to general classroom management and behaviour management skills, which would appear to bear no direct correlation to the standard under scrutiny. Other elements of general pedagogy that appeared in comments had more direct links to *subject knowledge*: assessment, differentiation and questioning. However, specific connections were few, and the vast majority of text relating to these themes was still entirely generic. For example:

There was differentiation.

Direct more difficult questions to the higher ability.

Children were given oral feedback.

Where observers' comments were identified as relating to models of teaching, the majority in this category related to understanding and use of VAK (visual, auditory, kinaesthetic learning styles).

VAK – children were up and able to be moving at start of the lesson.

Plan for more kinaesthetic learning on the carpet.

Demonstrates an awareness of VAK and trying new activities to develop her understanding of the pedagogy required.

These comments demonstrated a lack of critical awareness on the part of the observers about the reductionist practice around 'VAK' that has sprung up in schools, as an example of 'folk' pedagogy stemming from the much more complex theory of multiple intelligences (Gardner, 1983). Student teachers would be receiving mixed messages in relation to this practice with university-based training offering a critique of the practice, and some schools promoting its usage. This, once again, highlights the importance of developing shared understandings through partnership.

Mentors' explanations of *subject knowledge* from interview and questionnaire data, suggested a strong correlation with the knowledge bases of content knowledge and curriculum. This pattern was reflected in the lesson observation data too, however, it was overridden by general pedagogical knowledge, which dominated their observational comments in practice. Nevertheless, content knowledge and curriculum knowledge bases exerted a presence in the lesson observations. In the same way as for other data sources,

there was a significant emphasis on substantive forms of knowledge (e.g. terminology, correct understanding of concepts etc.). References to syntactic forms of knowledge were absent, despite the second bullet point of Teachers' Standard 3 placing a significant emphasis on this:

- *Demonstrate a critical understanding of developments in the subject and curriculum areas, and promote the value of scholarship*

In relation to this part of the standard, mentors simply repeated the phrasing used in the standard itself. This suggests a lack of understanding of what this might look like in practice and how it might be evident in a teaching episode.

In relation to comments categorised as being based on curriculum knowledge, student teachers' use of resources was most frequently noted in observations. Data from interviews and questionnaires suggested that, in relation to this knowledge base, *subject knowledge* was more closely linked to curriculum content in stakeholders' definitions of the term. It is of interest that when observing lessons, emphasis shifted to curriculum resources. Again, comments were of a mostly general nature. There were few links made to lateral and vertical knowledge of the curriculum, which would be relevant to pedagogical content knowledge and knowing how to teach for correct conceptual progression in the subject, in conjunction with the curriculum progression across and between age phases.

Pedagogical content knowledge was under-represented in feedback comments overall, as previously discussed. Within this knowledge base, it was evident that the most commonly occurring textual comments referred to the student teacher addressing misconceptions. This, however, was in a predominantly non-specific way (e.g. 'misconceptions addressed'). The frequency of such comments might be explained by the wording of the first bullet point of Teachers' Standard 3, which specifically mentions the expectation of the teacher to 'address misunderstandings'. Despite this, there was the largest proportion of specific comments categorised in this knowledge base. It suggests that where mentors were providing high quality specific feedback to student teachers, a significant proportion of this resided within this knowledge base, including references to identifying and addressing specific misconceptions:

James confused index and contents pages in non-fiction texts.

Corrected pronunciation of 'minute' and allowed alternative – synonym prefix 'micro' offered by another child.

You must ensure you understand the properties of the Venn diagram. You created a misconception in your modelling of the use of the Venn diagram intersection.

Good knowledge of misconceptions that children have with money (value and size); these were addressed at the beginning of the lesson.

Subject-specific knowledge and pedagogy were occasionally combined in very good quality feedback that had the potential to impact significantly on the student teacher's developing understanding.

When teaching children about 3-D shapes, the most effective way to do this is for them to see and handle 3-D shapes. During your initial carpet time, you relied on the use of images on the IWB and looking at 3-D shapes as 2-D images can make it difficult when children are trying to visualise 'hidden' sides or corners. Also, take care that your questions are not misleading. For example, during the plenary, you held up a 3-D shape and asked 'Can you see a 2D shape here?' The response from a child was 'no' because she could clearly see that it was a cuboid. However, I think that you were referring to the shape of a face on the cuboid (which was a rectangle). Rather than saying, 'we've got hexagons and rectangles' you need to be making it clear that there are faces that are hexagonal or rectangular.

Use of subject-specific resources was also picked up by a perceptive mentor, who recognised how this choice by the student teacher demonstrated their conceptual understanding, combined with their developing ideas of what children might find difficult in working with this idea and how to address this in practice. This culminated in their choice of resource to illustrate the concept to children.

Excellent use of 100 square with pennies in it to illustrate 100p in £1

It might be suggested that if feedback from lesson observations could be channelled in this direction, it would have a greater impact on student teachers' understanding of *subject knowledge* and its place in primary teaching and their ability to make more progress in developing their expertise.

Table 29 Breakdown of observers' comments in relation to sub-categories of each knowledge base

Knowledge bases	Sub-categories within knowledge base	Specific comment	General comment	TOTAL
general pedagogical knowledge	planning	4	190	194
	teaching methods	1	125	126
	differentiation	1	53	54
	classroom management	1	49	50
	assessment	4	41	45
	questioning	3	32	35
	behaviour management	0	19	19
	knowledge/models of teaching	0	6	6
content knowledge	substantive	77	106	183
	syntactic	0	0	0
	beliefs about subject	0	0	0
curriculum knowledge	resources	4	80	84
	content	6	34	40
	lateral	0	11	11
	vertical	0	1	1
pedagogical content knowledge	misconceptions - addressing	5	26	31
	misconceptions - identifying	10	4	14
	subject-specific pedagogies	10	13	23
	subject-specific knowledge/pedagogy	11	7	18
	appropriate resources	3	0	3
	purpose of teaching it	0	0	0
knowledge of learners	cognitive	2	9	11
	empirical	0	0	0
knowledge of educational ends, purpose and values		0	0	0
knowledge of self		0	0	0

3. School mentors' and university tutors' perceptions of completing lesson observations with regard to *subject knowledge*

In relation to conducting observations of student teachers' lessons, school mentors were asked to explain how they used the observation pro-forma and, in particular, what features of teaching they most commonly noted in relation to *subject knowledge* in the context of Teachers' Standard 3. They reported focusing on the accuracy of the content that was being taught and the 'knowledge behind the planning.' Use of vocabulary/terminology and the quality of planning were identified as being frequently commented on by a large proportion of mentors. This links with a trend seen in the analysis of lesson observation feedback. One mentor explained that she based her comments on whether the student teacher had been clear about what they wanted the children to learn and whether they understood the expectations for that year group, in that subject, in relation to the national curriculum. Only one mentor was concerned about the understanding of concepts demonstrated by the student teacher and the children during the lesson. Another mentioned that they commented on the pedagogical approach used; it was unclear whether this was in a general or subject-specific sense.

Less specific features identified by mentors as things they would write on the forms included a basic generic comment, but noting any deficit in *subject knowledge*, commenting on the overall strengths and issues and identifying any weaknesses evident in the teaching. Several mentors suggested that they would regularly comment on whether the student teacher was following school policy. One mentor asked whether *subject knowledge* was 'where you made reference to teaching assistants.'

The consensus on the strategies they used to complete lesson observations was the need to keep referring back to the Teachers' Standards as a reference point, following the prompts on the lesson analysis pro-forma and consulting with the North West Consortium Assessment Descriptors. One mentor suggested that she knew the subject knowledge was good 'if the outcomes of the lesson have been hit.'

When university tutors were asked what they would expect mentors to comment on in relation to *subject knowledge* on the lesson analysis forms, they highlighted some similar elements, such as vocabulary usage, accuracy of content and planning for progression in children's understanding. The most noticeable difference was that some university tutors included their expectation to see reference to aspects of pedagogical content knowledge,

e.g. effectiveness of subject-specific pedagogies, anticipation of children's misconceptions and addressing misconceptions.

In relation to their certainty about what the universities were expecting of them in relation to lesson observation paperwork, only one mentor reported being 'quite clear'. The other mentors all expressed different degrees of uncertainty. The general feeling was that mentor training helped but was hard to retain. The most useful support cited was the North West Consortium Assessment Descriptors document. Mentors reported relying heavily on the assessment descriptors for completing lesson observations and final report forms for students' placements. They were similarly uncertain about the level of consistency between school mentors in the way partnership paperwork was completed. Once again, they believed that the assessment descriptors document helped significantly with this and gained reassurance by following it. The majority identified that more training of using the assessment descriptors and some concise examples would help them to be more confident in completing lesson observations.

School mentors had accurate perceptions of the quality assurance role of the university link tutors who visited student teachers during their placements in school, and were perfectly content with arrangements. In contrast, the university tutors were much less sure about their roles in conducting school visits. Their collective complaint was that they were given unrealistic amounts of administrative work to complete on each visit by partnership managers. The reported situation was considerably worse for tutors from Institution B who were allocated two hours per visit, but had a list of activities to conduct that would, in reality, take 4-5 hours plus time to travel to and from schools. Morale was, generally, low amongst these participants in relation to this aspect of their work. Tutors from Institution A had experienced a change in the link tutor role by which they were no longer permitted to provide student teachers with feedback on lesson observations. Without exception, they missed the opportunity to do this and to use their subject expertise to support student teachers' subject knowledge development. Across both institutions, there was a collective sense of de-professionalisation from the academics, all of whom had originally been recruited to provide subject expertise in teacher education, but were now reduced to performing administrative roles in the context of partnership.

4. School mentors' and university tutors' perceptions of institutional ethos regarding *subject knowledge*

The university tutors at Institution A, believed that *subject knowledge* was strongly positioned in the ITT department. They noted the 'high interest' in 'tracking core subjects' and felt that *subject knowledge* was 'tackled head-on' and 'not swept under the carpet.' In contrast, university tutors at Institution B gave a more varied response. One tutor commented that it was 'a work in progress,' whilst another contrasted her personal belief that it was of central importance with her general feeling that, in practice, it was not 'pushed enough.' She was unsure of how it was conceptualised and positioned 'officially.' Several tutors expressed that the department paid 'lip service' to it in response to the Ofsted inspection agenda.

For school mentors working with either, or both, university department(s), none of them could articulate how the institutions portrayed *subject knowledge*. None believed that they had a clear view of the prevailing ethos. One school mentor asked, with some anxiety, "Should there be one?" Slightly defensively, another mentor asserted, "I assume that my interpretation is fine because no-one's ever mentioned it when they've been out."

5. Summary of analysis of completed lesson observation feedback on Teachers' Standard 3

The findings indicated that most feedback on lesson observations in relation to TS3 was generic in nature. For 10% of the sample, it was impossible to determine the specific focus of the lesson. This would have been a still higher proportion, except for the fact that Institution A has a prompt box for the name of the subject being taught. The vast majority of feedback comments in relation to *subject knowledge* actually related to general pedagogical knowledge and were mostly non-specific in nature. The propensity of comments in relation to content knowledge and curriculum knowledge concurred with the consensus identified within conceptions of *subject knowledge* from the interview/questionnaire data from student teachers, mentors and university tutors, in which these two knowledge bases dominated. However, despite their presence in the lesson observation feedback, they were outnumbered by references to general pedagogy overall. This means that in lesson observation feedback, general pedagogical knowledge was given a higher profile than it was in conceptions of *subject knowledge*. This would appear to be an example of espoused theories and theories in use (Argyris and Schön, 1974). Where feedback comments related to content knowledge, as found with the data

from other sources (questionnaires and interviews), comments actually related to substantive elements, and in a fairly shallow sense in most cases (e.g. correct use of vocabulary). Similarly, the less consistent emphasis on pedagogical content knowledge found in interview/questionnaire data, was also evident in the lesson observation feedback. In theory, features identifiable as PCK could be anticipated to be a crucial component of observations of *subject knowledge* in action during classroom teaching, as this is where substantive aspects of content knowledge would be translated into a teachable form that was meaningful and accessible to learners. This raises some interesting questions about the possible reasons for its lack of prominence. Generic comments on 'good/excellent/fair subject knowledge' were frequent but, ultimately, of little value to the learner. The same is true of comments that simply repeated the phrasing of the standard, with no exemplification or interpretation. A small proportion of observers of lessons had provided detailed, subject-specific feedback that would better support student teachers' learning, and work towards better accuracy in grading against the standards.

School mentors held varying perceptions of what they ought to report on for *subject knowledge* in lesson observations, which generally followed the patterns located in the analysis of lesson observation comments. They relied heavily on using the Teachers' Standards and the North West Consortium Assessment Descriptors to inform their feedback on teaching. They did not detect a clear ethos in relation to *subject knowledge* within their university partnerships.

Conclusions

The concept of *subject knowledge* presented in Teachers' Standard 3 can be mapped across a number of theoretical knowledge bases that includes both substantive and syntactic elements of content knowledge and pedagogical content knowledge. In contrast, the document used by both institutions in this study (NW Consortium of Universities & Teach First, 2012), which provides assessment descriptors for the Teachers' Standards, is predominantly orientated towards general pedagogical knowledge in its treatment of subject knowledge within Teachers' Standard 3. Analysis of lesson observation feedback comments on *subject knowledge* demonstrated that the vast majority were of a general nature and dominated by references to features of general pedagogical knowledge. Comments relating to content knowledge and curriculum knowledge demonstrated the same pattern of shallow and narrow representations of the knowledge bases that were evident in other data sources. There was no consistent emphasis on pedagogical content knowledge. School mentors reported their reliance on the assessment descriptors to

scaffold their completion of lesson observations; the influence of the descriptors was evident in lesson observation feedback comments in their generic orientation. The alternative guidance document available to ITT providers (UCET/NASBTT/HEA, 2012), that also supports assessment of the Teachers' Standards, has no such generic orientation and the findings suggest that adoption of this guidance document across the ITT partnerships in this study, would have the potential to support the provision to student teachers of higher quality, specific feedback on *subject knowledge*.

5. Discussion

5.1 Conceptions and interpretations of *subject knowledge*

The findings of this research have highlighted the complexity of *subject knowledge* for primary teaching. There appears to be limited shared understanding of *subject knowledge* as a critically distinct concept, across the two ITT partnerships at the centre of this study. Discourse concerning its nature, position and role in the processes and practices of primary teacher education, is not as coherent as it might be, both at the individual ITT partnership level and in the wider ITT policy context. *Subject knowledge* was found to be interpreted and understood in highly variable and individualistic ways, rendering it potentially problematic. The overarching findings regarding conceptions of *subject knowledge* held by student teachers and teacher educators (school-based and university-based) suggest that it was viewed simply as an umbrella term that is populated by combinations of knowledge bases for teaching. There appear to be elements of idiosyncrasy in precisely which combinations are selected and incorporated into an individual's conceptualisation of *subject knowledge*.

The findings also highlighted some areas of consensus across the sample of participants. All participants included aspects of knowledge corresponding with Shulman's (1987) category of content knowledge in their conceptualisations of *subject knowledge* and all, bar one student teacher, included curriculum knowledge. However, most conceptions of content knowledge were shallow, with a superficial focus on factual information; curriculum knowledge was mostly interpreted simplistically as what the pupils have to be taught. These findings suggest that the dominant view of *subject knowledge* comprises knowledge of what has to be taught, determined by the curriculum, and the associated factual content linked to this. This reduces conceptions of *subject knowledge* to the bare bones of curriculum content and delivery. This 'delivery' of curriculum is achieved via general pedagogical knowledge (which was most commonly cited as knowledge of teaching methods) for the majority of participants who included this knowledge base. Both student teachers' and school mentors' conceptions of *subject knowledge* were most frequently orientated towards general pedagogical knowledge. A smaller number of participants included aspects of knowledge that correlated to Shulman's category of pedagogical content knowledge, mostly in the form of reference to subject-specific pedagogies and

pupils' misunderstandings of the subject matter. University tutors and one particular student teacher were the sources of the majority of references to pedagogical content knowledge. This important aspect of *subject knowledge* was least evident amongst the conceptions held by school mentors. Highly individualistic combinations of other knowledge bases were also linked to notions of *subject knowledge*. Student teachers were most indiscriminate in their conceptualisations of the term and the university tutors were, in general, the most discriminating group of stakeholders. Although university tutors, as a group, showed greater concern with pedagogical content knowledge, their viewpoints still varied, perhaps, more than might be expected. In general, they had a more conceptually focused view of substantive knowledge and of lateral/vertical curriculum knowledge.

The data suggest a link between individuals' epistemologies of content knowledge and their awareness of pedagogical content knowledge. Individuals in this study who were conceptually orientated in their thinking about knowledge for teaching, paid most attention to exploring aspects of pedagogical content knowledge. In contrast, those who showed an objectivist orientation towards knowledge as consisting of substantive facts or content, demonstrated a lack of awareness of pedagogical content knowledge, as did those individuals in this study who espoused particularly child-centred beliefs.

What was clear from the research was that participants, in general, lacked the specific vocabulary to engage with clarity in discourse about knowledge and pedagogy. On the whole, understanding of the scope of knowledge bases for teaching was underdeveloped and superficial. Impoverished models of *subject knowledge* were most typical, although there were exceptions. It was possible to detect a tendency of some individuals to dismiss the relevance of *subject knowledge* within their practice, where they equated *subject knowledge* with facts and a transmission approach to teaching. Instead, such individuals claimed that general pedagogy was more important. In a number of instances, they positioned *creativity* opposite to *subject knowledge*. This highlights the potential danger of a confused narrative in relation to *subject knowledge* and pedagogy in primary education. Pedagogical content knowledge did not feature in thinking about *subject knowledge* to the extent that might be expected. It was notably absent from most of the school mentors' conceptualisations.

Despite empirical evidence of the pivotal nature of pedagogical content knowledge in expert teaching (Berliner, 2004), school mentors and university tutors gave precedence to affective qualities in their ideas about expert primary teachers. Alexander (2010: 418)

suggested that subject knowledge may be the elephant in the room in relation to teacher expertise; the data in this study confirms this uncomfortable observation. Overall, for a majority of participants, it seems that pedagogical content knowledge did not appear to be a 'valued form of knowledge' (James and Pollard, 2011:284) in relation to effective pedagogy. The implications of this are concerning, as pedagogical content knowledge is central to the expert knowledge base that raises the status of primary teaching to a profession. In response to the somewhat muddled discourse about *subject knowledge* in primary initial teacher education, student teachers and teacher educators appear to be left to develop their own interpretations and their resultant conceptualisations are highly individualistic and frequently, imprecise.

With such variation in comprehension of *subject knowledge*, it raises questions about the consistency with which the relevant Teachers' Standards are being interpreted in the assessment of trainee teachers. Lesson observation feedback in relation to *subject knowledge* has been shown in this research to be orientated towards general pedagogy. The Teachers' Standards assessment descriptors (North West Consortium of Universities & TeachFirst, 2012), used by both the ITT partnerships in this study, have been shown to be similarly orientated, rendering them somewhat misleading in scaffolding the assessment process. Consequently, they have a potentially damaging role in promoting and reinforcing impoverished views of *subject knowledge*. Pedagogical content knowledge is not given sufficient explicit focus in the descriptors and this is likely to contribute to simplistic and reductionist views of *subject knowledge* in primary ITT. The data also strongly suggest that without the university-based training, attention to pedagogical content knowledge in the partnerships would be extremely limited.

How student teachers (and teacher educators) come to make sense of *subject knowledge* and its role in their initial teacher education is influenced by cross-contextual factors as well as their individual values, beliefs and interests. These will be examined through the lenses of culture and practice in the main contexts involved in primary ITT.

5.2 The interplay between *subject knowledge* and the 'Culture', 'Practice' and 'Agents' in the system of primary ITT

In relation to Ellis's (2007) model of teachers' subject knowledge development and its components of 'Culture', 'Practice' and 'Agents' (and Bourdieu's (1977) correlating concepts of 'field' and 'habitus' – see Chapter 2.8, p47), these elements will now be

considered in the specific context of the initial education of primary teachers and their learned ways of knowing and being, across the predominant settings in which their learning is situated, i.e. university ITT departments and primary schools.

For the undergraduate programmes of primary education at the heart of this study, the student teachers' time is distributed between their studies of academic modules in the university setting, interspersed by substantial blocks of experience in primary schools. For one of the institutions involved in the research, they also spend some time on shorter enrichment experiences in alternative educational settings (e.g. field centres, museums, community projects), and some opt for an international school placement. The arena for their learning, i.e. the 'culture' (or field), includes each of these settings and the systems to which they belong (e.g. the higher education sector, local authorities, academy trusts) and the boundaries and rules that emerge from them (e.g. national educational policy context).

5.2.1 The primary school context: culture and practice

The culture of primary teaching in primary schools and the collective practice that emerges from it is undoubtedly dominated by the Ofsted inspection framework. Successful learning is measured in terms of pupil attainment and progress (Ofsted, 2016). This is reflected in participants' comments about it being the key driver for practice, particularly in relation to the emphasis on pupil progress that recurs in the narratives across the different groups of participants. Ofsted expects to see 'evidence of the monitoring of teaching and learning and its link to teachers' performance management and the teachers' standards,' (p11) so pupils' progress is directly correlated to teachers' performance as judged against the Teachers' Standards (Department for Education, 2012). The pedagogy deployed to achieve these outcomes is not subject to the same scrutiny as the outcomes themselves. In relation to subject-specific aspects of teachers' work, only literacy, including reading, and mathematics are explicitly detailed in the inspection framework. Again, the focus is on outcomes. Student teachers felt most confident in teaching these two subjects, mostly due to the frequency of practice in schools in comparison to other subjects. Conversely, this also accounts for the relative lack of opportunities to practise teaching across the other curriculum subjects.

The place of *subject knowledge* is indicated within the Ofsted grade descriptors for 'good' and 'outstanding' levels of quality of teaching, learning and assessment. To achieve a 'good' judgement, 'teachers use their secure subject knowledge to plan learning that sustains pupils' interest and challenges their thinking' (p48); for an 'outstanding' judgement,

'teachers demonstrate deep knowledge and understanding of the subjects they teach' (p47). There is no exemplification of what the distinguishing features of 'secure' and 'deep' knowledge might be. Likewise, there is no explanation of the slight shift in terminology used between the two; 'subject knowledge' and 'knowledge and understanding of the subjects'. The epistemological stance is ambiguous, although the latter perhaps suggests an objectivist tendency. Anything that might approximate to pedagogical content knowledge is not immediately evident. This ambiguity is likely to contribute to the variation in understanding of *subject knowledge* as a concept by the participants in this study, given that the Ofsted framework holds such a significant influence on culture and practice.

Similarly absent from the Ofsted handbook content is pedagogy. It receives one explicit mention in the text and this is in the context of an inspector judging the quality of leaders' discussion of pedagogy in relation to joint observations of teaching, i.e. as part of a performance measure. In comparison, the word 'performance' appears on forty occasions. This provides a clear indication of the relative weighting of pedagogy and performance in the state theory of learning (Lauder *et al.*, 2006). As subject-specific knowledge is an integral part of pedagogy, the two must be considered holistically. Alexander (2004: 11) provides a seminal definition of pedagogy:

Pedagogy is the act of teaching together with its attendant discourse of educational theories, values, evidence and justifications. It is what one needs to know, and the skills one needs to command, in order to make and justify the many different kinds of decision of which teaching is constituted.

