

**Subject Knowledge for Teaching (SKfT) – an
exploration of how secondary mathematics and
science trainees on the Graduate Teacher
Programme developed their SKfT**

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Signed declaration that the work presented in this thesis is my own work

I, Yvonne Marcelle Posner confirm that the work presented in this thesis is my own. Where information has been derived from other sources, I confirm that this has been indicated in the thesis.

Signed:

A handwritten signature in black ink, appearing to be 'YMP', written on a light-colored background.

Yvonne Marcelle Posner

Subject Knowledge for Teaching (SKfT) – an exploration of how secondary mathematics and science trainees on the Graduate Teacher Programme developed their SKfT.

Abstract

This thesis was based on empirical research of the Graduate Teacher Programme (GTP), an employment-based route of initial teacher training (ITT) which ran from 1998 – 2013 and aimed at improving recruitment especially in shortage subjects such as mathematics and science. During its operation the GTP came under heavy criticism especially from the office for standards in education (Ofsted) and teacher educators working on traditional ITT routes such as the postgraduate certificate of education. Much of this criticism centred on training deficiencies in the development of Subject Knowledge for Teaching,

The research question sought to address this issue by focusing on the Subject Knowledge for Teaching development of secondary mathematics and science graduate teachers. It explored how they acquired and developed their Subject Knowledge for Teaching. The research was undertaken by examining the programmes of three employment-based ITT providers (EBITTs) during the 2011-12 academic year. An interpretive research approach was taken using a combination of semi-structured interviews, document analysis and observation.

The main findings showed that the trainees' development on this route was influenced by their prior beliefs and experiences. Much of their training was unseen and took place through informal learning. Also significant was that being supernumerary rather than employed in a vacancy did not guarantee good training and that whilst the majority of training occurred in school EBITT central training provision was crucial both in terms of content and in providing a neutral space for peer support and discussion. The research led to a number of recommendations for future employment-based route practice and research.

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GLOSSARY OF TERMS AND ABBEVIATIONS

AST	Advanced skills teacher
BOOSTER COURSE	Funded courses usually to improve subject knowledge prior to entering ITT typically of eight weeks duration. Originally introduced by the TDA and now run by the DfE.
CENTRE-BASED DAYS	Training sessions provided by the EBITT provider based at a venue away from GTs' schools. For the HEI-led EBITTs these took place at their HEIs whereas for school-led EBITT the venue would be one of the partner schools.
CPD	Continuing professional development
DRB	Designated recommending body
EAL	English as an additional language
EBITT(s)	Employment-based initial teacher training provider(s)
GPA	Grade point average – US system of degree classification. Equates broadly as follows: first ≥ 3.80 ; 2:1 = 3.30–3.79; 2:2 = 3.00–3.29; third/pass no GPA equivalent.
GPS	General professional studies
GT(s)	Graduate teacher(s)
GTP	Graduate teacher programme
HE	Higher education
HEI	Higher education institution
ICT	Information and communication technology
ITP	Individual training plan
ITT	Initial teacher training
K of C	Knowledge of context
LA	Local Authority – name for local government body in UK with varying degrees of responsibility according to region. Most LAs are responsible for education services within their jurisdiction.
NATCEN	National Centre for Social Research
NQT	Newly qualified teacher
OCR	Oxford, Cambridge and RSA Examinations board

OECD	Organisation for Economic Co-operation and Development
OFSTED	Office for Standards in Education, Children's Services and Skills – originally established in 1992 as the Office for Standards in Education. In 2001 it was renamed when its responsibilities were expanded to include inspection of day care and childminding in England.
OTTP	Overseas trained teacher programme
PCK	Pedagogic content knowledge
PCKg	Pedagogic content knowing
PCK/SKfT	Pedagogic content knowledge /subject knowledge for teaching – both names refer to the same set of concepts. This format was used for majority of this thesis.
PE	Physical education
PGCE	Postgraduate certificate of education
PISA	The Programme for International Student Assessment. A triennial survey which reviews the extent to which students near the end of compulsory education (aged 15) have acquired mathematics, reading and science knowledge and skills.
PK	Pedagogical knowledge
PROGRAMME LEADER	Overall responsible for leading and managing the EBITT
PST(s)	Pre-service teacher(s)
QA	Quality assurance
QA ADVISER	Kingsview had QA Advisers responsible for QA of SKfT delivery via school visits
QTS	Qualified teacher status
RELEASE TIME	Time or a period allotted to a teacher apart from normal duties for a special activity, such as personal research
RTP	Registered Teacher Programme
SCITT(s)	School centred initial teacher training provider(s)
SED	Self-evaluation document
SEN	Special educational needs
SD	School Direct

SECONDARY PROGRAMME LEADER	Responsible for leading the secondary GTP. Only one of three EBITTs had a separate secondary programme leader
SMK	Subject matter knowledge
SSD	Salaried School Direct
SSE	Second school experience
SENIOR MENTORS	All EBITT partner schools had senior mentors who were overall Responsible for the GTP within their school and supported subject mentors. They ran generic professional studies sessions for GTs and often had some involvement with contributing to centre-based training
SKfT	Subject knowledge for teaching
STEM	Science, technology, engineering and maths
SUBJECT ADVISERS	Kingsview had subject advisers for mathematics and science who were also PGCE subject leaders. They were responsible for: developing subject materials; undertaking subject audits and QA of ITPs and SKfT input in schools
SUBJECT LEADERS	NineSG had mathematics and science subject leaders who were responsible for development of PCK/SKfT assessment documentation and training materials; supporting Subject Mentors and leading their trainin and QA of GT assessment.
SUBJECT MENTORS	Supported individual mathematics and science GTs in schools to develop their PCK/SKfT. Also responsible for assessment. At NineSG subject mentors also delivered centre-based sessions
SUBJECT SPECIALIST TUTORS	Central College had mathematics and science subject specialist tutors who were responsible for: leading centre-based sessions; producing ITP; QA of GT mentoring and PCK/SKfT in schools and candidate selection.
TA	Teaching Agency - former name for the UK government's teacher training agency 2012 – 13
TDA	Teaching and Development Agency for schools – former name for the UK government's teacher training agency 2005 -12
TEACH FIRST	Employment-based route of ITT based on Teach for America whereby highly qualified graduates are employed by state schools in low income, hard to recruit areas following an intensive six-week induction programme.
TIMSS	Trends in Mathematics and Science Study
TTA	Teacher Training Agency - former name for the UK government's teacher training agency 1993 – 2005

VLE Virtual Learning Environment

YEARS 8, 9, 10, UK Secondary School years and US grade equivalents

11, 12, 13

Year 7 (age 11-12) = 6th grade

Year 8 (age 12-13) = 7th grade

Year 9 (age 12-14) = 8th grade

Year 10 (age 14-15) = 9th grade

Year 11 (age 15-16) = 10th grade

Year 12 (age 16-17) = 11th grade

Year 13 (age 17-18) = 12th grade

Chapter One

Introduction

1.1 Background

The rationale for this research arose from my work as the Programme Leader of an employment-based routes initial teacher training provider (EBITT) in England between 2001 and 2009 when I was involved with the delivery of two routes of initial teacher training (ITT): the Graduate Teacher Programme (GTP) and the Overseas Trained Teacher Programme (OTTP). This study however focused on the secondary GTP. The GTP was one of a number of alternative pathways into teaching introduced by governments in England and other countries such as the USA, Australia, Germany, Poland and Norway in response to the need to improve teacher quality and address teacher shortages (e.g. Darling-Hammond, 2002; Musset, 2010; Eurydice, 2013)

As an EBITT manager I was committed to the GTP as a training route particularly because it provided the opportunity for non-traditional entrants such as career changes into teaching. They were also people who could not afford full-time study and needed to be able earn a salary whilst training. An example was Robert who was from an Afro-Caribbean background and had a sports science degree. After graduating he worked within the fitness industry but felt unfulfilled and decided to become a teacher. As science had been part of his degree and there was shortage of science teachers this was the subject he wanted to teach. He also wanted to be a positive role model especially for black pupils and encourage them to study science at A level and university. For Robert, acceptance onto an ITT course was challenging because most science programmes would not consider someone with a sports science degree. Also he could not afford to undertake a PGCE and so the GTP was his only option and he was offered a training place to train as a biology teacher. Our EBITT had an open access policy and we were able to consider his application through auditing his subject knowledge and Robert was offered a place conditional on undertaking Teaching and Development Agency for Schools (TDA) run subject booster courses in chemistry and physics. Robert successfully completed these courses and was able to enter the programme. The day Robert passed his final assessment and gained qualified teacher status (QTS) was for him “a dream come true”. Robert’s story exemplified why I was a strong advocate of the GTP because it provided a route to QTS that brought people into teaching who

might not otherwise have done so and train in subjects they might not have been considered for on traditional routes.

However, during my tenure as an EBITT manager I was aware that alternative ITT routes such as employment-based training had not been well received. Both teacher educators of traditional routes and schools were sceptical about the return to an apprenticeship model of training and some said these routes challenged the nature of ITT and undermined the efforts to professionalize teaching (e.g. Buchberger et al., 2000; Gilroy, 2002). Considerable criticism was focused on the capacity of alternative routes to deliver the training required especially in respect of subject training (e.g. French 2005, Coles and Pitfield, 2006; Darling-Hammond et al. 2002, 2005; Kind, 2014).

The GTP came under heavy criticisms during its first five years of operation especially after the expansion of training places and introduction of the training salary in 2000. The training salary led to the wider use of the GTP by schools to address teacher shortages and an influx of applicants attracted by the salary who were either better suited to the PGCE or unsuited to teaching at all (e.g. Foster, 2001, Dunne, 2005). Programme shortcomings included: underachievement of many who qualified via the GTP; poor selection procedures; inconsistent mentoring; lack of rigorous assessment procedures and absence of quality assurance arrangements (e.g. Foster, 2001; Ofsted, 2002, 2004; Dunne, 2005, Brookes, 2005)

Although by 2007 views were more positive subject knowledge for teaching (SKfT) delivery persisted as a training deficiency and the TDA responded by launching a SKfT framework which was largely aimed at EBITTs and provided a foundation for reviewing and improving SKfT training. By 2010 the Office for Standards in Education, Children's Services and Skills (Ofsted) commented that SKfT was now "a relative strength" and talked of a "turnaround" in the quality of SKfT input (p.60). How far this applied to EBITTs was unclear as the report referred to SKfT across ITT but did not distinguish between types of provision as it had previously.

By its final year (2012-13) the GTP had become a well-established ITT route but was still judged as producing a lower proportion of 'outstanding' teachers (e.g. Smithers et al., 2013). Nevertheless the top overall ITT provider was a school-led EBITT and

among the top 10 ITT providers were five EBITTs compared to only two HEIs and three SCITTs (Smithers et al, 2013). More pre-service teachers (PSTs) trained on school-based routes were found to enter teaching at the end of their training and EBITT newly qualified teachers (NQTs) rated their training more highly:

1.2 Rationale

Despite criticisms of subject training there has previously been limited research on the GTP and only been one study on the development of SKfT within the GTP.

Furthermore all previous GTP studies had looked mainly at the researchers' own provision where it may have been difficult to avoid elements of bias (Brookes, 2005) and none have included a school-led EBITT as they all explored HEI-led or partnered programmes.

SKfT development presented an important area for further research and the dearth of knowledge about the curriculum of school-based training has often been referred to (e.g. Hagger and McIntyre, 2006; Musset, 2010; Carter, 2015). Therefore this research sought to address these concerns by exploring the elements of training provided within the GTP to develop SKfT.

Regarding the aim of this study it is relevant to point out that I am not a mathematics or science teacher educator and so was not directly involved in delivery of SKfT training. My role as EBITT Programme Leader carried overall responsibility for programme provision and for ensuring recruitment and the ITT curriculum were both QTS compliant and met Graduate Teachers' (GTs) needs. Therefore from my perspective the aim of this study was to address gaps in knowledge about the elements of training provided within the GTP to develop SKfT. It was not my intention to add to existing SKfT theory or provide new insight into the nature of mathematics and science pedagogy. However if incidentally new insights developed this would be a valuable by-product of my work.

My reasons for concentrating on mathematics and science were fourfold. Firstly, because a major focus of the GTP had been to help address the long-term issue of mathematics and science teachers' undersupply and poor teaching. Secondly, because criticism of GTP SKfT delivery often focused on those subjects. Thirdly, the shortage of chemistry and physics teachers meant that GTs in these subjects were often mentored by

someone who did not share their specialism; exploration of this issue would add to the understanding of this aspect of SKfT development. My final reason was pragmatic as I felt that by concentrating on two key subjects I could keep the research more focused and obtain richer data.

It felt somewhat ironic that not long after I collected my data that Michael Gove, the then Education Minister announced that the GTP was to be replaced with Salaried Schools Direct (SSD). In reality it was not the end of employment-based ITT but rather a new phase in the ever changing pattern of provision. In answering my research question I knew that whilst the GTP has now been replaced I could make a valuable contribution to the understanding about how SKfT is developed within employment-based ITT and explore the programme's legacy as it moves into a new phase.

1.3 Thesis structure

This thesis falls into seven further chapters: Chapter two provides a review of the existing literature exploring six areas which provide this study's historical and theoretical perspectives and poses my research question. Chapter Three explains the methodology including the theoretical approach and data analysis. Chapters Four, Five and Six describe the findings and Chapter Seven discusses how these findings answer the research questions with reference to existing literature, draws conclusions from the discussion and considers research limitations. Chapter Eight makes recommendations for future ITT practice and research and the implications for SD and SSD.

Chapter Two

Literature review

2.1 Introduction

This chapter sets out this study's theoretical and historical and perspectives: mathematics and science teaching and teacher supply within a global context; introduction of the GTP; conceptual development of mathematics and science SKfT; delivery of SKfT within a constructivist approach; delivery of SKfT within the GTP and the relationship between prior beliefs and experience and SKfT development.

2.2. Mathematics and science teaching within a global context

2.2.1 Pupil achievement in mathematics and science

In the latest Trends in Mathematics and Science Study (TIMSS) (2011) and the Programme for International Student Assessment (PISA) (Organisation for Economic Co-operation and Development) (OECD) (2014) international surveys of performance in mathematics and science the UK was ranked fifteenth and 26th respectively. Whilst there has been criticism of these results and their suitability as a means of comparison on educational performance (e.g. The Guardian, 6 May, 2014) they do provide some indication of how countries fare in relation to each other.

In PISA the best performers were all Asian with Shanghai-China, Singapore and Hong-Kong China as the top three. Teacher shortages did not seem to impact on ratings as Shanghai-China and Netherlands who reported shortages were ranked respectively first and tenth (OECD, 2014).

2.2.2 Teacher supply and quality

Worldwide teacher quality and supply are key drivers in ITT policy as education is viewed as fundamental to economic prosperity in order to ensure a sufficient supply of skilled workers needed for the 21st century economy. Quality teaching is also essential in addressing social inequality and educational underachievement. The skills needed were especially mathematical and scientific skills (e.g. Schleicher, 2012; OECD, 2012; Smithers and Robinson, 2013, Coe et al. 2014).

In the UK there has been a longstanding history regarding the quality of mathematics and science teaching which is closely linked to teacher shortages. These shortages stem from an undersupply of graduates who tend to take up better paid employment opportunities other than teaching. Thus ITT recruitment for mathematics and science only hold up well in periods of economic recession (e.g. Smithers and Robinson, 2013). A consequence of insufficient mathematics and science graduates is that many teachers do not possess a degree directly related to their teaching subject. Additionally within science the imbalance between biology, chemistry and physics specialists has resulted in biologists training and/or teaching outside their specialist subject (e.g. SCORE, 2011, Kind, 2014).

Teacher recruitment trends research reveal acute teacher shortages overall with almost a third of vacancies being for science and mathematics (Poverty, C., 2015; Howson, 2015). For England the latest statistics show that during 2014 nearly 80 per cent of mathematics and almost 87 per cent of science lessons were taught by teachers without a specialist qualification (Poverty, C., 2015; DfE, 2015).

However the literature also revealed that it is the quality of teaching rather than teachers' qualifications which impact on pupil achievement. Moreover it is debatable how we define the best qualified teachers. One side argues that best qualified graduates make the most effective teachers (e.g. Wilson et al., 2003; Gove, 2012: Royal Society, 2014) whereas most research has found no significant relationship between effective teaching and qualifications (e.g. Wayne and Youngs, 2003; Rivkin et al., 2005; Allen and Burgess, 2009; Poverty, C., 2015) except for mathematics within the eleven to thirteen age range (Harris and Sass, 2011).

Some evidence suggests that teachers in higher performing countries are better trained. For example, Liping (1999) whose research compared the teaching of Chinese and American teachers found the Chinese teachers used far more effective algorithms to explain arithmetic processes. Certainly countries that performed better in PISA rankings have undertaken reforms to ITT although some still exhibit limitations and variation in terms of preparation inputs. For example in Shanghai-China, undertaking ITT is not a condition of teacher certification and teachers can be registered as long as they pass the certification tests. In Korea, ranked fifth by PISA, the levels of subject pedagogical input vary considerably from as much 51 per cent on some courses to as little as 10 per

cent (Ingersoll et al. 2007). However Singapore which conducted a comprehensive review of ITT in 2009 provided a new ITT framework with a strong focus on the development of subject pedagogy (NIE, 2009; CCSSO, 2012). In Finland, ranked twelfth, considerable ITT reforms were undertaken to improve teaching quality through more consistent input across provision and elevating the status of teaching in terms of qualifications, pay and conditions (e.g. Schleicher, 2012).

The variation of ITT reform in these countries suggests that other factors account for good results. Smithers and Robinson (2013) for example, argue that better outcomes are largely due to the higher status afforded the teaching profession.

2.3 Introduction of the GTP

ITT in the UK has long been characterised by the ad hoc nature of its development and diversity of training routes (e.g. King, 2002; Smithers and Robinson, 2013). This diversity is also reflected in the separate education jurisdictions in Scotland, Wales and Northern Ireland (Beauchamp et al., 2013). Currently in England there are ten ways to gain QTS (NAO, 2016; NCTL, 2016) whereas within the other three countries the routes are far more limited.

Issues of teacher supply and quality especially in mathematics and science have led to numerous government reports (e.g. Roberts, 2002; DfES, 2004; DfE, 2010; Royal Society, 2014) and much of ITT diversification has been due to the resulting initiatives. The GTP was one such initiative being preceded in 1989 by the Articled and Licensed Teacher schemes aimed at career changers and teachers with other types of teaching qualifications (Price and Mason, 1991; Galvin, 1993).

Both schemes were replaced in 1998 with new employment-based training programmes: the GTP; the Registered Teacher Programme (RTP) and Overseas Trained Teacher Programme (OTTP). The GTP was aimed at graduates whilst the RTP was for non-graduates with the equivalent of two-thirds of a degree such as a Higher National Diploma. Of the other home nations only Wales chose to introduce the GTP where it still operates whereas England replaced it with SSD in 2013.

The secondary GTP allocated the majority of training places to shortage subjects: mathematics, science, English; modern foreign languages, information and

communication technology (ICT) and design and technology. The GTP was presented as a programme for graduates who did not want to undertake a traditional ITT course and preferred to train on-the-job. It was also aimed at schools who wanted to train their own teachers but not via involvement with a SCITT programme (DfEE, 1996). The GTP began operation in January 1998 and commenced its complex history until its replacement by SSD from September 2013 (See Appendix 1 for key dates and developments).

The GTP time-line involved a process of constant change as well as taking into account other ITT developments such as revisions to the QTS standards (2007, 2012) and new Ofsted requirements in 2007-8. Although by its demise the GTP had expanded with 100 EBITTs running programmes it only accounted for around nineteen per cent of ITT provision (Smithers et al., 2013). This was due to a TDA decision not to increase GTP numbers after 2007 (TDA, 2008) and also because many EBITTs only trained small numbers of GTs (Smithers et al., 2013).

Comparatively few countries have introduced alternative pathways and despite reforms ITT remains mainly HEI-based (Musset, 2010; Eurydice, 2013). The best known alternative route is the USA's Teach for America whereby highly qualified graduates are employed by state schools in low income, hard to recruit areas after following an intensive six-week induction programme. This model has been adopted by England (as 'Teach First'), Germany and Australia (Musset, 2010). The USA in particular has also developed a variety of other pathways whereby qualifications or experience can lead to teacher certification (e.g. Darling-Hammond, 2002; Zeichner, 2006). Other work-based routes are typically of short duration and targeted at specific types of teachers, for example language teachers in Poland and pre-primary teachers in Norway. (Eurydice, 2013)

2.4 Development of ITT mathematics and science subject knowledge for teaching

2.4.1 The concept of 'subject knowledge for teaching'

As seen in Chapter One the GTP was criticised for its subject training deficiencies and the TDA's SKfT framework (2007) was largely aimed at EBITTs. Before considering this framework explanation of its origins is needed.

The concept of SKfT originated with the work of Shulman et al. (1986) who identified that teachers needed a specialised form of knowledge to make subjects accessible and enable learning. Shulman et al.'s model provided understanding of what this knowledge was and introduced the concept of pedagogical content knowledge (PCK). PCK involves the transformation of three other knowledge bases: subject matter knowledge (SMK); pedagogical knowledge (PK) and knowledge of context (K of C). Thus PCK is created by the reframing of SMK as teachers find ways to represent and transfer it through their teaching.

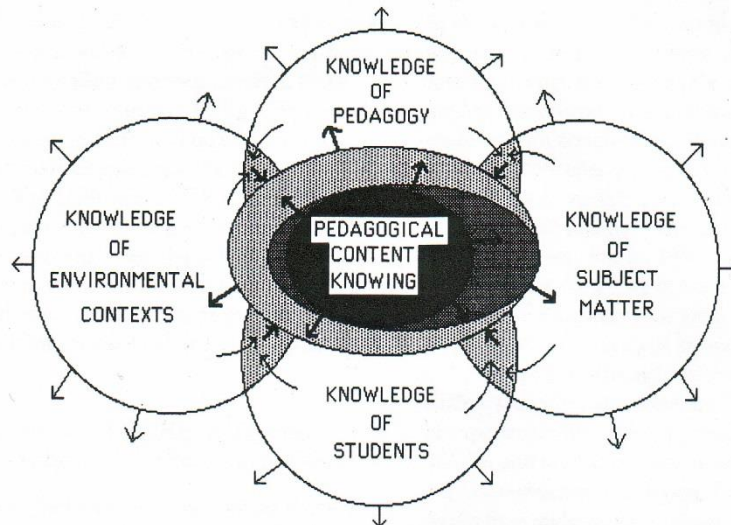
Although Shulman provided a powerful model for organising teacher knowledge it was insufficient to be applied to all subjects (e.g. Abell, 2008; Ball et al.2008) but has provided the theoretical framework for teacher educators' research and pedagogical development (Abell, 2007). The theoretical developments referred to here are most relevant to this research.

Cochran et al. (1993) redefined PCK as PCKg or 'pedagogical content *knowing*' based on a constructivist view of teaching and ITT. Their model accords with my research approach which is discussed in Chapter Three. Its main premise is that learning is context bound and created by learners. Their model (see Figure 1) presents the four domains of PCK as 'expanding' circles to represent the development of PSTs' understanding of each area as they go through training. The 'overlapping' of the circles represents the coming together of the separate domains of knowledge to form integrated PCKg which grows as PSTs further develop their practice. Thus the dark arrows and the 'expanding core' indicate the expansion of PCKg.

The concept of teaching style or '*orientation*' within PCK is associated with teachers' beliefs about teaching which are likely to be influenced by individual disposition and past experience. Grossman (1990) first introduced this as an overarching component called '*conceptions of purposes for teaching subject matter*'. It perhaps seems surprising that this was not included in Cochran et al.'s constructivist model of PCKg.

Figure 1

A Developmental Model of pedagogical Content Knowing (PCKg) as a Framework for Teacher Preparation (Cochran et al. 1993)



Magnusson et al. (1999) introduced '*orientation towards teaching*' replacing Grossman's '*conceptions of purposes for teaching subject matter*'. Drawing on previous studies they detected nine orientations to teaching science each with its own goal and teaching typology. However, in practice *orientation* has often been excluded from research because it lacked clear definition and/or researchers used different terms (Abell (2007)).

For this reason Friedrichsen et al, (2011) revisited Magnusson et al.'s orientations revealing several issues. In particular, how the relationship of *orientation* to other PCK components is inexplicit and some orientations have weak or non-existent theoretical and empirical backgrounds. Moreover whilst teachers can hold multiple orientations this is often overlooked by assigning them a single label (e.g. Friedrichsen et al., 2009). Table 2.1 lists the four empirically strong orientations which could equally apply to mathematics (e.g. Thoren et al., 2005) and found to be relevant to in this study.

Table 2.1 Teaching orientations adapted from Magnusson (1999) and Friedrichsen (2002)

Orientation	Teaching goal	Main characteristics of instruction
Didactic	Transmits the facts of science	Information is provided in a lecture format with questions to test understanding
Academic rigour	Represent a particular body of knowledge	Students are challenged with difficult problems and activities
Discovery	Provide opportunities for students to discover targeted concepts.	Student-centred. Students explore the world following their own interest
Inquiry	Represent science as inquiry.	Investigation centred. The teacher supports students in defining and investigating problems

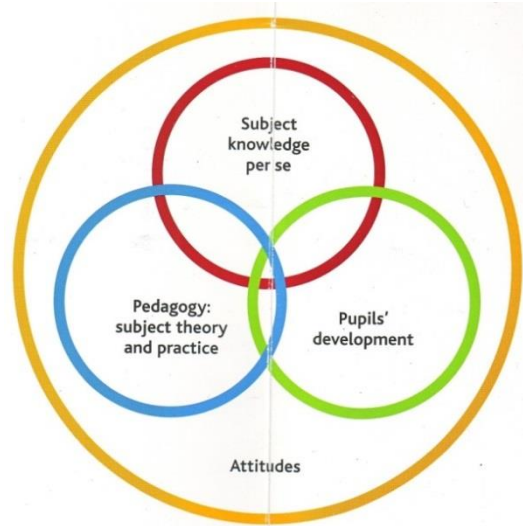
Some of the additional elements included by Turner-Bisset (1999, 2001) in her model of PCK are related to orientation, in particular, ‘*beliefs about subject*’ and ‘*knowledge of self*’. ‘*Knowledge of self*’ was regarded a crucial part of the process through which teachers develop understanding of their role (e.g. Elbaz, 1983; Kagan, 1992) and stood out because it has not appeared in other models of PCK.

The TDA framework for ‘Developing Trainees Subject Knowledge for Teaching’ (2007) (see Figure 2 and the full framework in Appendix 2) was suggested by Evans et al. (2008) to be partly based on Cochran et al.’s PCKg (1993). It has three intersecting domains with a surrounding concept of ‘attitudes’. ‘*Subject knowledge per se*’ equates to SMK whereas ‘*pedagogy*’ and ‘*pupils’ development*’ would both fall under the other PCKg elements. ‘*Attitudes*’ which included elements such as ‘*being creative in developing learning opportunities for all pupils*’ appears to be somewhat associated with orientation in the Magnusson et al (1999) model. Evans et al. (2008) also describe the framework as underpinned by the competency based model of ITT. They found from their research that ‘*self*’ emerged as an important factor in PCK and that it was a significant omission within the TDA framework. This linked their findings to Turner-Bisset’s (1999, 2001) model of PCK which included ‘*Knowledge of self*’.

The TDA framework created some confusion by using different terms for the same concepts as in previous PCK models. As identified by Abell (2007) this tendency within PCK literature can make it difficult for the reader to access it. Therefore in order to avoid confusion the abbreviation PCK/SKfT is used from this point onwards.

Figure 2

**Developing Trainees Subject Knowledge for Teaching
(TDA , 2007)**



Unlike other models and despite guidance regarding its implementation there was no explanation of the relationship in the TDA framework between the domains, how they influenced each other and whether readers should assume that PCK/SKfT is formed where the spheres intersect.

The framework is of particular relevance to this research because EBITTs were encouraged to use it to review their subject provision. It was therefore interesting to see whether EBITTs utilised it in developing the elements of PCK/SKfT inputs.

2.4.2 Mathematics and science PCK/SKfT - challenges and development of understanding

The purpose of this study was not to contribute to existing PCK/SKfT theory or provide new insights into mathematics and science pedagogies but rather to explore the different elements of GTP provision. However part of this exploration considered whether there were gaps and deficiencies in provision and therefore this section focuses on literature relevant to PCK/SKfT development reported by interviewees.

Both mathematics and science SMK hold particular challenges for PSTs because of the level and type of SMK they possess on entry (e.g. Abell, 2007; Ball et al. 2005, 2008). There are four contributing factors. Firstly, that entry level SMK does not relate to the school curriculum PSTs will teach: what they learnt at school has more relevance than their degree courses (e.g. Ball et al. 2005; French, 2005, Abell, 2007; Kind, 2014). This is a phenomenon for countries like England where most teachers are trained via a consecutive system first obtaining a degree and then undertaking ITT as opposed to a concurrent system whereby the subject is studied alongside educational and professional studies (e.g. Musset et al., 2010; Kind, 2014). Whilst a consecutive system allows flexible entry into teaching making it easier for graduates to make career changes it disadvantages them in terms of their SMK for teaching (Musset, 2010).

Secondly, PSTs hold knowledge that contains misconceptions and deficiencies and many hold some of the same naive ideas as their pupils. Much of this was found to come from their degrees as well as their school studies (e.g. Van Driel et al., 2002; Abell, 2007; Sadler et al., 2013; Coe et al., 2014; Kind, 2014). Thirdly, as Kind (2014) found the weaknesses in science SMK originate from PSTs' own schooling. In the UK in particular much of the science curriculum is designed to be rote-learned and does not encourage the teaching of underlying concepts. Also the shortage of chemistry and physics specialists means that many biologists are training outside their specialism. Similarly, within mathematics many PSTs either have non-mathematics or a part mathematics degree (e.g. French, 2005; Ofsted, 2012; Howson, 2015). Finally, in most countries science teachers teach all three sciences to students up to age 15 and where there is a shortage of physics and chemistry specialists they are frequently required to teach more than one science at higher secondary level (e.g. Abell, 2007; Kind, 2014)

The work of Ball, Hill and Bass (2005) provided understanding of mathematics SMK which is characterised as specialized knowledge existing separately from common mathematical knowledge and skills. Teachers need: to know all the different and non-standard approaches pupils use to make calculations; be able to explain why we use certain algorithms; identify errors and also analyse their source. Ball et al (2008) found mathematics SMK to have three domains: 'common content knowledge'; 'specialised content knowledge' and 'horizon knowledge'. 'Horizon knowledge' is an awareness of how topics relate across the curriculum including mathematics knowledge students will learn at the next level.

Limited opportunity to formally address gaps in SMK during training has been referred to and how this was expected to occur through self-study or continuing professional development (CPD) courses (e.g. Van Driel, 2002; French, 2005; Kind, 2014).

This is because the majority of ITT focuses on PK due to the proportion of time spent in schools. This is especially the case with alternative routes like the GTP where the majority of training is school-based (e.g. French, 2005). In respect of science Kind (2014) expressed concerns that an entirely school-based ITT route leaves insufficient time to compensate for SMK weaknesses.

Other literature refers to how SMK is built up over time through: learning new topics as they occur in the curriculum; working with experienced colleagues and via CPD (e.g. Sanders et al., 1993; Gess-Newsome and Lederman, 1995; Abell, 2007). However continuing inadequacies within entry level knowledge has led for calls for further development such as modules within degree courses for those intending to pursue a teaching career (e.g. Harris and Sass, 2011; Carter, 2015)

One of the most common PK challenges for PSTs relates to misconceptions and abstraction of many concepts in mathematics and science. Also how many concepts lack connection to pupils' common experiences and teachers need to use representations to explain mathematical algorithms and find appropriate scientific explanations which will not hinder pupils' understanding (e.g. Van Driel et al., 2002; Thoren et al., 2005; Ball and Forzani, 2010).

Also of relevance to this study is the requirement for science PSTs to develop pedagogy outside their subject specialism. Previous research has shown how they taught more 'risky' lessons within their specialism and tended to use a didactic orientation when teaching outside it (e.g. Thoren et al., 2005; Kind, 2014). However as they acquire a solid base of general pedagogical knowledge they become more able to develop PK outside their specialism (e.g. Sanders et al., 1993; Abell, 2007; Ofsted, 2013). Kind (2009) found preparing outside their specialism was less challenging for some "super-confident" PSTs who are able grasp the principle of transforming SMK to PCK very early in the training. It appeared that the learning curve is individual varying according to personal characteristics such as prior experience.

Research on '*orientation*' has revealed how it develops and the factors which impact on it. Anderson et al. (2000) saw how orientation can change during training and Abell (2007) found that it varied according to topics and the needs of students. Thoren et al., (2005) found that most PSTs hold multiple orientations which they choose from in planning and considering how to teach new topics.

2.4.3 Delivery of PCK/SKfT within ITT – following a constructivist approach

Since the late 1980s a constructivist approach has been utilised by many science and mathematics educators (e.g. Von Glaser field, 1989, 2006; Lerman, 2012; Duit et al., 1993; Mitzes et al., 2005): key to supporting learners is that teachers must understand how students construct and use their understandings (e.g. Von Glaserfeld, 1989).

Constructivist approaches also underpin theories within work-based learning and ITT. In particular: Eraut's (2004) informal workplace learning; Lave and Wenger's (1991) communities of practice and Schon's (1983, 1987) reflection in action. In respect of PCK/SKfT Cochran et al.'s (1993) PCKg model was based "on an explicit constructivist view of teaching and learning processes" (p.263). Whilst Cochran et al. did not confine their discussion exclusively to science and mathematics ITT the subjects did provide a major focus in their recommendations for PCK development within a constructivist paradigm.

Other studies also refer explicitly to a constructivist approach to PCK/SKfT development: Feiman-Nemser and Beasley (1997) exemplified its use in their mentoring approach and Jones and Vesiland's (1996) found how PSTs used experience of their training to reconstruct prior beliefs and definitions. Turner-Bisset (1999) saw that PSTs' prior beliefs and self-image were significant in how they developed their practice. Ellis's (2007) work on PCK/SKfT development advocated a collaborative model within a community of practice. Other studies are less explicit but use constructivist elements and terminology. For example, Hodkinson and Hodkinson (2005) found that teachers and PSTs' "...dispositions influenced the ways in which they construct and take advantage of opportunities for learning at work" (p.119).

Internationally constructivist views of teaching are widely held amongst teachers (TALIS, 2008) but are also shown as influenced by pre-existing beliefs based on their own experience in school and negative as well as positive models of teaching (e.g.

Feiman-Nemser, 1983; McClean, 1999). Consequently, despite being introduced to new and innovative inquiry based teaching many teachers do not adopt them because of the embedded influence of their own schooling (Thoren, et al., 2005; Abell, 2008; Schleicher, 2012). Overcoming these issues within PK is reflected in how most ITT programmes now include reflection on professional identity within the curriculum with emphasis on the ‘person’ as part of process becoming a teacher (e.g. Korthagen, 2004; Hagger and McIntyre, 2006).

Other PCK/SKfT literature refers to the provision of more effective training on how it is translated into classroom practice (e.g. Gess-Newsome, 1999; Abell, 2007; Loughran et al., 2008; Nillson, 2008). Gess-Newsome (1999) found that PCK/SKfT delivery fell within two contrasting models: ‘*Integrative*’ and ‘*Transformative*’. Within the *Integrative* model each element of PCK/SKfT is taught separately and then integrated within teaching at a later stage. The ‘*Transformative*’ model is where all elements are learnt together mainly in schools enabling the synthesis of all knowledge needed be an effective teacher. Thus PCK/SKfT elements come together to create a form of knowledge that is more meaningful than its individual parts

The problem is that most PCK/SKfT within ITT centre-based training occurs within an *integrated* model as part of the educational theory components. This is symptomatic of the longstanding problem of theory and practice divide whereby theory taught in isolation from practice is frequently meaningless (e.g. Hagger and McIntyre, 2006; Zeichner, 2010). The TDA SKfT framework despite having similarities to Cochran et al.’s PCKg model appeared to advocate an integrated approach with separate training and inputs for each element of PCK/SKfT.

Some research has used the transformative approach to teach mathematics and science PCK/SKfT and provided a valuable foundation on which to further develop this curriculum model (e.g. Thoren et al., 2005; De Jong et al., 2005; Loughran et al, 2008; Nillson, 2008). As Nillson (2008) suggests ITT programmes should look at designing specialised elements that deliberately link all PCK elements and their impact on teaching practices. A similar view was expressed by Carter (2015) who recommended that issues in subject-specific pedagogy should be part of a framework for ITT with a better shared understanding of what this would comprise.

This study will explore all these issues in relation to the GTP and explore how far a constructivist approach was used within centre-based PCK/SKfT training and whether a transformative or integrative approach was used to introduce PK concepts. The integrative approach seems to be the premise of the TDA framework (2007) which suggests that PCK/SKfT ‘happens’ at the intersection of the three spheres.

2.5 Delivery of PCK/SKfT within the GTP

2.5.1 Inadequacies and variations in provision

Wide variations in provision and levels of PCK/SKfT input were reported (Griffiths 2007, 2011; Ofsted, 2007; Smith and McLay, 2007; Hobson et al., 2008). Griffiths (2011) found that central training varied in terms of “content, length and frequency” with one EBITT requiring attendance one day each week whereas for another attendance was only optional.

There was less PCK/SKfT training input than for a PGCE (Dunne, 2005; Ofsted, 2007; Griffiths, 2007). Dunne (2005) found that the GTs in her study seemed: “...unable to distinguish between pedagogical issues and subject knowledge” (p.4). Ofsted (2007) found insufficient quality subject-specific input within mathematics and science. It was also suggested that mentors neither had the expertise nor time to provide the necessary PCK/SKfT input especially in respect of science where there were likely to be considerable SMK gaps (e.g. Arzi and White, 2007; Kind, 2014).

Brookes (2005) reported that provision was not always pitched to suit GTs’ needs and frequently they were included in training designed for other groups of learners such as PGCE. There were also concerns about insufficient cohesion between central and school-based training (Ofsted, 2009; TDA, 2011) leading to duplication of what GTs received in school (Smith and McLay, 2007). The sequencing of topics was also an issue as input needed to occur at times to complement school-based training (Hobson et al., 2008; Ofsted, 2009).

2.5.2 Mentoring within school-based ITT

By the time the GTP was introduced ITT was already more school-based and mentors had gained experience of assessing PSTs against the QTS standards and providing in-school support. Nevertheless there was no definitive mentoring model (e.g. Rodger, 2006).