The absence of pedagogy in the Ofsted handbook (2016) is not a new phenomenon and is symptomatic of a broader issue. Simon's (1981) critique of the lack of coherent, principled and systematic pedagogy in England and its unfavourable comparison with continental Europe, was reprised over a decade later (Simon, 1994) and the same issues were identified. Alexander (2004) revisited the argument a further decade on, to establish that the issues were still all too apparent due to the prominence afforded to curriculum above pedagogy in the English education system. As such, curriculum is a driver of culture and practice in schools. This focus is evident in the expectations of some school mentors for student teachers to be fully conversant with the content of curriculum documents, including archived materials that are no longer in use. It is also prominent in the consensus conceptions and interpretations of *subject knowledge* in the data that placed curriculum knowledge alongside content knowledge.

The nature and roles of subject-specific knowledge and pedagogy are far more clearly defined in other European countries. In the European tradition, didactics – the re-organisation and transformation of complex conceptual frameworks of knowledge into teachable forms that will be meaningful to learners – is clearly and coherently distinguished from pedagogy, which reflects the informed decision making in the flow of teaching, as described above. Unlike the ambiguity in the discourse around *subject knowledge* in the English system, mainstream European didactics clearly identifies and defines the subject-related elements of teachers' knowledge with a good degree of correlation with Shulman's (1987) categories of content knowledge and pedagogical content knowledge and, for certain nations such as Germany, the nature of subject study goes far beyond this into highly developed professional study (Alexander, 2010). Simon (1981) posed the question, 'Why no pedagogy in England?' Hamilton (1999) posed the same question about didactics. He argues that Anglo-American conceptions of curriculum lost touch with 'deeper questions that, for centuries, have animated pedagogy and didactics' (p 136). Instead, he surmises that it has been 'reduced to questions about instructional content and classroom delivery' (p136) that fail to stretch beyond the short-termism of what pupils should know rather than deeper philosophical examination of the purposes of education. This is mirrored in the data by the prevalence of piecemeal approaches used by many of the student teacher participants to prepare for teaching episodes. A typical reported approach was that they located what they had to teach in the relevant curriculum document, they engaged in some Internet-based research prior to teaching and then delivered this information to the pupils. This simplistic approach was also given credence by some school mentors and a minority of university tutors. Due to the lack of significance of *subject knowledge* in such a model of teaching, it has led in some instances to student teachers believing it to be irrelevant, or of limited significance, to their developing practice.

This reductionist discourse is an overarching influence on the culture of primary schools in which in-service primary teachers are immersed and into which pre-service teachers are inducted. Shared goals of practice in this culture were almost certainly characterised by the need to satisfy matters of compliance with Ofsted's expectations of pupil progress with an overwhelming emphasis on literacy, including early reading, and numeracy as prescribed by the inspection framework. Pedagogy and subject-specific knowledge are secondary to curriculum delivery and performance outcomes. Where teachers' personal beliefs and values and the moral purpose of teaching conflict with the realities of practice, it might cause disillusionment leading to staff turnover or burnout, as suggested by Kelchtermans

(2009:262). This was already found to be happening for some of the student teachers participating in this study, for example, in the decision of one individual (see Saskia's pen portrait, Section 4.4.2, p185) to dismiss the idea of teaching in mainstream schools and, ultimately, to become a foster carer instead.

School mentors' comments reflected the outcomes-driven focus of Ofsted inspections, in not being interested in *how* pupil progress is achieved. Whilst some school mentors and student teachers had clearly signed up to this perspective, other individuals showed a more pragmatic, or strategic, approach to compliance. In the data, some individual narratives of school mentors and student teachers picked up the theme of striving to maintain some degree of autonomy, even though it was restricted. Tensions were evident, however, with intensive workloads and performance measures. Against this background, finding time in primary schools for quality mentoring activities was cited universally, across all groups of stakeholders, as a challenge for school mentors. With significantly reduced access to subject-specific advisory teachers via local authorities, some mentors expressed the difficulty they sometimes encountered in seeking involvement and support from subject leaders within their schools in subject-specific mentoring of student teachers. Whole school CPD events seemed to consist mostly of 'off the peg' solutions to improving pupil progress in identified areas of national priority, rather than more personalised professional needs, thus concurring with Hustler *et al.* (2003). This does not necessarily align with the complex subject-specific development needs of student teachers training in schools and it makes considerable additional demands on school mentors to compensate for this. As a result, it was cited frequently that mentors tended to focus mostly on their personal areas of subject specialism in mentoring activities.

5.2.2 The university context: culture and practice

The arguments relating to the lack of pedagogy and didactics in England are entirely relevant and applicable to university education departments in which the initial education of primary teachers is embedded. As the findings of this study indicate, former primary teachers who have made the transition to become full-time teacher educators in university education departments have experienced the same culture in primary schools, and their work remains partly situated in it. The same drivers of the primary curriculum and the Ofsted school inspection framework are a shared concern of university-based teacher educators, as they seek to prepare trainee teachers to undertake placements in schools

and, ultimately, to begin their teaching careers as newly qualified teachers. Alongside these factors, the criteria for the accreditation of primary teacher training courses have undergone radical changes pertaining to their content and structure over the last three decades, as discussed in the literature review chapter in relation to the policy context of ITT. Monitoring of university ITT departments' compliance with these regulations is conducted through Ofsted inspections via a framework specific to the sector. The impact of Ofsted compliance is fully evident in university tutors' narratives in the data. Ofsted was frequently stated as the reason behind the weighting of subjects, lack of attention to foundation subjects and *subject knowledge* auditing and tracking practices.

The most recent inspection framework for ITT (Ofsted, 2015) details what documentation inspectors expect student teachers to have with them in the school setting. As well as teaching files, plans, reflections and portfolios of evidence, the list includes 'subject knowledge audits and records' (p16). This means that despite the auditing of trainees' *subject knowledge* in the core subjects being dropped as a requirement in 2002, following the introduction of revised teachers' standards (DfES, 2002), the expectation for there to be evidence of this practice remains embedded in the inspection process. So, essentially, it remains an unofficial requirement needed to satisfy inspectors' checklists. In relation to *subject knowledge* auditing practices, all university tutors in the sample cited Ofsted as the driving force for them, whilst voicing a certain amount of frustration over the lack of resources and time to use them in meaningful ways that might better support learning. The findings strongly suggested that lip service was being paid to them by university tutors and student teachers. Their role and purpose was believed to be unclear except that progress must be evident in outcomes data. Inspectors will also use discussions to 'probe trainees' and NQTs'/former trainees' knowledge and understanding of relevant phase, subject and curriculum issues' (Ofsted, 2015:37). From this it appears that subject-specific knowledge and understanding is an important focus of the inspection, however, overall judgements are based on the quality of outcomes for trainees.

Quality of outcomes is judged in terms of trainees' attainment (as defined by the Teachers' Standards), completion rates of courses, employment rates and how well trainees teach. In judging the quality of teaching, 'the key factor [...] is the impact teaching has on the quality of learning of children/pupils/learners' (Ofsted, 2015: 32). ITT providers need to demonstrate evidence of the impact of training on enabling trainees to achieve this impact on pupil progress, meaning that, ultimately, ITT providers are being held partially

accountable for pupil progress in schools, alongside primary schools. The precise focus of this is made clear with respect to the criteria for judging the quality of training in the partnership. Some primary-specific judgements relate to how well trainees are prepared to 'teach early reading and demonstrate a clear understanding of systematic synthetic phonics', 'teach early mathematics' and 'teach physical education and demonstrate good subject knowledge and teaching strategies (Ofsted, 2015: 38-39). In common with the school inspection framework, the same narrow subject focus linked to literacy and numeracy is evident, but with the inclusion of the more specific foci of early reading, via the use of systematic synthetic phonics, and physical education. It is interesting to note the change in positioning of primary science within both the school and ITT Ofsted inspection frameworks. Despite its designation as a core subject in the national curriculum, it warrants no specific focus within either of the inspection frameworks. The weighting of subjects is reflected in the university programmes central to this study, along with their emphases on *subject knowledge* and auditing/tracking. Student teachers' confidence is higher in teaching mathematics and English, however many are anxious about teaching physical education. In most instances, this was found to be due to a lack of opportunity in schools to practise teaching the subject. The root cause of this appeared to be the dominant practice in primary schools of employing external sports coaches to deliver physical education, thus removing the subject from the remit of teaching staff. This is an example of where ITT requirements are not supported by the school inspection framework. Differing priorities appear to cause a conflict in approach.

Another difference detected in the ITT inspection framework (Ofsted, 2015) in relation to *subject knowledge* is the expectation that leadership and management of the partnership might include in its 'vision of excellence', training that 'uses the most up-to-date research to promote high levels of subject and curriculum knowledge and excellence in teaching' (Ofsted 2015: 44-45). This gives university-based teacher educators a curiously dichotomous role. On the one hand, they are expected to be technically compliant with Ofsted requirements in relation to both the primary curriculum and ITT regulations. This promotes working practices focused on curriculum delivery and quality assurance auditing activities that require little critical evaluation or professional autonomy. On the other hand, they are expected, simultaneously, to engage in up-to-date research connected to improving trainees' 'subject and curriculum knowledge.' In complete contrast, this requires high levels of critical thinking and autonomy, along with sustained periods of time allocated to support such activities. The stark juxtaposition of ideologies, practices and values creates

a multi-dimensional paradox for teacher educators. How these conflicting roles are intended to be resolved in practice is uncertain, particularly when Ofsted is the dominant factor in university ITT departments (McNamara *et al.*, 2010). Most departments have no core research funding either (Dadds and Kynch, 2003). These tensions and conflicts in roles were all too evident in the narratives of the university tutors in both institutions. It is unsurprising that the discourse around *subject knowledge* in primary ITT lacks coherence when examined through the lens of culture.

As previously discussed in the literature review chapter in relation to the policy context, school-led routes of ITT have been proliferating since the introduction of School Direct in 2010. This has increased the marketization of ITT in as much that providers are now in direct competition for business from school teaching alliances. This research is located within the context of core undergraduate routes into primary teaching, but it is important to note that the rise of employment-based ITT has happened in parallel, so is a contributing factor to the culture and practice of teacher educators, whether they are based in school or in university departments. University tutor participants in the study, expressed shortcomings in relation to schools taking shared responsibility for student teachers' training in relation to *subject knowledge*. They knew that school mentors' comments on lesson observations forms were frequently bland and generic, to the point where they were of no particular use to them in their monitoring and evaluation activities. However, difficult matters of epistemology, curriculum, knowledge and pedagogy were found to be left unaddressed due to the need for maintaining good relationships with schools, along with some epistemological uncertainty on the part of some of the tutors. The overriding significance of Ofsted inspections of ITT is summed up by McNamara *et al.* (2010: 657), who highlight the politically motivated threat to university ITT departments through increased levels of scrutiny and accountability of traditional routes in comparison to the newer, employment-based routes.

Inspection grades are now systematically and transparently being used to inform allocation of training places for traditional provision; ideological drivers can be deduced from the tolerance of the repeatedly less than favourable inspection reports on EBITT provision since its inception.

The cultural influences on practices in university ITT departments will therefore, through practice, necessitate compliance with Ofsted's measures of quality; this equates to focusing on a narrow range of subject-specific learning, auditing *subject knowledge* and maintaining

rigorous records of trainees' progress and their impact on pupil progress. There are commonalities between primary schools and primary ITT departments in these respects, but with slightly different subject-specific foci. However, in practice, university-based teacher educators face additional challenges in their roles.

ITT courses are located within the academy of higher education, meaning that university-based teacher educators are also required to comply with quality assurance procedures of universities. These include the requirement for detailed programme specifications and the application of a modular framework with strict rules guiding students' academic progression. Measurement of the performance of staff is an increasing characteristic of higher education settings via module evaluations completed by students and the National Student Satisfaction survey. ITT departments are also accountable for the annual Newly Qualified Teacher survey which records former trainees' opinions about how well their training prepared them for their first year in the job. Research outputs of academic staff are also measured via the Research Excellence Framework. All of this means that teacher educators are situated firmly within an audit culture (Strathern, 2000), that shapes their working practices. Each key aspect of their jobs is under continual monitoring and surveillance.

The challenges faced by new entrants to the profession of teacher education are well-established (e.g. Murray & Male, 2005; McKeon & Harrison, 2010; Williams & Ritter, 2010; Shagrir, 2010). Boyd *et al.* (2006) emphasise the cultural boundary crossing involved in this transition from expert primary teacher to teacher educator. Against this already difficult background context, Brown, Rowley and Smith (2016) examine how the new challenges of school-led ITT have led to teacher educators being required to spend significant proportions of their time brokering deals with schools, managing relationships with teaching alliances and having greater involvement in quality assurance procedures. As this sort of work has intensified, it is increasingly difficult for teacher educators to engage in research and scholarly activity and they find themselves caught between the practical demands of their jobs and the opportunity to increase their status within the higher education system, which traditionally places value on research above teaching. McNamara *et al.* (2010) highlight the schism between research active staff and teacher educators. Some of the university tutors in the study cited the unique role of the university-based training in relation to *subject knowledge* as it being underpinned by current research. The claim was qualified, however, with reference to the lack of time for research and scholarly

activity. In some cases, this was expressed pragmatically, but in other cases, with openly-vented frustration. The lack of coherence in relation to *subject knowledge* amongst the university tutor participants suggests that minimal opportunities for the scholarly dimension of their jobs is a substantial issue for ITT departments, if they are to stake a claim for research engagement in ITT in the current landscape of expanding school-led routes into teaching. Ellis *et al.* (2013) conclude that, in reality, the experiences of university-based teacher educators resemble those of proletarianised workers whose expertise is unacknowledged and devalued. In effect, it is underexploited in the culture and practice of teacher education in which 'relationship maintenance' appears to take priority over other academic work that might employ their 'deep professional knowledge and expertise' in more impactful ways (Ellis and McNicholl, 2015:109). For example, in response to the findings of this research, demanding academic work could be undertaken to deepen key stakeholders' understanding of *subject knowledge* and its conceptual positioning in learning to become a primary teacher. This could have a powerful effect on the quality of learning across partnership.

The ITT department as a shared space for collective conceptual development of crucial matters of epistemology, pedagogy and subject-specific knowledge dimensions is, therefore, pressurised by the drivers of compliance and competition in an increasingly complex system. The competing tensions underpinning the identity of teacher educators are self-evident. Some of the newer ITT tutors interviewed were already disillusioned on discovering the extent of Ofsted compliance in the sector. They were not able to have the direct impact on trainee teachers that they envisaged when they moved into the sector. The data also showed that they had not yet developed deeper understandings of *subject knowledge* and, with the lack of time for scholarly activity and research, it is uncertain as to whether they would have opportunity to do so, thus perpetuating the issue.

In the pressurised and conflicted cultures of the primary ITT departments studied in this research, *subject knowledge* remains poorly defined and relatively unexplored at the departmental level. Its complexity appears to be a barrier and quick fixes are sought instead (e.g. making Teachers' Standard 3 a compulsory focus for every lesson observation in one of the partnerships). The Teachers' Standards assessment descriptors in use by both institutions are another such example. As a tool, they are inaccurate and unhelpful in deconstructing *subject knowledge* for assessors, and yet they continue to be used.

5.2.3 The ITT partnership context: culture and practice

Each setting – universities and primary schools - has its own set of cultural influences on practice, as discussed. Their nexus in the context of primary ITT is in the university-school partnership. Partnership in ITT was mandated in legislation in 1993 (DES, 1993, Circular 14/93). Dunne *et al.* (1996:41) described it as the ‘demarcation of practice in schools from educational theory.’ Edwards (1995) challenged simplistic models of partnership in which trainees were expected to develop practical skills in schools and *subject knowledge* in university. The importance of the development of shared values underpinned by a common knowledge base was highlighted by Taylor (2000). In reality, Furlong *et al.* (2000) concluded that nothing had changed in relation to who did what as a result of the legislation. An underlying reason for this was explained by Edwards (2002:11), who proposed that partnership is ‘a site for participatory learning but without the interactional support that one might expect to accompany it.’ Her argument pertains to the fact that the practice of partnership tends to be transactional and individualistic in nature. The interface between primary schools and the university primary ITT department is mediated through partnership documentation and paperwork that supports student teachers’ school placements. Ellis (2009: 169) explains how university tutors’ role in partnership tends to take the form of ‘quality assurance of the individual students’ entitlement to practise,’ and sometimes takes the form of ‘arbitration’. Dissatisfaction in relation to this was expressed by the majority of the university tutors, who perceived their role to be much more about using their subject expertise to coach student teachers and model mentoring dialogue to school-based colleagues. Paperwork was reported to be excessive in one institution and participants from that institution (university tutors and student teachers) were generally unhappy with the time they spent on this. The expansion of school-based routes into teaching has added the complication of different types of partnership operating simultaneously (Furlong *et al.*, 2006), and this was expressed frequently throughout the interviews with university tutors.

In addition to the nature of operational practices, underlying epistemological differences might also characterise partnerships without ever necessarily being addressed through participatory learning (Edwards *et al.*, 2002). This was clearly evident in relation to conceptions of *subject knowledge*. University-based teacher educators and school mentors are likely to have different priorities attached to their roles in teacher training (Price and Willet, 2006), including the nature and role of *subject knowledge*. The slight differences in foci between the Ofsted inspection frameworks for schools and ITT in relation to *subject*

knowledge have already been discussed. Additionally, school mentors may prioritise the immediate needs of classroom practice or following prescribed curricula (Jones and Straker, 2006), whereas university-based tutors may have an increased focus on more intellectual elements of teacher education such as *subject knowledge* (Hodson *et al.*, 2011). This is seen in the data in terms of the increased focus on pedagogical content knowledge from some of the university tutors. Rather than partnership providing a social space to consider differing conceptualisations of the knowledge needed for learning to teach, the technical rationalist approach that was observed in practice leads to an absence of such theorising, the outcomes of which are described thus by Furlong *et al.* (2006: 41):

The complexity and contestability of professional knowledge is no longer seen to be at the heart of what partnership is about; professional knowledge becomes simplified, flattened, it is essentially about contemporary practice in school.

The impoverished dominant models of *subject knowledge* evidenced in the findings echo this notion. Accompanied by the increasingly contested space of ITT, this process of simplification appeared to be commonplace.

Spaces for collective learning to develop shared practice between school mentors and university tutors tend to be restricted to school placement visits and mentor training sessions, which might be based either in the university department, or delivered in geographical clusters of partnership schools. As already discussed, these tend to be focused on quality assurance and relationship maintenance. Their success in dealing with complex epistemologies, including the nature of *subject knowledge*, can perhaps be extrapolated from the research findings of Brown and McNamara (2005) that school mentors tended to emphasise classroom management and professional issues and did not provide quality subject-specific feedback to support trainees in using subject knowledge effectively in their teaching. The findings of this study concur.

Jones and Straker (2006) found that whilst school mentors felt confident about the technicalities of teaching and establishing a working relationship with trainees, they did not understand fully the underpinning principles of mentoring, adult learning needs and assessment of trainees' attainment in relation to the teachers' standards. Restricting factors in their mentoring roles were identified as lack of time, too much paperwork and insufficient training. School mentors who participated in the current study also identified the challenge of time when balancing mentoring activities against the full time class

teacher role in most instances. They did not report that paperwork was excessive, but there was a lack of certainty about how to complete it and most would have liked more training, including access to more examples of completed documents. The assessment descriptors for the Teachers Standards (North West Consortium of Universities & TeachFirst, 2012) were viewed as helpful time-savers in this respect, filling in the training gap in relation to assessing trainees' progress. The descriptors were viewed uncritically by the vast majority of mentors.

School mentors, on the whole, did not view *subject knowledge* development as part of their role; they simply did not have time to tackle this. Any related issues were reportedly referred back to the university staff to solve the problem. Alternatively, the student teachers were expected to sort out their difficulties through solitary study. University tutors recognised the limitations of partnership in the realities of practice and the fact that responsibility for *subject knowledge* was not necessarily taken on board by schools. With more time being given over to school-based training, there was a concern about where and how *subject knowledge* was being developed in the absence of university input. Some mentors were also holding on to outmoded expectations of partnership where the student arrives with all the knowledge they need and applies it to practice. These are prime examples in the findings of where collective learning is needed across the partnerships. The findings raise the same issues as those highlighted by Edwards and Ogden (1998) in relation to the lack of focus on subject-specific knowledge in mentoring and the overarching observation of primary teachers' subject matter knowledge being taken for granted in a way that is not always appropriate. I would extend this caution to primary ITT departments too, given the irresponsible viewpoints expressed by a minority of university tutors about student teachers not requiring any knowledge in light of mobile technologies and the ability to look things up on the Internet before teaching, as being sufficient to prepare them for the profession.

5.3 Student primary teachers as 'Agents' in the system

As discussed previously in the literature review in relation to individual influences regarding *subject knowledge*, the individual's subject-related biography, epistemological stance and their view of the learning process all affect which resources (physical and conceptual) are taken up in their practice. The undergraduate students of primary education who were central to this study had widely varying subject biographies. At most, they had an A-level qualification in some subjects and other subjects had not been studied formally since GCSE,

or perhaps not even up to that level. Such differing subject biographies will certainly impact on their interpretations of shared goals and collective knowing in practice, including about *subject knowledge*, whilst studying for their undergraduate degree in the university system and participating in school-based teaching experiences. The cultures and practices in settings will influence epistemology and pedagogy. This means that if the concepts that are part of an academic discipline are not explicitly seen in action, there is very little chance that they will become part of the repertoire of physical and conceptual 'tools' that are incorporated into their own practice (Ellis, 2007). This is illustrated most emphatically by the rejection of the relevance of *subject knowledge* by some student teachers. Others had held on to their own objectivist viewpoints and their ideas about *subject knowledge* remained unchanged over the course of their studies. Certain student teachers, however, had developed deep conceptual ideas about *subject knowledge* that extended beyond their immediate stage of experience as a novice.

The synchronic time epistemology that Tochon and Murphy (1993) identified as being characteristic of expert teaching is problematic to reproduce in university settings due to the lack of ready access to groups of children. Equally, it is not promoted by many of the methods of support that typify partnership practice (e.g. scrutiny of teaching files, formalised observations of teaching, weekly progress meetings, target setting), most of which promote a diachronic time epistemology in the structures of learning. This is another example of the theory-practice gap in ITT where the structures of partnership are not necessarily congruent with the process of learning to teach, for which there are many models (e.g. apprenticeship of observation (Lortie, 1975); development of expertise (Berliner, 1988); legitimate peripheral participation (Lave and Wenger, 1991)). This means that student teachers' learning opportunities are perhaps not as representative of teaching 'moment-by-moment' as they might be. This could contribute to the linear approach observed in relation to *subject knowledge*, of accumulating information piece by piece in preparation for teaching, rather than encouraging them to dig deeper into connected conceptual frameworks and pedagogical content knowledge. It is clear from the findings, that not all partnership processes promoted deep learning in relation to *subject knowledge*, in particular *subject knowledge* audits, lesson observation feedback and assessment of the teachers' standards using the North West Consortium assessment descriptors.

The cultures and practices of each setting separately and collectively though partnership, present particular challenges for student teachers who find themselves required to fulfil

very different, and perhaps conflicting, roles in each context (Eraut, 1994). Edwards (1997) identified how student teachers are often supported and assessed in schools by the same people, which results in students being both learner and performer. In contrast, in the university setting, the student teacher's role is solely as a learner. As subject-specific knowledge is part of this learning process, it is logical that it might be considered differently in each context according to the role(s) that student teachers have to embody. For example, Ewing and Manuel (2000:10) identify how student teachers might be reluctant to ask for assistance in school 'since this may be interpreted as a reflection on professional competence.' Many of the student teachers in this study viewed development of *subject knowledge* as something they had to take responsibility for through solitary study, which might be partially influenced by this reluctance to reveal weaknesses to mentors. As school mentors are also responsible for assessing student teachers' attainment in relation to the teachers' standards and provide evidence of this via lesson observation feedback and target-setting to support weekly reviews of progress, it means that student teachers have to learn within a culture of performativity (Ball, 2013) in which they must make themselves 'calculable rather than memorable' (p136). Ball (2013: 6) describes performativity as:

...the ways in which lists, forms, grids and ranking work to change the meaning of educational practice – what it means to teach and learn – and our sense of who we are in terms of these practices – what it means to be an educator, and to be educated.