For example, Maynard and Furlong (1993) suggest the mentor role fell within three models: ‘apprenticeship’ whereby PSTs learnt their craft from the ‘master’ mentor; ‘competence’ with the training focus on QTS standards and the ‘reflective’ with the mentor adopting the role of ‘critical friend’.

Within a constructivist paradigm Feiman-Nemser and Beasley (1997) defined mentoring as:

“...face-to-face, close-to-the-classroom work on teaching undertaken by a more experienced teacher in order to help the latter develop his or her practice.”
(p.108)

This collaborative approach using high levels of co-planning and co-teaching they called ‘assisted performance’ provided a contrast to the conventional view of mentoring

The subject mentor role is key to PCK/SKfT development within the GTP and it would be important to see how mentoring approaches emerged in this study and compared to existing literature. Within existing GTP literature an employment-based training mentor model emerged (Dunne, 2005, Smith and McLay, 2007; Mead, 2007; Evans; 2009 and Griffiths, 2011). It rejects models outlined by Maynard and Furlong and reflected similarities with Feiman-Nemser and Beasley’s approach. The GTP required a collaborative approach unconfined within a QTS standards driven paradigm (Mead, 2007). Activities should include co-planning and teaching (Griffiths, 2011; Mead, 2007). Mentors needed to be proactive regarding programme requirements and opportunities to aid professional development. Lesson observation and feedback need to be ‘positive’ and ‘constructive’ with ‘tangible’ targets (Dunne, 2005; Griffiths, 2011).

Unconstructive types of mentoring practices were identified particularly by Griffiths (2007) who found many mentors used a ‘reactive rather than proactive’ approach doing the minimum to ensure programme requirements were met. Also Dunne (2005) referred to mentors giving ‘vague and unhelpful’ and negative ‘nit-picking’ feedback.

Rodger’s (2006) research which looked at mentoring on a traditional ITT programme characterised four different approaches identifying many of the same features of positive and negative mentoring referred to in the GTP literature. Her ideal type of ‘Open, flexible and challenging’ mentoring within a ‘construction model of learning’

matched the characteristics of ‘good’ GTP mentoring. Her ‘Closed and inflexible’ type was commensurate with a competence model of mentoring rejected by the GTP. The ‘Negative and destructive’ approach with negative and unconstructive criticism reflected the poor mentoring found in the GTP literature.

2.5.3 GTP Mentor role

The role of the GTP mentor was shown to be very different in terms of responsibility and time requirements (e.g. Brookes, 2005; Dunne, 2005; Jordan-Daus, 2007).

Although there was some HEI led EBITT input in schools this was mainly limited to monitoring visits and the majority of school-based training was the mentor’s responsibility (e.g. TDA, 2007; Griffiths, 2007; Evans et al., 2008). The changes to improve PCK/SKfT input further extended the role. The term ‘mentoring’ was seen as inadequate (Dunne, 2005; Evans et al., 2008). Evans et al felt that ‘school based trainer’ was more appropriate. Training a GT was more time-consuming as mentors had to set up a training plan, provide training sessions as well as undertake assessment, lesson observations and feedback. There was frustration expressed at the lack of understanding of the GTP by Ofsted inspectors and some teacher educators (e.g. Brookes, 2005).

The literature also refers to unsuitable mentors chosen regardless of whether they had the right skills and others were either coerced into the role or undertook it because of the status it afforded (e.g. Dunne, 2005; Rodger, 2006; Hughes et al., 2011, Cameron 2011). Selecting the right mentor was found to be crucial and that most problems could be avoided by a good mentor/mentee match (e.g. Boreen et al., 2003; Smith and Mclay, 2007; Pitfield and Morrison, 2009; Hughes et al., 2011). For example, Pitfield and Morrison’s research into mentoring found that mature trainees were best matched with mature experienced mentors able to understand their mentoring needs.

2.5.4 Mentor training and support

Mentor training emerged as variable with more consistency needed to ensure rigour across provision (Brookes, 2005; Rodger, 2006). Many mentors reported that they relied on their HEI PGCE mentor training (e.g. Dunne, 2005) or how they had been mentored themselves (e.g. Rodger, 2006).

Research described training as being briefing sessions on procedures, documentation use, and how to develop competencies rather than developing skills such as giving feedback (e.g. Rodger, 2006; Hughes et al., 2011, Cameron, 2011). Cameron made the distinction between ‘informational’ and ‘educational’ mentor training. Training which provided information about the programme was ‘informational’ and that aimed at developing understanding of mentoring and coaching practices was ‘educational’. There is some reference to initiatives including more ‘educational’ elements. For example, the use of non-directive coaching within GTP mentoring (Hughes et al., 2011) and the Teach First ‘Mentor Recognition Framework’ which encouraged a reflective mentoring approach (Cameron, 2011). School support for mentors was often found inadequate especially in respect of sufficient time to fulfil their subject training responsibilities (e.g. Dunne, 2005; Ofsted, 2007; Evans et al., 2008; Cameron, 2011). Cameron suggested that the quality of mentoring was context-dependent and Dunne (2005) talked of the need for “a whole-school culture of commitment” to ITT (p.15).

In this respect Bubb et al.’s (2005) research on NQT induction is relevant. GTP school support and mentoring displayed parallels with NQT induction mentoring (Dunne, 2005). Bubb et al. refer to the variability in school support and “...the persistent offenders - what we call the ‘rogue’ schools and head teachers...” (p.10). The degree of intent to flout regulations varied according to management competence with higher incidences of ‘rogue’ behaviour in less well-managed schools. So a well-managed school might either deliberately flout requirements or accidentally do so out of ignorance. For example a school was aware of the requirement for weekly GT/mentor meetings but deliberately failed to reduce the mentor’s teaching load to facilitate this. Another school out of ignorance had given a GT too large a timetable because they had unintentionally overlooked training timetable requirements.

In respect of specific PCK/SKfT training it seems that most mentors had not received any. There were conflicting views regarding its necessity. Brookes (2005) found that mentors considered it unnecessary because use of subject knowledge was part of their daily work. However Ofsted (2007) concluded that school-based subject mentoring required improvement. Evans et al. (2008) identified that that subject mentors had difficulty in demonstrating their understanding of PCK/SKfT indicating that additional training was required.

2.5.5 PCK/SKfT school-based training: informal learning ‘on the job’ within a community of practice

The GTP literature stressed that although the programme involved training ‘on-the-job’ it was not an apprenticeship model of ITT: it contained formal training elements and was best categorised as work-based learning (e.g. Griffiths, 2011; Smith and Hodson, 2010). Both Griffiths (2007, 2011) and Hodson et al. (2012) referred to the informal learning that naturally occurred ‘on-the job’ within a ‘community of practice’ as defined by Lave and Wenger (1991). Smith and Hodson (2010) talked of how GTs came into school as ‘newcomers’ and engaged in the process of ‘legitimate peripheral participation’ and thus able to “...learn, incidentally, the skills, routines and cultures of teaching by being in school.” (p. 263). This was echoed elsewhere (Evans, et al., 2008; Griffiths, 2011) where GTs said that significant parts of PCK/SKfT was developed within school through working alongside experienced colleagues, and support from other staff.

In the wider literature there is also reference to learning within a community of practice. Although not specifically referring to informal learning Nilsson (2008) found how PSTs ‘hinted’ that their science PK took on new meanings when shared within a group. Hodkinson and Hodkinson (2005) found that much of the teacher learning “was informal in the sense that it was ongoing, opportunistic, and incidental”. Hagger and McIntyre (2006) also refer to the connection between ITT and ‘learning on the job’.

However there is a downside to informal learning due to the tacit nature of teacher knowledge (e.g. Eraut, 2000; Hagger and McIntyre, 2006; Burn et al., 2007). Expert teachers often take their expertise for granted thinking that the teaching skills observed by PSTs are obvious and need little or no explanation (Hagger and McIntyre, 2006). Eraut (2000) suggested people often use espoused versions of theory rather than the original theoretical source when discussing their work which may be misleading.

Also important to informal learning is that afforded by school subject departments. The research of Burn et al. (2007) into science PCK/SKfT acquisition provided a valuable insight. They found how considerable workplace learning of PCK/SKfT took place within the physical spaces provided by science departments where PSTs had frequent opportunities to learn from other teachers. The importance of a communal learning space also links to other workplace learning literature. Brown and Duguid (1991)

distinguished between formal work-based training where learning occurred away from the main workplace to informal learning within a community of practice. Building on Bourdieu's (1973) work they suggested that formal training was analogous to a map of a journey and did not fully account for its complex process with setbacks and need for review along the way. Informal learning was a significant part of the 'journey'. Their findings also showed that too much reliance on formal learning with trainees grouped in separate learning spaces could put them at risk of being "designed out and...physically or socially isolated..." (p.50) from informal learning.

2.5.6 PCK/SKfT school-based training: formal space and the mentor as teacher educator

GTP research stressed the importance of 'formal spaces' for training in school and how sessions with mentors should be scheduled to address specific learning needs (e.g. Evans et al., 2008; Smith and Hodson, 2010). In Evans et al.'s research GTs said that the most significant parts of PCK/SKfT training occurred within school. Whilst the importance of formal training in school is stressed there is very little information about what it comprised.

The literature makes references to the demands placed on school-based training by a competence model of ITT. Compliance with QTS standards and the Ofsted inspection framework required an inordinate amount of mentor time. Also the standards alone could not provide the basis for training (e.g. Turner-Bisset, 1997; Hodkinson and Hodkinson, 2005; Hagger and McIntyre, 2006; Evans et al., 2009). Hagger and McIntyre (2006) pointed out the standards were not much more than "... an unintegrated, untheorized list" and that learning to meet each of them separately could not be "equated with learning to teach..." (p.63). Mentors had to go beyond merely creating opportunities to meet each standard and ticking it off on a list. The standards needed to be integrated into a coherently planned formal curriculum.

Hagger and McIntyre (2006) proposed a rationale for a school-based training curriculum and what it might include stressing that informal learning whilst important is inadequate and demands of school life provide no time for in-depth conversation and reflection. Learning needs to be planned and occur within formally allocated, protected time taking account of factors such as timing in the school year and individual trainee needs. Formal training activities should include: lesson observation; lesson planning;

and preparation for teaching pupils from diverse cultural backgrounds. Their research found lesson observation far much more useful when PSTs had more experience of teaching and that it needed to take place later with guidance on how to maximise PCK/SKfT learning opportunities.

As it is the mentors' responsibility to deliver such a curriculum this poses the question about how well they are prepared to take on this school-based teacher educator role. Only oblique references occur within GTP literature in stressing how the role was different to that of a PGCE mentor (e.g. Jordan-Daus, 2007). However, the wider ITT literature highlights this issue (e.g. Hagger and McIntyre, 2006; Zeichner, 2010). For example Zeichner (2010) pointed out how school mentors are usually not provided with the preparation needed to undertake a more "educative conception of mentoring" (p.90).

Murray (2005, 2008) and Murray and Male's (2005) work on teacher identity is also relevant. Murray (2005, 2008) explained the challenge of switching from the first order role as classroom teacher to that of second order teacher educator. Through her work on HEI induction for new teacher educators she commented that we cannot assume that:

“...knowledge and understanding of teaching acquired in the school sector can be ‘transferred’ to higher education with few problems...” (p.120)

More recently, Jackson and Birch (2015) explored the role of teacher educators as a result of introducing School Direct. They referred to mentors as a new breed of 'hybrid' teacher educators who were required to have much greater involvement in planning and delivering training.

2.5.7 Training context: scope and limitations of training offered within schools

Work-based learning research suggests that central to a learner's development was the allocation and structure of work-based training activities. Eraut (2004) pointed out how managers need to balance the needs of the job against the learner's needs. This is highly relevant to GTs where much of training revolves around their teaching.

It also emerged that immersion in the teaching role greatly increased learning opportunities (e.g. Evans et al., 2009; Smith and Hodson, 2010). For example, GTs talked of how "...learning through doing was the best practice" (Evans et al. p.10). They also highlighted that getting to know their classes and seeing the impact of their

practice on pupils' learning was key to taking ownership of their teaching. However, also emphasised was the reverse side of immersion which meant a more narrow experience as GTs spent the majority of time in one school (Coles and Pitfield, 2006; Evans et al., 2009; Griffiths, 2007). Linked is the type of second school experience (SSE) undertaken by GTs. It is a QTS requirement that all ITT trainees have experience of teaching in at least two schools and trainees on employment-based routes need to be released to undertake SSE (R2.9, QTS standards, 2007; C2.4, QTS standards, 2012). Although the guidance stated that the SSE school should provide a contrasting experience and be selected to meet individual training needs no length of time is stipulated. Consequently its scope, length and the extent to which it broadened experience was variable. Several references commented on the brevity of SSE, lack of focus, failure to provide a contrasting experience and poor mentoring (Rodger, 2006; Coles and Pitfield, 2006; Ofsted, 2007; Griffiths, 2007).

2.5.8 Design of EBITT central programme PCK/SKfT provision

The GTP literature revealed that it was difficult for EBITTs to decide on a central training model and being a work-based programme of ITT the GTP reopened the debate about craft apprenticeship and professional training (e.g. Brookes, 2005; Jordan-Daus, 2007).

The roll-out of the TDA PCK/SKfT framework (2007) and the requirement from 2008 that GTs must have 60 days of structured training meant that EBITTs had to review their provision. On a practical level the small numbers trained by many EBITTs posed a challenge as they could not benefit from economies of scale. This was particularly so for secondary programmes in respect of PCK/SKfT input. The TDA (2007) advised EBITTs with smaller numbers to take creative approaches to programme delivery.

Programme design was also complicated by the debate about the value of theoretical input and the associated academic work PSTs were required to do. Past research (e.g. Lomax, 1993) had found that they questioned its utility which was backed by more recent studies of Scottish ITT (e.g. Stark, 2000) which reported that trainees found it easier to 'forget' about theoretical studies once they were in school. As pointed out by Hagger and McIntyre the old 'theory- into-practice' approach was "often very nearly useless" (p.60) by the time PSTs came to apply it in the classroom.

The rejection of theory-into-practice led to the development of a new type of theoretical teaching (Korthagen, 2004; Hagger and McIntyre, 2006; Zeichner, 2006, 2010). Hagger and McIntyre describe this as ‘practical theorising’ which depends on close integration of school and HEI based elements. Within the GTP literature practical theorising was widely applied in central training (Jordan-Daus, 2007; Hobson et al., 2008; Griffiths, 2011). Griffiths found that one of the strengths of the provision was that unlike traditional routes central sessions employed ‘theorising on practice’ and GTs were easily able to make links between theory learnt at central sessions and classroom practice. Jordan-Daus (2007) found that GTs wanted theory within their training so within her programme she had sought to reconcile the practical aspects of the GTP with a commitment to the “philosophy of reflective practice.” (p.75).

The GTP literature refers to the variety of central training approaches to PCK/SKfT delivery (Coles and Pitfield, 2006; Evans et al., 2008; Griffiths, 2011; TDA, 2011). Griffiths (2011) indicated that subject specific PCK/SKfT training took place in schools whereas the GTs in Coles and Pitfield’s study attended university sessions alongside PGCE students. A TDA review of Ofsted inspection references to subject audit and training (2011) provided some examples of PCK/SKfT training but these were limited by the lack of standardised reporting hampering identification of references to provision content. The limited nature of Ofsted reporting was also referred to by Hagger and McIntyre (2006) who expressed disappointment in its failure to mention interesting new developments in school-based ITT. There are a few references to challenges to developing pedagogy (e.g. Evans et al, 2008; Griffiths, 2011) although only Evans specifically used the term PCK in illustrating them.

GTP research also mentions how SMK was addressed via improved audit processes and tasks in ITPs, school-based training, attending external training prior to the GTP such as TDA subject booster courses and attending other external training during the GTP year (Evans, et al., 2008; TDA, 2011). However unlike some traditional routes (e.g. French, 2005; Kind and Wallace, 2008) EBITTs did not provide central training to address gaps in subject knowledge.

2.5.9 The role of HEIs in PCK/SKfT central training provision

The importance of HEIs having a continuing role within ITT is a strong theme and there is a consensus about the need to reconceptualise their relationship with schools

(Korthagen, 2004; Brookes, 2005; Hagger and McIntyre, 2006; Jordan-Daus, 2007; Zeichner 2006, 2010; Jackson and Birch, 2015). Zeichner (2010) described the need to create a ‘third space’ rejecting divides such as the theory and practice splits within ITT provision. Following the same theoretical origins Jackson and Birch (2015) referred to the need to create a more collaborative provision with schools and HEIs working with each other as a teaching and learning community to design, develop, deliver and evaluate provision. Jordan-Daus (2007) referred to the fundamental contribution of HEI teacher educators to employment-based ITT but how it was essential for it to construct its own frameworks rather than borrowing course content designed for other routes.

However in practice a fully collaborative process has been inhibited by the largely part-time staffing model operated by most HEI ITT providers. There are many part-time tutors who undertake some elements of teaching and PST school supervision and this “peripheral” group of staff are expanded and contracted according to need (Zeichner, 2006; Posner, 2011). Although none of GTP literature referred explicitly to EBITT staffing it was known anecdotally amongst the EBITT community that this was the staffing model used and it was usually only programme leaders and some administrative staff that had full-time involvement. Consequently similar to Zeichner’s findings on more traditional ITT routes (2006) many of the tutors who taught and supported GTs had limited connection to GTP programmes and involvement in decisions about how they were run. Thus when references are made to community of practice within the GTP this was within the GTs’ schools with EBITT tutors as occasional ‘visitors’.

The literature also refers to other key aspects of the HEI role of which one was access to important resources especially libraries and specialised academic expertise which schools and PSTs need to be able to draw on. However within the existing GTP literature the use of HEI libraries was not specifically mentioned as a key resource. The GTs in Evans et al.’s (2008) research refers to use of some text books but said they found internet resources the most useful. Another key role for HEIs lies in the provision of an external layer of assessment inferred in the work of Coe et al. (2014). One key finding was the importance of external observation by expert mentors to feed into assessment thereby providing evidence from an independent source and ensuring that learning is not limited by training contexts.

A final significant aspect of the HEI role was the provision of a neutral space (Coles and Pitfield, 2006; Griffiths, 2007; Smith and Hodson, 2012). Coles and Pitfield (2006) refer to “a professional, mutually supportive space” (p.290) where GTs have access to peer support. This space was also somewhere “to share ideas about school experience and to rehearse thoughts on practice” (Smith and Hodson, 2012, p.188). GTs reported that schools were often too busy to address all learning needs and felt that as unqualified teachers they could not ‘rock the boat’¹ by overly questioning the pedagogy and practice of experienced colleagues (Griffiths, 2007). Therefore, away from school ideas could be aired in a neutral ‘space’ with EBITT tutors to provide structure and leadership.

2.6 Relationship between PCK/SKfT development and GTs’ prior experience and disposition and beliefs

2.6.1 Influence of prior experience

At its inception GTP candidates were typically mature and already known to their schools. The introduction of the training salary and removal of the 24-years minimum age limit however altered the GT profile. The work of Priyartharshini and Robinson (2003) in identifying six main types of career changer entering teaching is helpful in analysing this as it draws distinctions between the types of experiences GTs drew on when training (e.g. Griffiths, 2011). Table 2.2 outlines these categories.

Table 2.2 Six types of career changer

Category	Definition
‘Parent’	Those who referred to as being a ‘parent’ as their most recent experience prior to training
‘Successful careerist’	Professionals who had been successful in a career followed since university
‘Freelancer’	Those who had followed a single career often employed on short-term contracts
‘The late starter’	Those who had left school and entered employment with few or no qualifications choosing to enter higher education at a later stage
‘Serial careerist’	Those who had already achieved in a number of short term successful careers
‘Young career changer’	Those who had chosen a career immediately after university which did not suit them or had taken on temporary roles whilst deciding on a career

Source: Priyartharshini and Robinson (2003 p.98 -100)

¹To cause trouble; create inconveniences; disrupt things

The GTP best suited mature candidates with prior work experience especially in schools and who needed to earn whilst training (e.g. Smith and McLay, 2007). Dunne (2005) found that the successful GT was “resourceful”, “independent”, “extremely hard-working”, “confident” (p.12). Griffiths (2011) reported that a GT needed to be “...a particular kind of person to survive the GTP and succeed...” (p.26)

GTs have a well-developed sense of agency (e.g. Mead, 2007; Griffiths, 2007; Smith and Hodson, 2010). Smith and Hodson (2010) stressed how GTs’ disposition enabled them to maximise informal learning opportunities. Learning orientation was also significant in how they utilised their training inputs. Hobson (2003) identified three learning types, firstly the ‘proceduralist apprentice’ who wanted to be given procedures and strategies to use in the classroom “...but is not too interested in *why*.” (p.252)

The second type of ‘understanding-oriented learner’ additionally wanted to develop a critical understanding of practice. The third type, the education-oriented apprentice’ was “something of a hybrid” (p.254). They were mainly concerned with practical classroom strategies but felt they should also acquire some ‘background knowledge’ about teaching and education because of either its intrinsic or extrinsic value.

2.6.2 Teacher identity

The significance teacher identity development is often referred to (e.g. Clandinin, 1986, 1992; Korthagen et al., 2001) and is a strong theme within GTP research (Hobson et al., 2008; Smith and Hodson, 2010; Griffiths, 2011). Both Hobson et al. and Smith and Hodson found that identity formation happened sooner than on traditional routes as GTs were treated like members of staff from the outset. Griffiths’ interviewees talked of the significance of teacher “self-identity” in their development, making their transition to NQT “smooth and relatively easy” (p.25). This contrasted with trainees on traditional routes who felt that their teacher identity would not be established until they became NQTs. Griffiths also commented how a sense of belonging to the school maximised informal learning opportunities as it was easier to ask questions and engage in observation. Evans et al. (2008) talked of GTs’ ‘*knowledge of self*’ in respect of PCK/SKfT development and how they described a deepening sense of identity through the process of training and progressing children’s learning.

However, references in the wider literature warn of the danger of dis-identification and its detrimental impact on learning. This was stressed by Wenger (2010) and echoed elsewhere (e.g. Smilie, 2001; Schlager and Fusco 2003). Schlager and Fusco whose research explored teachers' CPD talked of dysfunctional communities of practice where schools' norms and values have proved barriers to professional development.

2.7 Summary and research focus

2.7.1 Summary

In common with other countries England shares problems of teacher quality and undersupply of mathematics and science teachers and has undertaken ITT reforms to address this. Part of the reform has been to make ITT more school-based and introduce alternative ITT routes such as the GTP. However PCK/SKfT development within the GTP was found to be wanting.

Shulman's original model of PCK has been reviewed many times but there does not appear to be any established models for delivering PCK within ITT. Within many models teaching orientation emerged as an important but contested element often inappropriately applied to individual PSTs and qualified teachers. The creation of the TDA's own framework designed to develop PCK/SKfT drew on Shulman's and other PCK/SKfT models and was largely aimed at EBITTs

Very little is known about the curricula of the GTP, the elements through which PCK/SKfT was delivered, how far the TDA's framework was utilised and how training addressed PCK. So far only Evans, et al. (2008) has looked specifically at PCK/SKfT within the GTP but did not report on the training curricula.

Previous research also acknowledged its limitations: Hobson et al. (2008) whose findings were based solely on trainee accounts felt this may "tell only one part of the story" (p.419); Smith and McLay (2007) acknowledged that omitting to ask GTs why they selected that GTP meant that "Its suitability for career changers is therefore untested in this study." (p.45). Evans et al. found they obtained limited data from final assessor evaluations regarding how PCK/SKfT development was supported.

Thus there is a gap in the knowledge regarding the different elements of employment-based ITT which developed PCK/SKfT. In particular: what central training comprised;

what other resources and support were provided by the EBITT; the working relationship between the mentor and mentee and other training in school. This was the focus for this study through which I hoped to make a contribution to the empirical field of employment-based ITT.

2.7.2 Research focus

This research was to focus on the rationale and elements of PCK/SKfT provision. I was interested to see whether *integrative* or *transformative* models were used and how far practical theorizing was employed within PCK/SKfT development; the role of mentors in PCK/SKfT development and the approaches used to support their GTs and the impact that GTs' individual disposition and prior experience had on their PCK/SKfT development especially the impact of sense of *self* on teaching orientation. To address these gaps in knowledge of mathematics and science GTP PCK/SKfT development and underlying issues I posed one main research question:

How did mathematics and science Graduate Teachers acquire subject knowledge for teaching and what were the factors that influenced this?

Underlying this question were three sub-questions:

- What was the rationale for EBITT's PCK/SKfT provision?
- What was the relationship between GTs' beliefs/prior experience and PCK/SKfT development?
- Are there still deficiencies in PCK/SKfT provision?

Chapter Three

Methodology

3.1 Introduction

This chapter explains my research methodology and falls into nine sections: research approach; methodology for data collection; sample selection; data collection through semi-structured interviews; data collection via examination of EBITT documents; data collection through observation of EBITT training; my role as researcher; ethical considerations and data analysis.

3.2 Research approach

As a novice researcher it was a challenge to position myself in terms of a philosophical stance and chosen methodology. However my own learning and professional experiences had made me aware how my knowledge, beliefs and practice had developed through past experiences and interaction with the culture and colleagues of the environments I engaged with. Similarly, working with the GTP had shown how GTs had come into teaching with preformed knowledge and beliefs which shaped their approach to teaching. These personal and professional experiences seemed to accord with the epistemology of social constructivism which became the lens I chose to view PCK/SKfT development. It was my hypothesis that how GTs developed their PCK/SKfT was likely to be a function of individual values, experiences and how these were influenced by and interacted with the culture and norms of the contexts in which they trained.

Social constructivism has well established philosophical origins (e.g. Mannheim, 1936; Merleau-Ponty, 1962). Crotty (1998) explains that within this epistemology we do not create meaning but instead "... meanings are constructed by human beings as they engage with the world they are interpreting..." (p.43) and that the world and its objects "...are our partners in the generation of meaning..." (p.44). An important element of social constructivism is 'relativism' which requires us to recognise that individuals have different ways of viewing the world and how these "different worlds constitute for them diverse ways of knowing, distinguishable sets of meanings, separate realities." (P.64)

In the context of education constructivist approaches were developed in the work of Vygotsky (e.g. 1978), Piaget (e.g. 1954, 1971) and Bruner (e.g. 1976, 1996). Whilst there are divergences within thinking the main premise is that knowledge is constructed

by learners rather than transferred to them by teachers and it is the teachers' role to support knowledge construction. As referred to in Chapter Two since the late 1980s a constructivist approach has become the dominant philosophy for many science and mathematics educators and used to develop PCK.

3.3 Methodology for data collection: a mixed methods approach

In designing my methodology I took into account my empirical setting and four key considerations:

- My theoretical approach
- What were the data collection techniques I would or could use?
- Where were the right sources for the data to address my research questions?
- The selection of my sample and the importance of justifying this selection
(Brown and Dowling, 1997)

Interpretivist/constructivist approaches to research have the intention of “understanding the world of human experience” (Cohen and Manion, 1994) and the researcher tends to focus on “participants’ views of the situation being studied” (Creswell, 2003, p.8). It is thus common for the researcher to rely on qualitative data collection methods using ethnographical approaches including interviews, long term observation and textual analysis (Leonard, 2005). However s/he may opt for a mixed or multi-methods approach (McKenzie and Snipe, 2006).

There has been much debate within philosophical and methodological literature about the use of mixed methods (e.g. Creswell, 2010) and what actually constitutes a mixed method design (e.g. Johnson and Turner, 2003; Morse, 2010) which I cannot fully explore here. There is also different terminology used to describe the different permutations of qualitative and quantitative mixes.

I found the rationale provided by Johnson and Turner (2003) helpful whereby they defined mixed methods research as falling into two categories of *intermethod* and *intramethod*. *Intermethod mixing* or “method triangulation” is where two or more methods are used, for example questionnaires and observations are mixed in a single study. The approaches can be either quantitative only or qualitative only approaches or a combination of both. *Intramethod mixing* happens where a single method includes both

qualitative and quantitative components for example the use of an open-ended and closed-ended questionnaire.

Ultimately I took a pragmatic stance in choosing a mixed methods approach (e.g. Greene and Caracelli, 2003; Green and Hall, 2010; and Biesta, 2010). Like Greene and Caracelli (2003), I believe that many paradigms are social constructions and so not necessarily “intrinsically bound to a particular set of methods and techniques” (p.95). Biesta (2010) talked of this approach as “everyday pragmatism” and of the “utility of research means for research ends” (p.96).

The pragmatic reasons were due to the nature of the empirical field which placed some limitations on research design. Firstly, the availability of the key players in PCK/SKfT delivery and development from whom much of the data was collected: GTs, school mentors, EBITT subject tutors and senior EBITT staff. All participants were constrained by time because of the work-based nature of the training and the demands on EBITT staff. Secondly, EBITTs have traditionally found it difficult to make the best use of their data (e.g. Ofsted 2007). So from my experience of the empirical field it was important to also have access to documentary data such as EBITT handbooks to supplement data gained from interviews. Given these considerations I decided to use a combination of methods which would allow me to answer my research questions (e.g. Greene and Caracelli, 2003; Johnson and Onwuegbuzie, 2004; Biesta, 2010).

The guiding principle of a mixed methods research approach is that methods should be mixed to complement their strengths and avoid non-overlap of weaknesses (e.g. Tashakkori & Teddlie, 1998, Johnson and Turner 2003). Johnson and Turner also stress that it is not a weakness or a limitation of any qualitative study that numerical generalisations cannot be drawn or that samples are not statistically representative just as it is not a weakness or limitation of a quantitative study that case-bound generalisations cannot be deduced or that the data is not information rich. It is rather the researcher that is weak or limited in choosing inquiry approaches for the wrong reasons or executes them in the wrong way.

In this research I used the *intermethod* approach collecting data using three methods: semi-structured interviews, document analysis and observation (attending EBITT

training sessions and regional meetings). The main method of data collection was via the interviews but using, document analysis and observation to:

- Gain information about provision rather than take up valuable interview time with EBITT staff to obtain it
- Provide data triangulation particularly in respect of attainment and central training provision

I also considered the use of focus groups with GTs and mentors to help refine the interview questions but decided not to for two reasons. Firstly they have some weaknesses: they can be dominated by some participants; data analysis can be time-consuming and there are possible 'reactive and investigator effects' because participants feel they are being watched (Johnson and Turner, 2003): Another disadvantage is that participants might find it difficult to share their views with a group. I also discounted the use of questionnaires as GTs and mentors are frequently asked to complete programme evaluations and I did not want this process to be another programme type 'demand'. Also questionnaires would not encourage the type of full and qualitative responses I was seeking.

Semi-structured style interviews were chosen to gain an understanding of how EBITTs developed their programmes, PCK/SKfT input and how GTs and mentors experienced the training process. Furthermore they have been used in similar studies for example: Foster (2001) who looked at the GTP's early development and Brookes (2003, 2005) who explored the adequacy of GTP training, mentor training and quality assurance. Griffiths (2007, 2011) also used this approach when looking at GTs' experiences of training and GTP career changers' early professional development. This method is ideal for face-to-face interviewing as it allows the interviewer to have flexibility in the order and wording of questions and time given to different areas (e.g. Spencer and Ritchie, 1994, Robson, 2001, Johnson and Turner 2003) but at the same time allows her/him to have a "shopping list" of topics s/he wants to address (Robson, 2001 p. 237). Using a topic list ensures that all interviewees were asked the same questions but also allows clarification and more in-depth exploration of particularly interesting themes. It also gives space to interviewees to expand on areas and introduce related topics they wish to refer to.

3.4 Sample selection and rationale

I decided to look at the PCK/SKfT provision of three EBITTs within two secondary shortage subjects because they have always been a major focus for the GTP. Although the aim of this research was not to evaluate or compare I knew it was important to explore different approaches to PCK/SKfT input. I also wanted to see whether the academic profile of GTs had any bearing on how well PCK/SKfT was developed.

I chose three EBITTs to gain sufficient data and reflect a range of provision. No two EBITTs operated in the same way and varied considerably in size: some school-led EBITTs had as few as four or five GTs whereas other university or consortia led providers trained as many as 200 in a year (Smithers et al., 2012). Also EBITTs tended to have strong geographical connections serving the needs of local schools which also had an impact on programme delivery. Data collection also took into account guidance that it should be both representative and manageable (e.g. Brown and Dowling, 1997; Robson, 2001) and reflect my own experience of the field. As a result my criteria for selecting the EBITTs were that they should:

- be representative of the GTP within the empirical field;
- reflect effective provision and so the providers would have to be Ofsted graded ‘good’ and ‘outstanding’;
- reflect the differing approaches EBITTs used to address and develop PCK/SKfT;
- include a provider which was more selective in recruiting trainees and one that had a more ‘open access’ policy;
- have sufficient potential data to draw on in terms of numbers of GTs and mentors.

Using these criteria I selected EBITTs with different origins and missions, of similar size in terms of secondary mathematics and science GT numbers and within a manageable geographical distance of each other. Having a longstanding connection with the GTP I was familiar with many EBITTs and knew the Programme Leaders. This facilitated my choice and the initial approach to be involved in my research. As Chapter Four provides the profile of the EBITTs based on the data only a brief outline is provided here:

- **EBITT 1 – ‘Kingsview’:** attached to a post 1992 university. It was recently graded ‘good’ with ‘outstanding’ features by Ofsted and had a more ‘open access’ policy in terms of entry requirements.
- **EBITT 2 – ‘Central College’:** attached to a large high research profile university. It was graded ‘outstanding’ by Ofsted in 2011 and usually expected candidates to have at least a 2:1 degree.
- **EBITT 3 – ‘NineSG’ (Nine Schools Group):** a school led EBITT and SCITT. The NineSG EBITT was graded overall ‘good’ with ‘outstanding’ features at its latest Ofsted.

3.5 Data Collection: Semi-structured interviews

3.5.1 Selection of participants

Data was mainly collected through 42 semi-structured interviews with four groups of interviewees: GTs; mentors; programme leaders and subject specialist tutors. To identify participants and comply with data protection I liaised with the programme leaders. The initial invitation was made by an email via the EBITT administration. It included information about the research outlining how issues relating to ethical considerations and confidentiality would be addressed (see Appendix 3). As the initial response to the emails was limited other approaches were also used to enlist participants such as personal contact through attendance at mentor and GT sessions.

I had hoped to interview equal numbers of mathematics and science GTs and their subject mentors to gain views of each side of the mentoring partnership but this was not possible in every case. However I had the opportunity to interview a former mathematics GT in one school and decided to include his data as his experience was similar to his colleagues and having had more time to reflect on his training added valuable data about the development of PCK/SKfT. I was also able to interview some senior mentors from Central College who had helped make arrangements to see their GTs and subject mentors. This added important data because of the overview role they had in managing ITT within their schools. The programme leaders were interviewed early in the data collection process so I could use data from their responses to inform topics to be covered with the other groups of interviewees.

The composition of the interview sample is shown at Table 3.1. All GTs started their training in September 2011 except the mathematics GT who originally trained in 2006-7.

Table 3.1 Interview sample

Interview group	Kingsview	Central College	NineSG	Total
Programme Leaders	1	1	1	3
Secondary Programme Leaders	1	-	-	1
Maths Subject specialists	1	1	1	3
Science Subject specialists	1	1	1	3
Maths Mentors	2	4	2	8
Science mentors	-	1	3	4
Senior Mentors	-	4	-	4
Maths GTs	2	5	2	9
Science GTs	2	2	3	7
Total	10	19	13	42

3.5.2 Semi-structured interviews: interview schedules and questions

The choice of questions was informed by issues and limitations previously identified by other studies and my own experience of the GTP. They fell into two categories, firstly the deficiencies in PCK/SKfT programme delivery and mentoring identified by Ofsted and the TDA. Secondly, limitations and other issues related to PCK/SKfT found elsewhere within the literature, in particular: Hobson et al. (2008) whose findings were based solely on trainee accounts; Smith and McLay (2007) who omitted to ask GTs about why they had chosen the GTP route and Evans et al. (2008) who found that data from their final assessor evaluations was limited.

In formulating the questions I drew on Cohen et al. (2000) who stressed that questions need to take into account the research's general goals and the following factors: interview objectives; the nature of the subject matter; whether facts, opinions or attitudes are being sought and whether depth and specificity is being sought. They also stress the importance of attention to issues such as: keeping language simple; avoiding double-barrelled questions; and assuming that respondents have the knowledge sought.

As there were four groups of interview participants these had to be accommodated in formulating the interview schedules. Each group had a different involvement with the GTP and their experience of PCK/SKfT varied accordingly. So whilst some categories of questions were appropriate to all groups others applied to only one or two groups. For example: only the programme leaders were asked about their EBITTs' origins,

development, numbers recruited and selection policy and questions regarding the rationale for developing PCK/SKfT provision were restricted to programme and subject specialist tutors. All groups were asked about mentoring, PCK/SKfT central training and school-based training and the challenges in developing PCK/SKfT. Table 3.2 provides a list of four interview schedules' topics.

Table 3.2 Interview schedule showing differences between the four participant groups

	Topic	Group(s) asked questions on the topic
1	Own background and prior experience	All
2	EBITT Role and responsibilities	Programme Leaders; subject specialists
3	EBITT background and current activities	Programme Leaders
4	EBITT rationale for PCK/SKfT delivery/training/support on PCK/SKfT	Programme Leaders; subject specialists
5	GT selection and induction – selection/audit/training needs assessment/ITP	Programme Leaders; subject specialists
6	Views on the GTP and comparison with PGCE/SCITT	All
7	Influence of GTs' prior experience and own schooling on PCK/SKfT development	GTs
8	Role of subject specialist tutor in PCK/SKfT development/delivery	Programme Leaders; subject specialists
9	Role of EBITT/University Tutor in PCK/SKfT development	Programme Leaders; subject specialists
10	EBITT run central PCK/SKfT training/support	All
11	Issues for GTs in development of PCK/SKfT	All
12	Mentor Training and support – generic and subject specific	Programme Leaders; subject specialists; mentors
13	Challenges of the mentor role	Programme Leaders; subject specialists; mentors
14	Teaching orientation and impact on PCK/SKfT development	All
15	Other resources to develop PCK/SKfT e.g. use of library, the internet, EBITT intranet, etc.	All
16	PCK/SKfT – school context specific issues	All
17	GTs' attainment against PCK/SKfT related QTS standards	Programme Leaders; subject specialists; mentors
18	Is there anything else you would like to add/tell me about?	All

The interview schedule for the specialist subject tutors was also tailored for each EBITT because data collected from the Programme Leaders’ interviews revealed that subject specialist tutor roles for each EBITT were different. Kingsview had ‘Subject Advisers’ who were also PGCE Subject leaders at their HEI whereas NineSG had ‘Subject Leaders’ recruited from its schools’ senior teachers. Central College did not have subject leaders although they used subject specialist tutors to lead central training sessions and GTs had subject specialist tutors who provided input via school monitoring visits. The Central College subject specialists did not have identical roles – one was a science specialist who led the central sessions for the combined group of mathematics and science GTs whereas the mathematics specialist acted as an EBITT tutor to mathematics GTs.