It, therefore, follows that the ways in which *subject knowledge* is framed within this system that contributes so significantly to culture and communities of practice, will impact on student teachers' conceptualisations of the nature of *subject knowledge* and its role in pedagogy. It has already been established that its definition and positioning within initial teacher education is ambiguous or, at best, pragmatic. The findings illustrated how some student teachers viewed it as something of a game, in working out what a particular school mentor wanted to observe in relation to *subject knowledge* and then producing plentiful evidence of those elements (e.g. use of vocabulary, differentiation, meeting children's needs), regardless of whether or not they are, in fact, conceptual components of *subject knowledge* in a theoretical sense. Their aim was simply to pass the placement and achieve the best grades that they could in that setting. In relation to *subject knowledge* audits, students referred to them as box-ticking exercises with an uncertain role in their learning.

The majority dismissed them as being irrelevant and unnecessary but still complied with their completion when asked to do so.

The combination of student teachers' strategic compliance with ITT processes and the majority's simplistic notions of *subject knowledge* lead to consideration of their future development of expertise in primary teaching. Those student teachers, who had considered *subject knowledge* in greater conceptual depth and its role in their practice, were already found to be displaying some early, emergent characteristics of expertise. For example, one student teacher (see Helen's pen portrait, Section 4.4.2, p177) judged the quality of her *subject knowledge* in relation to how quickly and easily she could formulate plans for teaching particular subject matter. This links directly to Sternberg's and Horvath's (1995) notion that experts can do more in less time, with less effort. With the workload demands placed on primary teachers and the connected problem of teacher retention, it would seem logical to aim to enable student teachers to develop such expertise over time, to help them to work effectively and efficiently in the role. Instead, the findings suggest that the prevailing models of *subject knowledge* in primary ITT, amongst the majority of participants, were too superficial to readily support this trajectory of development of deep subject-specific pedagogical expertise.

The same student teacher (Helen) felt she lacked 'credibility' in the absence of secure *subject knowledge*. Other student teachers noted how they were more open to collaboration with colleagues and communicating with parents when they had confidence in their *subject knowledge*, thus *subject knowledge* appeared to determine the extent of their participation and contribution to the school settings they experienced. More secure knowledge enabled novice teachers to move from legitimate peripheral participation (Lave and Wenger, 1991) in low risk activities to become involved in activities that are more central to the community of practice. As such, they begin to make an active contribution to teachers' 'ecologies of practice' (Stronach *et al.*, 2002: 121). Following this line of argument, it could then be suggested that *subject knowledge* supports the accumulation of novice teachers' cultural capital (Bourdieu, 1977) in the setting. The findings provide examples of this where student teachers with deeper conceptualisations of *subject knowledge* and understanding of the key role of pedagogical content knowledge, were able to critically evaluate curriculum documents and engage in independent decision-making, for example, about how to navigate the tensions between their own philosophies and some of the 'economies of performance' (Stronach *et al.*, 2002: 121) that they experienced

in schools (e.g. see Olivia's pen portrait, Section 4.4.2, p165). It would seem logical to suggest that if armed with conceptual tools to support their increased agency, they will be more likely to build sufficient resilience to remain in the profession, compared to those who do not move beyond short-term approaches.

Expert teachers work synchronically and have the ability to draw on complex frameworks of knowledge to respond intuitively to cues from students, on a moment-by-moment basis (Tochon and Munby, 1993). Tochon and Munby (1993) maintain that effective teaching will involve the disruption of a linear delivery of the curriculum to allow the pedagogical bringing together of knowledge and skills from a range of sources. It was clear from the findings of this study that a large proportion of the student teachers had not developed the pedagogical foundations that would support longer-term development of such expertise. Many expressed their fear of being put on the spot and not being given enough notice to be able to complete their usual short-term strategy of internet-based research to, in effect, create a scripted lesson on particular subject matter. In a number of cases, the significance of *subject knowledge* was dismissed and replaced with ideas of context-free *creativity* as pedagogy, rather than seeing *subject knowledge* as a crucial component of pedagogy that enables children's creativity. It is worrying to consider how some of the student teachers from the four-year undergraduate primary education degrees in this study could emerge as newly qualified teachers with such diminished views of primary pedagogy. One hopes that they will have opportunity in the future to re-consider their ideas from a different perspective. It is heartening that there were other student teachers who were embarking on their primary teaching careers with extremely well-developed and theoretically grounded ideas of curriculum, knowledge and pedagogy. Such wide variation, however, is a concern.

Edwards (1997) raised some key questions for ITT programmes that, from the evidence in the findings of this study, appear to be entirely applicable to current trends too. Firstly, she questioned whether student teachers understand that they have the right to see themselves as learners and not as competent performers during their initial training and, linked directly to that, whether student teachers and mentors understand the fundamental nature of mentoring conversations and what might benefit them in the process of learning to teach. *Subject knowledge* was not reported to be the focus of mentoring in school by either the student teachers or the school mentors. If such fundamental issues remain unresolved, then interpretations and conceptualisations of *subject knowledge* as part of

these processes will also remain open to ambivalence. This raises some questions in turn for university-based ITT providers about whether, in their treatment of *subject knowledge*, sufficient prominence and coherence is afforded to epistemology, pedagogy and subject-specific pedagogical content knowledge.

5.4 Summary

The influences on individual conceptions and interpretations of *subject knowledge* found in this study, are summarised in Figure 10, which is an extended adaptation of Ellis's (2007) model of secondary English subject knowledge development, discussed previously (see Chapter 2.8, p45-48). The student teacher's 'individual knowing' at the centre of the model comprises, for example, their conceptions of the purpose for teaching different subjects, their epistemological stance and their physical and conceptual 'tools' for teaching across different subjects involved in primary education. The individual student teachers are the 'Agents' in the system and their autobiographies, values and beliefs are central influences. The respective cultural identities of primary teaching in primary schools and university-based primary ITT and their policies and politics, are the central arenas for practice. 'Practice' represents the collective knowing and the rules operating in the community within a particular setting, i.e. a particular primary school and the particular university primary ITT department. The arrows show the interconnectedness of cross-contextual influences on the individual learners and the permeability of the boundaries is represented with dotted lines in the model. The system sits within the broader context of the individual subject communities allied with the field of primary education. Which elements of discourse that are taken up by particular communities are, again, fluid and dynamic. The broader discourse of academic disciplines is an over-arching influence in the system. The outer arrows represent, as they do in Ellis's (2007) model, that the whole system is dynamic and in constant flux. The wide variation in participants' conceptions and interpretations of *subject knowledge* for primary teaching can be understood more readily in relation to this melting pot of influences.

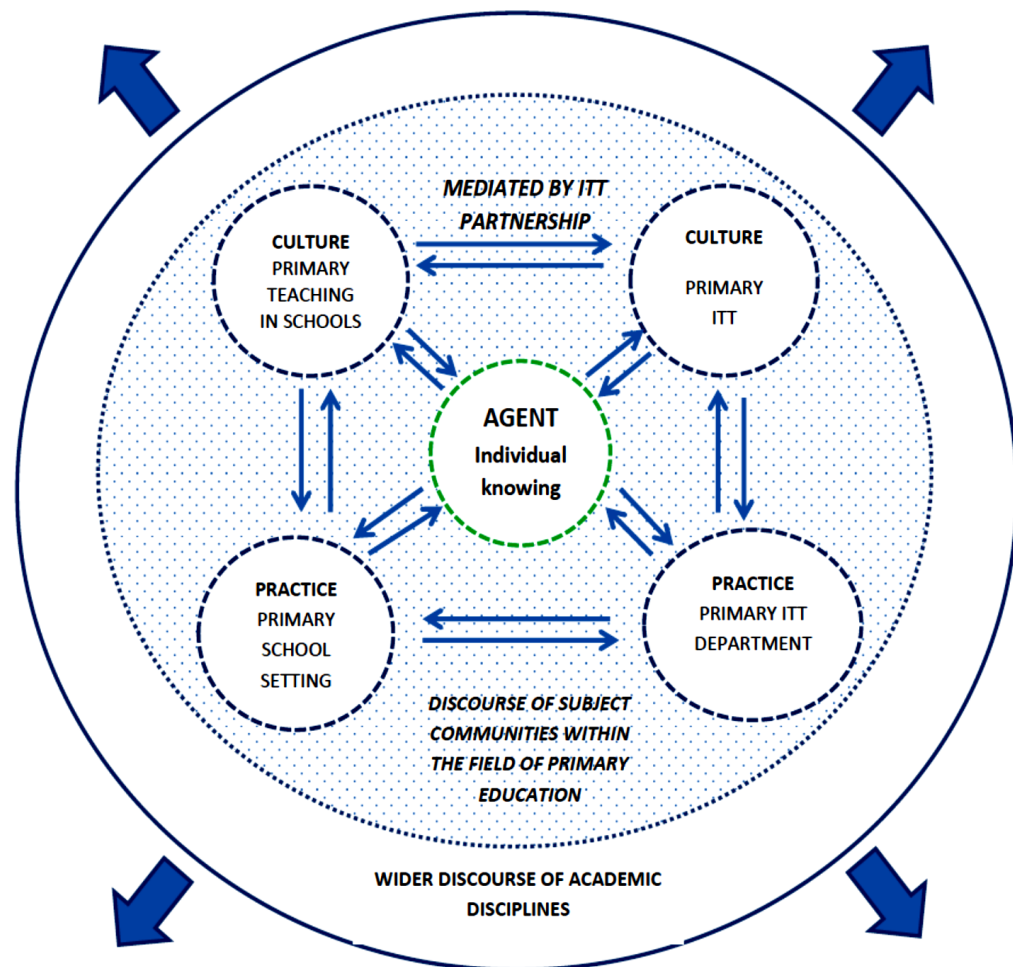


Figure 10 Influences on subject knowledge for primary teaching in the context of ITT (adapted from Ellis, 2007)

5.5 Looking forward: issues, challenges and opportunities

The idiosyncratic and individualistic notions of *subject knowledge* evident in the findings are fundamentally problematic in the primary ITT partnerships under examination. In the wider policy context, an opportunity for re-evaluation has emerged. In 2015, we saw the publication of the Carter Review of ITT (Carter, 2015), which made a series of recommendations in response to the issues identified from their examination of evidence from the sector. The first over-arching recommendation was to develop a framework of core content for ITT to address the variation observed in ITT courses. Subject knowledge development is given a prominent focus. The report highlighted the importance of a ‘high level of subject expertise in good teaching’ and included the review’s findings that the most

effective courses 'address gaps and misconceptions in trainees' core subject knowledge' (p7). It is important to note that no distinction is made between the significance of subject-specific knowledge in primary and secondary teaching, except to acknowledge the challenge of breadth for primary teachers. Key recommendations relating to subject knowledge were that its development should be part of the future framework of content for ITT and that all ITT partnerships should 'rigorously audit, track and systematically improve trainees' subject knowledge throughout the programme' (p7). Whilst the former points might suggest a focus on substantive knowledge, subject-specific pedagogy is also included in the recommendation for core content. This includes the need for trainers and mentors to have a good grasp of it. Elements of pedagogical content knowledge are deconstructed in the report. For example, understanding pupils' conceptions and misconceptions, conceptual progression and how to address misconceptions are all detailed as essential components of ITT course content. Their inclusion is potentially encouraging.

An independent expert group has since published their recommended framework of core content for ITT (2016) in response to the recommendations of the Carter Review. It has very recently been approved and accepted as policy by the Department for Education. Content in relation to *subject knowledge* emphasises the importance of auditing, but does not exemplify this in any way. Emphasis is placed on conceptual *subject knowledge* that includes subject-specific pedagogy. The intention is for newly qualified teachers to be equipped to 'teach a knowledge-rich curriculum to a depth beyond what is required of pupils' (p15). ITT providers will need to update their programmes to align with the new framework of content, because the intention is for it to be used as part of the quality criteria for allocations of ITT places from 2018/19. This provides a natural point for the ITT providers in the current study to reconsider how they position and conceptualise *subject knowledge* in the primary programmes. The policy has potential for driving improvement. However, given the tensions in role and the limiting factors of time and resources, the moment could be lost if quick fixes are sought.

6. Conclusion

The aims of the study were to determine to what extent individuals' conceptualisations of subject knowledge, as contextualised within primary ITT, related to theory and to map their exact nature, alongside examination of the influences that shape their thinking. The research was located in the context of the undergraduate B.A./B.Ed. (Hons) Primary Education programmes in two post-1992 university providers of ITT. The study was prompted, initially, by my personal difficulties in gaining a coherent picture of *subject knowledge* in primary ITT programmes when I first became a university-based teacher educator. I detected disparity between the theoretical knowledge base, ITT policy concerning *subject knowledge* and the practices embedded in primary ITT programmes in the department in which I was working. My initial concerns lay in the potential influence of this muddled discourse on trainee teachers' conceptions of subject knowledge and its role in their developing pedagogy.

To recapitulate, the key objectives of the research were:

- to explore the perspectives of key stakeholders (student teachers, school mentors, university tutors) about the nature and role of *subject knowledge* in the initial training of primary teachers and construct a comprehensive picture of their conceptualisations of *subject knowledge*;
- to identify and examine the nature of influences on key stakeholders in relation to *subject knowledge*;
- to analyse how ITT partnerships frame and position *subject knowledge* for primary teaching.

Over the course of the research journey, new policy changes have been initiated. The most directly relevant ones include: a new set of professional standards for teachers, introduced in 2012 (DfE, 2012); a new primary national curriculum launched for 2014 (DfE, 2013); and the publication, in 2015, of the findings of the Carter Review of ITT (Carter, 2015). Amongst the review's recommendations was the need for a renewed focus on *subject knowledge*. This is mirrored in the framework of content for ITT that was published subsequently, in July 2016. The findings from this research, therefore, make an opportune contribution to the current landscape of primary ITT.

6.1 Key findings

6.1.1 Conceptions and interpretations of *subject knowledge*

Despite the extensive theoretical knowledge base regarding types of teacher knowledge, there seems to be a pronounced gap between theory and practice in applications of *subject knowledge* within the contexts of primary ITT in which this study is located. The findings demonstrate that there does not appear to be a shared understanding of a critically distinct concept of *subject knowledge* amongst the participants of this study. Overall, the findings indicated that *subject knowledge* seemed to be used as an umbrella term representing general teacher knowledge, with a multitude of associated interpretations depending on the individual make-up and weighting of knowledge bases that individuals included in their definitions.

Whilst acknowledging the variability in participants' conceptualisations of *subject knowledge*, some commonality was found in the inclusion of content knowledge and curriculum knowledge as components. These elements were most typically presented in combination with general pedagogical knowledge and, far less frequently, pedagogical content knowledge. However, interpretations of these knowledge bases tended to be superficial and under-developed in comparison with theoretical models. It was noticeable that individual participants who were conceptually-orientated in their thinking about content knowledge, also tended to demonstrate a greater focus on PCK. In contrast, those with an objectivist stance towards content knowledge, and those with particularly child-centred views about teaching, typically showed far less awareness of PCK in their thinking. In general, student teachers' thinking about *subject knowledge* over the duration of their ITT courses typically moved from an objectivist stance (i.e. viewing it as propositional, codified knowledge), to a more pedagogically-orientated perspective. Some individuals' objectivist viewpoints remained unchanged.

6.1.2 Positioning and role of *subject knowledge* in primary ITT

A clear hierarchy of curriculum subjects was evident throughout the findings, with greater emphasis placed on *subject knowledge* in relation to the teaching of English and mathematics that mirrored the priorities embedded in the school inspection framework (Ofsted, 2016). Student teachers' perceptions of their confidence in their subject-specific knowledge aligned accordingly, reflecting their increased exposure to these subjects and opportunities to practise teaching them.

The role of *subject knowledge* was cited most frequently by student teachers as enabling children to make progress, whether this was via transmission of knowledge or through development of conceptual understanding. Pedagogical approaches were considered to be more open-ended and enquiry-based where *subject knowledge* was secure. Teacher behaviour and self-image were impacted by *subject knowledge* and the findings suggest that *subject knowledge* is a key component in a teacher's capacity to demonstrate behaviour that is characteristic of expert teachers. Participants' conceptions of *subject knowledge* and teaching expertise did not identify PCK with any consistency, nor did they unpick the deeper elements that would demonstrate an understanding of PCK and its role in teaching. This must influence student teachers' experiences during their initial training, their emerging conceptions of *subject knowledge* and its key role in pedagogy. Some of the university tutors in the study placed greater emphasis on PCK in teaching expertise and in their aspirations for trainees. If student teachers place a higher cultural value on development activities in school compared with university, or on the viewpoints of particular tutors over others, then the influence of these tutors is likely to be limited to just the individual trainee teachers who select these conceptual tools (Ellis, 2007) to be part of their pedagogic repertoire.

6.1.3 Contextual and personal influences on *subject knowledge*

Individuals' conceptions of *subject knowledge* and its development in relation to learning to teach were found to be influenced by a range of contextual influences. Student teachers agreed that university assignments, taught sessions and university tutors themselves, had demonstrable impact on their subject-specific knowledge development for teaching. Highly individualistic responses emerged in relation to the exact nature of this impact though. For example, certain individual student teachers who had developed deeper conceptualisations of *subject knowledge*, that included a focus on PCK, were strongly influenced by aspects of university-based training. In contrast, other student teachers who were also influenced by university-based learning, had developed particularly child-centred philosophies of teaching, in which *subject knowledge* played a minimal role and awareness of PCK was minimal or absent. School-based learning was found to be the ultimate driver for student teachers' personal subject-specific knowledge development. Those individual trainee teachers, who retained an objectivist epistemology throughout their training, had been predominantly influenced by school-based learning.

Although school placements provided a key stimulus for subject-specific knowledge learning, the findings suggested that school mentors had minimal impact on *subject knowledge* development. Activities to directly support *subject knowledge* development appeared to be located predominantly within the university-based elements of learning. University tutors had a common perception of student teachers' subject-specific knowledge development being a shared responsibility across the partnerships, whilst acknowledging that, in practice, it was actually dependent on the particular school and subject expertise of the individual school mentor. What is clear from the findings is that, without the university input, there would be minimal focus on *subject knowledge* development besides student teachers' independent research. Attention to PCK within this would be extremely limited.

With regard to the policy context of ITT, Ofsted inspections were identified as the driving force in relation to *subject knowledge*. Related themes of curriculum and performance were also dominant. The differing priorities for schools and university ITT departments in this respect are not synergistic. School mentors were found to be generally less concerned with matters of *subject knowledge*, whilst university staff had complex systems for tracking certain aspects of *subject knowledge*, simply to demonstrate trainees' progress to Ofsted.

Subject knowledge in the partnership context was found to be framed by particular examples of documentation that were cited by participants on a recurrent basis. They were the Teachers' Standards (DfE, 2012), the assessment descriptors used to guide assessment of trainees against the Teachers' Standards (North West Consortium of Universities & TeachFirst, 2012) and the partnerships' paperwork to guide processes, such as teaching observation analysis and feedback. The documents had a mediating role in promoting consistency between university and primary school settings across the ITT partnerships. The feedback on *subject knowledge* (Teachers' Standard 3) in teaching observations that was provided to student teachers in this study was found to be dominated by references to features of general pedagogical knowledge, which has implications regarding the validity of the assessment of the standard.

School mentors reported their reliance on the North West Consortium Assessment Descriptors (North West Consortium of Universities & TeachFirst, 2012) to scaffold their completion of teaching observations, across both partnerships represented in the findings. Whilst the concept of *subject knowledge* presented in Teachers' Standard 3 (TS3) can be

mapped across a number of theoretical knowledge bases, that includes both substantive and syntactic elements of content knowledge and pedagogical content knowledge, the descriptors for TS3 in the North West Consortium document were found to be orientated towards general pedagogical knowledge. The dominance of feedback comments relating to general pedagogical knowledge for this standard might, therefore, have been influenced by the generic tone of the assessment descriptors.

The influence of contextual factors was evident, but individual influences could also be identified. In particular, there appeared to be a close connection between job motivation/task perception (Kelchtermans, 2009) and perspectives on *subject knowledge*. Those student teachers who were concerned with deep learning had generally considered *subject knowledge* as a concept in much greater depth and detail. Those who were more concerned with their own teaching persona or child-centred approaches – whether espoused or practised – took a more superficial approach characterised by pragmatic, or strategic, compliance with processes linked to Ofsted-related requirements. The five pen portraits of student teachers illustrate some of the idiosyncrasies that were evident in individual views of *subject knowledge* and how it was positioned in their pedagogical practice.

The findings overall, support the notion of culture and practice in different contexts being interpreted and experienced in very different ways by individuals to influence their conceptions and interpretations of *subject knowledge*.

6.1.4 Implications for primary ITT

The challenge ahead for the ITT partnerships represented in the study is how to develop a deeper, theoretically-grounded, shared conceptual understanding of subject knowledge and its role in primary education. In order to address this, the findings indicate that subject-specific pedagogical content knowledge needs to be given more explicit prominence in programme content and in school-based learning, if the astute insights that were expressed by some student teachers are to be developed with greater consistency across the programme cohorts. Tools that are used to scaffold the assessment of trainee teachers must be of higher quality; attention needs to be paid to their epistemological and conceptual orientation over surface features. The assessment descriptors used in the partnerships in this study, appear to be doing more harm than good in relation to subject knowledge and a simple step that might support improving understanding, would be to

replace them with the alternative guidance document (UCET/NASBTT/HEA, 2012).

University tutors working in teacher education need to be able to fully develop their intellectual, and research-informed, understanding of subject knowledge, to enable mentor development activities in schools to move beyond superficial quality assurance activities.

6.2 Recommendations and questions for future research

My study set out to explore the complexities surrounding conceptualisations and interpretations of *subject knowledge* in initial primary teacher education. The findings have prompted questions/recommendations for future research that lead naturally from this study:

- How does written feedback on observations of trainees' teaching in relation to *subject knowledge*, compare with accompanying verbal feedback and mentoring dialogue? Is it equally generic, or more subject-specific?
- How might using the different versions of assessment descriptors for the Teachers' Standards (as presented and analysed in the findings) influence school mentors' conceptualisations of *subject knowledge* and the quality of their feedback to trainees?
- Can ITT partnerships undergo a paradigm shift away from focusing predominantly on linear processes towards capturing opportunities for more synchronic approaches, to highlight the role of subject-specific pedagogical knowledge in enabling primary teachers to respond in the moment to cues from their pupils? If so, what techniques might be helpful in achieving this? How might they influence key stakeholders' conceptualisations of *subject knowledge*?
- What might the perspectives of policymakers and Ofsted inspectors contribute to the picture of *subject knowledge* in primary ITT?
- How is *subject knowledge* conceptualised by primary trainee teachers studying on postgraduate programmes (PGCE)? Are there similarities and differences in comparison to the findings in this study relating to undergraduate programmes?
- How is *subject knowledge* framed within school-led routes of primary ITT, such as School Direct? How is *subject knowledge* conceptualised by postgraduate trainees on school-led routes in contrast to university-led routes?
- What might a longitudinal study contribute to our understanding of trainee primary teachers' conceptualisations and interpretations of *subject knowledge* over the first

few years of their teaching careers? Do their perspectives change? If so, how? What are the influences on their views over time?

6.3 Concluding comments

Subject knowledge in primary ITT is a complex business. Despite much theory and research, in practice, there is an apparent disconnect between the knowledge base and practice. Where individuals do develop deep conceptualisations of *subject knowledge* and its role in pedagogy through their initial teacher education, it seems to happen in spite of education policy, rather than because of it.

Following the Carter Review (Carter, 2015) recommendations, which included a greater focus on *subject knowledge* and subject-specific pedagogy, the publication of the framework of content for ITT (2016) will be a significant driver for change in the immediate future. It creates a natural pause for reflection in teacher education, but it remains to be seen how this will be enacted. If the framework is treated as yet another set of standards or competencies, reminiscent of the Circular 4/98 standards (DfEE, 1998b), then it is unlikely to address successfully the issues highlighted in the findings of this study. In response to the legacy of such policy in the late 1990s, Turner-Bisset (1999: 52) observed astutely that this approach ‘ignores the complex reasoning, thinking and synthesis which underpin the best teaching.’ It would be disappointing to lose the opportunity at this point in time, for the ITT sector to, instead, develop a coherent and critically, distinct view of subject knowledge and epistemology that is long overdue.

7. Reflections

7.1 Limitations of the research

As the research focuses on individuals' conceptions and interpretations of *subject knowledge*, the sampling of participants was a crucial element of the research design. The sample was drawn from student teachers studying on the four-year undergraduate B.A./B.Ed. (Hons) Primary Education programmes in both institutions, along with some of their university tutors and school mentors. As such, these student teachers had a relatively long period of study to develop their thinking about *subject knowledge*, in comparison with the wider population of trainee teachers represented within primary ITT, that would include a large proportion of one-year postgraduate programmes too. Trainee teachers on PGCE programmes would also be graduates and their prior knowledge and experience, combined with a shorter period of study of primary education, might well produce different findings in relation to *subject knowledge*.

Although maximum variation sampling (Patton, 1980) was used to ensure that diverse and multiple perspectives were reflected in the data collected from the student teachers, the sample was still drawn from those individuals who had volunteered to be interviewed. It is possible that alternative conceptualisations of *subject knowledge* might have been uncovered with a different sample, including individuals who might be harder to reach. Similarly, the school mentor participants were willing volunteers who offered to be interviewed. These are individuals who were fully engaged with the ITT partnerships and with their mentoring work with trainee primary teachers. Interviews with more reluctant school mentors might, perhaps, have yielded different insights. The same would be true in relation to the university tutor participants, who also volunteered their involvement in the study. It would have enriched the research data further if the perspectives of policymakers and Ofsted inspectors could have been included in building a comprehensive picture. However, this would have gone beyond the realms of feasibility for this study.

With regard to the findings generated from written lesson observation feedback provided to student teachers, I recognise that the accompanying verbal feedback in the mentoring dialogue between the observers and the trainee teachers might have revealed differences between written and verbal comments, in relation to Teachers' Standard 3 and aspects of *subject knowledge*. My original intention was to observe mentors conducting lesson observations and giving feedback to student teachers, but difficulties in recruiting school

mentors to the study and logistical issues made it too problematic in practice. It does, however, highlight a natural next step in building on the findings of this study.

Although the research has produced novel findings and contributed to the knowledge base, I am also aware that interpretations of qualitative data are subjective. I am not a disinterested researcher; the analysis of data is likely to have been influenced by my personal and professional knowledge and experiences. The research was conducted within the boundaries of a certain time and in two specific geographical contexts, that incorporated the particular cultural settings across the two ITT partnerships. Thus, I do not claim that the findings can be generalised or extrapolated. However, by providing thick description (Geertz, 1973), embedding different forms of triangulation within the research design and mapping a clear audit trail for data collection and analysis, I hope to have communicated an illuminative account of the research that will prove useful to those with an interest in matters of subject knowledge in the context of primary teacher education.

7.2 My learning journey through the research process

7.2.1 Personal realisations

This study began with my personal experiences of attempting to make sense of *subject knowledge* as a teacher educator when, instead of finding answers in the university ITT department, I discovered my own sense of dislocation and disillusionment. I detected a lack of epistemological congruence in much of the ITT rhetoric concerning *subject knowledge* and I suspected that superficial attitudes about it, dotted the landscape of primary ITT. I reached my own intuitive conclusions about the reasons for this, and made assumptions in the process. The research journey has led me towards a more nuanced appreciation of the interwoven layers of culture and practice that create the conditions out of which complex realities emerge, in relation to *subject knowledge* in primary ITT.

My appreciation of the significance of historic policy influences, and their enduring impact, has deepened considerably. This also makes me wary of how the Carter review recommendations will be interpreted and enacted. Policymakers have skewed important domains in education and in so doing, have changed the nature of the teaching profession at every level, including novice teachers at the start of their careers, as this study shows. The themes of performance, measures and surveillance emerged from the research data in a pervasive manner. Although the rhetoric of the current government is to hand teaching back to teachers, there is a lack of trust in the profession. My findings suggest that subject

knowledge might well be one of the elephants in the room in this respect, as Alexander (2010) suggested. Some of the beliefs and approaches to teaching that were expressed in the course of my research, worry me. However, it is the system itself that perpetuates conditions that can result in attention being diverted onto superficial aspects in teacher education. Quality assurance processes and superficial tracking systems dominate practices in relation to subject knowledge, whilst difficult conversations about the fundamental questions of epistemology, curriculum and pedagogy in relation to subject knowledge, perhaps, remain unarticulated. This is what I believe needs to change.

I have come to recognise that, on entering the ITT sector, my pre-existing understanding of subject knowledge was very closely aligned to content knowledge, pedagogical content knowledge and some subject-specific aspects of curriculum. I now see that my view of content knowledge as a compelling, process-driven arena is perhaps not as common in primary teaching as I had assumed. It offers some explanation to me of why I found that my fascination with the role of subject knowledge in primary teacher education was not, necessarily, a shared interest. On reflection through the research process, I have located my viewpoint as stemming from my former work in the field of evolutionary biology prior to becoming a primary teacher, in which knowledge is never regarded as a static entity. Instead it is fluid and dynamic, open to new discoveries made through exploration and inquiry. My viewpoint appears to be atypical of the majority of participants in the study; this has helped me to understand how my perspective is positioned in the bigger picture of primary teaching.

Another area of personal and professional growth for me through the research journey has been in my appreciation of qualitative research methodology. Most of my previous science research experience was rooted in statistical analyses of quantitative data, firmly located in the positivist paradigm. My long-term engagement with qualitative data during this study has given me far greater appreciation of the benefits of flexible, interpretative approaches in creating a different picture of the phenomenon being studied. My use of visual data as part of my research design delivered a breakthrough in my understanding of triangulation, not as a technique to apply rigidly, but as an implicit feature of good research design that simply helped me to be confident in my interpretations of the data. This is a realisation that I will carry forwards in my future research.

7.2.2 Looking ahead as a teacher educator

The findings of the study have implications for me in my professional role as a university-based teacher educator in highlighting the need for matters of subject knowledge, curriculum and pedagogy to be given far more explicit treatment to achieve greater clarity in teacher education. During my learning journey, I gained a deeper, and more nuanced, comprehension of how subject knowledge is interpreted and understood by my students, fellow university tutors and school mentors. This can be represented by a conceptual framework that is summarised and presented in Figure 11. It has stemmed from a combination of my learning from the theoretical knowledge base and my prolonged interaction with the research data during the process of analysis. From the findings of the study, it seems that individuals' conceptualisations of *subject knowledge* are characterised most frequently by the elements illustrated in Figure 11, with the complexity of understanding increasing from left to right. However, it must be noted that this is not a trajectory of development, nor does it signify a set of distinct typologies. Instead, individuals' conceptions of *subject knowledge* frequently comprised idiosyncratic combinations of features selected from different elements of the framework. The nature of these combinations might also vary for individuals according to the curriculum subject focus.

I have embedded this framework into my teaching to address directly, and explicitly, with student teachers, the nature of subject knowledge. It has the potential to be a stimulus for the dialogue that I originally wanted to begin with fellow teacher educators and school mentors about how we deal with subject knowledge in primary ITT and its role in high quality teaching. The pen portraits have also proved to be an engaging stimulus to provoke discussion with teacher educators. At this point in the research journey, I am conscious of having developed greater empathy with different viewpoints, because I have a fuller understanding of how they arise and gain credence. In this respect, the research has underlined for me the vital importance of developing criticality with student teachers in relation to policy and practice, to encourage them to seek deeper understanding over the course of their careers.

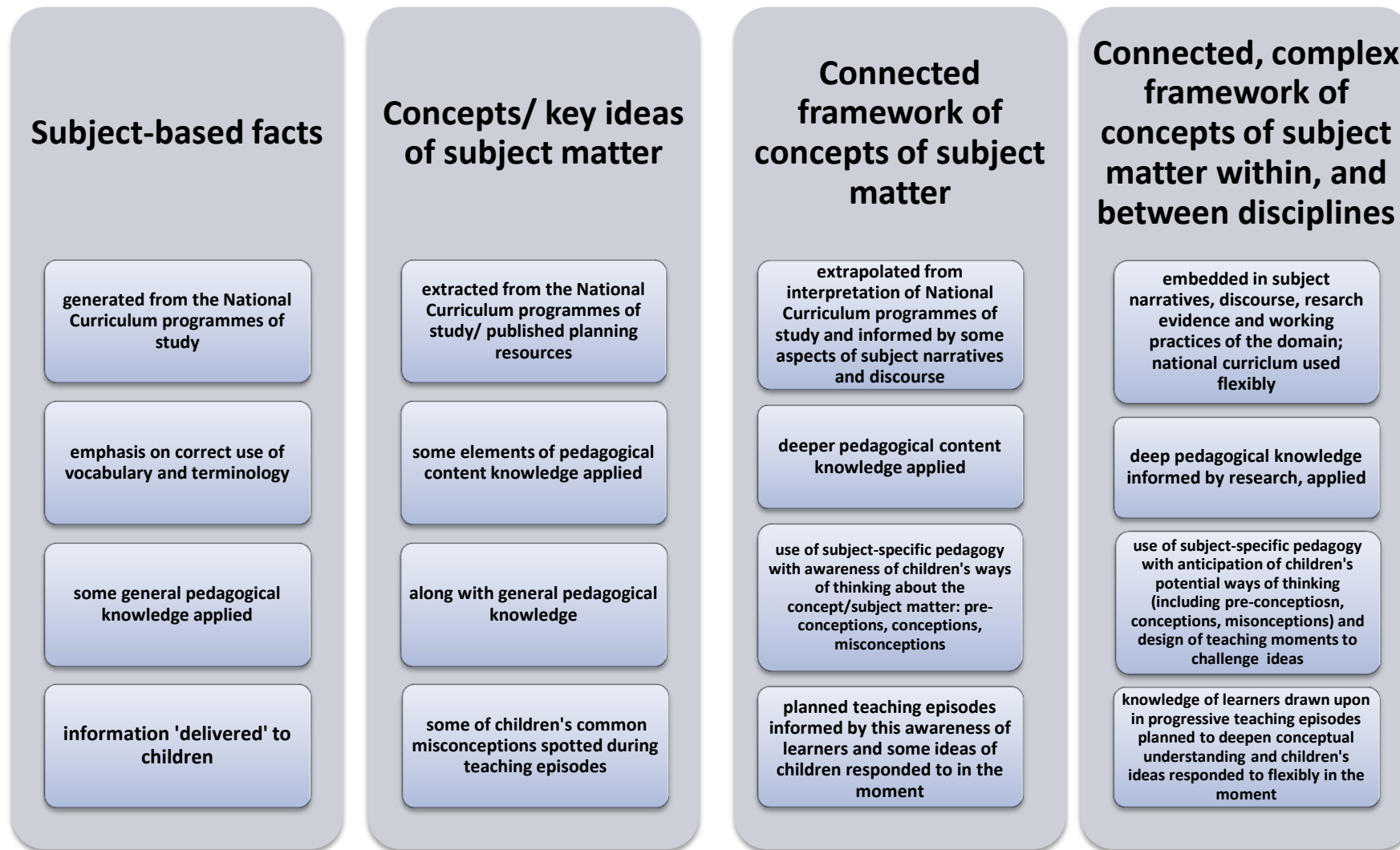


Figure 11 A topography of conceptualisations of subject knowledge in the context of primary ITT

References

- ABELL, S. K. 2008. Twenty years later: Does pedagogical content knowledge remain a useful idea?, *International Journal of Science Education*, 30, 1405-1416.
- ALEXANDER, R. 2001. *Culture and pedagogy: International comparisons in primary education*, Malden, MA, Blackwell.
- ALEXANDER, R. 2004. Still no pedagogy? Principle, pragmatism and compliance in primary education. *Cambridge Journal of Education*, 34, 7-33.
- ALEXANDER, R. J. ed. 2010. *Children, their World, their Education. Final report and recommendations of the Cambridge Primary Review*, Abingdon, Routledge.
- ALEXANDER, R. J., ROSE, A., J. & WOODHEAD, C. 1992. Curriculum Organisation and Classroom Practice in Primary Schools: A discussion paper. London: DES.
- ANDREWS, S. 2001. The language awareness of the L2 teacher: Its impact upon pedagogical practice. *Language Awareness*, 10, 75-90.
- APPLE, M. W. 2001. Markets, standards, teaching and teacher education. *Journal of Teacher Education*, 52, 182-196.
- APPLETON, K. 1995. Student teachers' confidence to teach science: is more science knowledge necessary to improve self-confidence? *International Journal of Science Education*, 17, 357-369.
- ARGYRIS, C. & SCHÖN, D. A. 1974. *Theory in practice: increasing professional effectiveness*, San Francisco, Jossey-Bass.
- ASKEW, M., BROWN, M., RHODES, V., WILLIAM, D. & JOHNSON, D. 1997. *Effective Teachers of Numeracy: Report of a study carried out for the Teacher Training Agency*. London: King's College, University of London.
- ATKINSON, P. & COFFEY, A. 2011. Analysing Documentary Realities. In: SILVERMAN, D. (ed.) *Qualitative Research*. London: Sage.
- AUBREY, C. 1997. *Mathematics Teaching in the Early Years: An Investigation of Teachers' Subject Knowledge*, London, Falmer.
- BALL, S. 1990. *Politics and Policy-Making in Education: explorations in policy sociology*, London, Routledge.
- BALL, S. J. 2013. *Foucault, power and education*, London, Routledge.
- BALL, S. J. & LACEY, C. 1980. Subject disciplines as the opportunity for group action: a measured critique of subject sub-cultures. In: WOODS, P. (ed.) *Teacher Strategies: Explorations in the Sociology of the School*. London: Croom Helm.

- BANKS, F., LEACH, J. & MOON, B. 1999. New Understandings of Teachers' Pedagogic Knowledge. *In: LEACH, J. & MOON, B. (eds.) Learners and Pedagogy*. London: Paul Chapman.
- BASSEY, M. 1999. *Case study research in educational settings*, Maidenhead, Berkshire, Open University Press.
- BENNETT, N. & CARRÉ, C. 1993. *Learning to Teach*, London, Routledge.
- BENNETT, N. & TURNER-BISSET, R. 1993. Case studies in learning to teach, *In: BENNETT, N. & CARRÉ, C. (eds.) Learning to Teach*, London: Routledge.
- BERA. 2011. *Ethical Guidelines for Educational Research*, London, British Educational Research Association.
- BERLINER, D. C. 1988. Implications of studies of expertise in pedagogy for teacher education and evaluation. *In: THE EDUCATIONAL TESTING SERVICE (ed.) New Directions for Teacher Assessment, Proceedings of the 1988 ETS Invitational Conference*. New Jersey: Princetown.
- BERLINER, D. C. 1994a. Expertise: The wonders of exemplary performance. *In: MANGIERI, J. N. & BLOCK, C. C. (eds.) Creating powerful thinking in teachers and students*. New York: Rinehart & Winston.
- BERLINER, D. C. 1994b. Teacher expertise. *In: HUSÈN, T. & POSTLETHWAITE, T. N. (eds.) The international encyclopedia of education*. Elmsford, NY: Pergamon.
- BERLINER, D. C. 2001. Learning about and learning from expert teachers. *International Journal of Educational Research*, 35, 463–482.
- BERLINER, D. C. 2004. Describing the Behavior and Documenting the Accomplishments of Expert Teachers. *Bulletin of Science, Technology and Society*, 24, 200-212.
- BEW, P. 2011. Independent Review of Key Stage 2 testing, assessment and accountability. London: Crown.
- BOND, L., SMITH, T., BAKER, W. K. & HATTIE, J. A. 2000. The certification system of the national board for professional teaching standards: A construct and consequential validity study. Greensboro, NC: Greensboro Center for Educational Research and Evaluation, University of North Carolina at Greensboro.
- BOURDIEU, P. 1977. *Outline of a theory of practice*, Cambridge, Cambridge University Press.
- BOYD, P., BAKER, L., HARRIS, K., KYNCH, C. & MCVITTIE, E. Working with multiple identities: supporting new teacher education tutors in Higher Education. *In: BLOXHAM, S., TWISELTON, S. & JACKSON, A. (eds.) Challenges and opportunities: developing*

- learning and teaching in ITE across the UK, ESCalate 2005 Conference Proceedings, 2006. Higher Education Academy.
- BRITZMAN 2004. *Practice makes practice: A critical study of learning to teach*, Albany, NY, State University of New York Press.
- BROWN, T. & MCNAMARA, O. 2005. *New Teacher Identity and Regulative Government: discursive formation of primary mathematics teacher education*, New York, Springer.
- BROWN, T., MCNAMARA, O., JONES, L. & HANLEY, U. 1999. Primary student teachers' understanding of mathematics and its teaching. *British Education Research Journal*, 25, 299-322.
- BROWN, T., ROWLEY, H. & SMITH, K. 2016. The beginnings of school-led teacher training: New challenges for university teacher education. School Direct Research Project Final Report. Manchester: Manchester Metropolitan University.
- BRYANT, A. 2002. Re-grounding grounded theory. *Journal of Information Technology Theory and Application*, 4, 25-42.
- BRYMAN, A. 2008. *Social Research Methods*, Oxford, Oxford University Press.
- CALDERHEAD, J. 1988. The contribution of field experiences to student primary teachers' professional learning. *Research in Education*, 40, 34-49.
- CALDERHEAD, J. 1991. The nature and growth of knowledge in student teaching. *Teaching and Teacher Education*, 7, 531-535.
- CALDERHEAD, J. 1998. The development of knowledge structures in learning to teach In: CALDERHEAD, J. (ed.) *Teachers' Professional Learning*. Basingstoke: Falmer.
- CAMPBELL, A., MCNAMARA, O. & GILROY, P. 2004. *Practitioner Research and Development in Education*, London, Sage.
- CARTER, A. 2015. Carter review of initial teacher training (ITT). London: Crown.
- CATLING, S. & MORLEY, E. 2013. Enquiring into primary teachers' geographical knowledge. *Education 3-13*, 41, 425-442.
- CHARMAZ, K. 2000. Constructivist and objectivist grounded theory. In: DENZIN, N. & LINCOLN, Y. (eds.) *Handbook of qualitative research*. 2nd ed. Thousand Oaks, CA: Sage.
- CHARMAZ, K. 2006. *Constructing Grounded Theory: A Practical Guide through Qualitative Analysis*, London, Sage.
- CHARMAZ, K. 2008. Constructionism and grounded theory. In: HOLSTEIN, J. A. & GUBRIUM, J. F. (eds.) *Handbook of constructionist research*. New York: Guilford.

- CHARMAZ, K. 2014. *Constructing Grounded Theory*, London, Sage.
- CHASE, S. E. 2005. Narrative Inquiry: Multiple lenses, approaches, voices. *In: DENZIN, N. & LINCOLN, Y. (eds.) The Sage handbook of qualitative research*. 3rd ed. Thousand Oaks, CA: Sage.
- CLANDININ, D. J. & CONNELLY, F. M. 1996. Teachers' Professional Knowledge Landscapes: Teacher Stories. Stories of Teachers. School Stories. Stories of Schools. *Educational Researcher*, 25, 24-30.
- CLARKE, A. E. 2003. Situational analyses: Grounded theory mapping after the post-modern turn. *Symbolic Interaction*, 26, 553-576.
- CLAYDEN, E., DESFORGES, C., MILLS, C. & RAWSON, W. 1994. Authentic Activity and Learning. *British Journal of Educational Studies*, 42, 163-173.
- COCHRAN-SMITH, M. 2008. The new teacher education in the United States: Directions forward. *Teachers and Teaching: Theory and Practice*, 14, 271-282.
- COCHRAN, K. F., DE RUITER, J. A. & KING, R. A. 1993. Pedagogical content knowing: an integrative model for teacher preparation. *Journal of Teacher Education*, 44, 263-272.
- COHEN, D. K. 2000. Innovation: Reconsidering the story. *Paper presented at the meetings of the American Educational Research Association*. New Orleans, LA.
- COHEN, L., MANION, L. & MORRISON, K. 2007. *Research Methods in Education*, Oxon, Routledge.
- CONNELLY, F. M. & CLANDININ, D. J. 1990. *Shaping a professional identity: Stories of education practice*, London, ON, The Althouse Press.
- CONNELLY, F. M. & CLANDININ, D. J. 1999. Stories of Experience and Narrative Inquiry. *Educational Researcher*, 19, 2-14.
- COOREN, F. 2004. Textual agency: how texts do things in organizational settings. *Organization*, 11, 373-393.
- CROTTY, M. 1998. *The Foundations of Social Research: Meaning and perspective in the research process*, London, Sage.
- DADDS, M. & KYNCH, C. 2003. The impact of RAE 3B ratings on educational research in teacher education departments. *Research Intelligence*, 84, 8-11.
- DAVIS, B. & SUMARA, D. J. 1997. Cognition, complexity and teacher education. *Harvard Educational Review*, 67, 105-125.
- DAVIS, B. & SUMARA, D. J. 2000. Curriculum forms: on the assumed shapes of knowing and knowledge. *Journal of Curriculum Studies*, 32, 821-845.

- DENSCOMBE, M. 1998. *The good research guide: for small-scale social research projects*, Buckingham, Open University Press.
- DENZIN, N. 1988. *The Research Act: A Theoretical Introduction to Sociological Methods*, Englewood Cliffs, NJ, Prentice-Hall.
- DENZIN, N. & LINCOLN, Y. 2003. Introduction: The Discipline and Practice of Qualitative Research. In: DENZIN, N. & LINCOLN, Y. (eds.) *The Landscape of Qualitative Research*. 2nd ed. London: Sage.
- DEPARTMENT FOR EDUCATION AND SCIENCE (DES) 1967. Children and their Primary Schools: A Report of the Central Advisory Council for Education (England) (The Plowden Report). London: HMSO.
- DES 1978. Primary education in England: a survey by HM Inspectors of Schools. London: HMSO.
- DES 1979. Aspects of Secondary Education in England: A survey by HM Inspectors of Schools London: HMSO.
- DES 1983. 9-13 Middle Schools: An illustrative survey. London: HMSO.
- DES 1984. Initial Teacher Training: Approval of Courses (Circular 3/84). London: HMSO.
- DES 1989. Initial teacher training: Approval of courses (Circular 24/89). London: HMSO.
- DES 1992. Initial Teacher Training (secondary phase)(Circular 9/92). London: HMSO.
- DES 1993. The initial training of primary school teachers (Circular 14/93). London: HMSO.
- DEPARTMENT FOR EDUCATION (DFE) 2010. The importance of teaching: The schools white paper. London: TSO.
- DFE 2012. Teachers' Standards. London: Crown.
- DFE 2013. The national curriculum in England: framework document. London: Crown.
- DEPARTMENT FOR EDUCATION AND EMPLOYMENT (DFEE) 1988. Education Reform Act 1988. London: HMSO.
- DFEE 1994. Education Act 1994. London: HMSO.
- DFEE 1996. Education Act 1996. London: HMSO.
- DFEE 1997. Teaching: High status, high standards (Circular 10/97). London: HMSO.
- DFEE 1998a. The National Literacy Strategy: framework for teaching literacy from Reception to Year 6. London: DfEE.
- DFEE 1998b. Teaching: High status, high standards (Circular 4/98). London: HMSO.
- DFEE 1999. The National Numeracy Strategy: framework for teaching mathematics from Reception to Year 6. London: DfEE.