There were also other factors to account for: NineSG had no external monitoring from a university tutor so questions relating to that input were irrelevant. Also neither the NineSG nor Central College subject specialists had worked as PGCE tutors although they had been PGCE mentors. So it was necessary to use three separate schedules; the initial interview schedules for each group with annotations following the pilot phase are shown at Appendix 5 and the final versions are shown at Appendix 6. Table 3.3 shows which topics’ questions were modified and which were identical for each pair of tutors. It was also helpful to ask some personal background questions to act as an icebreaker and to refer to PGCE and SCITT training models when interviewing mentors and subject specialist tutors as comparisons helped to contextualise the way in which the GTP model developed PCK/SKfT and identify strengths and problem areas.

Table 3.3 Subject specialist tutor interview schedules showing differences in topics

	Question category	Identical or modified to address EBITT differing provision
1	Background and responsibilities	Modified
2	Role in PCK/SKfT Role development/delivery	Modified
3	Views on the GTP and comparison with PGCE/SCITT	Identical
4	EBITT run central training/support on PCK/SKfT	Modified
5	Role of EBITT/Central College Tutor in PCK/SKfT	Not included for NineSG as it was a school-led provider
6	Issues for GTs in development of PCK/SKfT	Identical
7	Training for mentors and role of Central College tutor	Modified
8	Attainment of GTs against subject knowledge standards	Identical
9	Is there anything else you would like to add/tell me?	Identical

3.5.3 *Pilots of interview schedules and questions*

The interview schedules were piloted in two ways. Firstly, two experienced EBITT colleagues provided feedback on the topics and questions. One suggested that I needed to be careful about the terminology I used with mentors which might be unfamiliar to them. So for example asking about making “*the transition from first order to second order practitioner*” might not be understood. It was also suggested that I should provide more prompts for myself with some questions. When I asked about possible improvements to PCK/SKfT training for GTs they suggested I should give examples such as ‘*subject study groups*’ or ‘*training on difficult to teach topics*’. The other colleague suggested I explored more fully the limitations of the GTP training and mentoring context by asking questions from a variety of angles. For example asking GTs about: ‘*opportunities to observe and work with mathematics/science teachers other than their main mentor*’ ‘*whether there was a predominant teaching orientation/model they were expected to follow*’ ‘*were they able to take ‘risks’ and try out a range of teaching strategies*’. This advice helped me to refine the wording of my questions and add in additional prompts to use. For example, to a question for GTs which asked ‘*What do you feel were the most challenging aspects of developing your PCK/SKfT?*’ the following prompts were added: ‘*need to probe on pedagogical challenges in mathematics and science and use prompts: abstract nature of subject language; negative image of subject; teaching out of science specialism; cultural issues*’ (see Appendix 5).

Secondly, the interview process was piloted by using the first interview with each group to check whether issues arose regarding the content and ordering of the questions. I found that whilst the sequencing of topics worked well I needed to refine some questions and include some additional ones. For mentors the ITT route they had followed emerged as important in respect of their views on the GTP and how well they felt prepared for their role so I added a question asking which route they had followed. Regarding challenges in developing PCK/SKfT the first mentor interview also raised generic pedagogical issues such as behaviour management. Therefore I added a separate question asking about overall challenges followed by a question asking about challenges in developing PCK/SKfT. For the GT interview schedule some additional background questions about age, degree title and classification were needed as I realised that gaining this information first hand at interview was more efficient than requesting it from the EBITTs.

3.5.4 Conduct of interviews

Cohen et al. (2000) drew attention to the care needed in setting up and conducting interviews and how the interviewer should ensure that the interview is conducted “carefully and sensitively”. They cited Kvale (1996) who stressed that the interviewer is not just someone knowledgeable about the subject matter but also an “expert in interaction and communication” (p.361). Cohen et al. provided valuable guidelines for the conduct of interviews which included avoiding making judgements and the importance of remaining neutral and not giving your own view.

Because of the considerable demands on participants the interviews were arranged at a time and place to suit them (usually at their schools) with the majority of GT and mentor interviews taking place towards the end of the summer term. All interviews were face-to-face except for two telephone interviews with mentors. The interviews with EBITT managers and Subject Specialist Tutors mostly happened between February and June.

On average the interviews lasted for 45 minutes. All the interviews were taped and transcribed by me as I understood the context and could decipher any ambiguities, for example the different title given to the same role with different providers (Appendix 7 provides an example of a transcribed interview). During transcription I made notes about emerging themes which assisted the coding stage.

3.6 Data Collection: EBITT documentation

Johnson and Turner (2003) refer to secondary or documentary data as often combined with other data collection methods in intermethod mixing and it can take a wide variety of forms including official documents, archived data and personal data such as a diary. Official data can include speeches, annual reports, minutes of meetings, students’ records and consist of mixed quantitative and qualitative data.

For this research I drew on secondary data in the form of documentation produced by and for the three EBITTs:

- GTs’ individual training plans (ITPs)
- GTP handbooks
- Central programme timetables, outlines and materials

- Subject specific resources
- Evaluation reports from mentors and GTs, Self-Evaluation Documents (SEDs)
- EBITT Ofsted and external examiner reports
- Final assessment grades for GTs over the last three years

3.7 Data collection: Observation

Johnson and Turner (2003) categorise observation as having four possible modes. The most qualitative is the *complete participant* whereby the researcher becomes a full member of the group without informing them that they are being observed and the least qualitative is the *complete observer* where the researcher observes from the outside. In between is the third type of *participant-as-observer* where the researcher spends an extensive amount of time *inside* the group and informs participants they are being studied. Type four is that of *observer-as-participant* where the researcher spends a limited amount of time *inside* the group and informs members they are being observed. I took the role as *observer-as-participant* whereby I attended some EBITT central training sessions and meetings to gain a better understanding of the central training provision. I also attended TDA run school-based training providers' regional meetings I felt it would be useful to re-engage with this forum during my research so I could hear at first-hand what the current school-based training issues were. At these meetings attendees were made aware of my role and I only participated in respect of answering any questions they had about my research. I observed eleven sessions in total which are listed in Table 3.4 (p.43) with an outline for each. Appendix 8 provides more details of what each session covered.

I was not permitted to tape these sessions and so data was recorded in the form of handwritten notes which were then word processed (see Appendix 13 for an example). During the EBITT sessions I was seeking data on both content and delivery and so observation focused on both elements. In respect of delivery I wanted to record information about the teacher educator's presentation style, the session's setting and how the participants interacted with the session. Notes on these elements were made after the session. During the sessions I focused on data relevant to PCK/SKfT development and I recorded as much detail as possible. At the two school-based training providers' meetings I focused on noting all the key points but with more detailed notes on topics related to GTP provision and the new SD and SSD provision.

3.8 My role as the researcher

Although no longer involved with a GTP programme I was aware that my long association with the GTP could have labelled me as an ‘insider’ researcher and led to some bias. This was the concern in studies such as Smith and Hodson (2010) who admitted that as university tutors associated with the provision they were researching they had an interest in its operation.

Table 3.4 Sessions observed

1	NineSG Training/information meeting for mathematics mentors	<i>Focus on ITT developments e.g. new QTS standards; PCK/SKfT mentoring sessions; setting up PCK/SKfT central programme for 2012-13</i>
2	NineSG - Training/information meeting for science mentors	<i>Main focus as for the mathematics session above</i>
3	NineSG Mathematics PCK/SKfT session	<i>‘Assessment for Learning’ within mathematics</i>
4	NineSG Science PCK/SKfT session	<i>‘Exploring New Initiatives’ in the science curriculum</i>
5	Kingsview Mentor Conference	<i>Changes and developments within ITT</i>
6	Kingsview GTP Mentor training Secondary	<i>GTP mentoring role with focus on observation and feedback and GTP school-based training elements</i>
7	Central College GT Teaching and Learning session Ten 2011-12	<i>Early career development and End of programme review</i>
8	Central College Induction session for 2012-13 secondary GTs and Subject Mentors	<i>Mentors’ role and how GTs and mentors work together</i>
9	Central College Induction Day for 2012-13 secondary cohort GTs	<i>Early concerns of trainee teachers; reflective teaching; lesson observation</i>
10	TDA School-based provider Spring regional meeting	<i>Agenda included areas such as: Guidance for new QTS standards; Troops to Teachers; Ofsted consultation</i>
11	TDA School-based provider Summer regional meeting	<i>Agenda included areas such as: Special Educational Needs and Disability; Skills Tests; Self-Evaluation document review; School Direct</i>

However as I was not researching my own provision this gave me an advantage because my expert knowledge of the GTP allowed me ‘insider’ knowledge but from an ‘outsider’ perspective. This knowledge afforded a complete understanding of the context and as pointed out by Cameron (2012) researchers who are ‘outsiders’ to the empirical field can suffer from a lack of knowledge of a very different training programme however expert they are. The benefit of researching provision with which

one is familiar is in-depth “knowledge of the issues, the terminology, the shorthand and the acronyms” (Cameron, 2012, p. 3) which avoids any misconceptions or misrepresentations in data analysis. Like Cameron I also felt that expert knowledge of the programme inspired confidence from interviewees allowing more openness and generation of richer data.

However, ‘insider’ research can inhibit the ability to take a completely objective view and even though I was not a full ‘insider’ I had to be aware of the possibility of any bias which could affect reaction to responses and change the interview direction and data collected (e.g. Cohen et al., 2000, Griffiths, 2007). I was therefore careful never to ‘over identify’ myself or ‘side’ with any criticism of provision and to maintain a balanced neutral response.

3.9 Ethical considerations

As this research focused largely on gathering empirical data through interviews and examination of GT assessment data, obtaining ethical approval was a prerequisite. This was done through my HEI’s ethics committee following the British Educational Research Association Guidelines (2011).

I obtained voluntary informed consent and each participant was provided with information explaining the research’s purpose, how it would be reported and my role within the research. Each signed a consent form (see Appendix 4) which gave them the right to withdraw at any time via email. The form for EBITT managers also included a section agreeing to the use of EBITT documentation and GT data from previous cohorts (see Appendix 4).

Participants were assured that confidentiality would be maintained and that the names of providers, GTs, mentors and programme managers would be anonymized with pseudonyms used. The names of the schools and any colleagues referred to in the interviews have also been changed. The real location of the EBITTs was not mentioned and where it has been necessary to describe any aspects of the EBITTs’ and partnership schools’ data was presented in a way that did not allow identification.

The consent form also outlined the arrangements to agree the transfer of data collected into the record of the research (e.g. Bassey, 1999). At the end of each interview I

reminded the participants that they would be able to read a draft of their interview transcript and make any corrections before it was formally included in the evidence. Copies of transcripts were emailed and participants invited to check their records and make any amendments. Out of the 42 interviewees half provided some feedback and two asked for minor changes.

3.10 Data analysis

3.10.1 Semi-structured interviews

To analyse my interview data I used thematic analysis. This has a number of advantages as outlined by Braun and Clarke (2006). In particular it is: flexible in not being aligned to any particular theory and epistemology; relatively easy to learn and undertake; accessible to researchers with little or no qualitative research experience and able to summarize key features of a large body of data. Its flexibility is especially helpful as it can be used either as: a ‘realist’ method reporting on the reality of experience and meanings of participants; a ‘constructivist’ method examining the way in which experiences and meanings are a construct of a range of discourses within society or a ‘contextualist’ method which sits somewhere between realism and constructivism reporting on:

“...the ways individuals make meaning of their experience, and...the broader social context impinges on those meanings, while retaining focus on the material and other limits of ‘reality’...” (Braun and Clarke, 2006, p. 82)

Therefore my belief that the development of PCK/SKfT was most likely linked to both individual experiences and how these interacted with the training context was consistent with a ‘contextualist’ method of thematic analysis.

Despite the suitability of thematic analysis I was also aware that there was no consensus as to what thematic analysis was and how it should be undertaken (e.g. Attride-Stirling, 2001; Braun and Clarke, 2006). There are a number of methods which vary according to whether the researcher seeks to undertake theoretical or inductive analysis. Inductive analysis is data-driven where the researcher wishes to report on all possible themes within a data-set. Theory-driven analysis seeks to identify and report on themes related to the researcher’s wish to explore a particular theory or set of theories. For example Cooper and McIntyre (1993) who looked at teachers’ and pupils’ perceptions of effective classroom learning used a theory-driven thematic analysis method developing theories of effective learning early in the analysis of their interview data and then

applying a “form of recursive comparative analysis” to the rest of the data. They used a seven-stage process whereby the “unfolding description” and theories generated were gradually tested so that by stage seven all the data had been explored and all theories tested against it.

Other processes also lent themselves to both inductive and theoretical analysis. In particular Braun and Clarke (2006) provided a clear six stage process for thematic analysis based on its use within psychological research whereby themes are carefully developed and mapped across the data. Their approach shares many similarities with the four stage process developed at the National Centre for Social Research (NatCen) during the 1980s (Richtie and Spencer, 1994). However, distinct within the NatCen approach is the use of a matrix framework to classify and organise data according to key themes and facilitate thematic comparisons between interviewees or cases or groups of cases.

As I wanted to both further explore existing theories of ITT learning but also see if the data led to other theories I needed an approach which would allow me to do both. I decided to use the NatCen Framework firstly because it was appropriate to both data and theory driven analysis. Secondly, I found that having used it in previous research the matrix method for collating and classifying data provided an accessible model for identifying patterns of themes. With the need to classify data of four groups of interviewees and compare results this model would facilitate this process.

The NatCen protocol referred to four key stages which were:

- Stage one - identifying initial themes and concepts
- Stage two - constructing an index
- Stage three - labelling or tagging data
- Stage four - sorting data by theme or concept

Appendix 9 adapted from Ritchie and Spencer (2003) provides the detail of their guidance for each stage of process. Whilst following the NatCen Framework I also took into account the detailed guidance of Braun and Clarke (2006) during the stage of coding and thematic development.

Stage one - identifying initial themes and concepts

An initial list of concepts and themes was noted whilst transcribing the interviews, for example: *'felt like a teacher from the start'*; *'importance of peer support'*; *'influence of GTs' prior experience'* (a full list of initial themes are shown at Appendix 10). All items were initially coded and trialled against the data of four GT interviews. This revealed that each interview produced additional concepts and themes. All interviews were then re-read and further themes were listed. All coded items were then sorted and grouped together under overall concepts e.g. *'background of interviewee'*, *'mentor issues/problems'*; *'PCK/SKfT development in practice'*. Listed underneath were their related themes and subthemes.

Stage two - constructing an index

As not all concepts with related themes and sub-themes were common to each group of interviewees four sets of indexes were formulated. For example only programme leaders talked about the *'history and development'* of their EBITTs and only programme leaders and subject specialist tutors spoke about the *'rationale for PCK/SKfT development'*. Also whilst all groups talked about *'mentor issues/problems'* not all themes such as *'inconsistency'* were common to all and other themes were restricted to one group, e.g. *'paperwork/reporting requirements'* were only issues for mentors.

The process of index formulation required that themes were checked to ensure that they were not too diverse or had insufficient data to support them. Also some initial themes appeared to overlap. This required a process of refining themes which was done by piloting the indexes for GTs and mentors within two GT and two mentor interviews to ascertain how effectively the themes worked with the data. Some themes were shown to overlap and so became subthemes, for example *'teacher identity'* manifested itself in several ways such as: *'felt like a teacher from the start'* *'in at deep end and being hands on'* but as subthemes they could be grouped under *'teacher identity'*. Table 3.5 (p.48) provides an example of how themes and subthemes were developed.

When the final version was reached for each index I ensured the overall concepts/themes/subthemes common to all four groups were given the same name. This facilitated the process of labelling or tagging the data and making comparisons between the groups. So for example, each group had a *'Background'* concept (e.g. which school,

what subject were you training/mentoring in etc.) and each group had a ‘*Mentoring issues*’ concept and a ‘*PCK/SKfT development in practice*’ concept. So ‘*Background*’

Table 3.5 Example of how index subthemes were developed using concept of ‘PCK/SKfT Development in practice’

Initial identified themes	→	Themes that emerged after data review	→	Concept of ‘PCK/SKfT Development in practice’: final set of themes and subthemes
<ul style="list-style-type: none"> - Seen as a teacher from the start - Greater confidence because of responsibility and sense of ownership 	→	<ul style="list-style-type: none"> - In at the deep end' - Seen as teacher from start - Ownership of classes - Bigger timetable & plan more lessons - Length of time in school NQT year easier - Development of the 'reflective practitioner' 	→	<p>GTSK1 Teacher identity:</p> <p><i>Subthemes: 'seen as teacher from start; NQT year easier; development of the 'reflective practitioner'</i></p>
<p>Science and maths are difficult subjects for many pupils</p>	→	<ul style="list-style-type: none"> - Subjects difficult for many pupils - Pupils don't 'get it' - Abstract topics and difficult to grasp - Subject language difficult for pupils - What works with one class doesn't work with another - Some topics difficult to teach - Teaching context 	→	<p>GTSK20 Subject specific pedagogy:</p> <p><i>Subthemes: difficult subject for many pupils; abstract concepts; demystify language/ appropriate/accessible</i></p>

was the ‘B’ concept; ‘*mentor issues/problems*’ was the ‘MP’ concept and ‘*PCK/SKfT development in practice*’ was the ‘SK’ concept. Letters were used to denote the group and concept and the number referred to the theme. Thus ‘*teacher identity*’ was theme ‘SK1’ for each group i.e. ‘GTSK1’ on the GT index; ‘MSK1’ on the mentor index; SLSKI on the subject specialist/leaders index and PLSKI on the programme leaders’ index.

The subthemes for each theme were listed next to their theme on the index. Table 3.6 illustrates this with an extract from the GT and mentor indexes. The full version of the indexes is shown at Appendix 10.

Table 3.6 Extract from GT and mentor indexes

GT INDEX	
CONCEPT: MENTOR ISSUES (PROBLEMS)	
GTMP1 <i>Rogue School behaviour</i>	<i>Subthemes:</i> GTs not getting their entitlement; power relationship
GTMP2 <i>Inconsistency</i>	<i>Subthemes:</i> Inconsistency within: mentoring; school approach; provider/approach
MENTOR INDEX	
CONCEPT: MENTORING ISSUES (PROBLEMS)	
MMP1 <i>Rogue School behaviour</i>	<i>Subthemes</i> insufficient time; mentoring needs to be timetabled in; release time for training...
MMP2 <i>Inconsistency</i>	<i>Subthemes:</i> mentor/school/provider/approach
MMP3 <i>Mentor match</i>	<i>Subthemes</i> profile .e.g. age, background; subject match especially science...

Stage three – labelling data

The index of themes and sub-themes were then used to label the data from the four interview groups. For this I used the Microsoft word comment facility to label or tag my data. Figure 1 provides an extract from a GT interview showing how data was labelled.

Stage four - sorting data by theme or concept

The data for each of the four groups of interviewees was entered onto its own matrix grid. Microsoft Excel was used to create the matrix and as the number of themes exceeded the number of cases it was more manageable to reverse the NatCen matrix construct and assign themes to rows and cases to columns thus creating a chart that was easy to read at the findings stage. The first row of each column was used for case identification and the first column of each row was labelled with the theme number to enable cross referencing. Table 3.7 (p.51) provides an extract from the GT matrix. Extracts from all the matrices are shown at Appendix 12.

Figure 1 Extract from GT interview showing how data was labelled

Y: What was your timetable like in terms of the number so lesson you had to teach? Did you start with a lesser timetable and build up?

T: I would say that it was pretty consistent – it was about 10 or 12 hours a week – maximum was up to 16 but it would depend on what’s in demand really and how many trainees they recruit as physics teachers are a shortage. I think it was very similar in my second placement as well.

Comment [YP1]: GSK1 – teacher identity: ‘in at the deep end’; seen as a teacher from the outset; own classes throughout the year & larger timetable; NQT year easier

Y: What would say were the greatest challenges in terms of developing your pedagogy?

T: Trying out something new – ok sometimes it will go wrong but you’ve got to be brave enough to allow that because it is a part of the learning process really – I remember my first lesson – I think every teacher remembers! I was teaching year 8 maths lesson, bottom set Friday last period – not the best time. I think I did over plan that lesson because I was planning what I was going to say word for word. No, it didn’t work out really so it was quite a terrible lesson but you learn from it – I learnt quite a lot from that “don’t plan your lesson what you’re going to say word for word” make allowances for that ...it was too strictly following the lesson plan – lesson plan is a guideline really – the most important part is the kids, if they struggle on this part then you’ve got to spend more time on it. What I found was...yes, sticking to the scheme of work only seems to favour the very able students because they can stick to that timetable but the least able or the mixed ability sometimes they have to spend a bit more time on this so it doesn’t coincide with the timings of the scheme of work.

Comment [YP2]: GSK13 – teaching and learning styles

Comment [YP3]: GSK9 – early challenges in developing pedagogy

Comment [YP4]: GSK20 – subject specific pedagogy challenges: science is abstract & pupils struggle with concepts; subject language

3.10.2 Document analysis

The data collected from ITPs, handbooks, central training details, subject resources, evaluations, Ofsted reports and examiners’ reports were scrutinised and tagged using the interview indexes. Figure 2 (p. 52) provides an EBITT document extract showing how data was labelled. The tagged references which cross-referenced with interview and observation data were then ‘catalogued’ according to theme and subthemes. For example, the Central College SED shown in Figure 2 was noted as having relevant references on pages 16 and 24.

Table 3.7 Extract from the GT matrix

	GT7 Caitlin	GT8 Maths Elaina	GT10 Science Karen	GT13 Maths Paul
GTSK1 Teacher identity	...being in school so much was important to becoming a reflective practitioner ...	“...being responsible for their grades on your own in that very first year. For me that was a huge responsibility...”	...liked having fuller timetable from start and used to a larger amount of planning: “...I just much prefer to be thrown in...”	...teaching a large timetable from outset helped develop self-evaluation & reflection: “...I got the big picture and having ownership of it gave me that...”
GTSK20 Pedagogy Challenges	...difficulties students have with particular areas; Importance of adapting pedagogy to context - school is 99% Muslim girls...	...keeping the pace at the right level and keeping students engaged all the time; taking into account special needs, gifted and talented, different cultural & social backgrounds...	“...timing, getting timing right in science is key obviously because of fitting in practicals... making sure you always get to your plenary and recapping all your assessment for learning ...”	Not enough A level in his training “...When you do get those classes after you’ve been training you have to very quickly make sure that you’re up to speed with that style of teaching...”

GTs’ end of programme grades for the last three years were used to compile tables to explain patterns in mathematics and science attainment. These grades were given after GTs underwent a final assessment to confirm that all QTS standards had been met and a recommendation could be made for the award of QTS. This assessment was either undertaken by the GT’s school mentor and EBITT tutor as was the practice with Central College and Kingsview or by the mentor and an external assessor in the case of NineSG. The process involved observation of the GT teaching a lesson, scrutiny of the portfolio of evidence and interviews with the GT and mentor. The EBITT tutor or assessor would then complete a final assessment report confirming that the standards had been met including the agreed overall grade based on Ofsted criteria.

Figure 2 Extract from EBITT documentation showing how data was labelled

TDA self-evaluation document (SED) for initial teacher training (ITT) providers - Submission for academic year 2010/11

4.5 Referring to the data in 4.1 and 4.3

- analyse trainees' attainment over the past three years with reference to individual Standards or groups of Standards

In last year's SED, priority 1 was subject knowledge development and the External Examiner has indicated improvement in 2010/11 'subject knowledge of Central College GTs is robust'. The improved attainment levels described in 4.2 support this, but these improvements should not be entirely attributed to these interventions.

Subject Knowledge Development

Subject knowledge development was identified as an area of weakness by GTs in the 2011 NQT survey and referred to by the External Examiner as 'an improving aspect of GTP provision' at the end of the academic year 2010/11. Strengthening of GT attainment in relation to Q17 and Q18 focusing on subject knowledge for teaching was therefore a priority for 2010/11.

To improve subject knowledge provision the GTP team reviewed existing teaching and learning for subject knowledge and recognised there were several key issues that needed improvement:

Issue 1 - GTs needed specially tailored GTP workshops: Attending IOE Keynote lectures (new to 2010/11) and PGCE subject days were valuable to GT subject knowledge development but were not tailored to the stage in the GTs development. 'I really enjoyed the PGCE Geography workshop and did certainly come away feeling my practice has improved and with fresh ideas but there were parts of the day that assumed I was a new teacher and didn't allow me to bring my considerable classroom experience to bear'.

Action: The EBR requested extra funding to coordinate the running of Secondary SKD workshops and organisation of school facing days [see section c below].

Comment [Y5]: SKiT training needs to be tailored to GTs' needs. Triangulates with data from interviews and observation of central training – PLSK5, SLSK5, GTSK5, MSK5

3.10.3 Observation analysis

The word processed notes from the meetings were analysed using the interview indexes. Examples are shown at Appendix 12 with extracts from mentor and GT training sessions. Figure 3 provides a mentor training session extract showing how the data was labelled.

Figure 3 Extract from observation of mentor training showing how data was labelled

Kingsview mentor conference

Session was led by Secondary Programme Leader

First activity looked at ‘observation and feedback’ – we saw a video of a trainee teacher teaching ‘the boring IT lesson’ and then the feedback from the mentor.

Mentors were asked to comment:

“Feedback was very directive” – “nobody answered your questions” rather than “why do you think nobody answered your questions?” – Mentor should have referred to Blooms taxonomy. This was a very much ‘mini-me’ type of feedback telling the GT what they should have done and nothing positive was said.

Comment [Y5]: MMP4 – mentoring arrangements/style: directive; mentoring rather than training.
MSK13 – teaching styles: predominant style; ‘mini-me’.
MSK18 – mentoring that did not work well

It was pointed out that mentors need to look at the subject summative commentary form – reference to subject development.

GT and mentor presentation

English GT (Susie Brown, Xxxxx School) who had just finished her GTP and brought her portfolio with her.

School training model

School has its own GTP handbook – at Xxxx School, the school, aspect is co-ordinated by the Professional Mentor (PM) who also meets with each GT once a week and observes their classroom practice regularly – but not all schools are the same – in their school the PM was able to observe the GTs once a week.

Comment [Y6]: MSK17 – mentor-led training activities; ways in which mentor and GT worked together

GT has Subject Mentor (SM) as well – they meet once a week – meeting is on a Monday – meets the PM the next day so that the SM meeting feeds into the next day PM meeting. Notes on meeting go onto a shared drive so three way communication.

Comment [Y7]: MSK17

3.10.4 Data triangulation

Data from observations and documentation further illustrated and supported data collected from interviews and helped to fill in any gaps of knowledge about EBITT policy and PCK/SKfT provision. Data from the ITPs provided more insight into how they were used to develop PCK/SKfT and information from the other documents were used to report on the development and content of central PCK/SKfT provision, EBITT tutor support in schools and mentoring.

The process of triangulation was undertaken by bringing together the analysed data collected against each theme and subtheme. This involved linking the flagged data on the interview matrices, observation sessions and documentation ‘catalogue’ for contrast and comparison. Every subtheme had some element of triangulation although not always from all three data sources. The subtheme ‘SK5’ ‘Central training’ exemplifies where data from interviews, EBITT documentation and session observation provided

elements of concurrence and dissonance. Table 3.8 provides an illustration of this with the areas of dissonance shown in italics. In this example the triangulated data mostly

Table 3.8 Data triangulation using subtheme of central training from GTs’ perspective to illustrate points of concurrence and dissonance

Interviews	
Mathematics GTs	<ul style="list-style-type: none"> • GTs talked of importance of central training as providing opportunities to meet with peers and share ideas and concerns. • Seven GTs felt that PK was well covered and did not require additional central training. • <i>One Kingsview GT would have liked some SMK training.</i> • <i>NineSG GT did not find sessions provided useful as they mainly duplicated what was covered in school - would have liked training on hard to teach topics.</i>
Science GTs	<ul style="list-style-type: none"> • NineSG GTs had central PCK/SKfT training and all found sessions useful • <i>All seven science GTs wanted additional sessions on hard to teach topics.</i>
Documentation	
Mathematics GTs	<ul style="list-style-type: none"> • Provided important details of sessions: Central College and Kingsview ran generic PCK/SKfT sessions; NineSG provided generic and subject specific sessions; Kingsview’s and NineSG’s provided details of session content. • Kingsview provided details of pre and post session tasks; <i>Central College GTs referred to pre-session tasks but no information was provided.</i> • Kingsview’s end of programme evaluation confirmed satisfaction with input. • <i>Central College was unable to provide end of programme evaluations.</i> • <i>NineSG’s SED had referred to 100% satisfaction with central training for all subjects but not reflected by the mathematics GT interview; NineSG external examiners’ report indicated that GTs should have separate sessions from SCITT PSTs.</i>
Science GTs	<i>SED referred to 100 per cent satisfaction with central sessions across all subjects but not reflected by the mathematics GT interviews.</i>
Observation	
Central College and Kingsview Mathematics and science GTs	<ul style="list-style-type: none"> • Central College GT ‘Teaching and Learning Session Ten’ and ‘Induction’ Session - observation confirmed that mathematics and science GTs were in in the same teaching and learning group and sat together during the session. Observation revealed how sessions provided opportunities for peer support/sharing ideas. The tutor used a workshop style to train and modelled different teaching orientations during the sessions. <i>Session Ten was a programme review session but no reference to any inadequacies in provision from either mathematics or science GTs.</i> • Kingsview - no data as it was not possible to attend a session.
NineSG mathematics GTs	<ul style="list-style-type: none"> • Session on ‘Assessment for learning’ observed. Attended by both GTs and SCITT PSTs. • Session matched outline described; little underlying theory provided; GTs commented that some of the strategies referred to had already been accessed in their schools. • Session appeared to support interview data about the utility of the sessions.
NineSG Science GTs	<ul style="list-style-type: none"> • Session on ‘New initiatives in the science curriculum’. Presenter used a workshop style. • There was good interaction between the GTs and the presenter. Theoretical and practical teaching strategies were covered. • Supported interview and documentation data about value of the sessions.

agrees but there are two distinct areas of dissonance: differences in views between mathematics and science GTs about their PCK/SKfT training needs; dissonance in

evaluation of training between documentation and interview data. All triangulated findings were fed into Chapters Four, Five and Six.

3.11 Presentation of findings

As I wanted to give the interview participants a ‘voice’ much of the findings are presented through their own words. The value of being able to quote extensively has been referred to by other researchers (e.g. Sandelowski, 1994, 2003; White et al., 2013). Sandelowski (1994, 2003) referring to both interviews and participant observations talked of the “starring role” (p.344) they play in the presentation of qualitative research. They illustrate interpretive points, facilitate understanding of participants’ views and foster identification between them and the research audience. White et al. talked of the crucial role of quotes in terms of ‘grounding’ complex ideas and analyses of participants’ accounts. However, their use should be “sparing and judicious” (e.g. Kvale and Brinkman, 2009).

I also decided to include vignettes to present typologies that emerged in the data and the themes associated with them. White et al. (2003, 2013) referred to how presenting vignettes or cameos of different groups or ‘types’ can help to bring the groups ‘alive’ and assist the reader in recognising them. In this study vignettes have been used to illustrate key elements within PCK/SKfT development. In Chapter Four they illustrate attainment results and the relationship between qualifications and final outcomes. In Chapter Five they exemplify issues within mentoring. In Chapter Six vignettes serve to show how mentor match, training context, GTs’ beliefs and prior experiences and community of practice impact of PCK/SKfT development.

3.12 Summary

I chose to research the provision of three EBITTs in order answer my research as to “How mathematics and science Graduate Teachers acquire subject knowledge for teaching and what were the factors that influenced this?” However this was not a comparative study of the EBITTs as my selection was based on wanting to explore a representative cross-section of GTP provision which operated in different contexts.

My research approach was within an interpretative constructionist paradigm although I used a mixed methodology to collect my data as this best served the research context. This methodology allowed me to collect data from different sources which provided triangulation and more depth to the study. There were some limitations in respect of

some elements of the data which were related to the nature of the empirical field which are considered in Chapter Seven. The data was analysed using thematic analysis and a well-established matrix framework developed by NatCen to classify and organise data. The data was presented partly with the use of vignettes to illustrate many of the key themes that emerged.

Chapter Four

Findings one - EBITT profile and models of programme delivery

4.1 Introduction

This chapter presents findings on four key areas within EBITT provision: the EBITTs' profile and mission; programme entry requirements; the rationale and model of secondary mathematics and science PCK/SKfT delivery and the impact of changes to PCK/SKfT inputs to GTs' development and attainment.

4.2 Origins, mission and size of provision

4.2.1 'Kingsview'

Kingsview was based on the outskirts of a large city with a widely ranging socio-economic mix. The area included many schools working in challenging circumstances with large numbers of 'special educational needs' (SEN) and 'English as an additional language' (EAL) pupils. The EBITT trained primary and secondary GTs and also ran the OTTP. Kingsview started with a cohort of 35 primary and secondary GTs and expanded its allocation training a total of 187 GTs during 2011-12 of which 59 were secondary. Kingsview's founding mission was to use the GTP to attract non-traditional entrants such as career changers and to address teacher shortages. Many Kingsview schools employed unqualified teachers and so the GTP was ideal to their needs:

“...we work with schools in challenging circumstances with people they want to qualify as teachers and ...we've found ways of training people that wouldn't otherwise have become teachers...” (Matt, Programme Leader)

Kingsview's policy was to only work with state schools and train GTs in TDA salary funded places. Kingsview did not make it an absolute requirement for GTs to be supernumerary but instead ensured appropriate timetable levels and training entitlement which was evidenced by their partnership agreement. Kingsview operated a two cohort intake with GTs starting in either January or September.

4.2.2 'Central College'

Central College was a city based HEI and its EBITT was established to train high quality GTs in PGCE partnership schools. As the programme developed the EBITT expanded to include schools across a wider area taking in affluent as well as more challenging inner city areas. Central College worked with both state and independent schools and took self-funded GTs in state schools. Information in the EBITT's

handbook stated that schools in receipt of TDA funding must confirm that GTs had supernumerary status. However GTs self-funded by schools could be employed into vacancies and the EBITT partnership requirements ensured they received their training entitlement.

Barbara, the Programme Leader said of the EBITT's mission: "I think if I had to have one word it would be 'innovation'..." This referred to its work with many non-mainstream schools in particular SEN and sixth-form colleges developing special programmes for trainees the main programme could not cater for. However obtaining the best outcome for GTs and contributing to school improvement were also equally important elements of the EBITT's ethos.

Central College started with intakes of 20 secondary and 10 to 12 primary GTs. However, the intake grew to meet local needs and by 2011-12 there were 66 secondary and 79 primary GTs. The majority of secondary GTs (50) were self-funded. The EBITT also ran an OTTP and expected to train 20 OTTs in 2011-12.

4.2.3 'NineSG'

NineSG was a school-led secondary only provider consisting of nine schools within one local authority close to a number of small towns. The schools originally came together to deliver CPD and this collaboration led to establishing a SCITT and EBITT. The schools were based in a mainly affluent area with only two located in poorer areas. The numbers of pupils with EAL and from ethnic minority backgrounds were small.

NineSG's mission was to recruit and train teachers for their schools:

"...they're not doing it out of any sense of altruism to send teachers out there... Our heads' main focus for offering the GTP is to employ people in their schools..." (Lisa, Programme Leader)

NineSG started with around 10 GT per year but numbers had grown especially when schools discovered they could have self-funded places above the TDA allocation. For 2011-12 there were 34 GTs on programme. GTs could be employed into vacancies and the EBITT partnership requirements ensured that they received their entitlement.

The EBITTs' context and mission influenced recruitment and the schools they worked with. Kingsview's commitment to working with state schools and the demographics of their location meant that GTs trained in culturally diverse contexts. Central College with

a wide school partnership also provided a mainly diverse training environment. In contrast NineSG’s schools were located in an area lacking in cultural diversity with four schools in very affluent areas. It is a QTS requirement to teach in two contrasting environments but as it was NineSG’s practice to place GTs at another partner school for their SSE; this denied them the opportunity to have an extended experience in a diverse context. The impact of this is reported on in Chapters five and six.

Table 4.1 serves to contextualise the training environments by providing a breakdown of mathematics and science GTs who began their programmes in September 2011 by the type of lead school they trained in. The school types, for example: state school; multi-cultural state school were based on Ofsted report descriptors and the labels of S1, S2 and so on were used for simplification. The smaller number of Kingsview GTs reflected the two cohort intake whereby half of the mathematics and science GTs started training in January 2012. The table shows that five of the seven Kingsview’s GTs and ten of the fourteen Central College GTs were employed in multi-cultural state schools. In contrast only one of the thirteen NineSG GTs had experience of teaching in a culturally diverse school.

Table 4.1

Mathematics and science GTs total intake 2011 -12 by provider and school type

Provider /subject	S1	S2	S3	I	Total
Kingsview Mathematics	-	3	-	-	3
Kingsview Science	1	2	1	-	4
Central College Mathematics	1	4	1	1	7
Central College Science GTs	-	4	1	2	7
NineSG mathematics	3	1*	3	-	7
NineSG Science GTs	2	-	4	0	6
Total	7	14	10	3	34

Key:

S1 = State school – above average numbers of pupils from low income groups/SEN

S2 = Multi-cultural state school – above average numbers of pupils from low income groups/ SEN/EAL

S3 = Affluent area state school – pupils mainly from middle and higher income groups/below average SEN/EAL

Independent school – pupils mainly from high income groups/very few SEN/EAL pupils

* There was a special arrangement to train GTs from a school in a neighbouring LA as it was managed by a NineSG school under an executive headship.

4.3. Selection of GTP candidates

4.3.1 Degree requirements on entry

Both Kingsview and Central College operated a two stage selection process whereby candidates first found their own training places. Following a school's initial selection a joint application was made to the EBITT for acceptance onto the programme. In contrast NineSG applications were made initially to the EBITT where they were vetted for eligibility and then went onto a database circulated to their schools. Schools interviewed the candidates they were interested in and then selected those they wished to train.

Recent Ofsted reports for all three EBITTs commented on their rigorous selection processes. Central College and NineSG looked for a 'good' degree (at least a 2:2 within the UK degree classification system which is equivalent to a score of 50 – 59 percent or a GPA of 3.00–3.29) whereas Kingsview operated an 'open access' policy. Kingsview considered candidates with a third class honours degree although not usually a 'pass' degree but this depended on the candidate and other experience they had to offer.

Similarly whilst Central College and NineSG looked for candidates with a 'good' degree they considered a lower classification and took into account the whole profile. They also stressed that 'good' academic qualifications were not the best predictor of suitability as pointed out by Adam a Central College mathematics tutor involved with recruitment:

“I've actually had people with PhDs and first class² degrees who I've rejected ...you have to have the ability to deliver...if I don't see them with that capability then I say they're going to go into a classroom on day one and be eaten alive ...”

All three providers required 50 per cent of the degree to match the subject for QTS. However, this was not rigidly followed and other evidence was considered. Kingsview used subject specialist Subject Advisers to make:

“...a judgement about whether or not they have the subject knowledge ...”
(Programme Leader)

² 1st in the UK system is equivalent to a score 70 per cent or above or GPA of ≥ 3.80

4.3.2 Influence of EBITT mission and location on type of candidate

The EBITTs' remit and location impacted on the type of candidates they attracted. Lisa, Programme Manager, NineSG commented that the quality of candidates:

“...might be to do with the kind of area we're recruiting from ...as you've seen quite a middle-class, wealthy area...you've got a good strong pool of graduates to recruit from...”

Recruitment for specific needs also reflected the EBITT's market led ethos. Lisa gave the example of a school wanting to recruit a music and English candidate:

“...and it just so happened that somebody came through the door ...and he offered exactly what the school was looking for...”

Central College also attracted highly qualified candidates but this was related to its remit and being attached to a leading education HEI. For example, Simon wanted to train with Central College because of its reputation:

“....when I knew I'd got a place at Central College I was excited because I thought it was meant to be the place to learn teaching...”

Although Kingsview generally recruited strong candidates it found the profile of its schools and area sometimes affected the quality. One school had persistently selected candidates lacking good presentation and communication skills. To provide support Kingsview had set up a selection preparation programme with a TDA Recruitment and Retention Challenge grant:

“...we can still turn people down from that school and now they have better idea of why we are turning them down.” (Programme Leader)

Misdirected judgement from schools was also seen by Central College. Adam (mathematics tutor) gave the example of a candidate who had been working in a support role whose only mathematics qualification was a GCSE grade 'C':

“...she just couldn't do anything – her attitude was great and everything like that but...the thing really is that you rely on the school to make sensible choices...I don't know how they actually came to decide that this woman should be a maths teacher. It's very strange but schools do peculiar things sometimes...”

4.4 The model of secondary mathematics and science SKfT delivery

4.4.1 EBITT staff – the key players in SKfT development

The three EBITTs had differing staffing models although there were some roles in common albeit using different titles. Each had an overall programme leader with senior mentors and subject mentors delivering the GTP within schools. Kingsview and Central

College also had EBITT tutors who provided support to GTs and schools. Only the Kingsview Programme leader and Secondary Programme Leader were employed full-time for their EBITT. All the other EBITT staff undertook the work either on a part-time basis or alongside other work as a teacher educator or teacher. As these roles carried very similar responsibilities generic titles have been used throughout for simplification.

Subject specialist tutors roles with responsibility for SKfT programme development and input differed and the actual EBITT titles have been used: Kingsview used '*Subject Advisers*' who were also PGCE subject leaders whereas NineSG had '*Subject Leaders*' who were senior teachers appointed within their group of schools. Central College used part-time '*subject specialist tutors*'. The responsibilities of those involved in secondary PCK/SKfT development are summarised in Table 4.2 (p.63). It shows the similar nature of most roles but with some contrasting responsibilities. For example, NineSG subject mentors delivered centre-based training and marked assignments whereas their counterparts at Central College and Kingsview did not.

Only the teachers in NineSG schools received direct payment from TDA funding for their GTP work. Kingsview and Central College instead passed a proportion of the grant to the schools but none was passed to individual mentors. Kingsview and Central College's partnership agreements provided triangulating evidence regarding schools' responsibilities towards their mentors. For example Kingsview's handbook stipulated:

“...release time for the mentor to attend training, meet regularly with and provide support for the GT...” (Kingsview handbook, p.1)

NineSG however, whilst providing payment to their mentors and Subject Leaders for their roles did not allow protected time for the work.

“...You're not given the time but you're given the money to make the time...”
(Harriet, mentor)

4.4.2 Issues in the development of PCK/SKfT delivery

Being HEI led both Kingsview and Central College could have used PGCE sessions as the focus for central training PCK/SKfT input but in practice had found this problematic. This was in part because their HEIs did not offer all the same subjects.

Table 4.2 EBITT staffing models for PCK/SKfT development and delivery

EBITT and area of responsibility			
	Kingsview	Central College	NineSG
Programme Leader	Leadership and QA of the GTP. Co-led development of PCK/SKfT model.	Leadership and QA of the GTP. Development of PCK/SKfT model.	Leadership and QA of the GTP. Co-led development of PCK/SKfT model.
Secondary Programme Leader	Delivery of secondary GTP. Co-led development of PCK/SKfT model.	No equivalent role	No equivalent role
EBITT Subject Specialists	Maths and science ‘Subject Advisers’ <ul style="list-style-type: none"> •Development of PCK/SKfT training tasks, materials and Subject knowledge audit • QA of ITPs and PCK/SKfT input in schools 	Mathematics and science subject specialist tutors <ul style="list-style-type: none"> •Led Generic ‘Teaching & Learning’ sessions •Supported GTs: produced ITP; GT support; QA of GT mentoring and PCK/SKfT in schools •Candidate selection 	Maths and science ‘Subject Leaders’ <ul style="list-style-type: none"> •Development of PCK/SKfT assessment documentation and training materials •Supported Subject Mentors •Led subject mentor training •QA of GT assessment
Senior Mentors	<ul style="list-style-type: none"> •Some contributed to PCK/SKfT central training sessions •Led generic professional studies training often with other trainees e.g. PGCE 	<ul style="list-style-type: none"> •Input at EBITT partnership meetings. •Some involved with pilot of school-based PCK/SKfT sessions •Led generic professional studies training often with other trainees e.g. PGCE 	<ul style="list-style-type: none"> •Worked with Programme Leader to develop PCK/SKfT model •Supported subject mentors •Co-led GT recruitment in their schools • Led generic training for GTs and SCITT trainees
Subject Mentors	Supported individual maths and science GTs	<ul style="list-style-type: none"> •Supported individual maths and science GTs •Some involved in pilot of school-based PCK/SKfT sessions 	<ul style="list-style-type: none"> •Supported individual maths and science GTs • Some delivered central PCK/SKfT sessions •Marked assignments
QA Advisers	Two QA advisers who supported Subject Advisers in the QA of PCK/SKfT delivery via school visits.	No separate QA advisers – QA undertaken by Central College EBITT Tutors and Programme leader	No separate QA advisers – QA undertaken Subject leaders and Programme Leader

Barbara (Central College) pointed out that her EBITT had trained GTs in as many as 26 subjects “...and that goes beyond the PGCE offer...” Additionally schools were not always agreeable to GTs attending all sessions: “... [its] hard to get people to do because it’s again release from schools - getting people released ...” (Muge, Kingsview)

Another issue was that PGCE provision was not entirely suited to GTs’ needs because they had different starting points and PGCE training assumed that all PSTs were novice teachers. For Central College this was exemplified by an extract of the EBITT’s 2011 self-evaluation document (SED) (completed annually as part of the revised Ofsted framework requirements) with a comment made by a GT in a session evaluation:

“...‘I really enjoyed the PGCE Geography workshop ...but there were parts of the day that assumed I was a new teacher and didn’t allow me to bring my considerable classroom experience to bear’...” (SED, p. 16)

For NineSG provision was less problematic as their schools mainly chose to train GTs within core subjects like mathematics and science where there was plenty of subject expertise to draw on. For this reason they discouraged schools from training in ‘minority’ subjects such as business studies. However NineSG faced the separate challenge of not being attached to an HEI and able to automatically tap into subject specialist expertise:

“...probably the biggest challenge of any school-based training route is the actual subject knowledge input. It’s probably easier at the University PGCE route ... (Phil, mathematics Subject leader)

Inconsistency and variation in mentoring input and expertise were also referred to by both Subject and Programme Leaders for all three EBITTs. For example:

“...you know we’ve got perhaps 12 or 15 different maths mentors at any time and one problem is obviously going to be consistency...” (Phil, mathematics Subject leader, NineSG)

Muge (Kingsview) also had found gaps in mentor understanding of what was meant by subject pedagogy:

“...there’s a lot of mentors who don’t know what you mean [by pedagogy]...”

4.4.3 Rationale for PCK/SKfT provision

Because of the contextual constraints outlined both Kingsview and Central College adopted a generic approach to central PCK/SKfT provision. For Kingsview the starting point was how to provide input without expanding the established fortnightly centre-based based days. As Muge, Secondary Programme Leader explained:

“...The issue for the GTP is [that] ...we’ve probably got 10 different subjects so it’s not easy to have subject specific training...”

Kingsview built on the programme of generic pedagogic training with mathematics and science GTs attending the same sessions. Subject differentiation occurred through subject specific PCK/SKfT pre and post-session tasks which were evidenced within subject enrichment documents scrutinised as part of the documentation data. It was emphasised how GTs must recontextualise generic pedagogy within teaching their own subjects:

“...we teach generic pedagogy...So in the pre and post-session tasks, through the subject enrichment document and then tasks they are steered towards their own pedagogy...” (Muge)

Within central training sessions GTs also worked in cross-subject study groups to develop and share ideas such as different approaches to lesson starters and plenaries.

Kingsview’s approach also utilised the expertise within the host HEI’s PGCE:

“I thought well we’re in a university where there are subject leaders in those areas and most of them are our tutors ...I thought I need to exploit that so that we appointed them...as Subject Advisers...” (Muge)

To supplement the central generic provision GTs were required to undertake four externally run subject specific training days. The Subject Advisers assisted in identifying suitable training selected from PGCE sessions or other externally run provision. The key criterion was that the training met individual needs.

At Central College PCK/SKfT development had historically been delivered through the allocation of a subject specialist EBITT tutor to each GT and attendance at some PGCE sessions. The tutor contributed to PCK/SKfT development via input into:

“...what the training plan consists of and guidance and on-going dialogue throughout the year – so that’s all subject specific...” (Barbara, Programme Leader).

The quality of EBITT’s specialist tutor input was backed by evidence from the Ofsted report. Similar to the Kingsview approach there were no separate mathematics and science sessions and whilst Ofsted did not refer to central input on pedagogy the EBITT’s External Examiners raised this as an area for development:

“....As last year, I recommend that schools run a programme of discrete subject-specific training for GTs.” (2010-11 external examiners’ report)

Subject specific input for secondary GTP was under revision with a pilot model of school-based PCK/SKfT training days led by mentors within one partner school.

However, changes to the monthly central generic programme of ten ‘Learning and Teaching days’ to make it more subject-orientated were in place during 2011-12:

“...a group with the science and maths with a subject specific science and maths tutor ... in that taught session around subject knowledge development there will be more of a focus on science and maths...rather than a generic broad brush...” (Barbara, Programme Leader)

James who led this group also explained how he introduced the elements of PCK/SKfT:

“...I use a model of subject knowledge which was published by the TDA...”

He felt that the framework’s limited utilisation was due to the use of primary English as an exemplar:

“...They could have done exactly the same thing, left it generic and everybody would have been happy with it ...as a scientist it was chance that I came across it because it’s labelled ‘English’...”

The sessions whilst taking a generic approach required GTs to think how they would apply learning and concepts within their subject. For example, at one Central College session GTs were asked to consider a ‘Process/Thinking’ model (see Figure 1) using mathematical concepts as an example and apply it to their own subject.

Figure 1 Example of generic PCK/SKfT training activity

Process/thinking model	
Knowledge	To be able to recognise a divide sign on a calculator
Comprehension	To be able to divide with a calculator
Application	To be able to calculate $225 / 15 =$
Analysis	To be able to break down an arithmetic problem expressed in words and recognise the component parts
Synthesis	To be able to recognise a question as an arithmetic problem and decide how best to solve it
Evaluation	To be able to check your own working and problem solving strategies or that of another and recognise errors and omissions

Use this model to give an example within your subject

Prior to 2007 NineSG’s approach to SKfT development focused around school training with a central general professional studies (GPS) ‘twilight’ programme. There was no subject specific programme although the team of Subject Leaders was already established. Following introduction of the TDA framework the Programme Leader used it as the basis for PCK/SKfT development:

“...when that was such a big high profile initiative that I brought that back and said to our Subject Leaders ...we’ve got to cover these areas...”

Subject Leaders were made responsible for undertaking a PCK/SKfT mapping exercise against the QTS standards and the curriculum. They also produced a tracking document for logging PCK/SKfT specific training elements.

Nine subject specific sessions were also introduced jointly attended by GTs and SCITT trainees although their external examiners report 2010-11 had questioned whether it was appropriate to group them together and suggested separating GT and SCITT training. Senior mentors and Subject Leaders developed the programme which was delivered by subject mentors and some external trainers. The sessions covered identical topics such as ‘assessment for learning’ and ‘mistakes and misconceptions’. The only difference between mathematics and science provision was a science session focussing on physics, chemistry and biology for non-specialists.

The Subject Leader QA role was also expanded to assure the quality of subject mentoring and assessment via monitoring of evidence uploaded into the electronic portfolios:

“... [I] QA the whole delivery through the mentoring...I’m sending out ...lots of group emails “make sure you’re doing this ...by that date ...I try to keep like a little hands-on all of them really in that way...” (Tess, science)

All three EBITTs placed emphasis on providing training on different teaching orientations. Kingsview explained GTs were asked at the outset to think about their own learning preferences:

“...We start off with a lot of input about learning styles and preferences for their benefit as well – they need to know what their learning preferences are because that might not necessarily suit the people in front of them “... (Programme Leader)

Lisa, NineSG Programme Leader, similarly talked of how GTs were provided with:

“... a whole kind of toolbox ...of teaching styles and different ways of creating the learning environment...”

Both Kingsview and Central College also referred to how central sessions were used to model different teaching orientations:

“...we model in our own delivery of our sessions of how we want them to be in their own teaching...” (Muge, Kingsview)

“...I am modelling styles of teaching throughout the day...” (James, Central College at GT induction day)

In summarising the provision it emerged that despite differences in rationale mathematics and science PCK/SKfT were for the most part addressed by these EBITTs through the same key activities. Appendices 14 and 15 respectively provide an overview of similarities and contrasts in provision and examples of PCK/SKfT central training sessions and mathematics and science specific tasks.

4.4.4 The individual training plan

The ITP was based on a training needs assessment taking into account prior achievement (e.g. working in a school support role). Assessment started at the selection stage and was built on both at the start of and during training. The ITP set out the content, structure, delivery and assessment arrangements for each GT with the proviso that:

“...Training time should focus on subject-knowledge for teaching, planning, assessment and evaluation...” (QTS requirements guidance, 2007)

The Programme Leaders all explained how PCK/SKfT development was an ITP focal point with cross-referencing to the relevant QTS subject standards. For example, Lisa (NineSG) explained:

“.....we’ve tried to make that look like a map of a journey...when you look at the maths onethat has been put together with the view that you follow that you should be able to go into any school...and teach mathematics...[at all levels]...”

At Central College and Kingsview the ITP was drawn up by the EBITT tutor and subject and senior mentors with some input from the GT him/herself. At NineSG it was compiled jointly by the subject and senior mentors and the GT.

4.4.5 Resources to support SKfT provision

Each EBITT had a virtual learning environment (VLE) containing information about central training, and resources. Both Kingsview and Central College had developed on-line forums which were used to develop PCK/SKfT.

At NineSG the use of the VLE had been enhanced by purchasing mathematics and science specific resources. The EBITTs also ensured access to library facilities. Central College and Kingview being attached to HEIs provided access to education libraries. At NineSG facilities were more limited with a small library at the lead school and a designated section at the local town library.

4.4.6 Assessment and QA systems

The EBITTs had developed QA systems to ensure consistency of PCK/SKfT input and assessment. This was done through school partnership agreements, handbook guidance, assessment documentation and QA procedures.

For NineSG the mechanism was via an e-portfolio whereby all GT assessment and training requirements were uploaded centrally. This allowed QA and monitoring by both programme and subject leaders:

“...I suppose the main responsibility ... to try and ensure...consistency across the way we are delivering what we are expecting from our trainees, what we are giving our trainees...” (Tess, science Subject leader)

Similarly, Kingsview used their Subject Advisers to QA the subject aspects of school-based training. QA was undertaken via joint visits with GTs’ main EBITT tutors:

“...I am quality assuring the training ...making sure that key elements ... were in place: for example, having a specialist mentor doing the training and then also giving them the supplementary days that was their entitlement...” (Bill, science)

Central College tutors who were all subject specialists, quality assured mentoring and school-based training through school monitoring visits. Part of the visit involved observing a lesson enabling the tutor to “moderate judgements made by the school-based tutors” (Central College Handbook 2011-12 p.5). Adam (mathematics tutor) said that from his perspective:

“...things become quite evident when I see people teach and what the particular areas are...”

QA training for tutors was provided by the EBITTs. At NineSG this was run by the Programme Leader and senior mentors. Kingsview and Central College used work shadowing to train their tutors so that they could learn directly from experienced staff. For example, Adam described how he had learnt his role by working alongside the previous Programme Leader:

“...going out with Xxxx and shadowing him – so on the job...so I got all the details of how to do things from him...”

4.5 PCK/SKfT Attainment

4.5.1 Evidence from interviews

All EBITTs had seen improvements in PCK/SKfT attainment. Matt (Kingsview) explained it was evaluated through: a GT exit survey asking how well their training

prepared them in key areas; through an EBITT tutor survey and by benchmarking their NQT survey although the latter was less reliable because of the time lag between the end of the programme and completion:

“...That does quite well as a balance to the NQT survey because it’s the exit survey that’s done whilst it’s fresh in their minds...” (Matt)

The results of the GT exit survey for which evidence was provided revealed that the September 2011 cohort was either ‘very confident’ (73%) or ‘confident’ (27%) in their PCK/SKfT. The EBITT tutor survey was also positive about PCK/SKfT and it was “not perceived as a weakness”.

At Central College Barbara commented that attainment had improved and was largely due to schools’ better use of their EBITT tutor as a resource and changing the assignment format but was yet to find the best way of providing the evidence for this:

“...It’s been a difficult one to track. I...found in writing the SED that I didn’t feel that the partnership assessment was necessarily giving me the evidence I needed in relation to subject knowledge...”

At NineSG Lisa spoke of the comparison in attainment levels between GTs and SCITT trainees. GTs over the last three years had outperformed them although as yet they had been unable to ascertain why this was the case. Lisa suspected it was probably due to “...a combination of all the measures we’ve brought in” but cited mentor training on ‘changing gear’ as an important influence. This aimed at getting trainees to refine their teaching during their SSE:

“... We share with them the characteristics of the ‘outstanding’ trainee and say to them ‘this is where you are needing to be guiding your trainees’...”

Similar to Central College Lisa felt they needed to find a way to better use programme data such as final assessments in particular to find out why GTs were outperforming their SCITT peers. Some participants commented that improved attainment was also due to better recruitment procedures:

“...because we are more careful about who we take on than perhaps we were 10 years ago and because the number of applicants has gone up we don’t now take people who aren’t up to it...” (Programme Leader, Kingsview)

This was the view of five of the mentors who felt that higher levels of attainment were due to better recruitment. George, a Senior Mentor, referred to the poor recruitment

tactics which some schools (not his) had used when they were desperate to recruit to shortage subjects in the GTP's early days:

“...oh, my god, we haven't got a mathematician, look at that bloke walking down the street, let's have him and oh, we better do a GTP”. I didn't want to have anything to do with that sort of business....”

Improved school-based training and subject mentoring was also seen as largely responsible for better attainment. For example Patsy, a senior mentor commented:

“...Have I got better over time? Definitely, loads better over time in understanding how to do it....I think the school has got better...when we first started it was a leap in the dark and I don't think those people got a bad deal, just that perhaps now they get a better one...”

Similarly Adam (Central College tutor) had seen improvement in school-based PCK/SKfT training which he attributed to better and clearer articulation from EBITT tutors to mentors about programme requirements and expectations.

4.5.2 Final assessment reports: summary of assessment data

At the final assessment stage GTs were given Ofsted linked grades as required by the Ofsted framework of 2008. They were graded as either: one 'Outstanding'; two 'Good' or three 'Satisfactory'. Table 4.3 based on the EBITTs' final assessment grade data for the last three years shows that the majority of mathematics and science GTs were graded 'outstanding' or 'good' although the percentage of 'outstanding' dipped in 2010-11. The grades also showed that very few GTs were assessed as 'satisfactory'. These results also serve to place these EBITTs' provision in comparison with ITT overall with the inference that the standard of PCK/SKfT development was overall strong and compared favourably with other providers.

Table 4.3 Attainment of science and mathematics GTs 2009-12

Final assessment grade	2009 - 10	2010-11	2011-12
Grade 1 'outstanding'	15 (52%)	16 (47%)	20 (59%)
Grade 2 'good'	9 (31%)	15 (44%)	10 (29%)
Grade 3 'satisfactory'	5 (17%)	3 (9%)	4 (12%)
Total cohort of mathematics and science GTs	29	34	34

EBITT assessment data for 2011-12 also provided some evidence regarding any correlation between final grades, degree class and SMK/subject knowledge per se on

Table 4.4 Mathematics and science cohorts 2011-12 by EBITT, school type, degree subject and class and final assessment grade

Provider	Subject	N	School type*	Degree			Final assessment grade		
				Subject	Class**	Degree/subject match****	Grade 1	Grade 2	Grade 3
Kingsview	Maths	2	S2	<i>Pure mathematics (1)</i>	UC***	Y	✓		
			S2	<i>BEd (in-service) (2)</i>	2.2	N		✓	
	Science	5	S3	BSc Physics	2.1	Y	✓		
			S3	<i>BSc Biology (3)</i>	2.1	Y	✓		
			S2	BSc Biology	1st	Y	✓		
			S2	BSc Biology	2.1	Y	✓		
			S1	<i>BSc Analytical Chemistry (4)</i>	2.2	Y		✓	
Central College	Maths	8	S2	<i>BSc Economics (5)</i>	UC**	P	✓		
			S2	<i>BA Teaching (Mathematics) (6)</i>	2.1	Y	✓		
			I	<i>BSc Economics (7)</i>	2.1	P	✓		
			S2	<i>BSc Economics & Mathematics (8)</i>	2.2	P	✓		
			S2	<i>BSc Mechanical Engineering (9)</i>	2.2	P		✓	
			S2	BSc Economics	2.2	P		✓	
			S3	BSc Mechanical Engineering	2.2	P			✓
			S1	BSc Mathematics	2.2	Y			✓
	Science	6	I	BSc Physics	2.1	Y	✓		
			I	BSc Chemistry with physics	2.1	Y	✓		
			S2	<i>BSc Bio-physics (10)</i>	2.2	Y	✓		
			S3	BSc Biology	2.1	Y		✓	
			S2	BSc Physics & chemistry	2.1	Y		✓	
			S2	<i>BSc Chemistry & physics (11)</i>	2.2	Y			✓
NineSG	Maths	7	S3	BSc Mathematics	2.1	Y	✓		
			S3	<i>LLB (12)</i>	2.1	N	✓		
			S2	<i>BSc ICT (13)</i>	2.1	P	✓		
			S3	BSc Mechanical engineering	2.2	P		✓	
			S1	BSc mathematics	2.2	Y		✓	
			S1	BSc Economics	2.2	P		✓	
			S3	BSc Mathematics	2.1	Y	✓		
	Science	6	S3	<i>MSc Physics with astrophysics (14)</i>	1st	Y		✓	
			S3	<i>BSc Human Genetics (15)</i>	2.1	P	✓		
			S3	<i>BSc Oceanography (16)</i>	2.1	Y	✓		
			S3	BSc Chemistry	2.1	Y	✓		
			S1	BSc Biology	2.2	Y		✓	
			S1	BSc Biology	2.2	P			✓
Total		34					19	11	4

KEY

*S1 = State school – above average numbers from low income groups/SEN; S2 = Multi-cultural state school – above average numbers from low income groups/ SEN/EAL; S3 = Affluent area state school –

pupils mainly from middle and higher income groups/below average SEN/EAL; **I** = Independent school – pupils from high income groups/very few SEN/EAL pupils

** UK degree classes equate to US grade point average (GPA) broadly as follows: first ≥ 3.80 ; 2:1 = 3.30–3.79; 2:2 = 3.00–3.29; third/pass no GPA equivalent.

UC = unclassified overseas degree *Degree/subject match - extent to which degree subject matched specialist subject for QTS: Y= Yes; N= No; P = partial – at least 50 per cent

entry and the type of lead training school. This was of particular relevance to the debate about qualifications and teacher quality and whether the most highly qualified graduates make the best teachers.

Table 4.4 (above) provides a breakdown of the GTs by subject, school type, degree subject match to specialist subject taught, degree class and final assessment grade. The extent to which the degree met the subject for QTS is indicated by ‘yes’, ‘no’ or ‘partial’. The sixteen GTs interviewed for this research are italicised and numbered.

Table 4.5 shows the spread of grades across school types. The data in these two tables shows that equal numbers of GTs achieved ‘outstanding’ in their final assessment in S1 and S3 schools. However no GTs in a S1 school achieved a grade one. This suggests that the training context in S1 did not provide the same opportunity for GTs to achieve their full potential. However as only six GTs were training in these schools any inferences should be treated with caution.

Table 4.5 Distribution of grades across school types

School type	Grade 1	Grade 2	Grade 3
S1 State school	-	4	2
S2 Multi-cultural state school	8	4	1
S3 Affluent area state school	8	3	1
I Independent school	3	-	-
Total	19	11	4

The data also indicates that having a degree that ‘partially’ matched the specialist subject was not necessarily reflected in attainment with 50 percent (four out of eight) graded ‘outstanding’. In respect of degree classification and final assessment grade just under half of the GTs received a final grade which could be said to be in line with their degree classification. Four GTs achieved a higher grade although the GTs with overseas qualifications and graded ‘outstanding’ had degrees which were ‘unclassified’ in the UK system and so no direct comparison could be made. The shaded entries in Table 4.4 highlight the results which could be regarded as ‘unexpected’.

The following five vignettes selected from interviewees in different schools types and backgrounds illustrate the attainment results in Table 4.4. The first three delineate GTs who achieved better grades than their qualifications might have predicted. The fourth describes a GT who achieved a lower result than his academic profile indicated. The last refers to a GT whose grade reflected her starting point.

Vignette One (interviewee 7)

Simon was a mathematics GT with a 2.1 in Economics who trained in an independent school. He had worked for 15 years as an accountant and “didn’t enjoy it”. He experienced some challenges relearning A level mathematics but received good school support in addressing this. He found his prior work experience provided many transferable skills to draw on so that activities such as parents meetings and report writing did not faze him. Simon was graded ‘outstanding’ at the end of his GTP.

Vignette Two (interviewee 10) Caitlin physics

Caitlin had a 2.2 in Bio-Physics and had admitted that she “was not very good at doing exams”. She also had an art degree and had previously worked on a freelance basis with educational projects linking science and art. Caitlin was trained in a S2 school and was graded ‘outstanding’ at her final assessment.

Vignette Three (interviewee 12) Pam mathematics

Pam had a 2.1 degree in Law. She did not have mathematics beyond GCSE level and had been a chartered accountant. She was required to undertake a TDA mathematics booster course before she started her training. Pam was based in an S3 school where the Head of Mathematics had been reluctant to offer her a training place but was overruled by the Head teacher. After she was graded ‘outstanding’ her Senior Mentor commented “you know we’ve proved them wrong”.

Vignette Four (interviewee 14) Tom physics

Tom had always been passionate about science and had a strong academic background having gained a first class MPhys degree in physics with astrophysics. He turned down the opportunity to do a PhD as he wanted to pass on his love of physics through teaching. Tom’s lead school was a S3 school where he was mentored by Jasmine, a geographer. Tom was graded ‘good’ at the end of his programme.

Vignette Five (interviewee 4) Nicole chemistry

Nicole had a 2.2 in Analytical Chemistry and trained in an S1 school. She had delayed entering teaching whilst her son was young and had been a science technician in her training school. Nicole said that prior school experience made the initial stages of training much easier: Nicole was graded ‘good’ at the end of her training.

4.6 Summary

The findings in this chapter revealed how each EBITT’s mission and context influenced provision. For NineSG the policy of GTs training exclusively within the partnership

restricted the opportunity to experience culturally diverse training environments at first hand.

The development of PCK/SKfT provision was a challenge for EBITTs as they needed to cater for a wide range of subjects. Although the HEI-led EBITTs potentially had access to PGCE PCK/SKfT provision this could only be utilised on a limited basis as its curriculum did not totally address GTs' needs. In contrast the school-led EBITT appeared to find it easier to provide central subject specific PCK/SKfT training although GTs shared the sessions with SCITT trainees. However it felt at a disadvantage in not having automatic access to HEI expertise and the findings in Chapters five and six will reveal in more depth how EBITT context, mission and PCK/SKfT rationale impacted on PCK/SKfT development.

In terms of attainment, the majority of GTs from all three EBITTs were graded 'good' or 'outstanding' during the three year period 2009-12. The more detailed data available for 2011-12 shows that degree subject and class was not necessarily predictors of final grades. However the distribution of final grades within school types it suggests that mono-cultural state schools do not lead to development of 'outstanding' PCK/SKfT.

Programme evaluations from NineSG and Kingsview indicated that PCK/SKfT training input was effective but the difficulty EBITTs expressed in making the best use of data to measure impact seemed to hamper its use to explain patterns of attainment. This may explain why many interviewees felt that improvements were due more to better recruitment and mentoring than the changes made central training input.

Chapter Five

Findings two – mentoring and PCK/SKfT development

5.1 Introduction

Subject Mentors had the major responsibility for training and supporting GTs in schools and therefore played a pivotal role in PCK/SKfT development. This chapter focuses on the mentor role reporting on six key themes viewed mainly from the mentor perspective: mentoring models employed; the profile of the mentors interviewed; how mentors were selected; mentor and mentee match; mentoring issues and how mentors worked with GTs. In respect of the last theme the ways in which subject mentors supported GTs in tackling particular mathematics and science topics are not covered in any detail. The interview questions had not asked for that depth of information since the focus here was on exploring the different elements of PCK/SKfT training provision of which mentoring was a key element.

5.2 The mentoring models employed

As seen in Chapter Four EBITT models of PCK/SKfT delivery varied although the main roles and responsibilities were similar. Within the school mentoring structure there was a senior mentor (usually a member of the senior management team) who had overall responsibility for GTP mentor input with support from subject mentors for PCK/SKfT development and training.

The senior mentor led generic professional studies sessions often grouping GTs with other trainees such as PGCE students. At NineSG all senior mentors worked to the same model with a similar pattern for weekly meetings:

“...so every single week the senior mentor in the school is delivering one of these topics...so whether you're in school A or school B the ...programme is the same...” (Lisa, Programme leader)

There was no universal model for the larger EBITTs but partnership agreements required each school to have designated senior and subject mentors with clear areas of responsibility. For example, the Subject Mentor should:

“...Observe the trainee, using a proforma against the Standards, on average once a week...; meet weekly with the trainee, ensuring that the trainee records notes of the meeting in their Learning Journal” (Central College GTP Handbook 2011-12)

5.3 Profile of mentors interviewed

Of the 16 mentors interviewed four were senior mentors and twelve were subject mentors although one had the dual role of senior and subject mentor. There was variation in previous GTP mentoring experience with seven of the subject mentors new to the GTP. However, nine had prior ITT mentoring experience of some kind of which four were experienced PGCE mentors. Table 5.1 shows a breakdown of the subject mentors by provider and mentoring experience.

Table 5.1 Subject mentors by provider and mentoring experience

Provider	No. of mentors interviewed	Prior mentoring experience with any ITT route	No prior mentoring experience with any ITT route	'Novice' GTP mentor	'limited experience' *GTP mentor	'experienced' GTP mentor **
Kingsview	2	2	-	-	1	1
Central College	5	5	-	4	1	-
NineSG	5	2	3	3	1	1
Total	12	9	3	7	3	2

*Had only mentored one GT before

**Had mentored two or more GTs before

This variation in mentor experience was explained as being typical as schools and or departments tended to 'dip in and out' of working with the GTP and new ones came on board each year. For example, at the Central College induction session for the 2012-13 cohort, 17 out of the group of 20 mathematics and science mentors had not mentored GTs before. This meant that GTs were frequently mentored by mentors new to the programme which could be problematic unless there was GTP expertise in the school for mentors to draw support from.

5.4 Mentor selection

Some coercion was reported in the selection of subject mentors. For example, Bill, Science Subject Leader, Kingsview acknowledged that there were still incidences of 'reluctant' mentors but stressed that this was common across ITT.

Lisa, Programme Manager, NineSG said generally there was a good pool of teachers to select from and they were keen to mentor. Although sometimes due to a shortage in some subjects NineSG was obliged to choose those who were rigid and 'old school'³ in their approach:

³ Outdated

“...sometimes it’s been ‘Hobson’s choice’⁴ you know if you’ve recruited over your number and this person I’m thinking of is a chemistry teacher. So I’ve had to use him because I’ve recruited more chemists than I’ve got chemistry specialists to place with ...”

Some participants talked of mentors taking on the role for the wrong reasons: pay in the case of NineSG; kudos⁵ or that GTs would take some of their workload. Sandra, a NineSG mentor commented:

“...there will be some people who choose to be a mentor because of some extra money and they will have somebody taking their classes.... whilst I’m paid for this I don’t go into it particularly for money...”

Harry, a mathematics GT whose original mentor left the school early in his training felt that the new mentor wanted the role as it would put her in a favourable light:

“...think it was almost seen as “oh, hang on, this kid is doing alright. So if I can say he’s mine and he’s my project then it makes me look good”...”

In contrast other positive reasons emerged for taking on the role: six saw it as important for self-development. For example:

“...one of my strongest values is personal development but also the development of others so it’s my passion for passing on really what I’ve learnt ...” (Richard, mathematics mentor)

Five mentors had prior knowledge of a GT they wanted to mentor and so there was a vested interest as the department hoped that the GT would stay on as an NQT. Vested interest emerged as strong motivation for mentoring and was succinctly explained by Patsy, a senior mentor who had noted the contrast between GTP and PGCE mentor accountability:

“...when you have... [PGCE students] they were never yours; they were always going to be leaving...unless you were going to employ them...But GTP has involved people in that vested interest – they’re your trainee and next year they’re teaching your GCSE group....So you better make them the best that you can...I think that is a really important piece of accountability...”

5.5 Mentor match

5.5.1 Mentor and GT pairings within this research

Twelve pairs of mentors and GTs participated in this research (see Table 5.2).

⁴ A choice of taking what is available or nothing at all - origin mid-17th century: English Dictionary

⁵ Honour; glory; acclaim

Table 5.2 Mentor and GT pairings

GT/specialist subject/EBITT	Mentor/'s specialist subject; subject match to GT Yes; No; Partial	Mentor experience/how mentor was selected/how effective was the pairing
Tom Science – Physics NineSG	Jasmine Geography NO	Jasmine’s second time as a GTP mentor. She was asked to take the on role as no science specialist was available. Not a good pairing due to subject mismatch: “...the disadvantage was that my subject mentor was ...a geography teacher ...” (Tom)
Penny Science - Physics NineSG	Bev Chemistry Partial	Bev’s first time as a mentor. She was asked to take on the role. Bev did not regard this as a good match as she felt lacking in professional authority: “...being a relatively new teacher, it is quite difficult to have that kind of professional authority...” (Bev)
Elaina Mathematics Kingsview	Richard Mathematics YES	Experienced PGCE and GTP mentor who volunteered for the role. A good match that was hampered by unexpected staff shortages in the mathematics department: “It could have been amazing but it’s just good...” (Elaina)
Paul Mathematics NineSG	Rita Mathematics YES	Experienced PGCE and GTP mentor who volunteered for the role. A good match that was hampered by staff shortage in the mathematics department: “...it wasn’t any particular individual’s fault. It was just the way the department was at the time...” (Paul)
Valon Mathematics Kingsview	John Mathematics YES	Experienced PGCE and GTP mentor who was required by his school to take on the role. A good match as Valon had already been working as a TA: “...we started to develop a student and mentor relationship well before he officially registered...” (John)
Reva Mathematics Central College	Serena Mathematics YES	Experienced mentor but new to GTP who volunteered to mentor Reva. A good match: “...Reva...was working here as a TA and then we employed her last year as an unqualified teacher. So I recognised the potential...” (Serena)
Caitlin Science - Physics Central College	Jenny Biology Partial	Experienced mentor but new to GTP; volunteered to mentor Caitlin. It was a good match in terms of age and experience: “...it was considered because I’m older and more experienced ...it would be better [for me] to mentor an older and more experienced trainee... “ (Jenny)
Baruti Mathematics Central College	Terry Mathematics YES	Experienced mentor who volunteered to mentor Baruti. A good match: “Because she’s been around for such a long time and she’s fantastic... “ (Baruti)
Simon Mathematics Central College	Carol Mathematics YES	Carol’s first experience of mentoring. She was asked to mentor Simon. A good match: “Yes, it worked well; it works well. I mean it’s great...” (Simon)
Jolanta Mathematics Central College	Helen Mathematics YES	Experienced PGCE mentor but new to GTP. Helen volunteered for the role as Jolanta had been volunteering in the mathematics department. . A good pairing: “The mentor who I had was fantastic...the best mathematics specialist...” (Jolanta)
Pam Mathematics NineSG	Sandra Mathematics YES	First time as a mentor. Sandra was asked to take on role as a good ‘match’ for Pam: “...I think we were on the same page because of our past experiences which was why the pairing up worked really well...” (Sandra)
Cathy Science – Chemistry NineSG	Harriet Chemistry YES	It was Harriet’s first experience of mentoring. She was asked to take on the role. A very good mentor match:” I’ve been really lucky because I’ve had a really good mentor here...” (Cathy)

Analysis of the data shown in the table indicated whether there was specialist subject match between GT and mentor, the mentor's previous mentoring experience, how s/he was selected and how effective the pairing was. Nine pairings had specialist subject matches and two were a 'partial' match. These two science pairings are described as 'partial' because although they did not share the same specialism their GTs were teaching all three sciences. For one science GT there was 'no' match as he was mentored by a geography specialist. The quote from either the GT or mentor reflects views of how effectively the partnerships worked. The table shows that two pairings were problematic: Tom and Jasmine due to subject mismatch and Penny and Bev because of age and experience. Another two good pairings were marred by staff shortages within the department whereas the remaining eight were very effective as they provided a good match in respect of subject and profile. In Chapter Six the findings show how mentoring impacted on PCK/SKfT development and the final training outcomes for these GTs. Mentor match will emerge as one of the decisive factors in how well they attained.