- DEPARTMENT FOR EDUCATION AND SKILLS (DFES) 2002. Qualifying to Teach: professional standards for Qualified Teacher Status and requirements for Initial Teacher Training. London: Teacher Training Agency (TTA).
- DFES 2005. Education Act 2005. London: HMSO.
- DEPARTMENT OF EDUCATION 1944. Education Act 1944 (7&8 Geo 6 c. 31) London: HMSO.
- DREIER, O. 1999. Personal trajectories of participation across contexts of social practice. *Outlines: Critical Social Studies*, 1, 5-32.
- DREYFUS, H. L. & DREYFUS, S. E. 1986. *Mind over machine*, New York, Free Press.
- DUGGAN, S. & GOTT, R. 1995. The place of investigations in practical work in the UK National Curriculum for Science. *International Journal For Science Education*, 17, 137-147.
- DUNNE, M., LOCK, R. & SOARES, A. 1996. Partnership in Initial Teacher Training: after the shotgun wedding, *Educational Review*, 48(1), 41-53.
- EAUDE, T. 2013. What makes primary classteachers special? Exploring the features of expertise in the primary classroom. *Teachers and Teaching*, 20, 4-18.
- EDWARDS, A. 1995. Teacher Education: partnership in pedagogy? *Teaching and Teacher Education*, 11, 595-610.
- EDWARDS, A. 1997. Guests bearing gifts: the position of student teachers in primary school classrooms. *British Educational Research Journal*, 23, 27-37.
- EDWARDS, A. 2002. Developing understandings of agency and disposition in sociocultural accounts of learning to teach. *Paper presented at the annual American Educational Research Association*. New Orleans.
- EDWARDS, A. & COLLISON, J. 1996. *Mentoring and Developing Practice in the Primary Schools: Supporting Student Learning in Schools*, Buckingham, Open University Press.
- EDWARDS, A., GILROY, P. & HARTLEY, D. 2002. *Rethinking Teacher Education: collaborative responses to uncertainty*, London: RoutledgeFalmer.
- EDWARDS, A. & OGDEN, L. 1998. Constructing curriculum subject knowledge in primary school teacher training. *Teacher and Teacher Education*, 14, 735.
- EISENHART, M., BORKO, H., UNDERHILL, R., BROWN, C., JONES, D. & AGARD, P. 1991. Conceptual knowledge falls through the cracks: Complexities of learning to teach mathematics for understanding. *Journal for Research in Mathematics Education*, 24, 8-40.
- ELBAZ, F. 1983. *Teacher Thinking: A study of practical knowledge*, New York, Nicholls.

- ELLIS, V. 2007. Taking subject knowledge seriously: from professional knowledge recipes to complex conceptualizations of teacher development. *Curriculum Journal*, 18, 447-462.
- ELLIS, V. 2009. *Subject knowledge and teacher education: The development of beginning teachers' thinking*, New York, Continuum.
- ELLIS, V., GLACKIN, M., HEIGHES, D., NORMAN, M., NORRIS, K., SPENCER, I. & MCNICHOLL, J. 2013. A difficult realisation: the proletarianisation of higher education-based teacher educators. *Journal of Education for Teaching: International research and pedagogy*, 39, 266–280.
- ELLIS, V. & MCNICHOLL, J. 2015. *Transforming Teacher Education. Reconfiguring the academic work*, London, Bloomsbury.
- ERAUT, M. 1994. *Developing professional knowledge and competence*, London, Falmer Press.
- ERICSSON, K. A. & CHARNESS, N. 1994. Expert performance: Its structure and acquisition. *American Psychologist*, 48, 725-747.
- ETZIONI, A. 1969. *The Semi-Professions and their Organization*, New York, Free Press.
- EWING, R. & MANUEL, J. 2005. Retaining quality early career teachers in the profession: new teacher narratives. *Change: Transformations in Education*, 8, 1-16.
- FENSTERMACHER, G. D. & RICHARDSON, V. 2000. On making determinations of quality in teaching. Paper prepared for the Board on International Comparative Studies in Education of the National Academies of Science and the National Research Council, Washington, DC.
- FLICK, U. 2002. *An introduction to qualitative research*, London, Sage.
- FONTANA, A. & FREY, J. H. 2005. The interview: From neutral stance to political involvement. In: DENZIN, N. & LINCOLN, Y. (eds.) *The SAGE handbook of qualitative research*. Thousand Oaks, CA: Sage.
- FURLONG, J. 2005. New Labour and teacher education: the end of an era. *Oxford Review of Education*, 31, 119-134.
- FURLONG, J., BARTON, L., MILES, S., WHITING, C. & WHITTY, G. 2000. *Teacher Education in Transition: re-forming professionalism?*, Buckingham, Open University Press.
- FURLONG, J., CAMPBELL, A., HOWSON, J., LEWIS, S. & MCNAMARA, O. 2006. Partnership in English Teacher Education: changing times, changing definitions - evidence from the Teacher Training Agency National Partnership Project. *Scottish Education Review*, 37, 32-45.

- FURLONG, J. & MAYNARD, T. 1995. *Mentoring Student Teachers: The Growth of Professional Knowledge*, London, Routledge.
- GARDNER, H. 1995. Why would anyone become an expert. *American Psychologist*, 50, 802-803.
- GEERTZ, C. 1973. Thick description: Toward an interpretive theory of culture. In: GEERTZ, C. (ed.) *The interpretation of cultures*. New York: Basic Books.
- GLASER, B. 1978. *Theoretical Sensitivity*, Mill Valley, CA, Sociology Press.
- GLASER, B. 1998. *Doing grounded theory: Issues and discussions*, Mill Valley, CA, Sociology Press.
- GLASER, B. & STRAUSS, A. 1967. *The Discovery of Grounded Theory*, Chicago, Aldine.
- GLASER, R. 1999. Expert knowledge and processes of thinking. In: MCCORMICK, R. & PAECHTER, C. (eds.) *Learning and knowledge*. London: Paul Chapman.
- GOLBY, M., MARTIN, A. & PORTER, M. 1995. Some researchers' understanding of primary teaching: comments on Mant and Summers' 'Some primary-school teachers' understanding of the Earth's place in the universe.' *Research Papers in Education*, 10, 297-302.
- GOODE, W. J. 1969. The theoretical limits of professionalization. In: ETZIONI, A. (ed.) *The Semi-Professions and their Organization*. New York: Free Press.
- 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.
- GREAT BRITAIN. 1998. *Data Protection Act*. London: HMSO.
- GREEN, S. & OLLERTON, M. 1999. Mathematical anxiety amongst primary QTS students. Proceedings of the British Society for Research into Learning Mathematics, 1999. St. Martin's College, Lancaster.
- GREENO, J. 1997. On claims that answer the wrong question. *Educational Researcher*, 26, 5-17.
- GREENWOOD, J. 1994. Action research and action researchers: Some introductory considerations. *Contemporary Nurse*, 3, 84-92.
- GRIMMETT, P. P. & MACKINNON, A. M. 1992. Craft knowledge and the education of teachers. *Review of Research in Education*, 18, 385-456.
- GROSSMAN, P. 1987. A tale of two teachers: the role of subject matter orientation in teaching. *Annual Meeting of the American Education Research Association*. Washington, DC.

- GROSSMAN, P. 1990. *The making of a teacher: teacher knowledge and teacher education*, New York, Teachers College Press.
- GROSSMAN, P. 1995. Teachers' Knowledge. In: ANDERSON, L. W. (ed.) *International Encyclopaedia of Teaching and Teacher Education*. Oxford: Elsevier.
- GUBA, E. G. & LINCOLN, Y. 1981. *Effective evaluation*, San Francisco, Jossey-Bass.
- GUBA, E. G. & LINCOLN, Y. 1994. Competing paradigms in qualitative research. In: DENZIN, N. & LINCOLN, Y. (eds.) *Handbook of qualitative research*. Thousand Oaks, CA: Sage.
- GUBRIUM, J. F. & HOSLSTEIN, J. A. 1997. *The New Language of Qualitative Method*, New York, Oxford University Press.
- GUDMUNSDOTTIR, S. 1991. Values in pedagogical content knowledge. *Journal of Teacher Education*, 41, 44-52.
- HAMILTON, D. 1999. The pedagogic paradox (or Why No Didactics in England?). *Pedagogy, Culture and Society*, 7, 135-152.
- HAMMERSLEY, M. 1990. *Reading Ethnographic Research: a Critical Guide*. London, Longmans.
- HARGREAVES, A. 2000. Four Ages of Professionalism and Professional Learning. *Teachers and Teaching*, 6, 151-182.
- HEYWOOD, D. S. 2005. Primary Trainee Teachers' Learning and Teaching About Light: Some pedagogic implications for initial teacher training. *International Journal of Science Education*, 27, 1447-1475.
- HILLOCKS, G., JR. 1999. *Ways of Thinking, Ways of Teaching*, New York, Teachers College Press.
- HODKINSON, H. & HODKINSON, P. 2005. Improving school teachers' workplace learning. *Research Papers in Education*, 20, 109-131.
- HODSON, E., SMITH, K. & BROWN, T. 2011. Reasserting theory in professionally-based initial teacher education. *Teachers and Teaching*, 18, 181-195.
- HOYLE, E. 1974. Professionalism, professionalism and control in teaching. *London Educational Review*, 3.
- HU, J. 2014. A critical review of Pedagogical Content Knowledge components: nature, principle and trend. *International Journal of Education and Research* 2, 411-424.
- HUBERMAN, A. & MILES, M. 2002. *The Qualitative Researcher's Companion*, London, Sage.
- HUSTLER, D., MCNAMARA, O., JARVIS, J., LONDRA, M. & CAMPBELL, A. 2003. Teachers' Perceptions of Continuing Professional Development. Research report 429. London: DfES.

- INDEPENDENT EXPERT GROUP ON A NEW CORE CONTENT FRAMEWORK FOR ITT. 2016. A framework of core content for initial teacher training (ITT). London, Crown.
- JAMES, M. & POLLARD, A. 2011. TLRP's ten principles for effective pedagogy: rationale, development, evidence, argument and impact. *Research Papers in Education*, 26, 275-328.
- JOHNSON, T. J. 1972. *Professions and Power*, London, Macmillan.
- JOHNSON, T. J. 1984. Professionalism: Occupation or ideology. In: GOODLAD, S. (ed.) *Education for the Professions: Quis Custodiet?* London: SHRE & NFER-Nelson.
- JONES, M. & STRAKER, K. 2006. What informs mentors' practice when working with trainees and newly qualified teachers? An investigation into mentors' professional knowledge base, *Journal of Education for Teaching: International Research and Pedagogy*, 32(2), 165-184.
- KELCHTERMANS, G. 2009. Who I am in how I teach is the message: self-understanding, vulnerability and reflection. *Teachers and Teaching*, 15, 257-272.
- KINCHELOE, J. L. 2001. Describing the bricolage: Conceptualizing a new rigor in qualitative research. *Qualitative Inquiry*, 7, 679-692.
- KLEINMAN, S., STENROSS, B. & MCMAHON, M. 1994. Privileging fieldwork over interviews: consequences for identity and practice. *Symbolic Interaction*, 17, 37-50.
- KRIPPENDORFF, K. 2004. *Content Analysis: An introduction to its methodology*, Thousand Oaks, CA, Sage.
- KVALE, S. 1996. *InterViews: An introduction to qualitative research interviewing*, Thousand Oaks, CA, Sage.
- LABAREE, D. F. 1992. Power, knowledge, and the rationalization of teaching: a genealogy of the movement to professionalize teaching. *Harvard Educational Review*, 6, 123-153.
- LAUDER, H., BROWN, P., DILLABOUGH, J. A. & HALSEY, A. H. 2006. *Education, Globalization and Social Change*, Oxford, Oxford University Press.
- LAVE, J. 1988. *Cognition in Practice, Mind, Mathematics and Culture in Everyday Life*, Cambridge, Cambridge University Press.
- LAVE, J. & WENGER, E. 1991. *Situated Learning: Legitimate Peripheral Participation*, Cambridge, Cambridge University Press.
- LEACH, J. & MOON, B. 2000. Pedagogy, information and communications technology and teachers' professional knowledge. *The Curriculum Journal*, 11, 385-404.

- LEINHARDT, G. 1988. Situated knowledge and expertise in teaching. *In: CALDERHEAD, J. (ed.) Teachers' Professional Learning*. London: Falmer Press.
- LINCOLN, Y. & GUBA, E. G. 1985. *Naturalistic Inquiry*, Beverley Hills, California, Sage.
- LORTIE, D. 1975. *School Teacher*, Chicago, IL, University of Chicago Press.
- LYOTARD, J. F. 1984. *The postmodern condition: A report on knowledge*. Manchester, UK: Manchester University Press.
- MAGNUSSON, S., KRAJCIK, J. & BORKO, H. 1999. Nature, sources, and development of pedagogical content knowledge for science teaching. *In: GESS-NEWSOME, J. & LEDERMAN, N. G. (eds.) Examining pedagogical content knowledge: The construct and its implications for science education*. The Netherlands: Kluwer Academic Publishers.
- MARKS, R. 1990. Pedagogical content knowledge: From a mathematical case to a modified conception. *Teacher Education*, 41, 3-11.
- MAY, T. 2011. *Social research: Issues, methods and process*, Berkshire, UK, McGraw-Hill/OUP.
- MAYNARD, T. & FURLONG, J. 1993. Learning to teach and models of mentoring. *In: MCINTYRE, D., HAGGER, H. & WILKIN, M. (eds.) Mentoring: Perspectives on School Based Teacher Education*. London: Kogan Page.
- MCEWAN, H. & BULL, B. 1991. The Pedagogic Nature of Subject Matter Knowledge. *American Educational Research Journal*, 28, 316-334.
- MCINTYRE, D. 1992. Theory, theorising and reflection. *In: CALDERHEAD, J. (ed.) Conceptualising reflection in teacher development*. London: Falmer Press.
- MCKEON, F. 2004. Teacher autonomy and subject knowledge. *Education 3-13*, 32, 32-37.
- MCKEON, F. & HARRISON, J. 2010. Developing pedagogical practice and professional identities of beginning teacher educators. *Professional Development in Education*, 36, 25-44.
- MCLAUGHLIN, M. & TALBERT, J. 1993. *Contexts that matter for teaching and learning: Strategic opportunities for meeting the nation's educational goals*. Stanford, CA: Center for Research on the Context of Secondary School Teaching, Stanford University.
- MCNAIR, A. 1944. *Teachers and Youth Leaders (The McNair Report)*. London: HMSO.
- MCNAMARA, D. 1991. Subject knowledge and its application: problems and possibilities for teacher educators. *Journal of Education for Teaching*, 17, 113-128.

- MCNAMARA, O., WEBB, R. & BRUNDRETT, M. 2010. Primary Teachers: Initial teacher education, continuing professional development and school leadership development. *In: ALEXANDER, R., WITH, DODDINGTON, C., GRAY, J., HARGREAVES, L. & KERSHNER, R. (eds.) The Cambridge Primary Review Research Surveys.* London: Routledge.
- MEDWELL, J., WRAY, D., POULSON, L. & FOX, R. 1998. Effective Teachers of Literacy: Final Report on a Research Project. Exeter: University of Exeter.
- MEREDITH, A. 1995. Terry's learning: some limitations of Shulman's pedagogical content knowledge, *Cambridge Journal of Education*, 25, 176-187.
- MERTON, R. K. 1960. Some Thoughts on the Professions in Americal Society. Providence Brown University Papers No. 37.
- MILES, M., HUBERMAN, A. & SALDAÑA, J. 2014. *Qualitative Data Analysis: A Methods Sourcebook*, Thousand Oaks, CA, Sage.
- MILES, M. B. & HUBERMAN, A. M. 1994. *Qualitative data analysis: an expanded sourcebook* Thousand Oaks, CA, Sage.
- MILLER, J. & GLASSNER, B. 2011. The "Inside" and the "Outside": Finding realities in interviews. *In: SILVERMAN, D. (ed.) Qualitative Research.* London: Sage.
- MURRAY, J. & MALE, T. 2005. Becoming a teacher educator: evidence from the field. *Teaching and Teacher Education*, 21, 125-142.
- NATIONAL BOARD FOR PROFESSIONAL TEACHING STANDARDS. 1994. What teachers should know and be able to do. Detroit, MI: Author.
- NORTH WEST CONSORTIUM OF UNIVERSITIES & TEACHFIRST. 2012. North West Consortium Trainee Teachers' Standards Assessment Descriptors. NW Consortium: TeachFirst.
- OFSTED 2015. Initial teacher education inspection handbook. Manchester: Crown.
- OFSTED 2016. The school inspection handbook. London: Crown.
- ORBUCH, T. L. 1997. People's accounts count: the sociology of accounts. *Annual Review of Sociology*, 23, 455-478.
- OXFORD ENGLISH DICTIONARY. 2016. "secure, adj., adv., and n.1". OED Online. December 2016. Oxford University Press.
<http://www.oed.com/view/Entry/174647?result=2&rskey=HwunMn&> (accessed December 5, 2016).

- PARK, S. & OLIVER, J. S. 2008. Revisiting the conceptualisation of pedagogical content knowledge (PCK): PCK as a conceptual tool to understand teachers as professionals. *Research in Science Education*, 38, 261-284.
- PARKER, J. 2004. The synthesis of subject and pedagogy for effective learning and teaching in primary science education. *British Educational Research Journal*, 30, 819-839.
- PARSONS, T. 1968. Professions. In: SILLS, D. (ed.) *International Encyclopedia of the Social Sciences*, XII. New York: Macmillan and Free Press.
- PATTON, M. Q. 1980. *Qualitative Evaluation Methods*, Beverley Hills, CA, Sage.
- PEISER, G. & JONES, M. 2013. The influence of teachers' interests, personalities and life experiences in intercultural languages teaching. *Teachers and Teaching*, 20, 375-390.
- POLANYI, M. 1983. *The tacit dimension*, Gloucester, MA, Peter Smith.
- POLLARD, A. 2014. *Reflective teaching in schools*, London, Bloomsbury.
- POULSON, L. 2001. Paradigm Lost? Subject Knowledge, Primary Teachers and Education Policy. *British Journal of Educational Studies*, 49, 40-55.
- POULSON, L., AVRAMIDIS, E., FOX, R., MEDWELL, J. & WRAY, D. 2001. The theoretical beliefs of effective teachers of literacy in primary schools: an exploratory study. *Research Papers in Education*, 16, 271-292.
- PRICE, A. & WILLETT, J. 2006. Primary teachers' perceptions of the impact of initial teacher training on primary schools. *Journal of In-Service Education*, 32, 33-45.
- PRIOR, L. 2008. Repositioning documents in social research. *Sociology*, 42, 821-836.
- PROSSER, J. 2011. Visual methodology. In: DENZIN, N. & LINCOLN, Y. (eds.) *The Sage handbook of qualitative research*. 4th ed. Thousand Oaks, CA: Sage.
- ROBBINS, L. 1963. Report of the Committee of Higher Education (the Robbins Report). London: HMSO.
- ROBSON, C. 2011. *Real World Research*, Chichester, West Sussex, Wiley.
- ROVEGNO, I. C. 1992. Learning to teach in a field-based methods course: the development of pedagogical content knowledge. *Teaching and Teacher Education*, 8, 69-82.
- ROWLAND, T., HUCKSTEP, P. & THWAITES, A. 2005. Elementary Teachers' Mathematics Subject Knowledge: the Knowledge Quartet and the Case of Naomi. *Journal of Mathematics Teacher Education*, 8, 255-281.
- RYEN, A. 2004. Ethical issues. In: SEALE, C., GOBO, G., GUBRIUM, J. F. & SILVERMAN, D. (eds.) *Qualitative research practice*. London: Sage.

- SACHS, J. 2001. Teacher professional identity: competing discourses, competing outcomes. *Journal of Education Policy*, 16, 149-161.
- SCHÖN, D. 1983. *Educating The Reflective Practitioner: How Professionals Think in Action*, New York, Basic Books.
- SCHWAB, J. J. 1964. The Structure of the Disciplines: Meanings and Significance. In: FORD, G. L. & PURGO, L. (eds.) *The Structure of Knowledge and the Curriculum*. Chicago: Rand McNally.
- SCHWAB, J. J. 1978. *Science, curriculum and liberal education*, Chicago, University of Chicago Press.
- SEALE, C. 1999. *The quality of qualitative research*, London, Sage.
- SHAGRIR, L. 2010. Professional development of novice teacher educators: professional self, interpersonal relations and teaching skills. *Professional Development in Education*, 36, 45–60.
- SHULMAN, L. S. 1986. Those Who Understand: Knowledge Growth in Teaching. *Educational Researcher*, 15, 4-14.
- SHULMAN, L. S. 1987. Knowledge and Teaching: Foundations of the New Reform. *Harvard Educational Review*, 57, 1-21.
- SILBERSTEIN, M. & TAMIR, P. 1991. The expert case study model: an alternative approach to the development of teacher education modules, *Journal of Education for Teaching*, 17, 165-179.
- SIMON, B. 1981. Why no pedagogy in England? In: SIMON, B. & TAYLOR, W. (eds.) *Education in the eighties: the central issues*. London: Batsford.
- SIMON, B. 1994. *The state and educational change: essays in the history of education and pedagogy*, London, Lawrence & Wishart.
- SMITH, D. N. 1999. College ideals and school practice. *Mathematics Education Review*, 10, 13-19.
- STAKE, R. 1995. *The art of case study research*. Thousand Oaks, CA: Sage.
- STAR, S. L. 2007. Living grounded theory: Cognitive and emotional forms of pragmatism. In: BRYANT, A. & CHARMAZ, K. (eds.) *Handbook of grounded theory*. London: Sage.
- STERNBERG, R. J. & HORVATH, J. A. 1995. A prototype view of expert teaching. *Educational Researcher*, 24, 9-17.
- STONES, E. 1994. *Quality Teaching: a sample of cases*. London, Routledge.