5.5.2 Subject match

All Programme Leaders stressed the importance of subject specialist mentoring but also acknowledged that it was not always possible for each GT to be mentored by a specialist within their subject:

“...I ...insist that they are a subject specialist and if they can't be then at least they have a coach and a subject specialist ... there's got to be a subject specialist somewhere...” (Muge, Kingsview)

For NineSG a shortage of science mentors was identified as a particular challenge:

“...we place them with the subject specialist for one of the two placements so they should all...be mentored by a subject specialist at placement one or placement two...” (Programme Leader)

The Central College Programme Leader also talked of the lack of subject mentors in some instances and of special arrangements to ensure subject input:

“...if they don't they have to buy that expertise in – we've done that a few times and we have this year as well...”

Concerns regarding mentor subject match were expressed by Bill, Science Subject Adviser, Kingsview:

“...one thing I've come across with GTP that I've never come across with PGCE is mentors outside the subject area...not just non-specialists but people

outside the science department.it maybe that they're very strong in mentoring in many other ways but I still feel that it's not great..."

These concerns and the implications for PCK/SKfT development were exemplified in Vignette Six of Tom and Jasmine.

Vignette Six Tom and Jasmine

Tom was one of two physics GTs in the same school filling vacancies. There was a large science department but a lack of experienced mentors with capacity to mentor the GTs. Jasmine was a geography teacher who had previously mentored a GT in another humanities subject. Because of the shortage of science mentors and as Jasmine had mentored outside her specialist subject before she was asked to mentor Tom.

In order to ensure that Tom received subject specialist input a three way mentor arrangement was set up with support from Jean (acting head of physics) on physics pedagogy and from Tess, the NineSG Science Subject leader (based at the same school) with compiling the portfolio. Jasmine was however the designated 'subject mentor' and both she and Tom found this arrangement put them at a disadvantage:

"...it might be better if he had a science mentor... I've been working with Tom on pedagogy and things but because I'm still not part of the department there's a lot of things that he might have wanted to ask during our mentor meetings which I couldn't answer because they were science-based... I wanted to help him more...but just because I have no idea where he can get the resources from, what science required and whether there was a test or some sort of exam that they needed to be working towards..." (Jasmine)

"...I guess for me the disadvantage was that my subject mentor was actually a geography teacher so she couldn't help me on the subject side..." (Tom)

Tom had considerable problems with behaviour management and found that his SSE which provided the opportunity to work with a physics specialist mentor significantly improved all aspects of his PCK/SKfT:

"I have to say that when I came back from my second placement I was changed quite a lot and my students knew that and they complimented me on it.... this teacher's quite a lot different now"

As a well-qualified GT with a first class degree Tom was not able to maximise his potential. He was graded 'good' but it is likely that a different mentoring arrangement would have resulted in an 'outstanding' final assessment.

5.5.3 Background and experience match

It also emerged that a match was needed in terms of age and prior experience:

“...it was part of the discussion that maybe it would be better to have an older, more experienced person to mentor an older and more experienced trainee rather than somebody much younger...” (Jenny, a science subject mentor)

There was a similar consideration in the selection of a subject mentor for Pam, a mathematics GT who had worked as an accountant. Sandra was asked to mentor Pam because she had a similar background and had herself trained via the GTP:

“...they said to me that she came from a similar background to me...I think we were on the same page because of our past experiences which was why the pairing up worked really well...” (Sandra, mathematics mentor)

In contrast a pairing such as Bev and Penny appeared less effective due to their age and experience profiles. Bev who had qualified three years earlier said she felt at a disadvantage:

“...Being quite young and being a relatively new teacher, it is quite difficult to have that kind of professional authority as I was dealing with a trainee who was the same age as me ...it’s difficult to have that kind of mentoring relationship rather than just being mates...”

Consequently, Bev’s mentoring was quite ‘hands off’ as Penny was a very proactive GT with a strong personality who preferred to be left to ‘get on with it’:

“...Yes, because I can be a bit trouby if someone starts bossing me around ...so I’m probably better just getting on with it...”

5.6 Mentoring issues

5.6.1 School commitment

Whole school commitment was stressed to be a key requirement to effective GTP mentoring:

“...I think head teachers really have to understand that its real work. It’s not a teacher on the cheap... I think...it’s been acknowledged that training is a big amount of work...” (Patsy, Senior Mentor)

Although interviewees felt schools were committed to supporting the programme, mentors having insufficient time and conflicting priorities was a common theme:

“...whenever we have any kind of feedback from mentors or subject leaders, time is our biggest problem...sometimes you have to prioritise and sometimes you can’t do it all...” (Phil, Mathematics Subject Leader, NineSG)

The exceptions were those in roles which allowed more time for mentoring. For example, Jenny was in a role that allowed her to be creative with her time:

“...I wasn’t given time. But I only teach half a timetable ...because I do STEM [science, technology, engineering and mathematics] enrichment and careers as my other half; so I can be flexible...yes I had enough...I chose to have that time...”

Vignette seven of John and Valon illustrates the impact on the mentoring relationship where full support was not provided.

Vignette Seven John and Valon

John, an experienced mathematics mentor who had originally only expected to mentor Valon but was then required to mentor another GT from a different EBITT on the assumption that they could be mentored together. This was very problematic:

“...it was hard work ...first we were doing it simultaneously and I quickly realised that their needs and wants weren’t the same...I had to...split them up and meet them on different occasions and this became very difficult because sometimes when we planned to do this then they would put me on cover...”

This meant that weekly meetings were not timetabled and took place after school with other training on an informal ‘ad hoc’ basis:

“...we did find time with the mentor to sit after school and look at certain areas...So we had lots of those sessions and normally even over a cup of tea we always shared good practice and ideas how to teach...” (Valon)

School timetabling policy made it difficult for them observe each other:

“...we have this system when it is mathematics that we are all teaching at the same time. So you see sometimes it is really difficult to get a cover so you can go and observe ...” (John)

“...it wasn’t possible for me to observe my mentor or any other mathematics teachers only when I went into the other placement that I saw some mathematics teaching...” (Valon)

John was often unable to be present at the EBITT tutor monitoring visit:

“...sometimes I will hear he’s come and gone because most of the time when he comes we were also teaching anyway...the main challenge I found was time. You see you’re always running against time...”

Other difficulties emerged due to lack of experience of the programme or a change of circumstances: Jenny and her GT Caitlin’s school worked extensively with the Teach First programme and so was:

“...very Teach First orientated...you know they’re not supernumerary ... so one thing that started to happen here...“oh, Caitlin can pick up that bit or that bit”

and I put a stop to that...she needed to have the same kind of experience as our two Teach Firsts...” (Jenny)

Richard and his GT Elaina found themselves the victims of changed circumstances which compromised their mentoring relationship:

“...the plan was for me to do team teaching with her. Unfortunately we lost a member of staff and I had to go take on other classes. So we didn’t do as much as I would have wanted ...” (Richard)

“...my mentor said that at the beginning his interactions with me were not the ones that he wanted...” (Elaina)

5.6.2 Inconsistency of practice

Despite EBITT monitoring and QA systems examples of inconsistency were referred to by both mentors and EBITT subject specialist tutors:

“... I know all the Subject Leaders well and we all do the same...we all get the same information but it does appear that by the time it gets down to the trainees or the mentors even that it’s starting to go awry a bit...” (Tess, science Subject Leader, NineSG)

Sam, mathematics Subject Adviser (Kingsview) felt that inconsistency was often due to variations in commitment:

“...sometimes that’s why there’s that inconsistency with the programme. You need the mentor to really want to do it....I know in some schools resources are really good and good practitioners.... In others it probably doesn’t work so well...”

It was also suggested that working across a number of schools absolute consistency cannot be expected and was overall unnecessary. James, Central College central trainer commented that the quality of training and assessment was more important:

“...As an ex-senior manager of a school - did all my staff sing to the same hymn sheet? No, and once you bring in another institution as well... I think the issue is that the standards and expectations of the course are high and are enforced. ...”

However, whilst Kingsview and Central College schools had a layer of external support and monitoring via EBITT tutors visits this was absent from NineSG. Whilst none of the NineSG interviewees saw this as a deficiency one mentor, Sandra expressed concerns about how the quality of mentoring was assessed. She referred to lack of feedback and how she felt that the quality and experience of those selected to mentor was insufficiently addressed.

5.6.3 Predominant teaching orientation model

Mentors' expectation that their GTs should follow a predominant teaching orientation did not emerge as a major issue. This was said to be due to improved mentoring and the range of learning and teaching orientations taught through central training. For example Barbara, Programme Leader, Central College explained:

“...the sort of 'mini-me' syndrome when they want people to teach in their shadow...we've really done a lot of work...around developing...an individual model of being a teacher...”

Four mentors talked of the importance of non-directive coaching in developing their GTs. For example:

“...I think you are more or less working as a facilitator rather than telling them exactly what they should do...” (John, mathematics mentor)

“...when I started at the school it was very much “I do it my way” whatever way that was...since then we've had lots of teaching staff going on the Outstanding Teacher programme...there has been a real shift...I think that's made a difference to our GTs” (Harriet, Science mentor)

5.6.4 Mentor training and preparation for the role

The EBITTs provided new mentor training in the summer term prior to the new intake in September. Kingsview's training included a session on mentoring and coaching run jointly with Senior Mentors from schools. Central College subject mentors were expected to attend one additional session during the year, focusing:

“...around the coaching conversation – so it's about their practice in working with a trainee and about confronting difficult challenging conversations...”
(Barbara, Programme Leader)

NineSG also ran other mentor training focusing on topics such as assignment marking. None of the three EBITTs ran subject specific mentor training although the NineSG new mentor training covered the TDA PCK/SKfT framework. However the Programme Leader was unsure how far their mentors understood it:

“...there's so much for them to take on board. I give them the copy and I might refer to it...if I'm honest probably it's...in one ear and out the other because it's not as meaningful to them...”

Seven of the mentors felt well prepared in terms of expectations and the completion of monitoring and assessment documentation, For example:

“....the mentor training ...really brought across...all the things that you have to set in place...and who I need to speak to just in case there are some aspects of

his mentoring that I need to reflect on or I wasn't sure of ..." (Terry, Subject Mentor, Central College)

Two mentors who felt less informed had not attended the induction training. For example Helen, a mathematics subject mentor found because of the late decision to take a GT that:

"...I'd missed the initial training sessions so I was kind of launched in at the deep end ...so I did feel I was on a bit of a catch up all the time, but once I got into the swing of it, it became that bit easier..."

5.6.5 Training – what could be improved?

Five mentors said training focused too much on documentation completion with little input on the actual mentoring process and so was largely seen as time-wasting and irrelevant:

"...on the practical things of how to do the mentoring itself I do feel that no, I don't benefit a lot in that way..." (Richard, Kingsview mentor)

"...an email comes and says come to this training session and I think "I'm going all the way to Central College to be told about pieces of paper"...I have been before to sessions like that for PGCE students and I just think I don't need to..." (Jenny, Central College mentor)

When considering whether subject mentor training was needed views were split with only two mentors wanting this input:

"...Perhaps built into the induction. Something subject specific....yes it would have been useful....more specific about what are the challenges going to be within mathematics..." (Carol, Central College)

But the majority did not feel it was needed. Harriet, a science Subject Mentor did not regard the absence of PCK/SKfT training as an omission:

"...We were told what they needed to do, how to mark and how to judge it but not as in how to deliver the content to the trainees. But I don't feel that's a weakness of it..."

Views also varied amongst the Subject and Programme Leaders. Because NineSG provided some subject elements they felt this aspect of training was covered. Central College was reconsidering this element but had yet to find a better model of delivery:

"...there was such a low uptake that we've decided that we are not going to give up on it but we are going to have to revamp it and think about how we do that..." (Barbara, Programme leader)

In contrast the Kingsview Subject Advisers felt this training was needed. Bill (science) commented:

“...subject element of the school-based training is always something which is a weakness both in GTP and in other teacher-training models... [we should] have mentor meetings only focused on subject pedagogy ...”

More training in the process of coaching and mentoring was universally favoured. Lisa, NineSG Programme leader commented:

“...I need to revisit that mentoring dialogue...how to feedback to trainees after lesson observation...I've heard more than one trainee say 'I only hear the negative and I don't hear the positive from my mentor'...it's not a proper coaching conversation if it's all critical...”

Although Central College had introduced twilight 'coaching' sessions Patsy, a senior mentor felt this was insufficient:

“...how you do mentoring...you need it to be in small groups and you need to spend a day doing it at least. Listening, counselling, supporting, coaching and all the other bits and pieces there are for mentors...”

Richard (mathematics mentor) also stressed the need for the development of coaching skills:

“...there's this assumption that the trainee doesn't know anything and “I have to tell them exactly what to do and they have to do it my way” but exposing the mentors to other practices like coaching...would be quite helpful...”

Another area for improvement was differentiation between the needs of new and experienced mentors:

“...You're very aware...that some people are doing it for the first time and there are people there who have been mentoring for 11/12 years...” (Meredith, Central College)

5.6.6 Other preparation and support for the mentor role

Other preparation for their role was seen as equally valuable to the EBITT training.

Mentors' own more recent training was especially helpful:

“...had I not I think been through the system...and we've had plenty of trainees come to the school so I've seen how it works through them ...I think that helped with the training, alongside the training...” (Harriet, NineSG)

“....I felt I had very strong mentoring when I was doing my PGCE so I was trying to follow a similar route and similar level of advice etc.” (Carol, Central College)

They also drew on experience gained through mentoring on other ITT routes and externally provided training:

“...I've been trained in coaching and the coaching skills helped me as well to mentor ...the GTP student...” (Serena, Central College)

“...I’ve done it with my local church and with my community and a lot of training on mentoring outside of work settings. Yes, so those skills have come in handy...” (Richard, Kingsview)

Patsy, a senior mentor also commented how she now draws on a range of provision for all her mentors:

“...if someone’s...never done it before then I send them to a course...Whatever is available. If Central College is doing one then I’ll send them [there] and if Teach First ...because it’s very similar... my mentors often do a GTP and Teach Firstso there’s a lot of cross-over...”

For the HEI led EBITTs subject mentors also benefitted from working with their EBITT tutors and said how joint observations helped to develop their skills. For example, Serena, a mathematics mentor found the tutor’s input helped to view her GT’s teaching from a different perspective:

“...he had a different agenda to me in the sense that the pedagogy and all that comes into it and I was more focused on the mathematics side and how the teaching and learning can be improved...So it has been a very, very useful ‘conversation’...”

Support for mentors within their schools’ community of practice was however variable. Whilst the majority talked of support from their departments and senior mentors others did not receive the same input. Sandra a new NineSG mentor found that her senior mentor had no time to meet with her. Helen an experienced PGCE mentor but new to GTP mentoring was expected to take on the senior mentor role as well with little support. Also for NineSG there was not a cohesive community of practice for the GTP between the nine schools. This was partly due to the practice of running much of EBITT and SCITT training together and the limited time to meet as a group. Mentors only met four times a year for formal training but otherwise both mentors and Subject Leaders referred to limited interaction due to time constraints. Contact focused on specific mentoring problems, issues in arranging SSE or liaison regarding central session delivery. There was however no reference to mentoring issues regarding subject specific pedagogy.

5.6.7 Challenges of mentoring - Transition from teacher to teacher educator

Several interviewees talked of the challenges taking on a teacher educator role, in particular: that the role involved training as well as mentoring; having to relinquish control of classes; understanding the QTS standards; marking assignments; knowledge

of pedagogical terminology; training GTs to be ‘reflective practitioners’ and delivering central sessions

Harriet, (NineSG mentor) had observed that not all mentors understood that their role involved training as well as mentoring:

“... they don’t perhaps understand how much the training side is involved ...we’ve had discussions ...about how much should we be doing subject knowledge based training with our trainees....I think perhaps it does give the wrong impression because we are training them rather than just them being [mentored]...”

Sam, Mathematics Subject Adviser, Kingsview found that because many GTs had previously been in learning support or unqualified teacher roles that mentors did not fully appreciate their training needs:

“...understanding that they’re training and they are going to make mistakes...So that role ...is much of a training role...”

Three mentors found it was hard to pass over control of the class especially in the initial stages of training:

“...I do find it difficult to relinquish that control of the class....that has been quite challenging but I have got better at keeping my mouth shut...and then do the feedback afterwards...” (Harriet, NineSG)

Understanding the QTS standards and completing the assessment paperwork was a challenge especially for those less familiar with the current standards:

“...I think some mentors have issues not being familiar with the standards, not really knowing what’s required of them” (Bev, NineSG)

Assignment marking was an area of difficulty although in this research only for the NineSG mentors. At the other EBITTs mentors did not mark the tasks and assignments and they were not graded. Instead EBITT tutors provided feedback and monitored the submissions to ensure they met EBITT assessment requirements. However at NineSG subject mentors were required to mark subject assignments which were sampled and moderated by the Subject Leaders. For mathematics mentors this was particularly challenging as their subject did not normally require academic writing and many did not have a masters’:

“...they are supposed to be writing at quite a high level and I’m not sure that I’m at that level. ...There’s good guidance but I don’t find I’m confident. Probably if I was in another discipline like English then...writing...is part and parcel of your job but as a mathematics teacher, you know [it is not]...” (Rita, NineSG)

There was also concern regarding mentors' capacity to introduce theory into training their GTs. Muge (Kingsview, Secondary Programme Leader) explained that although mentors constantly discussed pedagogy with their GTs they found it difficult to link the practice to the underlying pedagogical theory.

Sandra, subject mentor, NineSG illustrated this challenge when she commented:

“...I often thought that because I'm not formally trained in teaching pedagogy and just do what comes instinctively I don't know what the name for some of the things I do are. I often wondered if I was giving her the best quality training...”

George, a senior mentor found that many of his subject mentors lacked the proficiency to develop their GTs' evaluative and analytical skills:

“...that sort of analytical process and extracting the meaning of what they're reading....that's not always forthcoming as a skill in subject mentors that they can rely on...you want them to have some of those skills, obviously many don't...”

Running central sessions was also a challenge for NineSG subject mentors who felt they lacked the expertise of HEI based teacher educators to deliver sessions to adult learners.

Bev, a NineSG mentor commented:

“...the difficulty is that the GPS sessions are delivered by us and we're not all specialists...”

This lack of expertise was confirmed by the comments of the teacher who delivered the mathematics session I observed. She remarked afterwards on her relief that the session was over as she had felt “quite nervous” and lacked confidence in providing this type of training which was outside her usual practice.

5.7 How mentors worked with GTs

5.7.7 Mentoring approach

The previous chapter outlined the required school-based PCK/SKFT training activities and the variety of delivery. These activities emerged as occurring mainly through a non-directive approach. For example:

“...I do allow them to do it their way initially and it's through the feedback that I ask...“How do you think things went? Do you think you could have done it a better way?” ...” (Richard, mathematics mentor)

Although there were also examples of more directive mentoring:

“...I’ve been quite directive on occasion...we have very constructive schemes of work...so it’s about what’s going to work for this class; it’s all about selecting and matching needs with resources...” (Jenny, science mentor)

There were also references to creative training approaches. For example Terry who mentored Baruti would get him to ‘teach’ his lessons to her first:

“...Yes, that was it “teach it to me” and then after that I would write all my points about it and all the bits that he can fix before he teaches that topic to the class. And I must say it pays off ...”

Observation of the subject mentor and other teachers emerged as a key aspect of PCK/SKfT training with more prominence than suggested in ITPs. In particular mentors stressed the importance of observing other subjects:

“...I get them ...to go and look at other teachers...I tell them “although you are not looking at mathematics, every teacher’s class you go to there are several ideas, several strategies you can build and implement into yours...” (John)

However, it was acknowledged that observation needed to be undertaken in a structured way:

“... not just throw them in and say “go and observe so and so” but throw them in to observe so and so and do x and take notes in this structured way and then we are going to talk about what you saw and you’re going to explain to me what [you saw]...” (Patsy, senior mentor)

5.7.8 A lot of training is ‘implicit’

It emerged that much of the school-based training was undocumented and ‘implicit’:

“...with the more formalised PGCE process you know what you’re handing out ...so everyone’s doing it to the same standard and same level....On the quiet⁶ they get quite a lot of training – it’s just not explicit but because the government can’t see it they think it’s not there...” (Adam, mathematics tutor)

The Kingsview Programme Leaders also commented how Ofsted “expect to see a PGCE” and Muge commented that during their recent Ofsted inspection she lacked the opportunity to explain how the elements of programme operated in reality and that:

“...I wish I could have told the inspector what I’ve just told you...”

Some implicit aspects of training occurred particularly in respect of SMK. Although ITPs included specific activities many participants stressed that much was learnt ‘as you teach’. As James, central trainer with Central College pointed out:

“...we have to remind the trainees ...they won’t teach half of what they knew about for years and then suddenly it will crop up and they will have to sit down and relearn it...”

⁶ Secretly

This view was echoed by subject mentors, for example:

“...I honestly think that you learn as you teach it so when you come up to Year 9 [grade 8] chemistry that’s when you learn about it....” (Jenny, science Mentor)

5.8 Summary

The findings in this chapter revealed the key aspects of GTP mentoring. It was significant how mentor match in terms of age and experience was as important as subject match. Also in contrast to other routes such as a PGCE mentor motivation to undertake the role was largely related to a vested interest in their GTs as well as their own professional development.

It was unexpected that one GT was mentored from a completely different discipline and the extent to which mentoring issues such as lack of time and school commitment were still prevalent. In contrast to past reporting of ‘rogue school’ behaviour some instances in the research appeared ‘unintended’ and due to inexperience or unexpected changes. The shortcomings in mentor training were also somewhat surprising given how well established this ITT route had become by the time of this research. Chapter Six will show how these issues impacted on PCK/SKfT development and attainment.

It was also revealed how mentors experienced working with their GTs and that this was more of training than purely mentoring role. Furthermore much of the work between mentors and mentees was shown to be ‘unseen’ and this was not understood by Ofsted.

The extent to which mentors were trained to undertake their role revealed some continuing deficiencies. They wanted more training on mentoring skills and the teacher educator role especially in the case of the school-led EBITT mentors. It was also surprising that EBITT mentors did not have the opportunity to work within a wider GTP community of practice as they were constrained by time and contextual limitations

Chapter Six

Findings three – the development of PCK/SKfT - GT perspective

6.1 Introduction

This chapter reports on PCK/SKfT development mainly from the GTs' perspective. The first section profiles the GTs interviewed for this research. The next focuses on GTs' perceived challenges in PCK/SKfT development and the contribution of their ITPs and central training to development. The third section reports on how prior experience, beliefs and status as employed unqualified teachers-in-training contributed to the development of teacher identity and PCK/SKfT. The final section provides findings on the impact of school training context on PCK/SKfT development and attainment.

6.2 Profile of GTs interviewed

Sixteen GTs were interviewed: six female and 10 male. 14 had degrees defined as 'good' (i.e. 1st, 2:1 or 'solid' 2:2). Two had overseas qualifications which were treated as 'unclassified' in the UK. Fourteen had degrees which either matched or partially matched their subject for QTS. A 'partial' match is where at least 50 per cent was within the specialist subject. So for example, Harry, a mathematics GT had a degree in mechanical engineering so this represented a partial match.

The majority (14) were career changers of which eight had considerable prior school experience in either support or unqualified teacher roles. A breakdown of GTs by subject, subject match, degree class, prior career, recent school experience and final assessment grade is shown in Table 6.1 (p.94). For career stage the six categories defined by Priyadharshini and Robinson (2003) are used with two additional categories of 'Unqualified overseas teacher' and 'First career after graduating' to cover the range within the cohort.

The data in table 6.1 shares similarities with Table 4.4 in Chapter Four (p.72) which indicated that degree match to specialist subject and degree class were not necessarily predictors of final assessment grades: three GTs with a 'partial' match and one with a non-specialist degree were graded 'outstanding'. Caitlin who had a lower second degree was graded 'outstanding' whereas Tom who had first class degree was graded 'good'. Of those GTs graded 'outstanding' only four had recently spent a sustained period in UK schools indicating this was not a decisive factor in their development. Of

Table 6.1

GTs by subject, subject match, degree class, prior career, recent school experience and final assessment grade

Subject	Age	Degree/ subject match	Degree class*	Prior career	Recent UK school exp.	School type	Final Assess- ment grade
Bethan (Sc) physics	23	Y	2:2	First career	Y	S2	3
Valon Mathematics	38	N	2:2	Late starter	Y	S2	2
Nicole (Sc)chemistry	38	Y	2:2	Parent	Y	S1	2
Caitlin (Sc) physics	58	Y	2:2	Freelancer	N	S2	1
Elaina mathematics	30	Y	oversea s degree	Unqualified overseas teacher	N	S2	1
Reva Mathematics	42	P	oversea s degree	Parent	Y	S2	1
Jolanta mathematics	29	Y	2:1	Young career changer	Y	S2	1
Paul Mathematics	23	P	2:1	Young career changer	N	S1*	1
Karen (sc) biology	24	Y	2:1	Young career changer	Y	S2	1
Penny (Sc) physics	26	Y	2:1	Young career changer	N	S3	1
Baruti Mathematics	26	P	2:2	Young career changer	Y	S2	1
Tom (Sc) physics	24	Y	1st	Young career changer	N	S3	2
Pam Mathematics	38	N	2:1	Successful Careerist	N	S3	1
Simon Mathematics	37	P	2:1	Successful Careerist	N	I	1
Cathy (Sc)chemistry	28	P	2:1	Successful Careerist	N	S3	1
Harry mathematics	27	P	2:2	Serial careerist	Y	S2	2

KEY

Degree/subject match - extent to which degree subject matched specialist subject for QTS:

Y= Yes; N= No; P = partial – at least 50 per cent

Prior career – using classification based on Priyadharshini and Robinson-Pant (2003) (see Chapter Two) with two additional categories of ‘first career’ after completing first degree and ‘unqualified overseas teacher’ to reflect the cohort

Recent UK school exp. – experience of working/volunteering/observing in UK schools in the last year

School type: S1 = State school – above average numbers of pupils from low income groups/SEN;
S2 = Multi-cultural state school – above average numbers of pupils from low income groups/ SEN/EAL;
S3 = Affluent area state school – pupils mainly from middle and higher income groups/below average SEN/EAL;

I = Independent school – pupils from high income groups/very few SEN/EAL pupils

*UK degree classes equate to US grade point average broadly as follows: first ≥ 3.80 ; 2:1 = 3.30–3.79; 2:2 = 3.00–3.29; third/pass no GPA equivalent.

* Paul was based in a S1 school but qualified in 2007

the 11 GTs who were graded ‘outstanding’ seven were in challenging state or multi-cultural state schools and the other four were in affluent area or independent schools. As shown in Table 4.5 none of GTs in mono-cultural state schools achieved a grade one suggesting a link between school type and grade.

6.3 Challenges in PCK development

6.3.1 Initial challenges

For eight GTs the main challenge at the start of training was lesson planning and preparation, for example:

“...the hardest thing is you have nothing so you’re constantly preparing materials and you spend a long time preparing stuff that’s completely wrong...”
(Pam, mathematics GT)

Some (six) also expressed concerns about gaps in SMK, for example:

“...I was having to develop a lot of subject knowledge in organic chemistry which was my weakest part of chemistry...” (Bethan, science GT)

6.3.2 Later pedagogical challenges

GTs talked of challenges which emerged as their PCK/SKfT development progressed. One common to both subjects was which pedagogical approaches would work with different classes:

“...the most challenging aspects are just knowing which classes to try different things out with because I could do one activity with one class and it would work really well and then other classes it completely flops...” (Cathy, science GT)

Another was understanding the difficulties pupils have with the abstraction of many mathematics and science concepts:

“...what I’ve really learnt in this year is just the difficulties students have with particular areas...because I didn’t have great difficulties myself in those areas it’s hard to know what to really look out for until you actually come across it...”
(Caitlin)

In mathematics specifically GTs referred to how pupils starting secondary school have varying levels of mathematics knowledge and skill. This required GTs to acquire knowledge of upper primary mathematics to assist their pupils’ transition. Also the need to be familiar with all mathematics algorithms to suit the needs of learners:

“...That’s something I found challenging because some topics I didn’t see even a second method of doing it... my mentor would...say “did you show them that method?...” ...” (Baruti)

Science GTs referred to pupils' lack of understanding scientific language, for example:

“...they get confused with easy [terms] ... For example they don't know what 'increasing' and 'decreasing' are so they get confused between the two so therefore they give wrong answers to questions...” (Nicole)

The science GTs who were either training outside their specialist subject or required to teach more than one science at higher secondary level referred to addressing areas they felt less secure with. However they applied themselves to the job of learning rather than finding this a major challenge. For example, Cathy a 'young career changer' with a biology background commented:

“...I've spent time in science and I'm more experienced than someone that's just come out of university...I'm not an actual chemist... I found the sixth-form chemistry I've had to revise a lot. So that's taken up a lot of my time. It's a lot easier now...”

6.4 Role of the individual training plan (ITP)

Varying views were expressed about the PCK/SKfT elements of ITPs. Only two GTs seemed to have a good understanding of its relevance. Others felt that the PCK/SKfT aspects mainly focused on SMK. Some GTs (3) had themselves taken the lead in writing either all or part of the PCK/SKfT activities within their ITPs, for example:

“... in terms of writing me a plan for things; they haven't done that...I just did it by myself and then I used the NineSG papers afterwards ...” (Penny, science GT)

Another GT did not understand her ITP or its relevance to PCK/SKfT until the mid-point of her training:

“...we filled in the initial training plan it was like it was in Chinese and for quite a long time ...I didn't understand it...I'm sure he [my mentor] did but there was no time explaining it...” (Elaina, mathematics GT)

6.5 Central EBITT provision – training, access to external training and resources

6.5.1 Central training sessions

The majority (14) stressed how central training provided opportunities to meet up with their peers for support and discuss their training away from their schools:

“...I was by myself here a little bit. So it's so nice to be able to just go and vent⁷ – I did a lot of venting – timetabling issues were usually my vent...” (Bethan, science GT, Central College)

The HEI-led EBITTs' GTs felt that although their sessions were not subject orientated the generic approach worked well, for example:

⁷ Vent - to relieve by giving expression to something

“...Learning wise, I loved the way that James always...taught by example kind of thing....so it was a lot of learning ...in terms of general pedagogy...” (Bethan, Central College)

“...a lot of things...I applied it in my lessons ...When we did Bloom’s Taxonomy for example that was like a light coming on...I put questions in my lesson but I didn’t recognise why I did them, where did they fit in, in terms of pedagogy but after the session everything fell into place...” (Elaina, Kingsview)

Kingsview GTs such as Nicole (science) spoke positively about the contribution of the four subject specific training days:

“ ...Two were ‘Outstanding lessons in the Science Department’ and ‘Moderation of marking Coursework’ ran by OCR⁸ ...provided good resources I used in lessons ...it was important to see how these resources could be adapted to use in your school...” (Nicole)

All seven of the science GTs and seven of the nine mathematics GTs said they would have liked formal training on how to teach more difficult topics particularly at A level. For the NineSG GTs who had subject specific central sessions this was also regarded as a shortcoming as well as some topics being unsuited to their needs:

“...I had a few which were not really very worthwhile – one which was looking at different syllabuses...I didn’t really get anything out of that at all...” (Cathy, science)

Similar views were expressed by the Kingsview GTs despite having some subject specific training in addition to generic central sessions. They also would have liked additional subject training:

“...I think that would be good...if you’re actually learning how to teach a specific topic that perhaps is one of the more tricky ones that would be definitely useful...” (Karen, science)

Most GTs indicated a wish for more subject specific input (see Table 6.2). It was perhaps surprising that the mathematics GTs who did not want additional PCK input were from Central College where there was no central subject specific provision. However both felt they had received sufficient input in school and from the generic sessions. Also notable was that two of the science GTs, specifically wanted school-based sessions where they could observe real lessons and to talk to teachers. Nicole pointed out that hearing from teachers about “that’s the way I deal with things” provided better insight into pedagogical practice.

⁸ OCR – an examination board – see glossary

There were other issues raised about central training. Some GTs would have liked more academic theoretical input:

“...I’m one of the few that had master’s degree on the course and I’ve kind of missed the academic aspect of it...” (Elaina mathematics GT)

Table 6.2 Extent to which GTs wanted more subject specific PCK/SKfT input

EBITT	Mathematics		Science	
	Yes	No	Yes	No
Kingsview	2	-	2	-
Central College	3	2	2	-
NineSG	2	-	3	-
Total	7	2	7	-

Central College and NineSG GTs found that activities linking the sessions to school practice were either not required or expectations were inconsistent:

“...what you should do before the sessions, what reading you should do and then no-one stuck to it...It started off being relevant ...but then we stopped...” (Bethan, Central College)

For NineSG and Kingsview GTs the timing and length of sessions were an issue:

“...they weren’t at all nice at the end of the day...lots of people...would be late because they were teaching last period on a Thursday. So they just weren’t at a good time...” (Cathy, NineSG)

“...they were saying things like “...we’ll keep this short” and then you’d be all day there and have endless breaks...” (Karen, Kingsview)

The sequencing of topics was also raised:

“...sometimes it was too late. For example we had an ICT session. I don’t feel that was of any use towards the end ...” (Nicole, Kingsview)

6.5.2 Access to external training and resources

Structured direction to external training was a part of Kingsview provision whereas at the other EBITTs it was not widely facilitated:

“...I’d applied to go to one thing on differentiation but it was during the exams and they wouldn’t let anyone out of school...” (Cathy, NineSG)

Paul, another NineSG GT exemplified how influential this can be to PCK/SKfT development:

“...really made me think about what I could do differently in the classroom. Going outside made a massive difference to me...you had completely different people who have completely different sort of views on things...”

All GTs referred to accessing resources from their EBITT’s VLE and other on-line provision. However library use was limited and mainly used for assignments due to the wealth of material on-line for mathematics and science:

“...mathematics...It’s the subject that’s the most highly resourced on the internet by a long, long way...” (Harry, Mathematics GT)

Some GTs cited lack of time and distance of their school from the library as other reasons for limited use. Others who were used to accessing up to date research felt at a disadvantage as this was not available during their training:

“...I come from a university environment where I did my PhD... for me not to have all the new research and E-journals that kind of panicked me because that was my lifeline “ (Cathy, science GT)

6.6 Impact of prior experience on PCK/SKfT development

6.6.1 Prior experience and development of teacher identity

As indicated in Table 6.1 most GTs were career changers in some form. Fourteen had considered teaching for a while beforehand with seven undertaking unqualified teacher or learning support roles to assist their decision. Thirteen GTs said they chose the GTP because they wanted to be trained ‘on the job’:

“...I wanted to learn practically... I’d rather do it sort of on the job training as opposed to sit in the classroom learning the theory of it” (Simon, Mathematics GT)

Many talked of the advantage of prior work experience making them more resilient and better prepared for the GTP:

“.....because I’d been working for 15 years so it’s almost that there’s not much that can phase you ...I think if I’d just been a new graduate I might have found it difficult ...” (Pam, mathematics GT)

These views were supported in particular by Tess, Science Subject Leader, NineSG

“...someone straight out of degree I don’t feel it’s suitable...I think people struggle with it when they’re younger and they haven’t had career [or] industry experience behind them...”

Experience of taking the initiative also enabled GTs to take responsibility for much of their training. Several stressed the importance of being proactive:

“...It’s been quite ‘me-led’ really.... I’ve been proactive ...If I hadn’t done it, it would have been awful...” (Penny, Science)

The importance of proactivity was reiterated by Adam (mathematics tutor):

“...I say to all my trainees... “I don’t care what the roles and responsibilities are, you ‘drive’ it. Because all the people around you are busy. They forget things. So you see what’s next to do and then you kick them...”

Similarly, recent UK school experience was beneficial and GTs said this had given them an advantage:

“...I walked in the room and kids came in and ‘bang’ we were away because I knew and I’d been through in my head “Right this could happen and this could happen”...” (Harry, Mathematics GT)

Thus for the majority prior experience was significant in establishing teacher identity because they had transferable skills to draw on. However it was this experience combined with the status of being employed as an unqualified teacher-in-training which was seen as key to the early development of teacher identity. In contrast to PGCE or SCITT trainees who as soon as they became established had to move to a second school GTs were regarded as members of staff which helped to develop professional confidence in the classroom:

“...It has been not that I’ve been seen as a student this year – I have always been seen as member of the department ...” (Valon, mathematics GT)

This early development of ‘teacher identity’ combined with teaching a larger timetable over a sustained period within a predominantly one-school model maximised PCK/SKfT development. This was due to the extended time and opportunity for pedagogical development through trial and error and reflection on practice:

“...if you’re not doing as many lessons it’s too fragmented – you don’t see it all coming together and especially because I owned my own classes ...I could really see a weakness in the class so it meant that I could do something about thatI got that big picture from teaching as many lessons as I did...” (Paul, mathematics GT)

The second benefit was better preparation for the NQT year:

“...[the PGCE students].... had one hour of lessons every day ...I thought “how are they going to cope as an NQT...?” ...we are still in touch with a few PGCE students ...they’ve got a job now and they found it very stressful because they hadn’t had that routine...” (Nicole, Science GT)

This view was reflected by several mentors. Bev, who was PGCE trained three years ago felt that she did not learnt to teach until her NQT year and the GTP provided better PCK/SKfT training. Lidia a Senior Mentor saw how GTs developed their practice more quickly. She compared them to her school's PGCE PSTs who struggled to link theory to practice:

“...they go to the lectures, they do a bit of teaching, they try and incorporate the two together...and often they end up asking us to check their essays and helping them to rewrite them...”

6.6.2 Impact of beliefs and prior experience on pedagogy development

Twelve GTs stressed how their own schooling had influenced their initial teaching approach:

“... I studied in school in India and it was a completely different way of teachingin my first year as an unqualified teacher I think I brought that style... into my teaching and it was very lecture led, teacher led...” (Reva, Mathematics GT)

Observation was seen as one of the best ways of learning pedagogy. But GTs made decisions about what they chose to bring into their own practice based on their orientation preferences:

“...we have 12 maths teachers all teaching in different styles..... There were a few maths teachers that I observed that I felt I was more close to rather than others but...every single one of them had a strength which I took in...” (Elaina)

The majority of GTs (13) felt that they had plenty of opportunity to try out a range of pedagogical approaches and take risks. For example:

“...Never like this is how we do it...this school's run very differently ...always put an element of 'risk' in...because you never know that might turn out to be your best lesson...” (Tom, science GT)

Two GTs found their schools were more teacher-led but this was not imposed on them. For example:

“...our school...It's a lot of teacher-led... I know she [subject mentor] does a lot of copying from books...sometimes I think she would like me... [to teach that way]...it was her style but she didn't push it...” (Nicole, Science GT)

Harry however found he was constrained by the predominant teaching style in his school:

“...this is very old school teacher-led... I'm at the uni⁹ and I'm working with people who are very 'out there' and I say ...It's a mad idea but it might work. Whereas I'm in a department where they say “don't take any risks” ...”

⁹ Informal for university

GTs also talked of how they came to change and modify their teaching orientation. For example:

“...from week two I completely moved away from the board and now I’ve come to a point where I use a good mix of everything, of ICT and everything...”
(Baruti, mathematics GT)

Similarly, Harry and Simon, mathematics GTs found some topics needed a didactic approach:

“...Like indices laws, it’s boring. I’m going to have to teach this the boring way...it’s just going to be boring for half an hour...” (Harry)

Simon also found that that the influence of his own schooling was so embedded that it was difficult to maintain a more student-centred orientation:

“...because that’s kind of how I was schooled so that’s kind of what I know...if you’re ever in doubt it’s very easy to slip back into the other way of doing things...”

The vignettes of Bethan and Pam further illustrate the influence of prior beliefs and experience. They show how different sets of experiences and beliefs impact in contrasting ways on PCK/SKfT acquisition and how they can hinder development without appropriate mentoring.

Vignette Eight Bethan

Bethan was physics GT with a ‘sound’ 2.2 in Chemistry and Physics. She was a supernumerary in a multicultural state school. Teaching was her ‘first career’ choice after graduating but she had some recent school experience. The science department at her school was going through a period of change resulting in numerous mentor and timetable changes. Bethan had strong beliefs about teaching as she been schooled in a “...very traditional ‘chalk and talk’ way and it was really boring”: and so was determined to develop a very different style:

“...I don’t want to ever just be a ‘giving them information’ kind of person - ...I try to do practice before theory...”

Bethan’s beliefs led her to persist with an ‘inquiry’ orientation for most of her training. When she went to her SSE school, a selective high achieving boys school she had difficulties:

“They are very, very chalk and talk...[the boys said] ...”why aren’t you just telling us the answers, you’re not teaching us”...I battled against them the entire time trying to teach my way and it just never worked...”

Bethan had four sets of mentoring arrangements but was mentored mainly by Mary, a biologist. Bethan described Mary’s teaching as “very chalk and talk and that really is her only style”. Mary was unable to model or assist with Bethan’s development in selecting

from a range of teaching styles which inhibited her progress. Mary was eventually replaced by a three way mentoring ‘partnership’ led by the head of department assisted by Pete, an AST and Tim, an NQT for physics input.

Bethan felt she could have been assisted by working more within a community of practice but this was lacking in her lead school:

“...We don’t have like a science room and that kind of thing is really supportive. When I had that at Xxxxx [SSE school] you all sit in one room and you could just be like “I’m doing this, what shall I do?” and you could just bounce off ideas really quickly. Here it’s like going from person to person all shut away in their labs...”

Bethan’s mentoring issues meant only latterly in her training was she able to select teaching ordinations appropriate to her classes:

“...[now] I have different routines with different classes...depending on their ability...year 9’s they’re quite low ability¹⁰...I have to be very strict – this is exactly what we do every single lesson...Whereas top sets ...“right we’re going to investigate something, you’re going to plan it”...”

Bethan was graded ‘satisfactory’ and her final assessment report commented on the challenge of “unpredictable timetabling and mentoring from numerous sources” and how within her teaching Bethan was still “...discovering the strategies she is most comfortable with...”

Vignette Nine Pam

Pam was a Nine SG mathematics GT who had come from a successful career as a management accountant. Her lead school was a high achieving affluent area state school. Pam was a qualified chartered accountant with a 2.1 degree in law and good A level grades although she did not have A level mathematics. The Head of Mathematics had been opposed to offering her a training place but was overruled.

Pam had reached a stage when she wanted to transfer her skills to benefit others:

“... there’s a lack of maths teachers, I can do maths... I didn’t particularly excel at it at school...But since school...I was using it in a business context every day...”

Sandra was Pam’s mentor and it was a good match as Sandra had also come from the business world:

“...Sandra’s great...we’d worked in similar industries...it was perfect for me...”
(Pam)

Pam’s approach to teaching and her PCK/SKfT development was highly professional and she constructed her teaching informed by her previous experiences:

“...she was a hugely conscientious person which is one of her many attributes and why she’s achieved so well in her previous careers...” (Sandra)

¹⁰ Based on test results attained by pupils on completion of primary phase

Pam was pragmatic about what she believed she needed for her teaching career. Thus she did not regard diversity training as important:

“I think it depends how much diversity you’re expecting in your future career. If you think you’re going to be in that kind of school then you need that experience...I don’t think it’s necessarily something that has to be...I think it depends where you’re going to end up...”

Her prior experience in a business environment also made her critical of some GTP training and assessment practices. She felt that the final assessment process lacked rigour:

“...I think that’s because I come from a professional background...when I did my accountancy training; it was very rigorous...”

At the end of her training Pam was assessed as an ‘outstanding’ GT having disproved the earlier judgement of her potential.

6.7 Impact of training context

6.7.1 School type

All GTs but one were based in mainstream state schools. Ofsted reports for Kingsview and Central College confirmed that diversity training was a key strength of their provision. GTs who trained in diverse settings regarded this aspect of their PCK/SKfT development of key importance:

“...when you want to explain something in mathematics you want to take something within the culture of the students and make that more relevant to them...” (Elaina, mathematics GT)

Conversely, two GTs: Pam, a NineSG GT and Simon a Central College GT who trained at an independent school regarded the diversity aspects of their training largely irrelevant. Simon’s school had very few EAL pupils and felt that as he would be an NQT there the training was not “...particularly relevant to me here...” Pam who had secured an NQT post at another NineSG school argued that:

“...I think it depends where you’re going to end up...I might have one EAL student maybe in three years. I’m going to have to research it anyway because I’m not going to remember from what I did then...”

It is a QTS requirement to teach in two contrasting environments and all GTs undertook a second school experience (SSE). For Kingsview and Central College SSE was also used to address particular training needs. Muge, Secondary Programme Leader for Kingsview explained its contribution to PCK/SKfT:

“...they look at the different setting and how that has an impact on delivery of subject knowledge... If someone from Xxxshire [more affluent mono cultural area] is going to Xxxxx [inner city diverse cultural area] well subject

knowledge...would be different simply because of the type of school you're in would have a huge impact and how you deliver the curriculum...So you enhance your subject knowledge...by having that richness of experience ...”

The majority of GTs (11) talked of the benefits of their SSE and the impact on their PCK/SKfT development. For example:

“...what was useful was my contrasting setting ... at that school I taught a lot of the top sets so that really stretched me in learning how to extend higher ability students ...” (Karen, science GT)

For NineSG SSE could have provided the opportunity to teach in a culturally diverse setting. However it was policy for GTs to undertake their SSE at another school within the group. Diversity was addressed via a one day school visit in a neighbouring borough, an approach which two GTs found disconcerting. Pam commented:

“...it was a bit like...‘let’s go and be diverse!’ ... I felt it was singled out as something ‘different, something wrong in some kind of way rather than just being a general run of the mill¹¹ ...”

Some GTs also talked of less a successful SSE due to insufficient planning or because the school did not provide a contrasting experience:

“...I didn’t feel I got out of it as much as I should of.....It’s got a very similar cohort of children and the ability range is very similar and they all come from similar backgrounds and mixed school as well...” (Cathy, science GT)

A longer SSE also had disadvantages: at Central College where it was between four and six weeks there were examples of lead schools changing timetables as a consequence of this:

“...when I came back I had to ask for classes that would allow me to plan ...” (Caitlin, science GT)

At Kingsview and NineSG where the experience was for three weeks GTs felt this was sufficient time and any longer would have been counterproductive. For example Pam explained:

“...in that first three weeks...the learning curve is really steep...What I would have learnt on-going would have started to tail off and would have been similar to what I was learning probably at that stage since January in my existing school ...more time out would have disconnected me more from my classes where I was...”

¹¹ Ordinary or average

6.7.2 Supernumerary status or filling a vacancy

As seen in Chapter Four GTs filling vacancies were supposed to have lighter timetables at the start of their training. Of the six GTs employed into vacancies three had timetables considered high for a GT in their first term:

“... 17 periods a week...I didn’t have a reduced timetable – it was reduced but not as compared to other students on the course...” (Valon, mathematics GT)

Those in vacancies talked of the disadvantages in particular being expected to start teaching almost immediately and less opportunity to observe and be observed:

“...I didn’t have much opportunity observing other people teach physics...you miss out...on the amount of observations you do because at the beginning you are right away just teaching - “thrown in at the deep end”¹² ... “ (Tom, science GT)

Not being supernumerary also placed restrictions on SSE as experienced by Penny one of two physics GTs filling vacancies. Her SSE was delayed and spread over four weeks because she had to return to her lead school one day each week to teach some of her classes:

“...everyone had been the three weeks before...I had to wait... So it was out of the time ...and they just weren’t ready for it...”

A mixed picture emerged of how beneficial supernumerary status was to training. Three supernumeraries described themselves as being treated almost like cover teachers which limited the opportunity to develop PCK/SKfT through working with the same classes throughout the year. Bethan (science) and Harry (mathematics) both talked of numerous timetable changes and how for Bethan:

“...In terms of subject knowledge it wasn’t very structured...”

Harry who experienced ten timetable changes commented how he had been “...used here, there and everywhere” and how this had limited his opportunity to evaluate his PCK/SKfT development through the impact on his classes’ learning.

6.7.3 Mentoring

As seen in Chapter Five the choice of mentor could be constrained by contextual factors and could impact negatively on GTs’ PCK/SKfT development. This was highlighted in Table 5.2 (p.79) which outlined the GT and mentor pairings interviewed for this research. Eight of the twelve pairings in Table 5.2 were effective partnerships. Of the

¹² to make someone do something difficult, especially a job without preparing them for it

remaining four Karen and Nicole also spoke well of their mentoring whereas Bethan and Harry had negative experiences which are illustrated in vignettes eight and eleven.

Other input from the senior mentor and other experienced teachers also emerged as part of formal mentoring:

“...Dr Smith [senior mentor] is on top of his game¹³, he knows everything every step of the way...I would say it’s been ‘outstanding’... (Baruti, mathematics GT)

This layer of support was particularly important for GTs whose mentors did not share the same subject specialism:

“...Sarah is the other physics teacher...and I worked with her Year 11’s...so I got more physics with her... when I had issues with subject knowledge I went specifically to the physics [teachers]...” (Caitlin)

6.7.4 Community of practice

Opportunities for informal learning within a community of practice were significant to PCK/SKfT development especially those based in a departmental office. However, Adam, Central College specialist tutor pointed out the contribution of development was largely subject dependent:

“... There’s always a mathematics department in a school because mathematics is taught everywhere. If you were talking about other subjects then they can be Cinderella¹⁴ subjects and then problems will begin to arise...there’s always some support somewhere for a mathematician and the same with science....”

Where there was no departmental office these learning opportunities were inhibited which was seen in the vignette of Bethan. The vignettes of Cathy and Harry also illustrate the impact of training context, prior beliefs, prior experiences and mentoring on PCK/SKfT development. Cathy’s vignette provides an example of a good mentor match and training context but how she recognised the disadvantage of limited access to a community of practice in her SSE school. Harry’s vignette also illustrates the importance of support from other teachers but how an unsuitable mentor match and dis-identification with the training context can inhibit PCK/SKfT development.

Vignette Ten Cathy

Cathy had a 2.1 degree and PhD in Human Genetics. She had previously worked as researcher but had not enjoyed it. Her subject for QTS was chemistry so she was

¹³ Someone who has reached a high level of expertise in their profession

¹⁴ Someone or something that is given little attention or care, especially less than they deserve

training outside her specialism. Cathy's lead school was based in an affluent mono-cultural area with low levels of challenging pupils. Her subject mentor Harriet was a chemistry specialist and they had a positive mentoring partnership. A strong academic background formed an important part of Cathy's beliefs about teaching and she was disappointed in the lack of theoretical input and access to academic resources:

"I didn't get as much from GPS as I thought I would...I would have liked some kind of lecture...on things to do with child psychology maybe...for me not to have all the new research and E-journals that kind of panicked me...[I'm] trying to get the sixth-formers a little bit more prepared if they're going to university to do science degrees because when I went to uni I looked at a journal paper and thought "what the hell is this?..."

Cathy stressed the significance of a community of practice which contrasted with that of her second school:

"...I found it easier because I've been in the office with all the science people...when I went to my second school...the department didn't really have a central office...You were very much on your own...they had a trainee suite ...you're not actually learning the profession because you're not really around other qualified teachers which is the thing which has been most beneficial to me seeing what other teachers do..."

In her lead school Cathy found it easy to seek support from other teachers in developing her PCK/SKFT:

"You feel like you're part of the team... [the] Head of Chemistry... if I'm not sure on something that I'm doing he'll come in and...watch or I can go and watch him...it's been really good because I have had those opportunities ...The help that I've received has often been a lot more than other people have received or the training definitely..."

Cathy was graded as 'outstanding' at the end of her training.

Vignette Eleven Harry

Harry was a mathematics GT with a 2.2 in mechanical engineering. His lead school was a challenging multicultural state school. Harry was supernumerary during his training and had two years' experience as an unqualified teacher and teaching assistant. He described his own schooling as 'boring' and this influenced his approach to teaching:

"...I literally always sit down and plan a lesson and think what would I have thought of this when I was at school?"...I try and make things activity-based..."

Harry was initially mentored by Malcolm whose teaching and judgment he respected: "...Someone with a vast array of experience.... I had lot of respect for him..."

However, Malcolm left the school early in the year and was replaced by Alice with whom Harry had been a TA and did not respect professionally. So this was not a good

mentor match:

“...I’d also been a TA [teaching assistant] with her and didn’t think much of her lessons at all”

The problems with his new mentor were exacerbated by the school’s predominant didactic teaching orientation and their ‘golden rules’ for lesson delivery which conflicted with Harry’s beliefs about teaching. Consequently, Harry developed ways to ‘work around’ this:

“... I took our ‘golden rules’...saved it as favourite on my phone and if someone came in to observe me from the school on a learning walk the first thing I would do is whip out my phone and quickly check this is what I need to do - five things...”

He also tried to avoid contact with Alice drawing instead on the support of colleagues within his department:

“...I used to let it out next door with Gina...she’s basically been more of a mentor to me than anyone else....Yes, a lot of informal mentoring...”

When he found himself short on lesson observations he arranged for other teachers to observe him:

“...I said “you’re retiring and you’ve helped me enough over the last year and half...let me now help you...I’ll give you the paperwork, I’ll take over your class...at least it’s going to give me some more observations...”

Harry’s final assessment grade reflected that he had encountered problems during his training. His EBITT tutor stated: “I have moved Harry’s score from ‘Satisfactory’ to ‘Good’... Harry has shown himself to have been very reflective and has evaluated his own practice....I believe that he has the capacity to become an ‘outstanding’ teacher...”

6.7.5 Input from the EBITT tutor

For Central College and Kingsview the input from EBITT tutors was regarded as contributing significantly to PCK/SKfT development. Harry, who had a mentor change early in his training, spoke of the contribution of his EBITT tutor:

“... Yes, after Malcolm left he was by far the biggest influence ... He also picked up on the fact that there were issues here...that I was teaching based on some of the things I’d seen which probably he didn’t want to see. So I really did try everything he told me to try...”

The joint observations from EBITT tutor and subject mentor were seen as particularly valuable. For example Jolanta (mathematics GT) said that her EBITT tutor was able to provide a different perspective:

“...it’s always going to be difficult for a mentor here that from the school...to see it from outside of the box. So having Xxxxx who’s worked in many different schools and regularly sees and observes students is really great...”

As Patsy, a senior mentor pointed out the ‘triangle’ of input for the GT from mentor, senior mentor and EBITT tutor worked very successfully.

6.8 Summary

GTs’ own schooling, prior work experience and beliefs about teaching were shown to be influential in how they developed their PCK/SKfT. A good mentor match and supportive training environment were regarded by GTs as crucial and where the context failed to provide suitable mentoring they did not achieve their full potential.

GTs’ degree match to specialist subject and degree class did not emerge as predictors of final assessment results although it was suggested that school type could impact on achievement. Being supernumerary did not ensure the best training and it was also seen that it was the quality of the SSE placement rather than the length that made it effective with a shorter three week placement having as much impact on PCK/SKfT development.

Also interesting was the equal importance of central training as a ‘space’ for GTs to meet with peers and discuss and share experiences of PCK/SKfT development and other training issues away from their schools. For the HEI led EBITTs the role of the EBITT tutor was seen as important in PCK/SKfT development by providing a layer of support absent from school-led EBITT provision. Whilst GTs at NineSG did not refer to this as a shortcoming in their training it is implicit that this external input could have benefitted their PCK/SKfT.

Chapter Seven

Discussion and conclusions

7.1 Introduction

The research question asked “How did mathematics and science Graduate Teachers acquire subject knowledge for teaching and what were the factors that influenced this?” Underlying this question lay three sub-questions: What was the rationale for EBITT’s SKfT provision? What was the relationship between GTs’ beliefs/prior experience and SKfT development? Are there still deficiencies in SKfT provision?

This chapter considers how the findings addressed the research questions discussing them with reference to the literature. It also draws conclusions about how this research has contributed to the empirical field and finally considers its limitations.

7.2 How did mathematics and science Graduate Teachers acquire subject knowledge for teaching and what were the factors that influenced this?

7.2.1 Rationale for PCK/SKfT provision

It emerged that in contrast to mainstream provision EBITTs’ individual missions were largely dictated by the recruitment needs of their locality and partnership schools. Whilst variations in EBITT characteristics had been referred to (e.g. Griffiths, 2007; Smithers et al., 2012, 2013) the relationship between context, mission and rationale for PCK/SKfT inputs had not previously been explored. Whilst some HEI-led EBITTs tapped into PGCE provision (e.g. Pitfield and Coles, 2006) this input was not always regarded suitable input for GTs (Brookes, 2005; Jordan-Daus, 2007) because they had different starting points and PGCE training assumed that all PSTs were novice teachers. Additionally HEI-led EBITTs trained GTs in a greater number of subjects than their institutions’ PGCEs. Therefore pragmatic considerations also dictated the need for separate provision.

The limited use of TDA SKfT Framework was also revealed and whilst Central College used the framework to explain PCK/SKfT it was not used beyond that. The suggestion that the use of primary English as an exemplar limited the framework’s wider application is one likely explanation; the other being that many mentors were unfamiliar with the concepts of PCK/SKfT. These explanations are supported anecdotally by

discussions within the school-based training community although there are no references within the literature.

PCK/SKfT inputs was also seen to be dictated by EBITT policy as was the case of NineSG which operated in a mono-cultural and mainly affluent area and adopted a policy of arranging all its SSE placements within its partnership.

7.2.2 The model of secondary mathematics and science PCK/SKfT delivery

Previous GTP research has given some indication of what programme elements comprised (e.g. Brookes, 2005; Hobson et al, 2008) but not explicitly considered the different elements for PCK/SKfT delivery. Nor had it included school-led EBITTs as all prior GTP research had looked either at HEI led EBITTs or those working in partnership with HEIs.

All three EBITTs were shown to provide the same elements of PCK/SKfT input with most of the training occurring within schools supported by a programme of central sessions.

7.2.3 Central training

The generic approach for central sessions used by the HEI-led EBITTs meant that central training looked identical for both mathematics and science. Although the school-led EBITT provided subject-specific sessions the topics were almost identical for both subjects.

Whilst the HEI led EBITTs utilised the expertise of HEI teacher educators the school-led provider drew mainly on teachers input for PCK/SKfT sessions. This presented a challenge as they were not experienced teacher educators. Whilst previous GTP literature had referred to the extended role for GTP mentors (e.g. Dunne, 2005; Griffiths, 2007) it had not identified this issue which is discussed further in section 7.3.1.

EBITT central training did not include SMK input and GTs were required to address major shortfalls before entry and other gaps during training (e.g. TDA, 2011; Kind, 2014). Whilst GTs and EBITT staff recognised the SMK challenges of training within a consecutive education system (e.g. Abell, 2007; Ball et al., 2005; Musset et al., 2010;

Kind, 2014) this was not seen as problematic. These findings showed how EBITTs addressed SMK gaps via ITPs and that GTs had the confidence and motivation to undertake the required self-study. GTs found the best way to tackle knowledge gaps was to ‘relearn or learn as you teach’ thus building up expertise over time (e.g. Gess-Newsome and Lederman, 1995; French, 2005; Abell, 2007, TDA, 2011).

Central training was delivered within the ‘practical theorising’ approach (e.g. Hagger and McIntyre, 2006; Griffiths, 2007) making GTs more able to link theory to practice. Training included elements of a constructivist approach with emphasis on the ‘person’ as part of process becoming a teacher reflecting constructivist ITT literature about the need to include reflection on professional identity as part of the curriculum (e.g. Jones and Vesiland, 1996; Korthagen, 2004; Ellis, 2007). However the benefits gained from this input were not fully capitalised because PCK/SKfT topics were delivered separately within what Gess-Newsome (1999) described as an *integrative* delivery model.

A key aspect of central training was provision of a ‘neutral space’ for GTs to meet together, receive support and opportunities to discuss aspects of PCK/SKfT outside their schools (e.g. Griffiths, 2007; Smith and Hodson, 2012). For GTs with the HEI-led EBITTs this allowed cross-school discussion and the opportunity to ‘ask difficult questions’. The school-led EBITT GTs did not have the same opportunities to meet within a ‘neutral space’ and it was implicit that this might have inhibited the opportunity to fully question practice and extend their experience.

7.2.4 EBITT resources and use of external provision

The EBITTs provided a VLE and library facilities and GTs made extensive use of web-based resources as indicated by Evans et al. (2008). However in contrast to wider ITT literature which stressed the importance of library access to support PCK/SKfT development (e.g. DfES 2004, Hagger and McIntyre, 2006) these GTs rarely visited a library. However having access to E-journals was important especially for the ‘understanding-orientated learner’ (Hobson, 2003). Although Evans et al. (2008) had referred to the contribution of external training to PCK/SKfT development this emerged more prominently in this research. GTs who accessed either selected PGCE provision and or external CPD training found it an important dimension of PCK/SKfT training and indicated the need for this to be formally built into alternative route ITT.

7.2.5 Input from EBITT tutor

Input from HEI-led EBITT tutor visits was as an essential PCK/SKfT training element and previously unaddressed other than in TDA and Ofsted reports (e.g. TDA, 2011). The tutors provided additional school-based training and an objective view of GTs' progress. They also undertook what Griffiths (2011) described as a mediation role if there were any problems such as mentoring deficiencies. This input was apparent for GTs such as Jolanta who valued a different assessment of her teaching and Harry who experienced mentoring problems. Also mentors such as Serena and Terry who regarded EBITT tutor support as essential to their effectiveness as mentors.

It also supports the continuing HEI role in providing training input within schools (e.g. Hodson et al, 2008; Griffiths, 2011) and an external layer of assessment and QA (e.g. Coe et al., 2014). In contrast the school-led EBITT lacked the opportunity for external PCK/SKfT input, monitoring or support until the final assessment stage and external examiner's visit. This indicated that school-led provision could be limiting its effectiveness.

7.2.6 School-based PCK/SKfT input: Individual training plan (ITP)

The GTs' ITPs reflected the requirements of a competence model of ITT. However, ITPs emerged as more of a 'road map' with sign-posts to different elements of training. This reflects the view that QTS standards alone cannot provide the basis for training (e.g. Hagger and McIntyre, 2006). This research highlighted these limitations in respect of employment-based ITT because for Ofsted the ITP provided the basis for much of its judgement of the GTP. In reality these findings showed that whilst each GT had a personalised ITP the training provided by mentors went beyond what was outlined within it.

7.2.7 School-based PCK/SKfT input: Subject mentor

Having a good subject mentor was seen as key to PCK/SKfT development and the effective mentor pairings reflected the ideal mentoring referred to in the literature (e.g. Rodger, 2006; Griffiths, 2007, 2011). Whereas previously the importance of selecting the right mentor had been stressed (e.g. Smith and McLay, 2007; Hughes et al., 2011; Coe et al., 2014) this research showed that mentor match as more complex than the allocation of an experienced subject specialist. This reinforced the findings of Pitfield and Morrison (2009) and countered the view of Rodger (2006) that good mentor

practice was more important than matching individual characteristics.

As found in Evans et al (2008) most PCK/SKfT training in school was achieved through the teaching itself with support from mentors. Some GTs had opportunities to co-plan and team teach lessons reflecting the ‘assisted performance’ approach of Feiman-Nemser and Beasley (1997) and advocated elsewhere (e.g. Tamir, 1988) but it was disappointing that this learning opportunity was not more widely evidenced.

The unseen aspects of training were also apparent in comments from EBITT staff that Ofsted did not fully understand alternative ITT routes and took a somewhat inflexible approach looking for parallels with traditional programmes (Brookes, 2005; TDA, 2006; Jordan-Daus, 2007). This finding also underlined how formal work-based training can distort the picture of how learning really took place (Brown and Duguid, 1991; Hodkinson and Hodkinson, 2005; Burn et al., 2007).

Most of the personalisation of training took place within the mentoring partnership (e.g. Hughes, 2011) and probably accounts in part for continuing perceptions of mentoring inconsistencies. Similar to Cameron’s (2013) study of mentoring within Teach First this research found that mentoring involved a range of activities such as coaching and counselling, all needed at different times.

Observing other teachers was shown as an important aspect of PCK/SKfT development but was more valuable as training progressed and when properly directed (e.g. Hagger and McIntyre, 2006; Evans et al., 2009). It also highlighted the challenge of facilitating observation within employment-based training where there are timetabling issues to account for.

7.2.8 School-based PCK/SKfT input: Second school experience (SSE)

SSE was shown to be important to PCK/SKfT although some GTs reported unsatisfactory experiences echoing earlier criticisms (e.g. Evans et al. 2008, 2009; Smith and Hodson, 2010). However it was significant that the quality of SSE rather than the length that made for the greatest impact. Many GTs regarded three weeks as sufficient and a longer placement would be counterproductive.

7.2.9 School-based PCK/SKfT input: community of practice

The finding that ‘on the quiet’ GTs received considerable levels of informal and inexplicit training on PCK/SKfT made this a key element of training. This accords with the constructivist ITT paradigm of learning within a community of practice (e.g. Ellis, 2007) and how secondary schools with large mathematics and science departments facilitate this process (e.g. Hobson, 2003; Burn et al., 2007). Whilst Hodson et al. (2010) for example had referred to informal learning within the GTP this was not in respect of PCK/SKfT. This team support was shown to be especially important where there were mentoring difficulties as seen in the vignette of Harry who relied on the community of practice in his department to support him through his training.

However, not previously highlighted was how PSTs not based within their subject department or where the school lacked a departmental office found that learning opportunities were restricted as shown in the vignettes of Tom, Cathy and Bethan. These organisational arrangements jeopardised the learner’s position on the periphery of practice putting them at risk of being “designed out” of learning opportunities (Brown and Duguid, 1991).

This deficit issue for some GTs emerged as a wider one for EBITT staff. Despite the value placed on HEI-led EBITT tutors input they only worked part-time and the ‘peripheral’ nature of their employment (e.g. Posner, 2011) prohibited them from becoming “active participants” (Wenger, 1999) in a community of practice with GTs and mentors. Similarly the school-led EBITT mentors had little opportunity to meet as a group.

7.3 What was the relationship between GTs’ beliefs/prior experience and PCK/SKfT development?

7.3.1 Impact on development of teacher identity

The profile of GTs in terms of age and experience reflected earlier studies (e.g. Griffiths, 2007, 2011; Smith and McLay, 2007) with the majority being career changers and fitting the categories of Priyadharshini and Robinson (2003). These GTs’ prior experience and skill development created proactive learners with the resilience to ‘drive’ their training (e.g. Griffiths, 2011). However, whilst GTs found previous school experience gave them an advantage over other GTs (e.g. Smith and McLay, 2007) it was not shown to necessarily impact on attainment.

The finding that highly-qualified candidates were not always suited to teaching supported earlier research (e.g. Harris and Sass, 2011). However this research also highlighted that those with PhDs were often unsuited to the GTP. Also surprisingly it emerged that although poor recruitment practices had gone (e.g. Foster, 1992) schools still considered training unsuitable applicants as in the example given by Central College.

Professional experience was significant to development and provided evidence to support Griffiths' (2011) suggestion that pre-existing skills might be essential for PSTs on an employment-based training route. Their resilience helped them to deal with challenges faced in PCK /SKfT development especially for those GTs filling vacancies. However it was disappointing that despite the provision improvements that some GTs still referred to a 'sink or swim'¹⁵, experience at the beginning of their training (Dunne, 2005; Griffiths, 2011).

Subject specific PCK/SKfT challenges were identified, for example, how to teach largely abstracted concepts (e.g. Thoren et al., 2005; Ball and Forzani, 2010). However GTs' confidence made them proactive and resourceful in meeting these challenges. Prior experience combined with the status of unqualified teacher-in-training and 'immersion' in the teacher's role led to the early development of teacher identity and easier transition to NQT (e.g. Griffiths, 2007, 2011; Smith and Hodson, 2010). However this early adoption of teacher identity combined with the opportunity to teach a larger timetable over a sustained period emerged as interlinking factors not identified before in respect of PCK/SKfT development.

The fact that GTs were regarded as teachers, had ownership of classes and taught more, maximised learning from 'mistakes' and developed reflective practice. It was significant how both GTs and mentors recognised the contrast between a GT's pedagogical development and that of PSTs on traditional routes (Smith and Hodson, 2010).

However, development of teacher identity and PCK/SKfT were shown to be compromised where the learner is unable to identify with his/her professional community (Smilie 2001; Schlager and Fusco 2003; Wenger, 2010) or where PSTs'

¹⁵ A situation in which you will fail if you do not make a lot of effort

pre-existing ideas about teaching are diametrically opposed to those introduced within training (e.g. Feiman-Nemser, 1983; Korthagen, 2004). The vignette of Harry illustrated this conflict and dis-identification with his school-based training impacted on his attainment and the assessment of his development.

7.3.2 Impact on pedagogy development

This study also serves to deepen understanding of how PSTs' beliefs and prior experience impact on PCK/SKfT development. These GTs had a well-developed sense of agency (e.g. Mead, 2007; Griffiths, 2007) and ideas and beliefs about teaching were based on prior experiences (e.g. Feiman-Nemser, 1983, 1997; Korthagen, 2004; Ellis, 2007; Schleicher, 2012). Negative experiences of their own teachers and schooling were shown to be equally influential as positive ones (Korthagen, 2004; Priyadharshini and Robinson, 2003). Bethan and Harry were examples of GTs who had negative memories of their own schooling and were determined to teach differently.

The significance of '*self*' to PCK/SKfT was clear, making its absence from Cochran et al.'s (1993) constructionist PCKg model even more surprising. This study supported the need for its inclusion as shown in Turner-Bisset's (1999, 2001) model of PCK. It also corresponded with Evans et al (2008) who identified '*knowledge of self*' as fundamental to how GTs linked subject and pedagogic knowledge.

However, despite having strong beliefs about their preferred teaching style GTs did not necessarily maintain a unilateral approach (e.g. Abell, 2007, Thoren et al., 2005). This counters previous research which tried to assign a single orientation to PSTs (e.g. Freidrichsen et al., 2009) or suggested that orientation can change from one type to another during training (e.g. Anderson et al., 2000). GTs were found to switch between orientations and use that which best suited the topic and/or the needs of their pupils. For example, Harry who liked his lessons to be activity-based found the need to use a didactic, 'boring' style for part of a lesson to introduce a new concept.

There was also an indication that the strong influence of '*self*' and embedded prior experience could at times lead to a 'default' orientation when other approaches might be more suitable reflecting the finding of Abell (2008). An example of this was Simon who found he sometimes reverted to being more teacher-led as that was how he was schooled. It perhaps explains why despite having exposure to innovative pedagogies

and holding constructivist views of teaching, teachers often persist in teaching in traditional ways or how they were taught themselves (e.g. Abell, 2008; Schleicher, 2012)

Work experience was also an important influence on the ‘successful careerists’ who felt they only needed knowledge and skills relevant to their working environment. Prior experiences also provided a strong foundation for PCK/SKfT development as shown with GTs required to teach outside their specialist subjects. They all took a confident work-like approach to their learning. This provided further support for the Kind (2009) who found that some PSTs were ‘super-confident’ and able grasp the principle of transforming SMK to PCK early in their training.

Learning orientation also emerged as part of individual beliefs and fitted within Hobson’s (2003) learning types. For example, Cathy who had a PhD was an ‘understanding-orientated learner’ who would have liked more theory within central training whereas Simon was an ‘education-oriented apprentice’ who despite considering some training irrelevant could see its extrinsic value in meeting the QTS standards.

7.4 Other factors that influenced PCK/SKfT development

7.4.1 Impact of training context: School type

Although the EBITTs had endeavoured to ensure that GTs were being trained for the profession the type and location of school meant that direct experiences of SEN, EAL and diversity were variable. GTs in the two HEI led EBITTs had considerable experience of diversity and stressed the importance of knowing how to adapt pedagogy to reflect pupils’ context reflecting Cochran et al.’s model of PCKg (1993), the TDA SKfT framework (2007) and other literature (e.g. Thoren et al., 2005)

However for the school-led EBITT the practice of keeping SSE within the partnership limited opportunities to develop PCK/SKfT for diverse contexts. Although diversity training was provided this was limited and this narrower experience appeared to reinforce a parochial view of teaching. This was illustrated by Pam whose teaching was constructed through the interaction of prior beliefs and experience and her school training context. This training limitation was surprising and reminiscent of past Ofsted concerns (e.g. Ofsted, 2006) regarding arrangements to suit schools and not their GTs. It

also reflects the ‘tick box’ approach to addressing QTS competences (e.g. Hagger and McIntyre, 2006; Evans, 2009; Griffiths, 2011).

7.4.2 Impact of training context: Supernumerary status or filling a vacancy

Previous studies had shown that filling a vacancy was detrimental to training (Foster, 1992; Dunne, 2005; Ofsted, 2007) but all pre-dated the 60 days of training requirement. In this research an unexpected finding was that being supernumerary did not necessarily benefit PCK/SKfT development. This was an issue not previously been referred to and this research showed that it weakened the ‘immersion’ element of the GTP reflecting the point made by Eraut (2004) that the allocation of work must be such that it allows learning.

7.5 Are there still deficiencies in SKfT provision?

7.5.1 Central training

The timing of centre-based training was shown to undermine their benefit and or made it difficult for GTs to attend: thus NineSG’s sessions were felt to be too late in the day and Kingsview’s overlong. This reflected concerns of previous studies (e.g. Smith and McLay, 2007; Hobson et al., 2008). Some sessions were also found occurring too late in the programme reflecting the need to link theoretical input to the appropriate stage in the year (e.g. Hobson et al, 2008). In NineSG’s case it was also questionable whether running subject specific PCK/SKfT sessions jointly with SCITT trainees met GTs’ needs (e.g. Jordan-Daus, 2007). It was apparent that despite the considerable experience of running programmes there was a continued tension between the demands of schools’ timetables and training needs which is a feature of employment-based ITT.

Despite finding the sessions mainly useful to their PCK/SKfT development there were criticisms of training content. Some GTs wanted more theoretical input and others found some topics not useful or duplicated school-based training, reflecting past criticisms (Smith and McLay, 2007; Kind and Wallace, 2008; Hodson et al., 2008).

All the science GTs and the majority of mathematics GTs would have liked sessions on how to teach more challenging topics. This supports mathematics and science PCK/SKfT literature regarding the distinct nature of each subject’s PCK/SKfT and the need for separate subject specific training (e.g. Tamir, 1988; Abell, 2007, 2008; Ball and Forzani, 2010; Kind, 2014). It also supports the need for a *Transformative* approach

to PK development (Gess-Newsome, 1999) where the elements are brought together and focus around teaching specific mathematics and science topics (e.g. Tamir, 1988; Loughran et al., 2008; Nillson, 2008).

Only one EBITT consistently built in both pre and post-session tasks linked to school practice. However, for those GTs not given such tasks this did not detract from the benefit of the sessions counteracting criticisms (e.g. TDA, 2011; Carter, 2015). In the case of NineSG this may be partly due to subject mentors being well aware of the central programme input and the practice of discussing it at weekly mentor/mentee meetings. But it was also connected to the proactivity of GTs who referred to how they ensured that they made the best use of central training input.

7.5.2 Mentoring issues

Although mentoring issues were less widespread there were still deficiencies. Whilst the majority of GTs were supported by mentors within their subject specialism, some science GTs were not and one had a mentor from another subject discipline as shown in the vignette of Tom and Jasmine. Bethan and Harry also had unsuitable mentoring and this was detrimental to PCK/SKfT attainment.

This reflected previous references to unsuitable mentoring (e.g. Dunne, 2005; Ofsted, 2007) and the continuing shortage of experienced science specialists in schools (e.g. Smithers et al., 2012; Howson, 2015). The mentor profile also showed that turnover was still a feature with over half the subject mentors new to the role reflecting Ofsted and TDA reports (e.g. Ofsted, 2007). Other mentoring issues such as lack of time and uncommitted mentors still persisted (e.g. Dunne, 2005; Griffiths, 2007, 2011). Even GTs in good mentor matches suffered due to circumstances which limited the time and support mentors could provide. This was the case with Elaina and Richard due to staff loss in the mathematics department.