- STRATHERN, M. 2003. New Accountabilities: anthropological studies in audit, ethics and the academy. In: STRATHERN, M. (ed.) *Audit Cultures: Anthropological studies in accountability, ethics and the academy*. Londond: Routledge.
- STRAUSS, A. & CORBIN, B. 1998. *Basics of qualitative research: Grounded theory procedures and techniques*, Thousand Oaks, CA, Sage.
- STRAUSS, A. & CORBIN, J. 1990. *Basics of qualitative research: Grounded theory procedures and techniques*, Newbury Park, CA, Sage.
- STRONACH, I., CORBIN, B., MCNAMARA, O., STARK, S. & WARNE, T. 2002. Towards an uncertain politics of professionalism: teacher and nurse identities in flux. *Journal of Education Policy*, 17, 109-138.
- STRONG, M. & BARON, W. 2004. An analysis of mentoring conversations with beginning teachers: Suggestions and responses. *Teaching and Teacher Education*, 20, 47–57.
- TAMIR, P. 1988. Subject matter and related pedagogical knowledge in teacher education. *Teaching and Teacher Education*, 4, 99-110.
- TAYLOR, W. 2000. The role of the providers. In: REID, I. (ed.) *Improving schools: the contribution of teacher education and training: an account of the Joint UCET/HMI Symposium, Edinburgh, December*. London: UCET.
- TRAINING AND DEVELOPMENT AGENCY (TDA) 2007a. Developing trainees' subject knowledge for teaching: A way of looking at subject knowledge for teaching. London: TDA.
- TDA 2007b. Professional Standards for Teachers: Core. London: TDA.
- TOCHON, F. & MUNBY, H. 1993. Novice and expert teachers' time epistemology: A wave function from didactics to pedagogy. *Teacher & Teacher Education*, 9, 205-218.
- TURNER-BISSET. 1997. *Subject matter knowledge and teaching competence*. Unpublished doctoral thesis, University of Exeter.
- TURNER-BISSET, R. 1999. The Knowledge Bases of the Expert Teacher. *British Educational Research Journal*, 25, 39-55.
- TWISLTON, S. 2000. Seeing the Wood for the Trees: The National Literacy Strategy and Initial Teacher Education; pedagogical content knowledge and the structure of subjects. *Cambridge Journal of Education*, 30, 391-403.
- UCET/NASBTT/HEA 2012. Working with the Teachers' Standards in Initial Teacher Education. Guidance to support assessment for Qualified Teacher Status (QTS). YORK: HEA.

- VAN DRIEL, J. H., VERLOOP, N. & DE VOS, W. 1998. Developing science teachers' pedagogical content knowledge. *Journal of Research in Science Teaching*, 35, 673-695.
- VERRET, M. 1975. *Le Temps des études*, Paris, Librairie Honoré Champion.
- WARD, G. 2013. Examining primary schools' physical education coordinators' pedagogical content knowledge of games: are we just playing as this? *Education 3-13*, 41, 562-585.
- WARWICK, P., LINFIELD, R. & STEPHENSON, P. 1999. A comparison of primary school pupils' ability to express procedural understanding in science through speech and writing. *International Journal of Science Education*, 21, 955-968.
- WEBER, S. 2008. Visual images in research. In: KNOWLES, J. G. & COLE, A. L. (eds.) *Handbook of the arts in qualitative research*. London: Sage.
- WEINSTEIN, D. & WEINSTEIN, M. A. 1991. Georg Simmel: Sociological *flaneur bricoleur*. *Theory, culture & society*, 8, 151-168.
- WILLIAMS, J. & RITTER, J. 2010. Constructing new professional identities through self study: from teacher to teacher educator. *Professional Development in Education*, 36, 77-92.
- WILSON, S. M. & WINEBURG, S. S. 1988. Peering at history with different lenses: the role of disciplinary perspectives in teaching history. *Teachers College Record*, 89, 525-539.
- WOOD, D. 1988. *How children think and learn*, Oxford, Blackwell.
- WRAGG, E. C., BENNETT, S. N. & CARRE, C. 1989. Primary teachers and the national curriculum. *Research Papers in Education*, 4, 17-45.
- WUBBELS, T. 1992. Taking account of student teachers' preconceptions. *Teaching and Teacher Education*, 8, 137-149.
- ZEICHNER, K. M., TABACHNICK, B. R. & DENSMORE, S. 1987. Individual, institutional and cultural influences on the development of teachers' craft knowledge. In: CALDERHEAD, J. (ed.) *Exploring Teachers' Thinking*. London: Cassell.

APPENDICES



INFORMATION SHEET

For [insert name here], [insert name of department here]

An investigation of the nature, role and purpose of subject knowledge in the initial teacher training of primary school teachers

Researcher: Deborah Pope, Faculty of Education, Community and Leisure, LJMU.

With your permission, I would like to invite final year students on the four-year undergraduate BA (Hons) Primary Education with QTS programme to take part in a research study, along with their allocated school mentors and liaison tutors. I have provided some information regarding the research study below, including what would be involved for potential participants. Please ask me if there is anything that is not clear or if you would like more information.

1. What is the purpose of the study?

Although the study is focused on the training of primary teachers at [insert institution name], it is also located within the wider context of initial teacher training in England. The Professional Standards for QTS require students to provide evidence of their subject knowledge for teaching in order to qualify and OfSTED inspections of initial teacher training programmes place emphasis on trainees' subject knowledge development. However, research around teachers' subject knowledge is predominantly focused on secondary teaching, as is the university/school partnership model operating in many institutions involved in initial teacher training.

Against this backdrop, I would like to investigate perceptions of 'subject knowledge' from the perspectives of primary education students, school mentors and liaison tutors. I am interested in understanding how students construct and develop their subject knowledge and what role it plays in their teaching. By gaining a more detailed insight into students' experiences, I anticipate that the findings can enhance the quality of the university and school-based programme for undergraduate primary teacher training and improve the support and guidance given to student teachers by their tutors and mentors. It will also inform the guidance, support and professional development provision for liaison tutors and school mentors.

2. Do the relevant stakeholders have to take part?

Participation in this study is entirely voluntary. It is up to individuals to decide whether or not to take part. If they do, they will have the option of taking part in the questionnaire survey only or combining the survey with follow-up interviews. All individuals will be given an information sheet similar to this and asked to sign a consent form. They are free to withdraw at any time and without giving a reason. A decision to withdraw will not affect their rights/any future service they receive.

3. What will happen to participants?

If they decide to take part, they will be involved in data collection at different points. They will be asked to complete a questionnaire right at the start of the students' final year. If they are approached and agree to take part, follow-up interviews (probably one but perhaps two) will take place at the end of the year. The aim is to explore the themes that have emerged from the questionnaire data in greater depth.

All activities will take place either on university premises or in the placement school, as appropriate. Interviews will be audio recorded and take approximately 30 minutes.

4. Are there any risks / benefits involved?

There are no risks involved in participating in this project. Completing the questionnaires and/or taking part in the interviews may make some small demands on individuals' time. At the same time I would like to emphasise that being involved in this study may help participants to clarify their own thoughts and reflections about subject knowledge for primary teaching and its role in professional learning and development. I anticipate that the findings of this study will be used to inform the development of the Primary Education programme, particularly in respect to the university-school partnership.

5. Will my taking part in the study be kept confidential?

In order to facilitate tracking of questionnaire and interview responses, I will need to ask participants to provide me with their name and in the case of interview participation their contact details. However, I will assure you that all the information provided will be treated in strictest confidence and anonymity will be protected by means of a coding system. Completed paper copies of the questionnaire will be placed in a sealed envelope and kept in a locked filing cabinet. All data (completed questionnaires, interview transcriptions and documentary evidence) will be coded and stored securely in a locked office and electronic files will be protected by means of a password. All data will be destroyed five years after completion of the research.

Contact Details of Researcher

Deborah Pope

E-mail: d.pope@ljmu.ac.uk

Tel: 0151 231 5487

To be completed by [insert name and job title of Head of Department]

- 1. I confirm that I have read and understand the information provided for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.

- 2. I agree to the researcher approaching and recruiting students, liaison tutors and school mentors from the BA (Hons) Primary Education with QTS programme to participate in this research study.

- 3. I understand that participation is voluntary and that I am free to withdraw at any time, without giving a reason and that this will not affect my legal rights.

Name:
Position:
Signature:
Date:

Name of researcher:

Signature:

Date:

PARTICIPANT INFORMATION SHEET



An investigation of the nature, role and purpose of ‘subject knowledge’ in the initial teacher training of primary school teachers

Researcher: Deborah Pope, Faculty of Education, Community and Leisure, LJMU

You are being invited to take part in a research study. Before you decide to take part, it is important that you understand why the research is being done and what it involves. Please take time to read the following information. Ask me if there is anything that is not clear or if you would like more information. You should take time to decide if you want to take part or not.

1. What is the purpose of the study?

This study is focused on the training of primary teachers within Higher Education Institutions; it is also located within the wider context of initial teacher training in England. The Professional Standards for QTS require students to provide evidence of their subject knowledge for teaching in order to qualify and OfSTED inspections of initial teacher training programmes place emphasis on trainees’ subject knowledge development. However, research around teachers’ subject knowledge is predominantly focused on secondary teaching, as is the university/school partnership model operating in many institutions involved in initial teacher training.

Against this backdrop, I would like to investigate perceptions of ‘subject knowledge’ from the perspectives of primary education students, school mentors and university link tutors. I am interested in understanding how students construct and develop their subject knowledge and what role it plays in your teaching. By gaining a more detailed insight into your experiences, I anticipate that the findings can enhance the quality of the university and school-based programme for undergraduate primary teacher training and improve the support and guidance given to student teachers by their tutors and mentors.

2. Do I have to take part?

Participation in this study is entirely voluntary. It is up to you to decide whether or not to take part. If you do, you will have the option of taking part in the questionnaire survey only or combining the survey with a follow-up interview. You are free to withdraw at any time and without giving a reason. A decision to withdraw will not affect your rights/any future service you receive.

3. What will happen to me if I take part?

If you decide to take part, you will be asked to complete a questionnaire and indicate if you might be willing to be interviewed. If you are approached and agree to take part, a follow-up interview will take place on university premises and at a time to suit you. Interviews will be audio-recorded and last approximately 40 minutes. The aim is to explore the themes that have emerged from the questionnaire data in greater depth.

4. Are there any risks / benefits involved?

There are no risks involved in participating in this project. I would like to make you aware that completing the questionnaires and/or taking part in the interviews may make some small demands on your time. At the same time I would like to emphasise that being involved in this study may help you to clarify your own thoughts and reflections about subject knowledge for primary teaching and its role in your professional learning and development. The findings of this study will be used to inform the development of the Primary Education programme, particularly in respect to the university-school partnership. It may thus not be of immediate benefit to you, but assist new generations of student teachers in their preparation for teaching. If you become a student mentor in your future career, the findings may benefit you at this later date.

5. Will my taking part in the study be kept confidential?

In order to facilitate tracking of questionnaire and interview responses, I need to ask you to provide me with your name and in the case of interview participation your contact details. However, I will assure you that all the information you provide will be treated in strictest confidence and your anonymity will be protected by means of a coding system. Completed paper copies of the questionnaire will be placed in a sealed envelope and kept in a locked filing cabinet. All data (completed questionnaires, interview transcriptions and documentary evidence) will be coded and stored securely in a locked office and electronic files will be protected by means of a password. All data will be destroyed five years after completion of the research.

Contact Details of Researcher

Deborah Pope

E-mail: d.pope@ljmu.ac.uk

Tel: 0151 231 5487

Appendix 3 Questionnaire for student teachers

**An investigation of the nature, role and purpose of
'subject knowledge' in the initial teacher training
of primary school teachers**



Questionnaire for student teachers

Thank you for agreeing to complete this questionnaire. The purpose of this survey is to investigate 'subject knowledge' in initial teacher training in the context of undergraduate Primary Education degree courses with QTS located within Higher Education Institutions. It is conducted in line with the *British Educational Research Association Revised Ethical Guidelines 2011*. [<https://www.bera.ac.uk/wp-content/uploads/2014/02/BERA-Ethical-Guidelines-2011.pdf>]

If you are happy to complete the questionnaire, please place a tick in the box beside the statement below.

I have read the Participant Information sheet and understand the information provided about the project.

Your name

.....

(In order to protect your anonymity, each questionnaire will be coded by the researcher.)

Please complete the gaps or circle the appropriate response.

1. What is your specialist subject within primary education?

.....

2. What is your highest qualification (with grade) in each of these subjects:

English.....

Mathematics

Science.....

3. Which subjects did you study at 'A'-level (or equivalent)?

Please list below and indicate the grade you achieved in brackets beside the subject.

.....

.....

.....

4. Did you have a career prior to beginning teacher training?

No Yes (please give details of your role and length of career below)

.....

5. Please identify your age group.

- | | | | | |
|-------|-------|-------|-------|-------|
| 21-22 | 23-24 | 25-26 | 27-30 | 31-35 |
| 36-40 | 41-45 | 46-50 | 51-55 | 56+ |

6. In your opinion, what **knowledge** is needed for primary teaching?

.....

.....

.....

.....

7. Drawing on your answer to question 6, what do you think is the **most important** type of knowledge needed by primary teachers and why?

.....

.....

.....

8. What is **your** definition of the term '**subject knowledge**' in the context of your studies and training to become a primary teacher?

.....

.....

.....

.....

9. How important is 'subject knowledge' (as you have defined in question 8) to you in your studies and training to become a primary teacher? Give reasons for your answer.

.....

.....

.....

.....

10. How have you developed the subject-specific knowledge that you use in your teaching?

.....

.....

.....

11. Please answer this question by placing a tick in the box below the number that best represents your response to each statement.

1= strongly disagree 2= disagree 3= neutral 4= agree 5=strongly agree

	Statement	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
		1	2	3	4	5
a	Primary teachers need many different kinds of knowledge.					
b	'Subject knowledge' is concerned with content and facts.					
c	'Subject knowledge' includes how to teach a particular subject.					
d	'Subject knowledge' is a mixture of many other types of knowledge.					
e	The term 'subject knowledge' is used in the same way to mean the same thing by all the people involved in all aspects of my training.					
f	The university-based element of my training has helped me to develop my subject-specific knowledge.					
g	The school-based element of my training has helped me to develop my subject-specific knowledge.					
h	I have received feedback on my subject-specific knowledge through university-based activities.					
i	I have received feedback on my subject-specific knowledge through school-based activities.					
j	My university tutors have helped me to set subject-specific targets.					
k	My school-based mentors have helped me to set subject-specific targets.					
l	My liaison tutors have helped me to set subject-specific targets.					
m	University tutors, liaison tutors and school-based mentors attach equal importance to subject-specific knowledge.					
n	My subject-specific knowledge has improved over the last three years of the course.					
o	I am confident to teach all subjects of the primary curriculum.					
p	I feel more confident teaching subjects that I know more about.					
q	Primary teachers with good subject knowledge are better teachers.					

THANK YOU FOR COMPLETING THIS QUESTIONNAIRE

If you would be willing to be interviewed please indicate by circling the relevant response:
YES NO

LIVERPOOL JOHN MOORES UNIVERSITY



CONSENT FORM

For Student Teachers

**An investigation of the nature, role and purpose of ‘subject knowledge’
in the initial teacher training of primary school teachers**

Researcher: Deborah Pope, Faculty of Education, Community and Leisure, LJMU.

1. I confirm that I have read and understand the information provided for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.
2. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving a reason and that this will not affect my legal rights.
3. I understand that any personal information collected during the study will be anonymised and remain confidential.
4. I agree to take part in the interview.
5. I agree to my files containing coursework items (e.g. lesson plans, lesson observation feedback sheets, reflective logs etc.) being available for the collection of additional information in relevance to the research question.
6. I understand that the interviews will be audio recorded and I am happy to proceed.
7. I understand that parts of our conversation may be used verbatim in future publications or presentations but that such quotes will be anonymised.

Name of Participant	Date	Signature
Name of Researcher	Date	Signature
Name of Person taking consent	Date	Signature

INTERVIEW SCHEDULE FOR STUDENT TEACHERS

Primary teaching

- Why did you want to become a primary teacher?
- What are your motivations now?
- What do you think makes an expert primary teacher?
- How does this compare with your opinion of what makes an expert secondary teacher?

Subject knowledge

- What is *subject knowledge* for primary teaching in your opinion?
- Have your thoughts changed over your training?
- **Drawing task:** visual representation of the areas of subject knowledge for primary teaching and how they might be related. Talk/question as they draw.

Influences

- What has influenced your thinking about *subject knowledge*?
- What impact has the university-based training had on you in relation to SK?
 - University tutors?
 - Response to the auditing process?
- What impact has the school-based training had on you in relation to SK?
 - School mentors?
 - School contexts?
- What independent, personal activities have you engaged with in relation to SK development?
- Is there one thing that has helped you most with regard to SK development? Why? How did it do this?

Outcomes/experiences relating to subject knowledge

- Can you tell me about a time when your subject-specific knowledge enhanced your practice as a primary teacher?
- Can you tell me about a time when your subject-specific knowledge impaired your practice as a primary teacher?
- What is the role of subject-specific knowledge in primary teaching?
- What are your thoughts about your own subject-specific knowledge as a beginning primary teacher?

LIVERPOOL JOHN MOORES UNIVERSITY

PARTICIPANT INFORMATION SHEET



for School Mentors

An investigation of the nature, role and purpose of ‘subject knowledge’ in the initial teacher training of primary school teachers

Researcher: Deborah Pope, Faculty of Education, Community and Leisure, LJMU.

You are being invited to take part in a research study. Before you decide to take part, it is important that you understand why the research is being done and what it involves. Please take time to read the following information. Ask me if there is anything that is not clear or if you would like more information. You should take time to decide if you want to take part or not.

1. What is the purpose of the study?

This study is focused on the training of primary teachers within Higher Education Institutions; it is also located within the wider context of initial teacher training in England. The Teachers’ Standards for QTS require students to provide evidence of their subject knowledge for teaching in order to qualify and OfSTED inspections of initial teacher training programmes place emphasis on trainees’ subject knowledge development. However, research around teachers’ subject knowledge is predominantly focused on secondary teaching, as is the university/school partnership model operating in many institutions involved in initial teacher training.

Against this backdrop, I would like to investigate perceptions of ‘subject knowledge’ from the perspective of primary education students, school mentors and liaison tutors. I am interested in understanding how students construct and develop their subject knowledge and what role it plays in their teaching. By gaining a more detailed insight into students’ experiences, I anticipate that the findings can enhance the quality of the university and school-based programme for primary teacher training and improve the support and guidance given to student teachers by their tutors and mentors. It will also inform the guidance, support and professional development provision for liaison tutors and school mentors.

2. Do I have to take part?

Participation in this study is entirely voluntary. It is up to you to decide whether or not to take part. You will be given this information sheet and asked to sign a consent form. You are free to withdraw at any time and without giving a reason. A decision to withdraw will not affect your rights/any future service you receive.

3. What will happen to me if I take part?

If you decide to take part, you will be involved in data collection via an interview. All activities will take place either on university premises or in your school, as appropriate. Interviews will be audio recorded and take approximately 30 minutes.

4. Are there any risks / benefits involved?

There are no risks involved in participating in this project. I would like to make you aware that taking part in the interviews may make some small demands on your time. At the same time I would like to emphasise that being involved in this study may help you to clarify your own thoughts and reflections about subject knowledge for primary teaching and its role in your professional learning and development. The findings of this study will be used to inform the development of the Primary Education programmes, particularly in respect to the university-school partnership.

5. Will my taking part in the study be kept confidential?

All the information you provide will be treated in strictest confidence and your anonymity will be protected by means of a coding system and any final written publications resulting from the research will be anonymized. All data (interview transcriptions and documentary evidence) will be coded and stored securely in a locked office and electronic files will be protected by means of a password. All data will be destroyed five years after completion of the research.

Contact Details of Researcher

Deborah Pope

E-mail: d.pope@ljmu.ac.uk

Tel: 0151 231 5487



An investigation of the nature, role and purpose of 'subject knowledge' in the initial teacher training of primary school teachers

Questionnaire for school mentors

Thank you for agreeing to complete this questionnaire. The purpose of this survey is to investigate 'subject knowledge' in initial teacher training in the context of the four-year undergraduate BA (Hons) Primary Education with QTS degree programme. It is conducted in line with the *British Educational Research Association Revised Ethical Guidelines 2004*. [<http://www.bera.ac.uk/files/guidelines/ethica1.pdf>]

If you are happy to complete the questionnaire, please place a tick in the box beside the statement below.

I have read the Participant Information sheet and understand the information provided about the project.

Your name.....

School.....

Position.....

(In order to protect your anonymity, each questionnaire will be coded by the researcher.)

Please complete the gaps or circle the appropriate response.

1. For how many years have you been involved in mentoring students?

0-2 3-5 6-10 11-15 16-20 20+

2. What is your highest qualification (with grade) in each of these subjects:

English.....

Mathematics

Science.....

3a. What is your First Degree Qualification (or equivalent)?

BSc Hons BA Hons BSc Ord BA Ord MA MSc
Other.....

b. What is your first degree subject?

.....

c. Where did you obtain your first degree?

.....

4. Did you have a career prior to teaching?

No Yes (please give details of your role and length of career below)

.....

5. Please identify your age group.

- | | | | | |
|-------|-------|-------|-------|-------|
| 21-22 | 23-24 | 25-26 | 27-30 | 31-35 |
| 36-40 | 41-45 | 46-50 | 51-55 | 56+ |

6. In your opinion, what **knowledge** is needed for primary teaching?

.....

.....

.....

.....

7. Drawing on your answer to question 6, what do you think is the **most important** type of knowledge needed by primary teachers and why?

.....

.....

.....

8. What is **your** definition of the term '**subject knowledge**' as used in the context of the students' initial training to become a primary teacher?

.....

.....

.....

.....

9. How important is '**subject knowledge**' (as you have defined in question 8) in initial teacher training for student primary teachers? Give reasons for your answer.

.....

.....

.....

.....

10. How have you developed the subject-specific knowledge that you use in your mentoring role?

.....

.....

.....

11. Please answer this question by placing a tick in the box below the number that best represents your response to each statement

1= strongly disagree 2= disagree 3= neutral 4= agree 5=strongly agree

	Statement	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
		1	2	3	4	5
a	Primary teachers need many different kinds of knowledge.					
b	'Subject knowledge' is concerned with content and facts.					
c	'Subject knowledge' includes how to teach a particular subject.					
d	'Subject knowledge' is a mixture of many other types of knowledge.					
e	I am clear of the meaning of the term 'subject knowledge' as used in the context of initial teacher training.					
f	The university-based element of students' training develops their subject-specific knowledge.					
g	The school-based element of the students' training develops their subject-specific knowledge.					
h	I rarely teach subject-specific knowledge to students I mentor.					
i	I often give feedback on subject-specific knowledge in lesson observations.					
j	I regularly set subject-specific targets for students on school placement.					
k	University tutors are more concerned with subject-specific knowledge than mentors who are practising teachers.					
l	I am confident to complete students' lesson observations in all subjects of the primary curriculum.					
m	I feel more confident carrying out lesson observations for subjects that I know more about.					
n	My subject-specific knowledge has improved through mentoring students.					
o	Primary teachers with good subject knowledge are better teachers.					

THANK YOU FOR TAKING THE TIME TO COMPLETE THIS QUESTIONNAIRE

If you would be interested in participating further in the research please tick the box.

Contact telephone number (can be school no.):

e-mail address:

LIVERPOOL JOHN MOORES UNIVERSITY

CONSENT FORM



For School Mentors

**An investigation of the nature, role and purpose of ‘subject knowledge’
in the initial teacher training of primary school teachers**

Researcher: Deborah Pope, Faculty of Education, Community and Leisure, LJMU.

1. I confirm that I have read and understand the information provided for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.

2. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving a reason and that this will not affect my legal rights.

3. I understand that any personal information collected during the study will be anonymised and remain confidential.

4. I agree to take part in the interview.

5. I understand that the interviews will be audio recorded and I am happy to proceed.

6. I understand that parts of our conversation may be used verbatim in future publications or presentations but that such quotes will be anonymised.