Thus ‘rogue’ school behaviour (Bubb et al, 2005; Dunne, 2005) was still prevalent within some schools although this research revealed a contrast between ‘unintended’ bad practice and deliberate flouting of programme requirements. Those deliberately non-compliant schools experienced in training GTs were aware of what they should do but chose not to. This was illustrated in the vignette of John and Valon. Whereas other transgressions seemed more ‘unintended’ either as a result of changes out of the

school's control such as staff departures or a lack of programme understanding (e.g. Jordan-Daus, 2007; Cameron, 2013). This was the experience of Caitlin whose school was more familiar with the Teach First model of training.

This research also highlighted the teacher educator role that mentors undertake on alternative routes. Whilst previous GTP literature (e.g. Dunne, 2005) had drawn attention to the greater demands on teachers it did not refer to the challenge of activities such as marking assignments. Furthermore, the move from teacher to teacher educator emerged as a greater challenge for school-led provision where most PCK/SKfT input was provided by teachers. This was especially so for mathematics mentors many of whom had no experience of academic writing.

This reflected the multi-faceted new breed of 'hybrid' mentor/teacher educator role described by Jackson and Birch (2015) who is based in school but required to plan and deliver training. The challenges in adopting this role have been highlighted elsewhere (e.g. Murray, 2005, 2008). Thus this research clearly signals the need for preparation for this 'hybrid' role.

Also highlighted was the need for mentor training which revisited PCK/SKfT theories and how to deliver a *transformative* approach. Although some mentors rejected the need for PCK/SKfT training as in previous research (Brookes, 2005) others along with Programme and Subject Leaders held the opposite view. This mirrored Evans et al (2008) that not all mentors fully understood PCK/SKfT and needed further training. Even NineSG which used the TDA framework was not sure how far mentors understood it and for some it may have been because they trained via the GTP themselves with less exposure to theory. The ability to support PCK/SKfT development by GTP trained mentors was referred to by Griffiths (2011) who saw this could be a limitation especially if they stayed in the same school.

Also those who trained via traditional routes may have either 'forgotten' the original theoretical sources or through experience transformed them into their own sometimes misleading espoused versions of theory (Eraut, 2000). This links to the tacit nature of teacher knowledge whereby expertise is taken for granted and teachers believe their skills need little or no explanation (Hagger and McIntyre, 2006; Burn et al., 2007).

Therefore it follows that some experienced mentors needed training in order to put the 'names' to the practice.

Despite what appeared to be obvious training needs these findings revealed that most existing training was still 'informational' rather than 'educational' echoing Cameron (2012). The mentor training run by Kingsview appeared to be an exception as the EBITT worked collaboratively with Senior Mentors from their schools. This reflected the reconceptualization of the relationship with schools advocated in the literature (e.g. Jordan-Daus, 2007; Zeichner, 2006, 2010; Jackson and Birch, 2015).

7.5.3 Were there still deficiencies in PCK/SKfT attainment?

The final assessment outcomes in this research provided further evidence that employment-based programmes can produce well-trained teachers (e.g. Smithers et al. 2013). Also that these programmes make an important contribution to addressing the worldwide problem of teacher quality and supply (e.g. Schleicher, 2012). The outcomes also counteracted sceptical views about the ability of alternative training routes to provide good PCK/SKfT training (e.g. Buchberger et al., 2000; French 2005, Darling-Hammond et al., 2002; Kind, 2014). It was interesting that NineSG which runs both a more traditional SCITT programme as well as the GTP with identical PCK/SKfT input found that GTs outperformed SCITT trainees.

The attainment grades attained for these EBITTs showed improvement for both mathematics and science GTs and supported other findings (e.g. Smithers, et al., 2013) which had shown an improvement in GT outcomes overall. However it can be argued that a competence based system of assessment may be masking deficiencies (e.g. Hagger and McIntyre, 2006). Additionally we should be wary of Ofsted reporting which was exemplified in the Central College, 2010 Ofsted report which made little reference to subject knowledge and no reference to pedagogy. This illustrated the variation in Ofsted understanding of the GTP and reporting styles (e.g. TDA, 2011)

The qualifications of the GTs showed that these EBITTs recruited a high percentage of well-qualified candidates. EBITT staff and mentors all felt that improved attainment was equally due to better recruitment procedures as well as mentoring. This contrasted to suggestions made by TDA (2011) and Ofsted (2009, 2010) that changes to central training provision and ITPs were mainly responsible for improved PCK/SKfT

development. It also supports the view that PCK/SKfT input still requires further development (Carter, 2015).

Attainment results showed that degree subject, degree classification, match of specialist subject to degree were not always predictors of attainment. They reflected previous findings that there was no significant relationship between effective teaching and qualifications or that the best qualified candidates have the potential to be the best teachers (e.g. Allen and Burgess, 2009; Poverty, C., 2015). This was exemplified by the vignettes in Chapter Four and supports an open access policy which makes exceptions for less well-qualified candidates with potential. GT outcomes however reveal a strong link between good mentoring and a supportive school environment. The findings exemplified how GTs maximised their potential when they were matched with the right mentor and had support within a well-functioning community of practice. They also suggested that mono-cultural state schools may not provide the best training context unless GTs have SSE placements in a diverse setting.

7.6 Research limitations and validity

There are some limitations within the data of this research due to its qualitative approach involving a small sample. However I felt that using a mixed methods approach with triangulating data helped to ensure its validity. Also rigorous analysis through using a well-established qualitative analysis tool ensured that themes within data were thoroughly explored and cross-referenced.

Also it could be said that working with only three EBITTs placed limitations on how far the findings could be generalised. However, I considered that these contrasting EBITTs offered a good cross-section of provision and by keeping the scope focused more in-depth and richer data was obtained. Because the research was confined to mathematics and science which have large departments there were indications that the findings would have been different for minority subjects. However, rather than a limitation this indicates an area for further exploration.

Other data limitations were related to the nature of the GTP which places constraints on the key players' time to be involved with the research. Also as many interviewees were self-selected there was a level of subjectivity related to their decision. For example, some GTs had experienced difficulty during their training and so having an opportunity

to talk about it was part of their motivation. I also found that despite efforts to make contact I was unable to interview each GT's mentor which would have provided additional 'completeness' to the data.

Another limitation was the number of EBITT sessions-observed which was due to a combination of my availability and difficulty in making contact to agree access. So whilst the sessions seen provided valuable triangulating data there were areas that might have been enriched if more sessions had been observed. For example, I was unable to observe any Kingsview GT sessions which would have provided more insight into how their generic central training approach worked in practice.

Whilst I was not seeking to explore PCK/SKfT in depth I could see that more questions could have been asked about how mathematics and science topics were approached within mentor/mentee meetings. In particular, whether a *transformative* approach was taken when looking at how to plan for and teach topics.

Finally, I considered whether my role as an 'insider' researcher placed limitations on how I interacted with my participants and the data and led me to focus on some aspects to the detriment of others. However, I found that by choosing not to research my own provision I was able to avoid bias whilst benefitting from insider knowledge and understanding of my empirical field.

7.7 Summary

This research provided insight into the different elements of an employment-based route of ITT that contribute to PCK/SKfT development and included a school-led provider. School-led provision was shown to have some striking contrasts in respect of programme delivery and training context. The context placed some limitation on the experience of its PSTs and the provision also lacked the advantage of an external layer of support and quality assurance provided by an HEI-led EBITT. Additionally many teachers felt at a disadvantage having to take on a teacher educator role.

This research also provided more evidence for a constructivist view of PCK/SKfT development with PSTs' professional practice based on pre-existing beliefs and experiences and their interaction with their training context. Teaching orientation was an important part of this development and strongly linked to individual backgrounds.

Also within a constructivist paradigm informal learning within a community of practice was shown to be as important to PCK/SKfT development as central training and working with mentors. This research thus supported a constructivist PCK/SKfT model but one which included 'self, beliefs, prior experiences' as an overarching influence and included 'orientation' within 'knowledge of pedagogy'. There was additionally the need for a *transformative* approach to PCK/SKfT training via learning to teach specific topics especially those that PSTs find most challenging.

The research also showed how supernumerary status did not necessarily benefit PCK/SKfT development and that a short SSE can be as valuable as a longer placement. Also revealed was that whilst some aspects of 'rogue' behaviour still persisted in schools there was a distinction between 'deliberate' and 'unintended' rogue school behaviour which had previously not been identified.

Chapter Eight

Recommendations for future practice and concluding comments

8.1 Introduction

This research had asked ‘how mathematics and science Graduate Teachers acquire subject knowledge for teaching and what were the factors that influenced this?’ It revealed the rationale and elements through which an employment-based ITT route developed mathematics and science PCK/SKfT which previously had not been holistically addressed. Furthermore this was the first time that school-led EBITT provision had been explored and it was apparent that it operated in a different context which impacted on its PCK/SKfT provision.

This chapter makes recommendations to policy makers, schools, HEIs, ITT providers and inspection regimes drawing on the conclusions in Chapter Seven. These refer in particular to the delivery of PCK/SKfT input for alternative school-based routes in particular England’s SD and SSD programmes. Also where applicable it considers the implications for ITT overall.

8.2 Rationale for EBITT’s PCK/SKfT provision

It appears that many EBITTs may have used a more ‘bolted-on’ approach to reviewing PCK/SKfT provision as indicated in this study. In hindsight the processes of ‘content and pedagogic recontextualisation’ outlined by Guile and Evans (2011) in their work on work-based degree courses could have supported PCK/SKfT input development. Given that employment-based training is likely to expand this approach could be explored as a model for both SD and SSD programme development.

The limited use of the TDA SKfT framework appeared to result from a combination of mentors’ lack of PCK/SKfT understanding and the framework’s limited appeal by using primary English as an exemplar. Outside the UK previous PCK/SKfT research had also shown that PCK/SKfT models have not utilised in the context of ITT and CPD tending to be the subject of research rather than practically applied (e.g. Abell, 2007).

For a model of PCK/SKfT to provide a comprehensive aide to PCK/SKfT development it needs to be within a more explicit constructivist paradigm including ‘orientation’ and the overarching influences of ‘beliefs, self, prior experiences’. The concept of ‘attitudes’

in the TDA framework needs redefining with an explanation regarding the relationship between its elements.

A revised framework could be used within a *transformative* rather than an *integrative* approach to PCK/SKfT input within ITT for PSTs and their mentors. It seems that this would be the best way of addressing the ongoing concerns about subject specific delivery within ITT (e.g. Carter, 2015). Such input would fit ideally within ‘third space’ activity’ with collaborative training where schools and HEIs provide a programme focusing on topics where PSTs are actively involved in learning how to transform SMK “into viable instruction” (Abell, 2007).

In addition ‘third space’ activity should address mentor training which needs to be educational’ rather than ‘informational’ in particular focusing on coaching and counselling skills. The increasing ‘hybrid’ nature of the mentoring role also shows training is needed in order for mentors to operate as a teacher educators in a school training context.

8.3 The model of secondary mathematics and science PCK/SKfT delivery - are there still deficiencies in SKfT provision?

8.3.1 Central Training

This research indicated some continuing shortcomings in provision and the introduction of a *transformative* approach as outlined in 8.2 would address the majority of these connected with central training. However practical issues such as the timing and sequencing of central sessions also require attention. Also structured access to external sessions would allow greater opportunity for reflection and theoretical input.

Policy makers need to be aware that a potential danger of the less generous SSD funding and the removal of the supernumerary status for trainees is that timing and length of central sessions and SSE could be compromised as a result

8.3.2 ITP

This research suggested the need for a reconceptualization of the ITP in respect of PCK/SKfT to suit its training context and an improved approach to the inspection of employment-based training rather than one which still ‘looks’ for traditional ITT. Also

in the UK in particular, there is a need for common inspection reporting format which would facilitate making judgments and provide better understanding about provision across the sector.

8.3.3 SSE

This research showed that extended opportunities to experience a culturally diverse setting for school-led provision could be restricted. Also that SSE could be further compromised as a result of the less generous SSD funding and PSTs in vacancies rather than supernumerary. There is a risk that unless programmes are properly monitored there will a return to former criticisms levelled at the GTP about limited central PCK/SKfT input and inappropriate second placements.

However this research also showed that the brevity of SSE was not necessarily regarded as making a lesser contribution to PCK/SKfT development. It was suggested that the quality of experience was more influential than its length and the main learning occurred during the first three weeks. Given the tensions reported in arranging SSE it would benefit employment-based training in mainstream schools to investigate whether a shorter, well-focused placement provides a better model.

8.3.4 Mentoring

This research indicated that for all ITT routes the selection of an appropriate mentor needs to be better articulated to schools with more guidance. Schools should consider whether they should recruit unless they have the ‘right’ mentor to suit the needs of the trainee. They also need to be aware that a good mentor match is as important in terms of age and previous experience as a subject match. This research showed that it can be better to have a ‘partial’ match such as a biologist mentoring a physicist as long as the mentor and GT were suited in other respects and good subject support exists within the department.

8.3.5 Ensuring participation within a community of practice

Another distinctive contribution to understanding SKfT development was how much training was ‘unseen’ and GTs and mentors worked together in ways not necessarily written into their ITPs. Participation in a community of practice and informal learning is crucial to PCK/SKfT development but conversely lack of access due to the absence of a departmental office means that PSTs are in danger of being ‘designed out’. As it has

become common for new build schools not to include shared departmental space this means that policy makers and training schools need to reconsider how schools' physical design and space allocation can support learning.

8.3.6 Rogue' school behaviour

Although not reported in the findings many mentors expressed concern that the take up of SSD would intensify levels of 'rogue' school behaviour. They felt there was a likelihood of increased 'deliberate' and 'unintended' 'rogue' behaviour such as PSTs employed into vacancies with overburdening timetables. Also for school-led providers lower funding could compromise training quality because it would not allow the same economy of scale open to HEIs. Carter (2015) suggested that an evaluation of these programmes would reveal any such issues and after three years of operation this would seem timely.

8.3.7 Access to 'neutral space'

School-led provision was also shown as implicitly unable to provide a 'neutral space' in which PSTs could explore pedagogical issues outside their schools. This could be regarded as a limitation in PCK/SKfT provision as it restricts trainees' ability to question and critically reflect on their school's practice. Access to the training expertise and 'neutral space' afforded by HEIs is area for further exploration. They should have a continuing role in providing the opportunity for school-led SSD PSTs to meet with their peers in a 'neutral space' as well as those training in partnership with HEIs. This input could be provided through providing HEI facilitated sessions or via external training.

8.3.8 Access to HEI Resources

Continued access to academic expertise and resources are essential and this needs to be facilitated for PSTs training within school-led provision. Access to refereed journal publications is particularly important especially as these PSTs are at risk at being disadvantaged in comparison to their peers training within HEI linked provision.

8.4 Were there still deficiencies in PCK/SKfT attainment?

This research showed that alternative employment-based routes can provide good PCK/SKfT development and also that most highly qualified candidates do not necessarily make the best teachers pointing to a reconsideration of how 'good' and 'poor' candidates are defined. For example, current entrance requirements for SSD

specify a degree classed at 2.1 or above and at least three years' work experience although exceptions can be made especially in mathematics and science (DfE, 2014; NCTL, 2016). It is important to consider whether such criteria are appropriate if they exclude good candidates especially those whose only viable option to enter teaching is via employment-based training. Linked to this Ofsted should give greater weight to 'entry to teaching' in assessing the quality of training routes as employment-based routes have come to provide the highest take-up of teaching posts (e.g. Smithers et al. 2012, 2013).

Like many other countries England is currently facing another acute shortage and ITT is struggling to recruit (e.g. Howson, 2015, 2016). A recent State of the Nation Report (Poverty, C., 2015) argues that the introduction of SD and SSD have made the ITT offer more fragmented and difficult to understand and is losing potential candidates. This suggests that the complexity of ITT needs reconsideration

8.5 Recommendations for further research

There were indications that minority subjects might not have access to the same learning opportunities and this offers an area for further investigation. There is also scope for further exploration of the PCK/SKfT development within mentor/mentee partnerships and within a community of practice. The possibility that mono-cultural school contexts limit PCK/SKfT development unless balanced by a contrasting experience could also be explored further.

8.6 Concluding comments

This study supports the ability of employment-based training to be effective, Given the continuing growth of alternative ITT routes to address teacher quality and supply both in the UK and worldwide the models of training seen in this study make a valuable contribution to the understanding about how such training takes place and what further development is required to maximise the attainment of its PSTs. There is also a strong message regarding the ongoing role for HEIs across all ITT routes but within a further reconceptualised and well-developed 'third' space for collaborative PCK/SKfT provision.

Policy makers need to consider how prevalent some of the training limitations with school-led training may become across SSD programmes. As Carter (2015) indicted the

nature of data about different ITT routes makes it difficult to evaluate the effectiveness of SD and SSD programmes. Finally, policy makers need to be aware that problems can arise when change is policy rather than conceptually driven and priority given to a resource allocation model that could ultimately damage programme delivery (Elliott, 1991). As Smithers and Robinson (2012) suggested the government may be:

“...taking a risk in stripping the GTP of its identity and merging it into School Direct, with less financial support to schools...” (P.37-38)

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APPENDICES

Appendix 1

Time-line of GTP history and its development

1996	GTP, RTP and OTTP proposed by TTA
Oct 1997	Licensed Teacher, Overseas Trained Teacher and Registered Teacher Schemes abolished and replaced with GTP, RTP and OTTP from 1 December 1997
Jan 1998	GTP commenced for graduates aged 24 years +. A school could recruit and train provided it registered with TTA as a 'Recommending Body' (RB); HEIs, LEAs and other training providers also acted as RBs. Many schools worked in conjunction with other RBs to receive support and guidance.
2000	TDA training salary and grants introduced for GTs training in state schools. Also priority categories to target allocation of funded places to address secondary shortages e.g. secondary mathematics and science and to make the profession more representative e.g. men into primary teaching. The training salary was a contribution towards the cost of employing a GT and aimed at ensuring that GTs were 'supernumerary' i.e. not filling a vacancy
2002	First GTP Ofsted report published based on an evaluation of 72 providers conducted in 2000-2001. Highly critical of many aspects of GTP recruitment and provision.
2002	TTA conducted GTP review which resulted in changes to remove unsatisfactory provision: <ol style="list-style-type: none"> 1. End of the facility for individual schools to act independently as RBs. 2. GTP providers required to enter ITT accreditation process: first stage was to apply to become a DRB (designated recommending body); Providers were required to bid for funded places allocation based on evidence of the need in their geographical area, e.g. high vacancy rates in shortage subjects. Some providers failed to meet application process requirements and ceased to operate.
2002	<i>Teach First established – separate employment-based programme leading to PGCE award; aimed at addressing educational disadvantage by recruiting the best graduates to train in challenging schools; many schools worked with Teach First and GTP.</i>
Sept 2003	Schools ceased to act as RBs; start of three year Ofsted inspection programme of GTP - DRBs who failed to meet the requirements following inspection and re-inspection ceased to operate.
2004	Age 24 requirement removed to avoid breaking new EU age discrimination laws
2004 - 2007	DRBs apply for accreditation. GTP inspections were completed in 2006 and DRBs recommended for accreditation applied during 2004 -7. Successful accredited DRBs become known as EBITTs.
Sept 2006	Shortage subject funding premiums introduced - EBITTs received premiums for each science, mathematics and design and technology GT recruited. Later modified to provide higher premiums for physics and chemistry GTs.
2007	Ofsted overview report 2003-6 stressed that subject training was not good enough.
2007	TDA launches Subject Knowledge for Teaching framework: largely aimed at EBITTs to address SKfT training deficiencies. EBITTs to develop provision using the framework.
Sept 2008	TDA 60 days of training requirement: EBITTs had to ensure GTs had 60 days of structured training which required substantial programme changes.
2010 - 2011	New government published plans for ITT: new SSD programme to be introduced in 2012 allowing employment-based training to target the best candidates.
2011 - 2012	EBITTs operate during a period of uncertainty whilst awaiting clarification as to how ITT changes would be implemented.
June 2012	Closure of GTP announced.
Sept 2013	GTP closed and replaced by Salaried Schools Direct.

Appendix 2

Developing Trainees' Subject Knowledge for Teaching (TDA, 2007)

The framework (examples are for primary English)

Pedagogy

A range of teaching skills and strategies to promote pupils' learning in the subject including behaviour management and those proposed by the national strategies.

Example: an understanding of good practice including three- or four-part lessons, guided reading and writing, effective questioning.

The ability to plan lessons and sequences of lessons that are matched to pupils' needs, including opportunities for learning through homework.

Example: adaptation and use of year 6 exemplar unit plans and example lesson plans, from 'Developing Early Writing'.

The ability to make use of a range of resources including ICT.

Example: software to support the use of an interactive whiteboard and literacy, introduction to the National Whiteboard Network website.

Skills in the assessment of pupils' learning and the ability to use the information to plan for teaching which meets pupils' needs.

Example: the use of the QCA writing analysis grid to analyse the development of pupils' writing.

The ability to make a subject accessible to pupils at different stages in their learning and development and to provide a supportive learning environment.

Example: using demonstration techniques, including scribing and supported composition as different aspects of shared writing.

The ability to reflect on and improve teaching and learning.

Example: applying the 'Rose Review' to their own teaching of phonics.

High expectations of all pupils, and skills in working to overcome barriers to their learning.

Example: introduction to QCA's material on gifted and talented pupils.

Attitudes

The inclusion, achievement and well-being of all pupils.

Example: knowing how to meet the needs of boys when teaching writing.

The subject or the curriculum area and enthusiasm for teaching it.

Example: the importance of a lively stimulus and motivating context for writing.

Being creative in developing learning opportunities for all pupils.

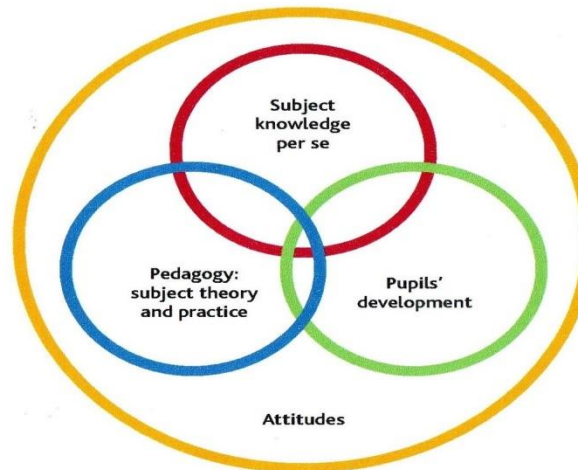
Example: using drama strategies effectively.

Continuing professional development within the subject or curriculum area.

Example: updating skills in teaching grammar, for example by using Grammar for Writing materials.

Working as part of a team, learning from others and contributing to the learning community.

Example: knowing how to deploy teaching assistants to run literacy intervention programmes at 'waves' 2 and 3.



Subject knowledge per se

The key concepts, language, skills and topics that define the subject or curriculum area.

Example: the most important aspects of the curriculum as defined by the national curriculum English programmes of study and the 12 core areas of learning in literacy within the renewed literacy framework.

Progression in the subject or curriculum area as defined by the national curriculum and other national expectations.

Example: progression in the acquisition of phonic knowledge, linking sounds to letters and blending.

The relevance of the subject or curriculum area and why aspects of the subject or curriculum area are taught.

Example: how speaking and listening skills underpin and support learning in reading and writing.

The connections across subjects or curriculum areas, including literacy, numeracy and ICT across the curriculum.

Example: how reading and writing of recounts could be contextualised in work in science.

The relationships within the subject or curriculum area.

Example: how talk can be used as a precursor to writing.

Assessment of pupils' achievement in the subject or curriculum area.

Example: level descriptions, assessment techniques used in SATs and teacher assessment, including running records.

Pupils' development

How pupils' learning in the subject is affected by developmental, social, religious, ethnic, cultural and linguistic influences.

Example: understanding of the implications of primary strategy material on the teaching of children with EAL, or traveller, gypsy, Roma children.

The range of ways in which pupils learn.

Example: interactive approaches including linking drama and writing.

How pupils develop as learners within the subject.

Example: staging posts in the development of writing, including handwriting and spelling development.

How the subject and curriculum area needs to be adapted to meet pupils' individual needs and contexts.

Example: how to support EAL learners at different stages in language competence.

How parents and carers contribute to their children's learning and development.

Example: how to enable parents to support children in the earliest stages of reading development.

Appendix 3

Letter and information sheet for participants outlining the research and how issues relating to ethical considerations and confidentiality would be addressed

Dear Xxxxx,

Research into delivery of Subject Knowledge for teaching within the Graduate Teacher Programme

Thank you for agreeing to be involved in this research. Firstly, I am writing to confirm the date for my initial visit to collect data and look at documentation and to provide you with more information about the remit of the research and how it will be used and disseminated. I also enclose a consent form, which you can complete when we meet.

Secondly, I would like to confirm that the identity of your EBITT will be kept anonymous and also that none of the information obtained will be used without your consent. You will be given the opportunity to read the data sets before they are formally included as data and make amendments regarding their accuracy.

If you have any queries about the research before we meet please do not hesitate to contact me via e-mail or telephone: yvemarcelle@talktalk.net; 0207 371 3112 (home) 0783 336 4711 (mobile).

Best wishes,

Yve Posner

Research into delivery of subject knowledge for teaching (SKfT) within the Graduate Teacher Programme

Role of the researcher

This research is being undertaken as the thesis for my doctorate of education. I have previously worked for eight years as the training manager of a large EBITT and am very committed to the GTP as a training route. My role within this research is an outsider with an outsider's perspective but with the advantage of inside knowledge and understanding of the GTP.

Background and focus of the research

After more than twelve years of operation the GTP has become a well-established and successful initial teacher training route. However it has often been subject to criticism from both Ofsted and more traditional teacher training providers that many GTs do not realise their full potential during their training and in particular that GTP provision on SKfT and attainment against the QTS subject knowledge standards have consistently highlighted as a shortcoming. This research will therefore focus on the effectiveness of the Graduate Teacher Programme in the provision of SKfT training and how well GTs (Graduate Teachers) achieve against the subject knowledge QTS standards.

Methodology

The research will focus on training within two secondary subjects – mathematics and science. These subjects have been selected firstly because training in shortage subjects has always been an important focus of the GTP. Secondly because of the acute shortage of mathematics and science teachers GTs are quite often supported by mentors who do not share their specialism. Consequently it is hoped that this research will provide a valuable insight into the training challenges this poses and how they are addressed. In order to provide robust data from which useful findings can be drawn three GTP providers will take part in this research: a large provider, a medium sized top 10 provider and a small school-led provider.

The methodology will involve the following:

- Collecting data on the attainment of mathematics and science GTs against the subject knowledge QTS standards during 2009-10, 2010-11 and 2011-12. This data will come from final assessment reports and assessment profiles.
- For 2011-12 cohort semi-structured interviews will take place with a sample of GTs, and mentors.
- Interviews will also be conducted with programme managers in each of three providers.
- Evidence will also be obtained from document analysis such as handbooks, Ofsted reports, and external examiners' reports.

The three EBITTs and all participants will be anonymous and only referred to by pseudonyms and the findings will be reported in a way that will ensure that none of the providers or any individual participants can be identified, e.g. locations and descriptions of the EBITTs and partner schools will be well-disguised. Each participant will sign a consent form and can withdraw from the study at any point if they so wish. Participants will also have the opportunity to read transcripts from their interviews to agree their accuracy and ask for any changes if necessary.

Benefits of this research and how it will be used

This research will provide a valuable insight and understanding of how a sample of providers run their programmes and the ways in which SKfT is taught. It will also produce evidence of the ability of the GTP to provide quality ITT and will make a contribution to the theoretical framework of SKfT:

- How it is understood by mentors
- The ways in which GTs acquire and develop it
- Development of a new model for training and supporting mentors in their teaching/support for GTP GTs

I am undertaking this work for my EdD thesis and after the thesis is submitted I will provide the EBITTs with a summary of its findings. I am also planning to adapt it to a paper to go forward for publication.

Appendix 4 Participant consent forms

RESEARCH INTO THE DELIVERY OF SUBJECT KNOWLEDGE FOR TEACHING WITHIN THE GRADUATE TEACHER PROGRAMME – INTERVIEW CONSENT FORM (for GTs, mentors and subject specialist tutors)

The participant should complete the whole of this sheet him/herself		
	<i>Please tick the appropriate box</i>	
	YES	NO
Have you read the Research Participant Information Sheet?	<input type="checkbox"/>	<input type="checkbox"/>
Have you had an opportunity to ask questions and discuss this study?	<input type="checkbox"/>	<input type="checkbox"/>
Have you received satisfactory answers to all your questions?	<input type="checkbox"/>	<input type="checkbox"/>
Who have you spoken to?		
Do you understand that you will not be referred to by name in any report concerning the study?	<input type="checkbox"/>	<input type="checkbox"/>
Do you understand that you are free to withdraw from the study:		
- at any time	<input type="checkbox"/>	<input type="checkbox"/>
- without having to give a reason for withdrawing?	<input type="checkbox"/>	<input type="checkbox"/>
Do you agree to take part in this study?	<input type="checkbox"/>	<input type="checkbox"/>
Signature of Research Participant:		
Date:		
Name in capitals:		
<u>Witness statement</u>		
I am satisfied that the above-named has given informed consent.		
Witnessed by:		
Date:		
Name in capitals:		

**RESEARCH INTO THE DELIVERY OF SUBJECT KNOWLEDGE FOR TEACHING
WITHIN THE GRADUATE TEACHER PROGRAMME – DATA COLLECTION
CONSENT FORM (for EBITT Programme Leaders)**

The participant should complete the whole of this sheet him/herself		
	<i>Please tick the appropriate box</i>	
	YES	NO
Have you read the Research Participant Information Sheet?	<input type="checkbox"/>	<input type="checkbox"/>
Have you had an opportunity to ask questions and discuss this study?	<input type="checkbox"/>	<input type="checkbox"/>
Have you received satisfactory answers to all your questions?	<input type="checkbox"/>	<input type="checkbox"/>
Who have you spoken to?		
Do you understand that you EBITT will not be referred to by name in any report concerning the study?	<input type="checkbox"/>	<input type="checkbox"/>
Do you understand that you are free to withdraw from the study:	<input type="checkbox"/>	<input type="checkbox"/>
- at any time		
- without having to give a reason for withdrawing?	<input type="checkbox"/>	<input type="checkbox"/>
Do you agree for your EBITT to take part in this study?	<input type="checkbox"/>	<input type="checkbox"/>
Do you agree to provide EBITT documentation and reports to be included in data for this study?	<input type="checkbox"/>	<input type="checkbox"/>
Name in capitals:		
<u>Witness statement</u>		
I am satisfied that the above-named has given informed consent.		
Witnessed by:		
Date:		
Name in capitals:		

Appendix 5

Draft versions of interview schedules showing changes following pilot phase

**Draft interview schedule for semi-structured interviews with EBITT ~~managers~~
Programme Leaders** *Use generic title of Programme Leader*

PILOTED WITH FORMER EBITT COLLEAGUES AND ONE PROGRAMME LEADER

1. Background of ~~manager~~-Programme Leader

- 1.1. Experience prior to current role
- 1.2. EBITT role – title – areas of responsibility
- 1.3. How long in the role?

2. EBITT background and current activities

- 2.1. When was your EBITT established?
- 2.2. Development of the EBITT – how did it start its ‘life’? – what nos. did it train initially – has it grown much or kept small and quite specialised?
- 2.3. What is the main focus of the EBITT’s GTP work – primary, secondary GTP? OTTP? Other special projects attached?
- 2.4. EBITT’s ‘mission’ in respect of GTP – e.g. training the ‘best’ candidates?
Serving needs of local schools, providing opportunities to those who might not otherwise entered teaching, working with non-traditional schools e.g. special schools

3. Graduate Teachers and acquisition of subject knowledge – selection/audit/TNA/TP

- 3.1. What level of academic requirement at degree level does you EBITT require?
- 3.2. What are your EBITT’s the degree requirements in terms subject? Do you follow R1.2 or do you require a degree/part of a degree in the subject for QTS?
- 3.3. Do you consider candidates who do not meet your degree requirements in terms of subject? If so how do you decide whether they meet R1.2?
- 3.4. Do you audit subject knowledge? When does this happen? How is it carried out?
- 3.5. Do you allow a GT to develop any shortfall in subject knowledge as part of or before his/her training? If so how is this done? E.g. use of TDA subject knowledge enhancement courses?
- 3.6. How are your GTs’ training plans compiled? Who carries out the TNA? Do you use a template or generic TP which is then adapted or is each TP produced from scratch?
- 3.7. Is the training plan all written at the start of training? Is it written one term at a time? Are TPs reviewed and modified in light of progress?
- 3.8. How much of the training plan specifically refers to the development of SKfT?
Swop order of 3.7 and 3.8

4. EBITT run training/support on SKfT

- 4.1. How did your EBITT develop training on SKfT? What is the rationale for the type of SKfT training you chose to provide? How much of the 60 days of structured training related to SKfT?
 - 4.2. What exactly does your EBITT's SKfT training involve? - centrally run training on SKfT? IT based distance learning? Distance learning materials and tasks? School-based tasks?
 - 4.3. Is the TDA framework of SKfT used by your EBITT? If not what are the reasons?
 - 4.4. If the framework is used how is it used in the training of GTs?
Add new question 4.5: Do you think there is anything missing from the framework which you feel is important in GTs' development of SKfT?
 - 4.5. How is it used in the assessment of GTs?
 - 4.6. How is SSE used to develop SKfT?
 - 4.7. How are GTs assisted/supported in developing their own teaching styles that are different to the predominant style/framework of teaching used in their school?
 - 4.8. If GTs experience difficulty in developing their own 'framework' of teaching what support is there from their EBITT tutors?
 - 4.9. Who is responsible for 'marking' SKfT tasks/assignments? *Ask this earlier – move to 4.3*
 - 4.10. How far do GTs use other types of training available on SKfT? *Include some prompts here for examples: subject association, local authority, exam board)*
 - 4.11. Is this training built into their TPs or taken up voluntarily?
 - 4.12. How far is their evidence that your GTs make use of other resources to develop their SKfT? *Include some prompts here for examples: E. Journals, research, news articles? Web-based – internet. Blogs, WIKIs? TDA resources, TTRB?*
5. **School-based training and ~~SBTs~~ Mentors** *Use generic title of mentor instead*
 - 5.1. What are your provider tutor arrangements? Are GTs supported by subject specialists?
 - 5.2. Does your EBITT require your ~~SBTs~~ mentors to be subject specialists?
 - 5.3. If a science GT is mentored by a science specialist with a different specialism how is subject specific mentoring provided?
 - 5.4. What assessment mechanisms do you use to monitor progress in the QTS standards relating to SK and SKfT?
 - 5.5. What training do your ~~school-based trainers~~ mentors receive on SKfT from your EBITT? Do they attend the training? What happens if they do not attend?
 - 5.6. What do you see as the main issues impacting on the effectiveness of ~~SBTs~~ mentors? Time for the role? Role being 'pushed' onto them? Difficulty in adapting from teacher/mentor to teacher educator? School policy and practice in respect of SKfT?
6. **Attainment of GTs against subject knowledge standards**
 - 6.1. How is the effectiveness of SkfT training evaluated by GTs, EBITT tutors and ~~SBTs~~ mentors?

- 6.2. How is the attainment of GTs relating to the QTS subject knowledge standards measured and recorded?
- 6.3. Is SKfT an area identified by you, your external examiners and Ofsted as an area for development? If so what in particular has been identified?
- 6.4. Have you seen improvements in the attainment of your GTs relating to SKfT since your EBITT was established? If so how evaluated this? Has the improvement been in some standards rather than others? Which?
- 6.5. How far have you seen improvements as a result of the introduction of /changes to training in respect of SKfT?
- 6.6. Do you feel there is room for improvement/ further area for development in respect of SKfT? What would these be?

Draft interview schedule for semi-structured interviews with ~~School-Based Trainers-mentors~~ PILOTED WITH FORMER EBITT COLLEAGUES AND TWO MENTORS

1. Background of ~~SBT~~-Mentor

- 1.1 Subject of GT you are supporting/training
Add question: Which route into teaching did you follow?
- 1.2 How long have you been teaching?
- 1.3 Were you previously involved in mentoring PGCE students?
- 1.4 How long have you been a ~~SBT~~ for the GTP?
- 1.5 How did you come to take on the ~~SBT~~ role for the GTP? *(Use some prompts: you specifically asked to be involved because good for professional development; knew the GT and wanted to mentor him/her; told you had to take on the role)*

2. Views on the GTP and comparison with mentoring on PGCE

- 2.1 What is your view of the GTP as a training route to QTS?
- 2.2 What do you think are the strengths of the GTP route overall?
- 2.3 What do you think are the strengths of the GTP for developing SKfT?
- 2.4 What do you think are the challenges of the GTP route overall?
- 2.5 What do you think are the challenges of the GTP in developing SKfT?
- 2.6 Do you think the title school-based trainer better reflects the role than school/subject mentor or tutor?
- 2.7 If you have mentored a PGCE student how do you think supporting/training a GT compares to mentoring a PGCE student? Similarities? Differences?

3. Training and support to take on GTP ~~SBT~~ mentor role

- 3.1 How well prepared did you feel to take on the role when you started?
- 3.2 What training did you receive to become a ~~SBT~~ mentor from your school?
- 3.3 What training did you receive to become a ~~SBT~~ mentor from your EBITT?
- 3.4 *SUBJECT MENTORS ONLY: how much subject specific mentor training did you receive? I.e. how to train in your subject.*
- 3.5 *SUBJECT MENTORS ONLY: Do you receive subject specific mentoring support? Is this sufficient?*
- 3.6 Is their training/guidance that you feel you needed but didn't receive?
- 3.7 *CENTRAL COLLEGE AND KINGSVIEW ONLY: Can you tell me about the input and support you have had from your EBITT tutor?*
- 3.8 *CENTRAL COLLEGE AND KINGSVIEW ONLY: How do you think this input has supported you, your subject mentor and your GT with SKfT development?*
- 3.9 Do you feel there is still training you would like that would help you in your role?

4. Challenges of the ~~SBT~~ mentor role

- 4.1 Lack of time for the role?
- 4.2 Insufficiently prepared/trained for the role?