Name of Participant	Date	Signature
Name of Researcher	Date	Signature
Name of Person taking consent	Date	Signature

Interview schedule with primary school-based mentors

Background

- How long have you worked at this school?
- What are your roles/responsibilities in this school?
- How long have you been in primary teaching?
- Can you tell me a little bit about your teaching career?
- What was your own route into teaching?
- Did you have a previous career prior to teaching?
- What got you involved in mentoring students?
- How long have you been mentoring students at this school/in previous schools?
- What keeps you doing it?

Primary teaching

- What do you think makes an expert primary teacher?
- What makes an outstanding primary trainee teacher?
- What in your view makes an expert primary mentor for trainees?

Subject knowledge

- What does the term 'subject knowledge' mean to you in relation to training primary teachers?
- Drawing task: visual representation of the areas of subject knowledge for primary teaching and how they might be related. Talk/question as they draw.
- How important do you think subject knowledge is in relation to the training as a whole?
- Would your definition and drawing be different/similar for secondary teachers' subject knowledge? If so, how?
- What has influenced your thinking about subject knowledge?

Mentoring in school

- What are the most frequent issues that arise with students in your mentoring role, generally and in relation to subject knowledge?
- Which things tend to be well-developed? General and in relation to subject knowledge.
- Who do you think is responsible for trainees' subject knowledge development?
- What do you think is the role of the school-based mentor in relation to subject knowledge?
- What do you think are the challenges for the mentor in developing subject knowledge with students?
- What strategies do you use if a student has real weaknesses? Real strength? How do you decide on your approach?
- Can you tell me about a particular mentoring episode that involved a student's subject knowledge?
- Does the school have a particular ethos in relation to subject knowledge?

- What does subject leadership look like in this school?
- How does this influence the students' training?
- Are there any differences in expectations for students in different curriculum subjects in relation to subject knowledge?
- What would help you most in your mentoring role?

Partnership paperwork and processes

- On the lesson analysis form, what kind of things would you comment on in the boxes relating to subject knowledge?
- Would you make any subject-specific references elsewhere on the form?
- On the final review form, what kind of things would you comment on in the boxes relating to subject knowledge?
- How certain are you that you are commenting on the same things as other mentors?
- How certain are you of what is expected of you on these sections of the forms?

Perspectives about the university partnership

- From your experiences as a mentor, do you think the university has a particular ethos in relation to subject knowledge for primary trainees?
 - If so, how would you describe it?
 - How does this influence the students' training?
 - How does it influence you?
- When the university link tutor comes out to visit the student teacher in school, what do you understand to be their role?
 - Do they have a role in relation to subject knowledge?
- How do you think that students view subject knowledge in the context of their training?
- What strategies do you think students use to develop their subject knowledge?
- Are you familiar with the subject knowledge auditing process used in university?
 - What do you think about this?
 - Purposes? Uses?
 - Could it be improved?
 - How do you think students view it, if they have mentioned it?

Outcomes/experiences relating to subject knowledge

- What do you think is the role of 'subject knowledge' as you have defined it for primary trainees in their training?
- What do you think is the overall impact of the university-based training in relation to subject knowledge?
- What do you think is the overall impact of the school-based training in relation to subject knowledge?

Policy

- What do you think are the messages we are being given by policy makers in relation to subject knowledge in primary teaching: a) in the new primary curriculum? B) in the intention to locate more ITT in school? C) via Ofsted?

LIVERPOOL JOHN MOORES UNIVERSITY



An investigation of the nature, role and purpose of ‘subject knowledge’ in the initial teacher training of primary school teachers

Researcher: Deborah Pope, Faculty of Education, Community and Leisure, LJMU.

You are being invited to take part in a research study. Before you decide to take part, it is important that you understand why the research is being done and what it involves. Please take time to read the following information. Ask me if there is anything that is not clear or if you would like more information. You should take time to decide if you want to take part or not.

1. What is the purpose of the study?

This study is focused on the training of primary teachers within Higher Education Institutions; it is also located within the wider context of initial teacher training in England. The Teachers’ Standards for QTS require students to provide evidence of their subject knowledge for teaching in order to qualify and OfSTED inspections of initial teacher training programmes place emphasis on trainees’ subject knowledge development. However, research around teachers’ subject knowledge is predominantly focused on secondary teaching, as is the university/school partnership model operating in many institutions involved in initial teacher training.

Against this backdrop, I would like to investigate perceptions of ‘subject knowledge’ from the perspective of primary education students, school mentors and liaison tutors. I am interested in understanding how students construct and develop their subject knowledge and what role it plays in their teaching. By gaining a more detailed insight into students’ experiences, I anticipate that the findings can enhance the quality of the university and school-based programme for primary teacher training and improve the support and guidance given to student teachers by their tutors and mentors. It will also inform the guidance, support and professional development provision for liaison tutors and school mentors.

2. Do I have to take part?

Participation in this study is entirely voluntary. It is up to you to decide whether or not to take part. You will be given this information sheet and asked to sign a consent form. You are free to withdraw at any time and without giving a reason. A decision to withdraw will not affect your rights/any future service you receive.

3. What will happen to me if I take part?

If you decide to take part, you will be involved in data collection via an interview. All activities will take place either on university premises or in your school, as appropriate. Interviews will be audio recorded and take approximately 30 minutes.

4. Are there any risks / benefits involved?

There are no risks involved in participating in this project. I would like to make you aware that taking part in the interviews may make some small demands on your time. At the same time I would like to emphasise that being involved in this study may help you to clarify your own thoughts and reflections about subject knowledge for primary teaching and its role in your professional learning and development. The findings of this study will be used to inform the development of the Primary Education programmes, particularly in respect to the university-school partnership.

5. Will my taking part in the study be kept confidential?

All the information you provide will be treated in strictest confidence and your anonymity will be protected by means of a coding system and any final written publications resulting from the research will be anonymized. All data (interview transcriptions and documentary evidence) will be coded and stored securely in a locked office and electronic files will be protected by means of a password. All data will be destroyed five years after completion of the research.

Contact Details of Researcher

Deborah Pope

E-mail: d.pope@ljmu.ac.uk

Tel: 0151 231 5487

Interview schedule with university tutors

Background

- What is your job title and role?
- How long have you worked in primary ITT?
- How did you come to work in this sector?
- What was your own route into teaching?
- Did you have a previous career prior to teaching?
- Did you mentor students in school? How long have you been involved in mentoring primary students?

Primary teaching

- How would you define an expert primary teacher?
- What do you think makes an outstanding primary trainee teacher?
- How would you describe an expert primary mentor?

Subject knowledge

- How would you define the term 'subject knowledge' in the context of primary ITT?
- Drawing task: visual representation of the areas of subject knowledge for primary teaching and how they might be related. Talk/question as they draw.
- Would your definition and map be different for secondary teachers' subject knowledge? How?
- What has influenced your thinking about subject knowledge?
- How important do you think subject knowledge is in relation to the training as a whole?
- Who do you think is responsible for trainees' subject knowledge development?

Subject knowledge and your job role

- What do you think is your role in relation to subject knowledge?
- What are the most frequent issues that arise with students in your role, generally and in relation to subject knowledge?
- Which things tend to be well-developed, generally and in relation to subject knowledge?
- What do you think are the challenges in developing subject knowledge with students?
- What sort of things do you do in your role to develop subject knowledge?
- How do you decide on your approach?
- What strategies do you use if a student has real weaknesses?
- Is there an emotional/sensitive element to dealing with subject knowledge?
- Do students receive subject-specific feedback from you? If so, where, when and how?
- Do you use audits in your role? If so, what is their nature and how are they used?
 - What do they think about them?
 - Purpose?
 - Could be improved?
 - Impact?

Partnership paperwork and processes

- What do you think your role is as a university liaison tutor? How certain are you in what the university is asking of you in this role? What would you change if you could?
- On the lesson analysis form, what kind of things would you expect mentors to comment on in the boxes relating to subject knowledge?
- Would you expect them to make any subject-specific references elsewhere on the form?
- On the final review forms, what kind of things would you expect mentors to comment on in the boxes relating to subject knowledge?
- How do you use the review form comments in your role? What would help you?
- Have you noticed any influence of the individual school context on students' subject knowledge development?

Perspectives about the university partnership

- Do you think the university has a particular ethos in relation to how subject knowledge is positioned in the primary UG programme?
 - How does this influence the students' training?
 - How does it influence you?
- How important do you think subject knowledge is in relation to the training as a whole?
- How do you think that students view subject knowledge in the context of their training?
- What strategies do you think students use to develop subject knowledge?
- How do you think students perceive subject knowledge audits and the tracking process?
- Do you perceive any differences in how different university tutors portray subject knowledge?
- Are there differences in expectations for subject knowledge training across the curriculum subjects?
- How could partnership be improved in relation to subject knowledge?

Outcomes/experiences relating to subject knowledge

- What do you think is the role of 'subject knowledge' as you have defined it for primary trainees in their training?
- What do you think is the overall impact of the university-based training in relation to subject knowledge?
- What do you think is the overall impact of the school-based training in relation to subject knowledge?

Policy

- What do you think are the messages we are being given by policy makers in relation to subject knowledge in primary teaching/primary ITT: a) in the new primary curriculum? B) in the intention to locate more ITT in school? C) via Ofsted?

Appendix 10 Data analysis exemplars

Appendix 10a) Example of qualitative data analysis from student teacher questionnaires

Question 8: What is your definition of the term ‘subject knowledge’ in the context of your studies and training to become a primary teacher?

Categories emerging	Sub-categories	Definitions of the term ‘subject knowledge’ (examples)
knowledge	Knowledge of what to teach (curriculum)	Knowing what content to teach Knowing the curriculum and what children should know in a variety of subjects at certain ages. It is about knowing what content to put in your lessons.
	own existing academic knowledge	Knowledge that we learnt at school e.g. Pythagoras theorem Academic knowledge in a given area. For example, in maths learning the different written algorithms. Your own subject knowledge is your baseline knowledge about a particular topic/subject.
	knowledge of subject/topic content in primary curriculum teaching	Knowledge from within subjects e.g. about what happened during WW2 or how to write a story in literacy. Not so much the knowledge of the subject in its entirety, but the knowledge that the children themselves are required/expected to know.
	knowledge of content of subject/topic AND how to apply to teaching in practice	I see it in two ways - knowledge of actual subject matter as well as strategies to go about teaching. Knowing what and how to teach all areas of the curriculum - not just knowing the facts - but how we can teach this effectively to children.
	Quantity/depth of knowledge of subject	How in depth your knowledge is of a topic, i.e. ratio, fractions etc. to enable you to teach the subject effectively and recognise what steps need to come first before continuing the learning journey. How much you know about a subject and a topic within that subject, e.g. history - the Romans. Science - light. General and sufficient knowledge to teach children. How much you know about a particular area.
	knowledge needed to teach	Subject knowledge is knowledge that

	curriculum subjects/topics (but not specified what this is)	we need to have in order to effectively teach the subject and address misconceptions. The knowledge required in order to teach the necessary aims and objectives from the National Curriculum.
understanding	Understanding of what to teach (curriculum)	Understanding of what each topic entails. An understanding of what children need to know and how to find it out.
	understanding of subject/topic content in primary curriculum teaching	Understanding the <u>content</u> of what you are teaching to children. An understanding of the key concepts across the whole primary curriculum (and to KS3 for G&T pupils is desirable).
	understanding of content of subject/topic AND how to apply to teaching in practice	Understanding of the topics covered in a range of subjects at KS1 - 3, and the ability to relay that knowledge. An understanding of and the ability to apply and teach the content of all the core and foundation subjects. A knowledge of the content also. e.g. a knowledge of word classes, being able to use and apply these word classes in talk and writing, then being able to teach children effectively about these and how to apply this knowledge.
	Quantity/depth of understanding own understanding of subject matter	Subject knowledge understands more than the level need to teach in upper KS2. Understanding and having competence in a particular subject area. Enough confidence and competence to be able to teach.
	understanding needed to teach curriculum subjects/topics (but not specified what this is)	Subject knowledge is the understanding of everything you need to know in order to confidently teach the curriculum subjects. Having the understanding of a subject that is needed to teach children.
knowledge and understanding	own knowledge and understanding of subject matter	Your knowledge and understanding surrounding a subject
	knowledge and understanding of what to teach (curriculum)	Knowledge and understanding of the curriculum and what is expected to teach.

	Knowledge and understanding of content of subject/topic in primary teaching	<p>Knowledge/understanding of the subject that you are teaching. However, what I need to know i.e. range/level/depth only seem to be apparent when teaching. Otherwise the term on its own is not specific about what I need to know.</p> <p>Knowledge and understanding of areas we will teach.</p>
	knowledge and understanding of content of subject/topic AND how to apply to teaching in practice	<p>Your knowledge and understanding of the teaching and learning of all the curriculum areas.</p> <p>Personal understanding of subject-specific criteria and knowledge of teaching and learning.</p>
related to actions	being able to explain/answer questions/recall information	<p>Subject knowledge means being able to define what you are talking about. But also to expand on it by giving facts and giving an opinion.</p> <p>Know how to answer questions relating to particular topics.</p>
	learning a topic to a higher level than children before delivery	<i>In vivo</i> code
	skills to teach children across the breadth of the curriculum	<i>In vivo</i> code

Appendix 10b) Summary of Likert scale question data from student teacher questionnaire and statistical analysis

Question 11

	Statement	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	No response
		1	2	3	4	5	
a	Primary teachers need many different kinds of knowledge.	1	0	0	18	85	
b	'Subject knowledge' is concerned with content and facts.	0	10	16	62	16	
c	'Subject knowledge' includes how to teach a particular subject.	2	29	13	46	14	
d	'Subject knowledge' is a mixture of many other types of knowledge.	2	10	23	39	28	2
e	The term 'subject knowledge' is used in the same way to mean the same thing by all the people involved in all aspects of my training.	6	50	19	22	7	
f	The university-based element of my training has helped me to develop my subject-specific knowledge.	1	7	21	59	16	
g	The school-based element of my training has helped me to develop my subject-specific knowledge.	0	2	2	37	63	
h	I have received feedback on my subject-specific knowledge through university-based activities.	2	15	24	49	14	
i	I have received feedback on my subject-specific knowledge through school-based activities.	0	3	9	46	46	
j	My university tutors have helped me to set subject-specific targets.	1	19	24	46	14	
k	My school-based mentors have helped me to set subject-specific targets.	0	14	20	35	35	
l	My liaison tutors have helped me to set subject-specific targets.	4	25	28	36	11	
m	University tutors, liaison tutors and school-based mentors attach equal importance to subject-specific knowledge.	4	29	24	41	6	
n	My subject-specific knowledge has improved over the last three years of the course.	0	1	5	51	47	
o	I am confident to teach all subjects of the primary curriculum.	3	24	21	45	11	
p	I feel more confident teaching subjects that I know more about.	1	0	2	37	64	
q	Primary teachers with good 'subject knowledge' are better teachers.	3	10	23	35	33	

Mann-Whitney U-test to compare means of each population for each statement in Question 11

	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q
z-score	0.4889	0.0166	0.1763	-0.2361	-1.1009	0.2927	-0.4689	0.4556	0.3858	-0.449	-0.4523	0.3758	0.0831	-0.4124	-3.4057	-0.7483	0.8082
p-value	0.62414	0.98404	0.85716	0.81034	0.27134	0.77182	0.63836	0.64552	0.69654	0.65272	0.65272	0.70394	0.93624	0.6818	0.00064	0.45326	0.41794
U	1217.5	1288.5	1264.5	1255.5	1125.5	1247	1220.5	1222.5	1233	1223.5	1223	1234.5	1278.5	1229	779	1178.5	1169.5
sig ≤0.05	no	no	no	no	no	no	no	no	no	no	no	no	no	no	yes	no	no
sig ≤0.01															yes		

The only significant difference between the two populations is for statement 'o': 'I am confident to teach **all** subjects of the primary curriculum.' Institution B student teachers were more confident to teach all subjects of the curriculum whereas students from Institution A were far less confident.

Appendix 10c) i. Exemplar extract from a semi-structured interview

¶154: So the emphasis has been on that, your own knowledge of the subject rather than...

¶155: I think they've taught obviously the pedagogy... I don't know if that's maybe because the lecturers know we've got to pass the skills tests at the end.

¶156: Um, ok that's what you've picked up on. What about the auditing process? What's your response to that process of doing the audits and you're then supposed to identify your areas of strength and weakness. What impact has that audit process had on you in relation to subject knowledge?

¶157: Erm...it's been ok but if I'm completely honest, I've lost the audits I've had from the years. I took them home. I read through and the questions I could answer I didn't bother answering and the ones I knew I had to focus on, I put a little circle on and just did a little bit of... I probably didn't utilise them in the full way they're meant to be utilised...

¶158: Because...?

¶159: I don't think we've ever really been questioned on them. I know it's up to us to do our own learning and I know it's up to me to make sure my subject knowledge is up to scratch.

¶160: I'm just interested because you've said a lot. You've picked up on your own strengths and weaknesses and you've worked on them and you can give really specific examples of how you've done that but you haven't used the audits in that?

¶161: Um...no, I don't think I have.

¶162: Ok. Did you need to do the audits to highlight what your areas of strength and weakness were?

¶163: I think if maybe if I'd utilised them properly then they might have worked but...

¶164: But you haven't and that's the reason I'm trying to dig into.

¶165: It sounds really awful. It was in first and second year and I had that much work on, I just thought it was an extra task. Something extra to go and do and we might have had assignments on or whatever so I quickly whizzed through, put it to one side. I moved back home and it got lost and that's my own fault for not utilising it but... I know you're not meant to constantly ask me have you done your audit? Or how did you get on? Erm so that could be me because somebody might have a completely different perception of them because they've utilised them properly.²

¶166: Ok, I just wanted to know if you had or hadn't. Now you've mentioned school already as being important. What impact has school-based training had on you in relation to subject knowledge?

¶167: Erm.. I think it's had a big impact. Yeah, it's definitely had a big impact. I think university you kind of focus a lot more on your knowledge of the subject and your pedagogy but I think when you're in school everything starts coming together because you're teaching it and you're delivering it and you're doing it for yourself.

¶168: Ok you're indicating the whole map starts to come together to in that school environment.

¶169: Yeah

¶170: So is it just the opportunity to apply everything? More about the opportunity than the And the mentors in school, what impact have the school-based mentors or class teachers who you've been working with, what impact have they had on you in relation to subject knowledge?

¶171: I'd have to say very little. I think you're expected to go to school – this is my experience – and you're meant to know even as a student teacher - I think you're just meant to know things. I've always been in that position, I mean I always ask, I'm always asking different teachers different questions, like literacy co-ordinators and numeracy. I would always go and ask and ask for a little bit of advice but no one's ever there to say 'how's your subject knowledge?' ' How do you feel about this?' Maybe that's just the school, it's just being able to go and teach it?

¶172: I think in a lecture you're told about your own subject knowledge and you're told about pedagogy but I don't think it's until – which helps your understanding – but I don't think it's until you actually go into school that you really start to bring everything together.

¶173: schools I've been in but it's always been something I've done on my own.

¶174: So you haven't had any direct teaching about anything?

¶175: No.

¶176: What about the level descriptors? Do you know when you were describing you were told you need to go and teach this and they need to be at this level, were you given any teaching about that aspect in school or did you have to go away and do it yourself?

¶177: Yeah, just completely on my own.

¶178: Ok, that's really interesting. Does the school context have an impact on your subject knowledge development? So you've been in different schools and different types of schools, does the school context have any impact on your subject knowledge?

¶179: I think the only aspect that has had an impact on is I've been in schools with children who are quite behind the national average. Although, that doesn't affect my

ii. Exemplar extract from a semi-structured interview with coding stripes (Nvivo 10)

¶117: Or you could flip it and think well if you didn't have all of these things (talking about the map), what would the impact be?

¶118: Yes, I think it's absolutely vital. Maybe my interpretation is wrong but I think a lot more people should have this interpretation of it...

¶119: Because?

¶120: Because subject knowledge to me is a balance. It's not this on its own. It's not this on its own (pointing to different aspects of map). It can't be that – pedagogy – on its own and it's not just knowing what to teach because you might know how to teach it but maybe it's an area you feel weaker in, you might not teach it as well. But just knowing what to teach...it might be an area in which you excel but if you haven't got the pedagogy behind you to teach it...I think...Have you got a different colour?

¶121: A different pen...? Ok so we're adding more links. (Returns to amend map.)

¶122: I think they're all interlinked. I think it's important but important is somebody has got an understanding and it's all of these things.

¶123: Ok and they interact in the way you've just shown. Ok that's fine. So you've thought about this a great deal! What are your thoughts about your own subject knowledge? At this point in time, you're at the end of your four-year course, you're about to go and get a job. What are your thoughts about your own subject knowledge?

¶124: I think...I think to be honest, I think...if I have a class in September I don't think I'll fully understand the subject knowledge until I know what year...like I know because I haven't taught across all the years and I haven't taught for a full year, I know whatever class I have, if I have one in September, I know that I will sit down, and I will look at everything and I will understand, right...this is the National Curriculum, have the levels, have the children's levels. I'll look at what I need to teach and then I'll start to unpick this area. I understand this but how am I going to teach this or this area, um I'm not sure how I'm going to teach. Or I'm not very good in this area and I think...um...so it's hard to say my own subject knowledge because I don't think it's easily measurable until you're in the classroom teaching. E m... I know where my weaker areas are and like I said before I know that I feel less confident teaching those areas.

¶125: That was numeracy wasn't it...?

¶126: I don't...some areas of numeracy but some areas of literacy where I have to do a 'Big Write' because my handwriting's awful and that's not subject knowledge. And I constantly second-question every spelling I put on the board because you've got TAs in the room observing and you've got children. I think also what subject knowledge

science

- challenging children's learning
- motivation for becoming a primary teacher
- expert primary teacher description
- expert primary teacher description
- adults
- adults
- teachability
- expert primary teacher

influence of school based training on subject knowledge development

what has influenced thinking about subject knowledge

teachability

influence of university based training on subject knowledge development

teachability

personal subject strengths and weaknesses

thoughts on own subject knowledge

thoughts on own subject knowledge

questioning philosophy

gives confidence

gives confidence

deep thinker

51.7.7

Coding Density

11 / 18

11A

comes down to is the confidence and I'd say that's my downfall as a teacher. So I don't know if I should put confidence on there (referring to map)?

¶127: Or do those result in confidence maybe?

¶128: Yes. Although you know a subject and although you know the pedagogy I think in teaching you can be a bit...(drifts off)

¶129: So really your answer is I can't really comment on my subject knowledge because it's so complex and I don't really know until I'm in the classroom teaching what I've got to teach.

¶130: And I don't think I'll know until I've been teaching for a few years and I've done different classes because I think that every class you go to...erm...if you go to Year 1 it's completely this (pointing to map – the pedagogy)...the pedagogy

¶131: The pedagogy

¶132: And these...(pointing to map)

¶133: National Curriculum and level descriptors

¶134: The National Curriculum and level descriptors and the pedagogy is completely different.

¶135: Yes, ok. And the government's thinking about taking away the level descriptors in the new National Curriculum.

¶136: Oh

¶137: Which is interesting that you've put them in there and they're thinking we don't want these any more.

¶138: I've put those there because even though I don't – I'm not going to open a can of worms! (laughs) – I know that the children when I leave need to have progressed and I know the teachers are focused on how far they've got and I know you've got to assess them and things. But I know this is there because teachers and a lot of people are...(searching for right word)

¶139: Very focused

¶140: Focused on level descriptors and where children are.

¶141: So that's why it's there. So what has developed your subject knowledge during your training? I'm just going to break it down into different things that could have influenced it. So your own personal activity that you've undertaken, what have you done in relation to that that has developed your subject knowledge?

¶142: Do you mean understanding of subject knowledge or general term?

science

- challenging children's learning
- motivation for becoming a primary teacher
- expert primary teacher description
- expert primary teacher description
- adults
- adults
- teachability
- expert primary teacher

influence of school based training on subject knowledge development

what has influenced thinking about subject knowledge

questioning philosophy

teachability

influence of university based training on subject knowledge development

teachability

personal subject strengths and weaknesses

thoughts on own subject knowledge

thoughts on own subject knowledge

questioning philosophy

gives confidence

gives confidence

deep thinker

51.8.2

Coding Density

12 / 18

12A

Appendix 10d) Exemplar matrix coding query results generated using NVivo10

i. Sub-categories of content, or subject matter, knowledge versus interview participant

Participant code	A : content knowledge	B : beliefs about subject	C : substantive	D : correct use of terminology	E : or understanding of what is linked to content of the	F : G : openly superficial	H : organisation of concepts	I : final level of knowledge attained	J : reference to facts	K : understanding of concepts	L : syntactic	M : alternative perspectives within the	N : search method of the discipline	O : position is warranted with	P : working practices of the discipline
M1	3	0	3	0	3	1	0	0	1	0	0	0	0	0	0
M3	2	0	2	1	1	0	0	0	0	0	0	0	0	0	0
M2	2	0	2	0	1	1	0	0	0	0	0	0	0	0	0
M4	3	0	3	0	0	2	0	1	0	0	0	0	0	0	0
M8	4	0	4	0	0	1	0	0	3	0	0	0	0	0	0
M6	4	0	4	0	0	0	0	1	3	0	1	0	1	0	0
M5	4	0	4	0	2	0	0	1	2	0	0	0	0	0	0
M10	2	0	2	0	1	1	0	0	2	0	0	0	0	0	0
M11	1	0	1	0	0	1	0	0	0	0	0	0	0	0	0
M9	5	0	5	1	0	3	0	1	1	1	0	0	0	0	0
M7	3	0	3	0	0	0	0	0	3	0	0	0	0	0	0
ST B1	4	0	4	0	0	1	0	0	3	0	0	0	0	0	0
ST A4	6	3	3	0	1	0	0	2	0	0	0	0	0	0	0
ST B2	6	6	4	0	0	0	0	2	3	0	0	0	0	0	0
ST B3	4	0	4	0	3	0	0	1	0	2	0	0	0	0	0
ST A10	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0
ST A5	5	0	5	0	0	2	0	3	0	0	0	0	0	0	0
ST B4	9	0	8	0	2	4	0	0	0	0	1	0	2	0	0
ST A6	9	4	6	0	0	2	0	3	2	0	0	0	0	0	0
ST A3	13	5	13	0	0	1	0	0	6	0	0	0	0	0	0
ST A2	6	0	5	0	0	2	0	3	1	3	0	0	0	0	0
ST B5	5	0	4	0	1	0	0	0	3	0	2	0	0	0	2
ST A7	4	0	4	0	2	2	0	2	0	0	0	0	0	0	0
ST B6	5	0	5	0	1	3	0	2	2	0	0	0	0	0	0
ST A1	4	0	4	0	2	0	0	0	2	0	0	0	0	0	0
ST A8	3	1	3	0	1	1	0	2	1	0	0	0	0	0	0
ST B7	2	0	2	0	0	2	0	2	0	0	0	0	0	0	0
ST B8	3	0	3	2	0	1	1	0	0	0	0	0	0	0	0
ST A9	3	0	3	0	2	1	0	0	1	0	0	0	0	0	0
UT1	5	0	5	0	0	0	0	4	4	3	3	0	0	4	0
UT9	4	0	4	0	0	0	0	4	0	0	0	0	0	0	0
UT8	5	0	4	0	0	2	0	2	1	0	2	0	0	1	1
UT4	6	2	5	0	0	5	0	0	0	0	0	0	0	0	0
UT5	2	1	2	0	0	0	0	2	0	0	0	0	1	0	0
UT11	4	1	3	0	2	1	1	0	0	0	0	0	0	0	0
UT6	6	2	5	0	2	0	0	3	1	3	4	0	3	0	1
UT2	4	0	4	0	0	2	0	3	0	0	0	0	0	0	0
UT12	2	0	2	0	2	0	0	0	0	0	0	0	0	0	0
UT3	3	0	3	0	0	0	0	3	0	0	0	0	0	0	0
UT10	4	0	4	0	0	0	0	1	1	3	1	1	0	0	0
UT7	1	0	1	0	0	1	0	0	1	0	0	0	0	0	0

ii) Sub-categories of pedagogical content knowledge versus interview participant

Participant code	A : pedagogical content knowledge	B : addressing misconceptions	subject-specific knowledge and pedagog	pre-conceptions that child	purposes for teaching	identifying misconceptio	ledge of children's under	appropriate resources	to recognise understandi	subject-specific pedagog	akes learning specific top	misconceptions combined
M1	2	1	0	0	0	1	0	0	0	0	1	2
M3	1	0	0	0	0	0	0	0	0	1	0	
M2	0	0	0	0	0	0	0	0	0	0	0	
M4	2	2	0	0	0	0	0	0	0	0	0	1
M8	0	0	0	0	0	0	0	0	0	0	0	
M6	3	0	2	0	0	0	0	0	0	1	0	
M5	1	0	1	0	0	0	0	0	0	0	0	
M10	0	0	0	0	0	0	0	0	0	0	0	
M11	0	0	0	0	0	0	0	0	0	0	0	
M9	5	0	0	0	2	0	0	0	0	2	0	
M7	2	0	0	0	1	0	0	0	0	0	0	
ST B1	3	0	0	0	0	0	0	0	0	3	0	
ST A4	1	0	1	0	0	0	0	0	0	0	0	
ST B2	1	0	0	0	0	0	0	0	0	1	0	
ST B3	2	1	1	0	0	1	0	0	0	0	0	2
ST A10	0	0	0	0	0	0	0	0	0	0	0	
ST A5	2	0	1	0	0	0	0	0	0	1	0	1
ST B4	2	0	0	0	0	0	0	1	0	1	1	
ST A6	0	0	0	0	0	0	0	0	0	0	0	
ST A3	0	0	0	0	0	0	0	0	0	0	0	
ST A2	8	3	7	2	0	2	2	0	0	2	0	5
ST B5	2	0	0	0	0	0	0	0	0	2	0	
ST A7	2	0	2	0	0	0	0	0	0	0	0	
ST B6	0	0	0	0	0	0	0	0	0	0	0	
ST A1	0	0	0	0	0	0	0	0	0	0	0	
ST A8	0	0	0	0	0	0	0	0	0	0	0	
ST B7	0	0	0	0	0	0	0	0	0	0	0	
ST B8	2	2	0	0	0	0	0	0	0	0	0	1
ST A9	2	0	1	0	1	0	0	0	0	0	0	
UT1	5	1	0	1	4	1	1	0	0	1	0	2
UT9	4	0	0	2	0	1	1	0	0	3	0	1
UT8	4	0	3	1	3	0	1	0	0	1	1	
UT4	0	0	0	0	0	0	0	0	0	0	0	
UT5	4	0	3	0	0	0	0	0	0	1	0	
UT11	0	0	0	0	0	0	0	0	0	0	0	
UT6	5	0	3	0	1	0	0	0	0	3	0	
UT2	5	1	1	2	0	3	3	0	0	2	1	5
UT12	1	1	0	0	0	0	0	0	0	0	0	1
UT3	0	0	0	0	0	0	0	0	0	0	0	
UT10	2	0	0	0	0	0	0	0	0	2	0	
UT7	0	0	0	0	0	0	0	0	0	0	0	0

Appendix 10e) Exemplar qualitative comments on lesson observation feedback for Teachers' Standard 3 (TS3) categorised according to knowledge bases for teaching

Knowledge bases	Sub-category	Quotes - specific	Quotes - generic
Content knowledge	substantive	<i>When one of the learners offered the adjectives 'rumble' and 'rush' you didn't correct that these were verbs and the adjectives describing the wind, were actually 'warm' and 'oily'.</i>	<i>Used subject-specific language</i>
Curriculum knowledge	content	<i>Sound knowledge and understanding of Phase 5 phonics teaching</i>	<i>Planning followed national curriculum for science</i>
	resources	<i>Use of whiteboards to draw shapes – not such a good idea.</i>	<i>Resources were appropriate for the activities</i>
	lateral	n/a	<i>Good understanding of the expectations of Year 1 children</i>
	vertical	n/a	<i>Pitch – you need to get this right so no gaps in learning (lateral and vertical curriculum knowledge)</i>
Pedagogical content knowledge	subject-specific knowledge/ pedagogy	<i>eu/ew compared and contrasted well. Good regular comparison on the day's new grapheme with the previous grapheme producing the same phoneme.</i>	<i>Good demonstration of addition techniques.</i>
	subject-specific pedagogies	<i>The 'feely box' activity encourages children to think about properties of shapes.</i>	<i>Your weekly planning shows your clear knowledge of how to teach phonics with activities suited to each stage of the lesson.</i>
	appropriate resources	<i>Excellent use of 100 square with pennies in it to illustrate 100p in £1.</i>	

	misconceptions - identifying	<i>You picked up on the misconception that the rule of the sequence was x5. You clarified that they were adding 5 but the answers are in the 5 x table.</i>	<i>Misconceptions were identified and you were able to confidently discuss and explain these to the children.</i>
	misconceptions - addressing	<i>Good knowledge of misconceptions that children have with money (value and size); these were addressed at the beginning of the lesson.</i>	<i>Addressed misconceptions</i>
General pedagogical knowledge	planning	<i>A sequence of 5 guided reading plans have [sic] been planned for over the course of a week. The lesson plan follows the sequence of guided reading including introduction, strategy check, independent reading, returning to text and follow up activity.</i>	<i>Planning followed the correct structure.</i>
	questioning	<i>Challenged children with leading questions e.g. Where do we get daylight from?</i>	<i>Think about differentiating your questioning.</i>
	teaching methods	n/a	<i>I like the varied teaching methods used on the carpet to keep pace and interest of class.</i>
	classroom management	<i>Repeat instructions so all children will be on task and SEN have a full understanding</i>	<i>Calm approach, good voice control. Children's books on tables.</i>
	behaviour management	n/a	<i>Behaviour was well controlled, lots of praise and encouragement given. Children who did not conform were dealt with appropriately.</i>
	differentiation	n/a	<i>Differentiation in outcomes</i>
	assessment	<i>Assessment focuses have been highlighted and taken from the Lancashire Reading Grids and linked to APP. These assessment focuses have been used to create the lesson objective and are based on children's prior learning.</i>	<i>Ensure your assessment of children is ticked off in teachers' mark book.</i>

	Knowledge/ models of teaching		VAK – <i>children were up and able to be moving at start of the lesson</i>
Knowledge of educational contexts		<i>Ensure you are familiar with the school's handwriting scheme so that children explicitly understand exact letter placement.</i>	
Knowledge of learners	cognitive	<i>Guided reading groups were well supported and had been set reading books appropriate to their level.</i>	<i>There are children in this group who need to be stretched further and moved on at a faster pace.</i>

Appendix 11 Teachers' standards assessment descriptors and guidance documents

Appendix 11a) Institution A's version of the North West Consortium Trainee Teachers' Standards Assessment Descriptors (NW Consortium of Universities & Teach First, 2012)

S3	Standard Prompts	Inadequate (4)	Requires Improvement (3)	Good (2)	Outstanding (1)
S3: Demonstrate good subject and curriculum knowledge	a) Have a secure knowledge of the relevant subject(s) and curriculum areas, foster and maintain pupils' interest in the subject, and address misunderstandings	Requires significant and constant support with subject and curriculum knowledge when planning lessons in order to meet the needs of their pupils. Unable to maintain any pupil interest due to lack of subject knowledge and inability to address misunderstandings.	Appropriate subject knowledge in relation to their specific subject area and its place within the wider curriculum. Can maintain pupils' interest by delivering effective teaching episodes, supporting learner progression and addressing misunderstandings.	Good level of subject and curriculum knowledge. Is able to foster and maintain increasing pupil interest in subject and curriculum area as well as addressing misunderstandings.	Highly confident and proficient in subject and curriculum knowledge. Is able to foster maintain increasing pupil interest in the subject by teaching engaging teaching episodes/lessons and ensuring progression is made by all learners and addressing misunderstandings.
	b) Demonstrate a critical understanding of developments in the subject and curriculum areas, and promote the value of scholarship	Demonstrates no awareness of developments in the subject and curriculum areas. Unable to promote the value of scholarship.	Can demonstrate critical awareness of developments and changes in subject and curriculum areas. Promotes scholarship amongst pupils within subject and curriculum areas.	Demonstrates awareness of developments and changes in subject and curriculum areas. Promotes scholarship and further study to all pupils within subject and curriculum areas.	Demonstrates a high level of awareness of developments in both subject and curriculum areas. Promotes high levels of scholarship and the value of further study to all pupils within their subject and curriculum areas.
	c) Demonstrate an understanding of and take responsibility for promoting high standards of literacy, articulation and the correct use of standard English, whatever the teacher's specialist subject	Has no understanding of strategies for promoting literacy, articulation and the correct use of standard English and hence limited or no ability to put these into practice.	Can demonstrate understanding of strategies for promoting high standards in literacy, articulation and the correct use of standard English.	Demonstrates an understanding of strategies for promoting high standards for literacy, articulation and the correct use of standard English and is able to use a range of strategies to put these into practice.	Demonstrates a well-established and thorough understanding of strategies for promoting high standards for literacy, articulation and the correct use of standard English and is able to use a wide range of strategies to put these into practice.

	<p>d) If teaching early reading, demonstrate a clear understanding of systematic synthetic phonics</p>	<p>Has no understanding of the role of systematic synthetic phonics in the teaching of early reading and hence limited or no success in doing this.</p>	<p>Can demonstrate understanding of the role of systematic synthetic phonics in the teaching of early reading to develop pupils' reading skills.</p>	<p>Demonstrates a good understanding of the role of systematic synthetic phonics in the teaching of early reading to develop pupils' reading skills.</p>	<p>Demonstrates a thorough understanding of the role systematic synthetic phonics in the teaching of early reading and applies this knowledge to provide engaging and challenging learning opportunities to develop pupils' reading skills.</p>
	<p>e) If teaching early mathematics, demonstrate a clear understanding of appropriate teaching strategies.</p>	<p>Has no understanding of strategies for the teaching of early mathematics and hence limited or no success in doing this.</p>	<p>Can demonstrate an understanding of early mathematics and appropriate teaching strategies.</p> <p>Applies this knowledge to devise appropriate learning opportunities to support pupils' developing mathematical skills with some success.</p>	<p>Demonstrates a good understanding of strategies for the teaching of early mathematics</p> <p>Increasingly applies this knowledge well to prepare and deliver engaging and challenging learning opportunities to develop pupils' mathematical skills.</p>	<p>Demonstrates a thorough understanding of strategies for the teaching of early mathematics</p> <p>Consistently applies this knowledge to prepare and deliver engaging and challenging learning opportunities to develop pupils' mathematical skills.</p>

Appendix 11b) Institution B's version of the North West Consortium Trainee Teachers' Standards Assessment Descriptors (NW Consortium of Universities & Teach First, 2012)

Standards	Beginning	Developing	Good	Outstanding
3a) Have a secure knowledge of the relevant subject(s) and curriculum areas, foster and maintain pupils' interest in the subject, and address misunderstandings	<p>Developing understanding and use of subject knowledge in relation to their specific subject area and its place in the wider curriculum</p> <p>Demonstrates developing ability to foster and maintain pupil interest in the subject by delivering effective teaching episodes, supporting learner progression and addressing misunderstandings.</p>	<p>Appropriate subject knowledge in relation to their specific subject area and its place within the wider curriculum.</p> <p>Is able to foster and maintain pupil interest in the subject by delivering effective teaching episodes, supporting learner progression and addressing misunderstandings.</p>	<p>Competent level of subject knowledge related to both their specific subject area and to the wider curriculum.</p> <p>Is able to foster and maintain increasing pupil interest in their subject and the wider curriculum as well as addressing misunderstandings.</p>	<p>Highly confident and competent level of subject knowledge related to their specific subject area and the wider curriculum.</p> <p>Is able to foster maintain increasing pupil interest in the subject by delivering engaging teaching episodes, ensuring progression is made by all learners and addressing misunderstandings.</p>
b) Demonstrate a critical understanding of developments in the subject and curriculum areas, and promote the value of scholarship	<p>Is developing understanding and shows some awareness of developments and changes in the subject and curriculum area.</p>	<p>Demonstrates awareness of developments and changes in the subject and curriculum area.</p> <p>Promotes scholarship and further study within their subject and curriculum area.</p>	<p>Demonstrates good awareness and critical understanding of developments and changes in both the subject and the curriculum area.</p> <p>Promotes scholarship and further study to all pupils within their given subject and curriculum area.</p>	<p>Demonstrates a high level of awareness and critical understanding of developments in both the subject and curriculum area.</p> <p>Promotes high levels of scholarship and the value of further study to all pupils within their subject and curriculum area.</p>
c) Demonstrate an understanding of and take responsibility for promoting high standards of literacy, articulation and the correct use of standard English, whatever the teacher's specialist subject	<p>Demonstrates a developing use and understanding of strategies for promoting high standards of literacy, articulation and the correct use of standard English, in the teacher's specialist subject</p>	<p>Demonstrates the necessary understanding of strategies for promoting high standards in literacy, articulation and the correct use of standard English and is able to put these into practice</p>	<p>Demonstrates an established understanding of strategies for promoting high standards for literacy, articulation and the correct use of standard English and is able to use a range of strategies to put these into practice.</p>	<p>Demonstrates a well-established and thorough understanding of strategies for promoting high standards for literacy, articulation and the correct use of standard English and is able to use a wide range of strategies to put these into practice.</p>

Standards	Beginning	Developing	Good	Outstanding
d) If teaching early reading, demonstrate a clear understanding of systematic synthetic phonics	Demonstrates a developing understanding of the role of systematic synthetic phonics in the teaching of early reading to develop pupils' reading skills.	Demonstrates sufficient understanding of the role of systematic synthetic phonics in the teaching of early reading to develop pupils' reading skills.	Demonstrates a good understanding of the role of systematic synthetic phonics in the teaching of early reading to develop pupils' reading skills.	Demonstrates a thorough understanding of the role systematic synthetic phonics in the teaching of early reading and applies this knowledge to provide engaging and challenging learning opportunities to develop pupils' reading skills.
e) If teaching early mathematics, demonstrate a clear understanding of appropriate teaching strategies.	Demonstrates a developing understanding of strategies for the teaching of early mathematics.	Demonstrates sufficient understanding of strategies for the teaching of early mathematics.	Demonstrates a good understanding of strategies for the teaching of early mathematics	Demonstrates a thorough understanding of strategies for the teaching of early mathematics.
NB For 'Early maths' read Early and Primary.	Increasingly applies this knowledge to devise appropriate learning opportunities to support pupils' developing mathematical skills	Applies this knowledge to devise appropriate learning opportunities to support pupils' developing mathematical skills.	Increasingly applies this knowledge to prepare and deliver engaging and challenging learning opportunities to develop pupils' mathematical skills.	Consistently applies this knowledge to prepare and deliver engaging and challenging learning opportunities to develop pupils' mathematical skills.

Appendix 11c) Working with the Teachers' Standards in Initial Teacher Education: Guidance to support assessment for Qualified Teacher Status (UCET/NASBTT/HEA 2012)

PART ONE: Teaching. A teacher must:			
<p>3 Demonstrate good subject and curriculum knowledge</p> <p>-have a secure knowledge of the relevant subject(s) and curriculum areas, foster and maintain pupils' interest in the subject, and address misunderstandings</p> <p>- demonstrate a critical understanding of developments in the subject and curriculum areas, and promote the value of scholarship</p> <p>-demonstrate an understanding of and take responsibility for promoting high standards of literacy, articulacy and the correct use of standard English, whatever the teacher's specialist subject</p> <p>-if teaching early reading, demonstrate a clear</p>	<p>By the end of the programme of ITE, all those trainees recommended for the award of QTS will have demonstrated that:</p> <p>They have sufficiently secure knowledge and understanding of the relevant subject / curriculum areas to teach effectively in the age phase for which they are training to teach. They know how learning progresses within and across the subject / curriculum age phases they are training to teach, in terms of the development of key concepts and of learners' common misconceptions. They are able to respond appropriately to subject specific questions which learners ask and they use subject specific language accurately and consistently in order to help learners develop knowledge, understanding and skills in the subject. They recognise the need to extend and update their subject and pedagogical knowledge as a key element of continuing professional development and have shown the ability and readiness to do so. They demonstrate an understanding of the need to promote high standards of communication, reading and writing for all learners and begin to build this into</p>	<p>Those trainees graded as 'good' at the end of the programme of ITE may have demonstrated additionally that:</p> <p>They have well developed knowledge and understanding of the relevant subject / curriculum areas they are training to teach and use this effectively to maintain and develop pupils' interest. They make good use of their secure curriculum and pedagogical subject knowledge to deepen learners' knowledge and understanding, addressing common errors and misconceptions effectively in their teaching. They are critically aware of the need to extend and update their subject, curriculum and pedagogical knowledge and know how to employ appropriate professional development strategies to further develop these in their early career. They model good standards of written and spoken communication in all professional activities and encourage and support learners to develop these skills in their lessons.</p>	<p>Those trainees graded as 'outstanding' at the end of the programme of ITE may have demonstrated additionally that:</p> <p>They draw on their in-depth subject and curriculum knowledge to plan confidently for progression and to stimulate and capture pupils' interest. They demonstrate very well-developed pedagogical subject knowledge, by anticipating common errors and misconceptions in their planning. They are astutely aware of their own development needs in terms of extending and updating their subject, curriculum and pedagogical knowledge in their early career and have been proactive in developing these effectively during their training. They model very high standards of written and spoken communication in all professional activities. They successfully identify and exploit opportunities to develop learners' skills, in communication, reading and writing.</p>

<p>understanding of systematic synthetic phonics -if teaching early mathematics, demonstrate a clear understanding of appropriate teaching strategies.</p>	<p>lessons.</p> <p>In relation to early reading: All primary trainees will demonstrate sufficient knowledge and understanding of the principles and practices of teaching and assessing reading and writing, including the use of systematic synthetic phonics, to be able to apply this effectively across the specific age phases they are training to teach. (See 'Systematic Synthetic Phonics in ITT: Guidance and Support Materials' for further information).</p> <p>In relation to early mathematics: all primary trainees will know and understand the principles and practices of teaching and assessing early mathematics, to be able to apply this effectively across the specific age phases they are training to teach. (See: 'Understanding Arithmetic in ITT Mathematics' for definition and further information).</p>	<p>In relation to early reading: primary trainees have a very secure knowledge and understanding of synthetic systematic phonics and its role in teaching and assessing reading and writing in the context of the age-phases they are training to teach.</p> <p>In relation to early mathematics: primary trainees have a very secure knowledge and understanding of the principles and practices of teaching early mathematics and employ effective teaching strategies across the age-ranges they are training to teach.</p>	<p>In relation to early reading: primary trainees draw on their very strong understanding of synthetic systematic phonics and its role in teaching and assessing reading and writing to teach literacy very effectively across the age-phases they are training to teach.</p> <p>In relation to early mathematics: primary trainees draw on their very strong knowledge and understanding of the principles and practices of teaching early mathematics to select and employ highly effective teaching strategies across the age-ranges they are training to teach.</p>
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