- 4.3 Supporting a GT in a different subject? E.g. biology specialist supporting a physicist or chemist? What are the specific challenges this presents? How do the EBITT and school support this? (*use prompts: buys in support; co-mentoring; additional visits from EBITT tutor*)
- 4.4 Taking on a teacher educator role alongside own role as a classroom teacher? ~~Transition from first order to second order practitioner? Don't use this terminology as they may not understand it and would be confusing!~~
- 4.5 Subject Knowledge for training and assessment of GTs
- 4.6 How do you support your GT in developing their SKfT? Lesson observation and feedback? Specific training activities (*Use some prompts: team-teaching; joint planning; structured observation of other teachers; one-to-one training on a specific topic/area*)
- 4.7 *CENTRAL COLLEGE AND KINGSVIEW ONLY: how much input is there from your provider tutor to support training/development of SKfT?*
- 4.8 Are you familiar with the TDA model for SKfT? (show framework) If so do you use it in training your GT?
- 4.9 What is your view of the EBITT central training for GTs on SKfT?
- 4.10 Do you feel there is room for improvement/ further area for development in respect of SKfT? What would these be? (*Use prompts: more EBITT central sessions; subject specific rather than generic; use of study groups; more subject specific tasks/assignments*)

5. Teaching styles and relationship with SKfT development

- 5.1 Would you say there is a predominant teaching style(s) in your school and/or dept.? If so are GTs able to have the opportunity to observe other teaching styles elsewhere?
- 5.2 Are GTs encouraged to try out other teaching styles and 'take risks'?
- 5.3 Do you think that a GT's own experience of schooling has an influence on developing their teaching style? Have you seen this as a factor in how GTs develop their SKfT?
- 5.4 Do you think the model for SKfT should include the knowledge of self as an area impacting on/influencing on a GT's development and should be taken into account in training? *The first mentor had not heard of the framework so probably better to skip this question if mentors answer "no" to 5.3*

6. Attainment of GTs against subject knowledge standards

- 6.1 How is the attainment of GTs relating to the QTS subject knowledge standards measured and recorded?
- 6.2 Would you say the attainment of GTs relating to SKfT has improved since you have been involved in supporting GTs? If so in which areas? Has this been evaluated?
- 6.3 How far do you think the improvements are as a result of the introduction of /changes to your EBITT's training in respect of SKfT? (*Use prompts: SKfT central sessions; central training study groups, SKfT tasks; input from subject specialist tutors*)

7. Other resources to develop SKfT

- 7.1 What resources do you encourage your GTs to use to develop their SKfT?
- 7.2 Do they use journals, research, news articles?
- 7.3 Do they use Web-based – internet. Blogs, WIKIs?
- 7.4 Do they use TDA resources, TTRB? Do they attend external training? (*Use prompts: subject association; local authority, exam board*)

- 7.5 Are there other resources you feel that should be used?
8. **Is there anything else you would like to add/tell me about?**

Draft interview schedule for interviews with EBITT maths and science subject specialist tutors

PILOTED WITH FORMER EBITT COLLEAGUES AND NINESG MATHS SUBJECT LEADER – BECAME CLEAR THAT I NEEDED SEPARATE SCHEDULES FOR EACH EBITT

1. Background of subject specialist

- 1.1. EBITT role and title? Use '*Experience prior to current role*' for Central College; Use '*Role at University*' for Kingsview
- 1.2. How long in the role? **Ok for all EBITTs**
- 1.3. Areas of responsibility **Ok for all EBITTs**

2. Views on the GTP as a training route

- 2.1. What is your view of the GTP as a training route to QTS?
Add in a questions asking about how GTP route compares with PGCE/SCITT as a training route?
- 2.2. What do you consider are the GTP's strengths?
- 2.3. What do you consider are the GTP's issues/disadvantages if any?

3. Role of subject specialist in SKfT development

- 3.1. Could you outline what your work as subject specialist with GTP involves?
(Use some prompts: writing/checking ITPs? acting as tutor for some GTs? QA of the work of other tutors?) For NineSG need to ask about whether they act as mentors as there is no layer of visiting EBITT tutors. Use some prompts/examples
- 3.2. What involvement did you have in developing the rationale and programme review for SKfT input?
- 3.3. What happens during the QA visit you undertake looking at the support tutors provide? *Frame question differently for NineSG – ask about QA as part of their own role*
- 3.4. What role do the University tutor play in the development for SKfT through their visits?
- 3.5. Programme Manager talked of key role University tutors play in the training and how this role has evolved and strengthened? *Move these questions to next section/ only relevant to Central College and Kingsview who use university tutors to monitor training*

4. Role of University Tutor in SKfT development

Put section here for Kingsview and Central College about role of university tutor

5. EBITT run central training/support on SKfT

- 5.1. What do you think are the challenges for GTs in development of their SKfT?
- 5.2. Do GTs attend some PGCE sessions – how do you decide which they should attend? It has been said that PGCE sessions whilst useful don't necessarily provide what GTs need – they need sessions more tailored to their training context? Do you agree? *For Central College and Kingsview only*
- 5.3. What in your experience are the different needs of GTs for central sessions in respect of SKfT?
- 5.4. How far do you think GTs benefit from the centrally run SKfT sessions?
NineSG – ask about subject specific sessions provided. Central College and Kingsview add question: 'Do you think GTs would benefit from centrally run subject specific SKfT sessions?' Ask Kingsview subject specialists about the 4 external sessions they have to attend
- 5.5. Do GTs talk of difficulty in getting release time to attend sessions/other training?

6. Issues for GTs in development of SKfT

Add an introductory line here – "I assume that your sessions always provide a lot of time for discussion/problem sharing etc. So I would like to touch on some of the issues that come up"

- 6.1. How well do you think second school experience is used to develop SKfT? *Ask for some examples of SSE*
- 6.2. Have GTs talked of any difficulties in developing their own teaching styles that are different to the predominant style/model of teaching used in their school?
- 6.3. Do GTs talk of being afraid to 'rock the boat'? *Need to explain this means in this context*
- 6.4. How far do GTs talk of inconsistency in mentoring? How much inconsistency of mentoring in schools have you found? *Ask sub-question – 'can you provide some examples?'*
- 6.5. Do any talk of their mentors having been 'pushed' into the role? Difficulty in adapting from teacher/mentor to teacher educator? School policy and practice in respect of SKfT?
- 6.6. How far do you feel that GTs make use of other resources to develop their SKfT? *(use some prompts e.g. E.journals, research, news articles? Web-based – internet. Blogs, WIKIs? TDA resources, TTRB?)*

7. Training for **SBTs mentors** and role of the Subject Specialist *Use mentor rather than school based trainer (SBT) as that is the title interviewees tend to use – may be confusing otherwise*

- 7.1. What is your involvement with training of **SBTs mentors**?
- 7.2. Do you think they would benefit from some subject specific mentoring sessions?
- 7.3. SBTs need this type of session? Or does Central College provide this via their support visits?

8. Attainment of GTs against subject knowledge standards

- 8.1. Have you seen improvements in the attainment of GTs relating to SKfT since you've been working with the EBITT?
- 8.2. How far have you seen improvements as a result of the introduction of /changes to training in respect of SKfT?
- 8.3. Do you feel there is room for improvements/ further areas for development in respect of SKfT? What would these be?

9. Is there anything else you would like to add/tell me about

Interview schedule for semi-structured interviews with Graduate Teachers
PILOTED WITH FORMER EBITT COLLEAGUES AND ONE GT

1. Background of Graduate Teacher

Start with question on age

1.1. Subject of degree *Ask for class of degree as well as subject*

1.2. Subject for QTS

1.3. Employing school for GTP – type of school

Add questions 1.4 whether supernumerary or filling vacancy and 1.5 amount of timetable at start of training

2. Reasons for becoming a teacher and own experience of schooling

2.1. What were your reasons for becoming a teacher? *Add question asking: “What were you doing prior to starting the GTP?” Add question asking “why the GTP route?”*

2.2. How far do feel your own experience of schooling has influenced on your approach to teaching your subject? *Probe by adding sub-questions - To teach in a different way? The same way?*

2.3. What did you find were the greatest challenges overall of your training?

2.4. What do you feel were the most challenging aspects of developing your SKfT? (need to probe on pedagogical challenges in maths and science) *(use prompts: abstract nature of subject; language; negative image of subject; teaching out of science specialism; contextual/cultural issues; teaching reproduction as part of science curriculum)*

3. GTP training on SKfT – school-based

3.1. How much of your training plan specifically referred to the development of SKfT?

3.2. What were your mentoring arrangements? I.e. one mentor or co-mentored. Did your mentor have the same subject specialism as you? If not did this present problems in terms of developing your SKfT? How did you receive subject specific mentoring?

3.3. How does/did your mentor provide training on SKfT? *(Use prompts: mainly through observation and feedback? Joint planning? Team teaching? Micro teaching? Specific time away from the classroom to receive SKfT training?) Add question asking about work with other teachers; add questions about predominant teaching style and opportunities to take ‘risks’*

3.4. Overall how well did you feel you were supported by your mentor in developing SKfT? Is there any support you would have liked that you didn’t receive?

3.5. What input did you have from your provider tutor to support the development of your SKfT?

3.6. Overall how well supported by your EBITT tutor did you feel in developing SKfT?

4. SKfT – school context specific issues

- 4.1. How far did the ability and type of pupils you were teaching affect how you developed your SKfT? Do you feel these placed limitations on your SKfT development?
- 4.2. How much second school experience did you undertake? What was the focus?
- 4.3. Were there specific opportunities to develop your SKfT in that school? How much do you think your second school experience helped to develop your SKfT?
- 4.4. Did the second school experience provide the opportunity to use very different/contrasting resources/teaching styles for a different context?

5. GTP training on SKfT – central/provider

- 5.1. How much central run training was there on SKfT?
- 5.2. How useful did you find these SKfT sessions? Which aspects in particular? *Ask about training input on numeracy, literacy, SEN, EAL*
- 5.3. Did the training use the TDA SKfT model? *(show the model)*
- 5.4. Do you think the TDA SKfT model covers all key areas of SKfT? Should ‘attitudes’ include ‘knowledge of self’ as an area to take into account in SKfT development? *This question was confusing at pilot interview as although GT had heard of the framework she didn't really understand the question – may be better to remove it*
- 5.5. Should there have been more central run training on SKfT and if so what should it have covered?
- 5.6. How well did these sessions link into school based training – was there a feedback mechanism?

6. Other resources to develop SKfT

- 6.1. What other resources have you used to develop your SKfT?
- 6.2. Have you used journals, research, news articles?
- 6.3. Have you used Web-based – internet. Blogs, WIKIs?
- 6.4. Have you used TDA resources, TTRB?
- 6.5. Have you attended any external training? *(Use prompts: subject association; local authority, exam board)*

7. Is there anything else you would like to add/tell me about?

Appendix 6

Final versions of interview schedules

Interview schedule for semi-structured interviews with EBITT Programme Leaders

1. Background of Programme Leader

- 1.1. Experience prior to current role
- 1.2. EBITT role – title – areas of responsibility
- 1.3. How long in the role?

2. EBITT background and current activities

- 2.1. When was your EBITT established?
- 2.2. Development of the EBITT – how did it start its ‘life’? – what nos. did it train initially – has it grown much or kept small and quite specialised?
- 2.3. What is the main focus of the EBITT’s GTP work – primary, secondary GTP? OTTP? Other special projects attached?
- 2.4. EBITT’s ‘mission’ in respect of GTP – e.g. training the ‘best’ candidates?
Serving needs of local schools, providing opportunities to those who might not otherwise entered teaching, working with non-traditional schools e.g. special schools

3. Graduate Teachers and acquisition of subject knowledge – selection/audit/TNA/TP

- 3.1. What level of academic requirement at degree level does you EBITT require?
- 3.2. What are your EBITT’s the degree requirements in terms subject? Do you follow R1.2 or do you require a degree/part of a degree in the subject for QTS?
- 3.3. Do you consider candidates who do not meet your degree requirements in terms of subject? If so how do you decide whether they meet R1.2?
- 3.4. Do you audit subject knowledge? When does this happen? How is it carried out?
- 3.5. Do you allow a GT to develop any shortfall in subject knowledge as part of or before his/her training? If so how is this done? E.g. use of TDA subject knowledge enhancement courses?
- 3.6. How are your GTs’ training plans compiled? Who carries out the TNA? Do you use a template or generic TP which is then adapted or is each TP produced from scratch?
- 3.7. How much of the training plan specifically refers to the development of SKfT?
- 3.8. Is the training plan all written at the start of training? Is it written one term at a time? Are TPs reviewed and modified in light of progress?

4. EBITT run training/support on SKfT

- 4.1. How did your EBITT develop training on SKfT? What is the rationale for the type of SKfT training you chose to provide? How much of the 60 days of structured training related to SKfT?

- 4.2. What exactly does your EBITT's SKfT training involve? - centrally run training on SKfT? IT based distance learning? Distance learning materials and tasks? School-based tasks?
- 4.3. Who is responsible for 'marking' SKfT tasks/assignments?
- 4.4. Is the TDA framework of SKfT used by your EBITT? If not what are the reasons?
- 4.5. If the framework is used how is it used in the training of GTs?
- 4.6. Do you think there is anything missing from the framework which you feel is important in GTs' development of SKfT?
- 4.7. How is it used in the assessment of GTs?
- 4.8. How is second school experience used to develop SKfT?
- 4.9. How are GTs assisted/supported in developing their own teaching styles that are different to the predominant style/framework of teaching used in their school?
- 4.10. If GTs experience difficulty in developing their own 'framework' of teaching what support is there from their EBITT tutors?
- 4.11. How far do GTs use other types of training available on SKfT? (*prompts e.g. subject association, local authority, exam board*)
- 4.12. Is this training built into their TPs or taken up voluntarily?
- 4.13. How far is their evidence that your GTs make use of other resources to develop their SKfT? (*prompts here for examples: e.g. E. Journals, research, news articles? Web-based – internet. Blogs, WIKIs? TDA resources, TTRB*)

5. School-based training and Mentors

- 5.1. What are your provider tutor arrangements? Are GTs supported by subject specialists?
- 5.2. Does your EBITT require your mentors to be subject specialists?
- 5.3. If a science GT is mentored by a science specialist with a different specialism how is subject specific mentoring provided?
- 5.4. What assessment mechanisms do you use to monitor progress in the QTS standards relating to SK and SKfT?
- 5.5. What training do your mentors receive on SKfT from your EBITT? Do they attend the training? What happens if they do not attend?
- 5.6. What do you see as the main issues impacting on the effectiveness of mentors? Time for the role? Role being 'pushed' onto them? Difficulty in adapting from teacher/mentor to teacher educator? School policy and practice in respect of SKfT?

6. Attainment of GTs against subject knowledge standards

- 6.1. How is the effectiveness of SKfT training evaluated by GTs, EBITT tutors, mentors?
- 6.2. How is the attainment of GTs relating to the QTS subject knowledge standards measured and recorded?
- 6.3. Is SKfT an area identified by you, your external examiners and Ofsted as an area for development? If so what in particular has been identified?

- 6.4. Have you seen improvements in the attainment of your GTs relating to SKfT since your EBITT was established? If so how evaluated this? Has the improvement been in some standards rather than others? Which?
- 6.5. How far have you seen improvements as a result of the introduction of /changes to training in respect of SKfT?
- 6.6. Do you feel there is room for improvement/ further area for development in respect of SKfT? What would these be?

7. Is there anything else you would like to add/tell me about

Interview schedule for semi-structured interviews with mentors

1. Background of mentor

- 1.1. Subject of GT you are supporting/training
- 1.2. Which route into teaching did you follow?
- 1.3. How long have you been teaching?
- 1.4. Were you previously involved in mentoring PGCE students?
- 1.5. How long have you been a mentor for the GTP?
- 1.6. How did you come to take on the role of mentor for the GTP? (*Use some prompts: you specifically asked to be involved because good for professional development; knew the GT and wanted to mentor him/her; told you had to take on the role*)

2. Views on the GTP and comparison with mentoring on PGCE

- 2.1. What is your view of the GTP as a training route to QTS?
- 2.2. What do you think are the strengths of the GTP route overall?
- 2.3. What do you think are the strengths of the GTP for developing SKfT?
- 2.4. What do you think are the challenges of the GTP route overall?
- 2.5. What do you think are the challenges of the GTP in developing SKfT?
- 2.6. Do you think the title school-based trainer better reflects the role than school/subject mentor or tutor?
- 2.7. If you have mentored a PGCE student how do you think supporting/training a GT compares to mentoring a PGCE student? Similarities? Differences?

3. Training and support to take on GTP mentor role

- 3.1. How well prepared did you feel to take on the role when you started?
- 3.2. What training did you receive to become a mentor from your school?
- 3.3. What training did you receive to become a mentor from your EBITT?
- 3.4. *SUBJECT MENTORS ONLY: how much subject specific mentor training did you receive? I.e. how to train in your subject.*
- 3.5. *SUBJECT MENTORS ONLY: Do you receive subject specific mentoring support? Is this sufficient?*
- 3.6. Is their training/guidance that you feel you needed but didn't receive?
- 3.7. *CENTRAL COLLEGE AND KINGSVIEW ONLY: Can you tell me about the input and support you have had from your EBITT tutor?*

- 3.8. *CENTRAL COLLEGE AND KINGSVIEW ONLY: How do you think this input has supported you, your subject mentor and your GT with SKfT development?*
- 3.9. Do you feel there is still training you would like that would help you in your role?

4. Challenges of the mentor role

- 4.1. Lack of time for the role?
- 4.2. Insufficiently prepared/trained for the role?
- 4.3. Supporting a GT in a different subject? E.g. biology specialist supporting a physicist or chemist? What are the specific challenges this presents? How do the EBITT and school support this? *(use prompts: buys in support; co-mentoring; additional visits from EBITT tutor)*
- 4.4. Taking on a teacher educator role alongside own role as a classroom teacher?

5. Subject Knowledge for training and assessment of GTs

- 5.1. How do you support your GT in developing their SKfT? Lesson observation and feedback? Specific training activities *(Use some prompts: team-teaching; joint planning; structured observation of other teachers; one-to-one training on a specific topic/area)*
- 5.2. *CENTRAL COLLEGE AND KINGSVIEW ONLY: how much input is there from your provider tutor to support training/development of SKfT?*
- 5.3. Are you familiar with the TDA model for SKfT? (show framework) If so do you use it in training your GT?
- 5.4. What is your view of the EBITT central training for GTs on SKfT?
- 5.5. Do you feel there is room for improvement/ further area for development in respect of SKfT? What would these be? *(Use prompts: more EBITT central sessions; subject specific rather than generic; use of study groups; more subject specific tasks/assignments)*

6. Teaching styles and relationship with SKfT development

- 6.1. Would you say there is a predominant teaching style(s) in your school and/or dept.? If so are GTs able to have the opportunity to observe other teaching styles elsewhere?
- 6.2. Are GTs encouraged to try out other teaching styles and 'take risks'?
- 6.3. Do you think that a GT's own experience of schooling has an influence on developing their teaching style? Have you seen this as a factor in how GTs develop their SKfT?
- 6.4. Do you think the model for SKfT should include the knowledge of self as an area impacting on/influencing on a GT's development and should be taken into account in training?

7. Attainment of GTs against subject knowledge standards

- 7.1 How is the attainment of GTs relating to the QTS subject knowledge standards measured and recorded?

7.2 Would you say the attainment of GTs relating to SKfT has improved since you have been involved in supporting GTs? If so in which areas? Has this been evaluated?

7.3 How far do you think the improvements are as a result of the introduction of /changes to your EBITT's training in respect of SKfT? (*Use prompts: SKfT central sessions; central training study groups, SKfT tasks; input from subject specialist tutors*)

8. Other resources to develop SKfT

8.1. What resources do you encourage your GTs to use to develop their SKfT?

8.2. Do they use journals, research, news articles?

8.3. Do they use Web-based – internet. Blogs, WIKIs?

8.4. Do they use TDA resources, TTRB?

8.5. Do they attend external training? (*Use prompts: subject association; local authority, exam board*)

8.6. Are there other resources you feel that should be used?

9. Is there anything else you would like to add/tell me about?

Interview schedule for interviews with EBITT subject specialist tutors – Central College

1. Background of tutor

1.1. Experience prior to current role

1.2. How long in the role?

1.3. Areas of responsibility

2. Views on the GTP as a training route

2.1. What is your view of the GTP as a training route to QTS?

2.2. What do you consider are the GTP's strengths?

2.3. What do you consider are the GTP's issues/disadvantages if any?

2.4. What do you think are the strengths/weaknesses of the GTP route in comparison with PGCE/SCITTs?

2.5. What do you see are main differences in supporting the GTP as opposed to PGCE? In general and then in respect of SKfT?

2.6. What do you see are main differences in supporting the GTP as opposed to PGCE? In general?

2.7. What do you see are main differences in supporting the GTP as opposed to PGCE in respect of SKfT?

3. Role of subject specialist in SKfT development

3.1 Could you outline what your work as subject specialist with GTP involves?

(Use some prompts: leading training sessions? writing/checking ITPs? acting as tutor for some GTs? QA of the work of other tutors?)

3.2 What involvement did you have in developing the rationale and programme review for SKfT input?

3.3 Was the TDA SKfT framework used for this input?

4. Role of university tutor in SKfT development

The Programme Leader talked of the importance of the university tutor role in supporting SKfT development and that a key part of training was via this support through the ITP and school visits.

4.1. How effective do you think university tutors are in this aspect of their role?

4.2. How in your view has this role has evolved and strengthened?

4.3. What happens during the monitoring visits that tutors undertake looking at the support mentors provide?

5. EBITT run central training/support on SKfT

5.1. *It's said that PGCE sessions for GTs whilst useful don't necessarily provide what they need – they need sessions more tailored to their training context.*

What in your experience are the different needs of GTs for central sessions generally and in respect of SKfT?

5.2. Can you outline the training sessions you are involved with?

5.3. What is the rationale for the type of SKfT training sessions you deliver? How many sessions?

5.4. Is the TDA model of SKfT used in your sessions?

5.5. Your Programme Leader talked of teaching groups and how banding GTs together in similar subjects e.g. maths and science and how that has allowed more subject focused sessions – could you tell me how far they are subject-focused?

5.6. How far do you think these grouping have helped GTs in developing their SKfT?

5.7. How far are there opportunities for addressing subject-specific pedagogy?

5.8. Do you think GTs would benefit from having separate subject specific sessions just for their subject?

5.9. How much of the central teaching days focus on the development of different teaching styles and 'taking risks'?

6. Issues for GTs in development of SKfT

I assume that your sessions always provide a lot of time for discussion/problem sharing etc. So I would like to touch on some of the issues that come up

6.1. What do you think are the challenges for GTs in development of their maths/science pedagogy? Examples?

6.2. How far do you think that GTs' profile and prior experience impact on their SKfT development?

6.3. Have GTs talked of any difficulties in developing their own teaching styles that are different to the predominant style/model of teaching used in their school?

6.4. Do GTs talk of being afraid to 'rock the boat'? (*i.e. raise issues with their school/EBITT about problems with mentoring and/or their overall training in school*)

6.5. How much inconsistency of mentoring in schools have you found? Can you provide some examples?

- 6.6. Do any talk of their mentors having been ‘pushed’ into the role? Difficulty in adapting from teacher/mentor to teacher educator? School policy and practice in respect of SKfT?
 - 6.7. How far do you feel that GTs make use of other resources to develop their SKfT? (*use some prompts e.g. E.journals, research, news articles? Web-based – internet. Blogs, WIKIs? TDA resources, TTRB?*)
 - 6.8. How well do you think second school experience is used to develop SKfT?
- 7. Training for mentors and role of the subject specialist**
- 7.1. What is your involvement with training of mentors?
 - 7.2. Could you talk about Central College’s compulsory training pre programme/ How far is SKfT covered in that training?
 - 7.3. *The Programme Manager talked of the trialling mentors’ attendance at central subject training last year and the low uptake and that at present there is no subject specific central mentoring sessions* – do you feel that mentors need this type of session? Or does the EBITT provide this via their support visits?
- 8. Attainment of GTs against subject knowledge standards**
- 8.1. Have you seen improvements in the attainment of GTs relating to SKfT since you’ve been working with the EBITT? Differences between maths and science?
 - 8.2. How far have you seen improvements as a result of the introduction of /changes to training in respect of SKfT?
 - 8.3. Do you feel there is room for improvement/further area for development in respect of SKfT? What would these be?
- 9. Is there anything else you would like to add/tell me about?**

Interview schedule for interviews with EBITT subject specialist tutors known as Subject Advisers – Kingsview

- 1. Background of subject adviser**
 - 1.1. Role at the University
 - 1.2. How long in the role?
 - 1.3. Areas of responsibility
- 2. Views on the GTP as a training route**
 - 2.1. What is your view of the GTP as a training route to QTS?
 - 2.2. What do you consider are the GTP’s strengths?
 - 2.3. What do you consider are the GTP’s issues/disadvantages if any?
 - 2.4. What do you think are the strengths/weaknesses of the GTP route in comparison with PGCE/SCITTs?
 - 2.5. What do you see are main differences in supporting the GTP as opposed to PGCE? In general and then in respect of SKfT?

- 2.6. What do you see are main differences in supporting the GTP as opposed to PGCE? In general?
- 2.7. What do you see are main differences in supporting the GTP as opposed to PGCE in respect of SKfT?

3. Role of subject specialist (Subject Adviser) in SKfT development

- 3.4 Could you outline what your work as subject specialist with GTP involves?
(Use some prompts: leading training sessions? writing/checking ITPs? acting as tutor for some GTs? QA of the work of other tutors?)
- 3.5 What involvement did you have in developing the rationale and programme review for SKfT input?
- 3.6 Was the TDA SKfT framework used for this input?

4. Role of university support tutor in QA of SKfT input in schools

- 4.1. What happens during the QA visit you undertake looking at the support tutors provide?
- 4.2. What happens during the monitoring visits that tutors undertake looking at the support mentors provide?
- 4.3. What do you see are main differences in supporting the GTP as opposed to PGCE? In general and then in respect of SKfT?

5. EBITT run central training/support on SKfT

- 5.1. I understand that GTs attend some PGCE sessions – how do you decide which they should attend?
- 5.2. *It's said that PGCE sessions for GTs whilst useful don't necessarily provide what they need – they need sessions more tailored to their training context.* What in your experience are the different needs of GTs for central sessions generally and in respect of SKfT?
- 5.3. Do you think GTs would benefit from centrally run subject specific SKfT sessions?
- 5.4. I understand GTs have to choose 4 external provided SKfT sessions – how much involvement As Subject Adviser do you have in advising what these should be?
- 5.5. Do GTs talk of difficulty in getting release time to attend sessions/other training?
- 5.6. Do you think GTs would benefit from having separate subject specific sessions just for their subject?

6. Issues for GTs in development of SKfT

- 6.1 What do you think are the challenges for GTs in development of their maths/science pedagogy? Examples?
- 6.2 How far do you think that GTs' profile and prior experience impact on their SKfT development?
- 6.3 Have GTs talked of any difficulties in developing their own teaching styles that are different to the predominant style/model of teaching used in their school?

- 6.4 Do GTs talk of being afraid to ‘rock the boat’? (*I.e. raise issues with their school/EBITT about problems with mentoring and/or their overall training in school*)
- 6.5 How much inconsistency of mentoring in schools have you found? Can you provide some examples?
- 6.6 Do any talk of their mentors having been ‘pushed’ into the role? Difficulty in adapting from teacher/mentor to teacher educator? School policy and practice in respect of SKfT?
- 6.7 How far do you feel that GTs make use of other resources to develop their SKfT? (*Use some prompts e.g. E.journals, research, news articles? Web-based – internet. Blogs, WIKIs? TDA resources, TTRB?*)
- 6.8 How well do you think second school experience is used to develop SKfT?

7. Training for mentors and role of the Subject Adviser

- 7.1. What is your involvement with training of mentors?
- 7.2. Do you think they would benefit from some subject specific mentoring sessions?
- 7.3. Does the EBITT provide any mentor training via their support visits?

8. Attainment of GTs against subject knowledge standards

- 8.1. Have you seen improvements in the attainment of GTs relating to SKfT since you’ve been working with the EBITT? Differences between maths and science?
- 8.2. How far have you seen improvements as a result of the introduction of /changes to training in respect of SKfT?
- 8.3. Do you feel there is room for improvement/further area for development in respect of SKfT? What would these be?

9. Is there anything else you would like to add/tell me about?

Interview schedule for interviews with EBITT subject specialists tutors known as Subject Leaders – NineSG

1. Background of subject leader

- 1.1. Experience prior to taking on role
- 1.2. How long in the role?
- 1.3. Had you been a mentor before you took on the subject leader role?
- 1.4. Areas of responsibility

2. Views on the GTP as a training route

- 2.1. What is your view of the GTP as a training route to QTS?
- 2.2. What do you consider are the GTP’s strengths?
- 2.3. What do you consider are the GTP’s issues/disadvantages if any?
- 2.4. What do you think are the strengths/weaknesses of the GTP route in comparison with PGCE/SCITTs?

- 2.5. What do you see are main differences in supporting the GTP as opposed to PGCE/SCITT? In general and then in respect of SKfT?
 - 2.6. What do you see are main differences in supporting the GTP as opposed to PGCE/SCITT? In general?
 - 2.7. What do you see are main differences in supporting the GTP as opposed to PGCE/SCITT in respect of SKfT?
- 3. Role of subject specialist (subject leader) in SKfT development**
- 3.1. Could you outline what your work as subject specialist with GTP involves? (Use some prompts: leading training sessions? writing/checking ITPs? acting as tutor for some GTs? QA of the work of other tutors?)
 - 3.2. What involvement did you have in developing the rationale and programme review for SKfT input?
 - 3.3. Did you have any involvement in/responsibility for developing the use of the TDA model of Subject Knowledge for Teaching – were you originally involved in that mapping exercise?
- 4. EBITT run central training/support on SKfT**
- 4.1. What is your involvement in developing the central SKfT sessions?
 - 4.2. How well do you think those sessions meet GTs needs?
 - 4.3. Is there anything you think should be in those central sessions that haven't been included that you think GTs would benefit from that you would like to see as a further development?
 - 4.4. Do GTs talk of difficulty in getting release time to attend sessions/other training?
- 5. Issues for GTs in development of SKfT**
- 5.1 What do you think are the challenges for GTs in development of their maths/science pedagogy? Examples?
 - 5.2 How far do you think that GTs' profile and prior experience impact on their SKfT development?
 - 5.3 Have GTs talked of any difficulties in developing their own teaching styles that are different to the predominant style/model of teaching used in their school?
 - 5.4 Do GTs talk of being afraid to 'rock the boat'? (*I.e. raise issues with their school/EBITT about problems with mentoring and/or their overall training in school*)
 - 5.5 How much inconsistency of mentoring in schools have you found? Can you provide some examples?
 - 5.6 Do any talk of their mentors having been 'pushed' into the role? Difficulty in adapting from teacher/mentor to teacher educator? School policy and practice in respect of SKfT?
 - 5.7 How far do you feel that GTs make use of other resources to develop their SKfT? (*Use some prompts e.g. E.journals, research, news articles? Web-based – internet. Blogs, WIKIs? TDA resources, TTRB?*)
 - 5.8 How well do you think second school experience is used to develop SKfT?
- 6. Training for mentors and role of the Subject Leader?**

- 6.1. What is your involvement with training of mentors?
 - 6.2. Do you think they would benefit from some subject specific mentoring sessions?
 - 6.3. Does the EBITT provide any mentor training via their support visits?
- 7. Attainment of GTs against subject knowledge standards**
- 7.1. Have you seen improvements in the attainment of GTs relating to SKfT since you've been working with the EBITT? Differences between maths and science?
 - 7.2. How far have you seen improvements as a result of the introduction of /changes to training in respect of SKfT?
 - 7.3. Do you feel there is room for improvement/further area for development in respect of SKfT? What would these be?
- 8. Is there anything else you would like to add/tell me about?**

Interview schedule for semi-structured interviews with Graduate Teachers

1. Background of Graduate Teacher

- 1.1. Age
- 1.2. Subject and class of degree
- 1.3. Subject for QTS
- 1.4. Employing school for GTP – type of school
- 1.5. Employing school for GTP – type of school
- 1.6. Were you supernumerary or filling a vacancy?
- 1.7. What size timetable did you have when you started your training?

2. Reasons for becoming a teacher and own experience of schooling

- 2.1. What were your reasons for becoming a teacher?
- 2.2. What were you doing prior to starting the GTP?"
- 2.3. Why the GTP route?
- 2.4. How far do feel your own experience of schooling has influenced on your approach to teaching your subject? To teach in a different way? The same way?
- 2.5. What did you find were the greatest challenges overall of your training?
- 2.6. What do you feel were the most challenging aspects of developing your SKfT?
(need to probe on pedagogical challenges in maths and science (use prompts: abstract nature of subject; language; negative image of subject; teaching out of science specialism; cultural issues)

3. GTP training on SKfT – school-based

- 3.1. How much of your training plan specifically referred to the development of SKfT?
- 3.2. What were your mentoring arrangements? I.e. one mentor or co-mentored. Did your mentor have the same subject specialism as you? If not did this present problems in terms of developing your SKfT? How did you receive subject specific mentoring?

- 3.3. How does/did your mentor provide training on SKfT? (*Use prompts: mainly through observation and feedback? Joint planning? Team teaching? Micro teaching? Specific time away from the classroom to receive SKfT training?*)
- 3.4. Have you worked with other teachers to develop your SKfT?
- 3.5. Is there a predominant style/model of teaching that you were expected to follow in your dept. /school? If so how did you feel this affected your SKfT development?
- 3.6. How far did you have opportunities to observe and try out a range of teaching styles? Do you feel you've been allowed to 'take risks'?
- 3.7. Overall how well did you feel you were supported by your mentor in developing SKfT? Was there any support you would have liked that you didn't receive?
- 3.8. What input did you have from your provider tutor to support the development of your SKfT?
- 3.9. Overall how well supported by your EBITT tutor did you feel in developing SKfT? Was there support you would have liked that you didn't receive?

4. SKfT – school context specific issues

- 4.1. How far did the ability and type of pupils you were teaching affect how you developed your SKfT? Do you feel these placed limitations on your SKfT development?
- 4.2. How much second school experience did you undertake? What was the focus?
- 4.3. Were there specific opportunities to develop your SKfT in that school? How much do you think your second school experience helped to develop your SKfT?
- 4.4. Did the second school experience provide the opportunity to use very different/contrasting resources/teaching styles for a different context?

5. GTP training on SKfT – central/provider

- 5.1. How much central run training was there on SKfT?
- 5.2. How useful did you find these SKfT sessions? Which aspects in particular?
- 5.3. Did you receive training on numeracy, literacy, SEN, EAL?
- 5.4. Did the training use the TDA SKfT model? (show the model)
- 5.5. Should there have been more central run training on SKfT and if so what should it have covered?
- 5.6. How well did these sessions link into school based training – was there a feedback mechanism?

6. Other resources to develop SKfT

- 6.1. What other resources have you used to develop your SKfT?
- 6.2. Have you used journals, research, news articles?
- 6.3. Have you used Web-based – internet. Blogs, WIKIs?
- 6.4. Have you used TDA resources, TTRB?
- 6.5. Have you attended any external training? (*Use prompts: subject association; local authority, exam board*)

7. Is there anything else you would like to add/tell me about?

Appendix 7

Example of a transcribed interview

Bethan science (physics) GT Central College

Y: So to start with just to get a bit of background information. I don't usually ask about age but it's useful to get data about the profile of the interviews.

B: I'm 23.

Y: What was the subject and class of your degree?

B: Joint honours in Chemistry and Physics. I got a 2.2.

Y: Xxxxx is mixed school and 11 -18?

B: 3 – 18 now, we've got some little ones in. It's only been this year it started.

Y: This a brand new building – when was it finished?

B: A year and a half ago.

Y: What were you doing before the GTP?

B: I'd only just finished university but I did a little bit of the student associate scheme up there and 'physics into schools' as one of my modules.

Y: Where did you go to University?

B: Xxxxxx.

Y: So you did a bit of work in schools when you were at uni and made a decision to go into teaching at that time?

B: Yes.

Y: What made you decide to become a teacher?

B: It was probably when I started the 'physics into schools' module so this was credits that went towards my degree. I sort of did the module because it sounded a lot more fun than 'molecules in action' and had so much fun and I realised that Mondays which was my school day was my favourite day of the week so I decided this is obviously going to be something that I'm going to enjoy more than becoming a research scientist so this is what I want to do and then I decided to do the GTP rather than the PGCE because when I did the student associate scheme I had already missed the deadline for PGCE applications and [someone said] "why don't you do the GTP?" This is all about it and told you quite a lot of information so

Y: That was in Xxxxxx presumably?

B: Yes.

Y: So why did you come to Xxxxxx?

B: I'm a Xxxxxxxx and I live like half an hour away.

Y: So logical to train in Xxxxxx and so did you start at the school when you started the programme?

B: I started here a week before the summer holidays.

Y: So you did a little bit of induction to get to know the school?

B: Yes.

Y: Thinking about your own experience at school – did that influence how you wanted to teach?

B: Well, I was taught in a very traditional 'chalk and talk' way and it was really boring so I know what teachers I liked and they were the ones that didn't do that so I realised it was the style I wanted to go for so it was more of an influence by negative influence rather than positive influence.

Y: Thinking about your training what were the greatest challenges of the programme?

B: Trying to get everything done because you've got lessons to plan properly, you've got the marking to do which is the one that always seems to get pushed to the bottom of the pile and then you've got sort of little essays to be doing here and there ...making sure you're doing all the assignments you're supposed to get done. It doesn't sound like a lot but it just seems like a lot at the time.

Y: So that was overall was the greatest challenge – was there anything else like behaviour management which most trainees worry about?

B: Behaviour management has been my on-going targetbut that's a new class I only took them over about two weeks ago.

Y: What year are they?

B: Year 9 – the top set. They're used to chalk and talk and they're really not liking me come in not giving them any answers ever – they hate that!

Y: That's interesting. There are obviously a lot of different teaching styles. So there isn't a predominant teaching style here?

B: No, not really. I think everyone adapts their teaching style to the class whereas I'm too stubborn I don't want to ever just be a 'giving them information' kind of person - I just don't think it's a good way to learn really. I try to do practice before theory – that way round to learn.

Y: So they are a new class for you?

B: Yes, I'm finding them a bit of a challenge at the moment – they don't like me.

Y: In terms of developing your subject knowledge for teaching or pedagogy – what would you say were the greatest challenges there?

B: There wasn't a scheme of work when I came here – no-one believed me when I said that there was no scheme of work. So it was just a case of having to go to other teachers and say "Right I've got to teach this now what should I do?" and then I'd be getting lots of different information from lots of different people and I'd end up having a mash-up lesson of everyone's ideas and that would usually go a bit wrong. So I had to limit it to just a few people to get ideas but also TES was really useful to get information...and we have 'Caboodle' now which has got a scheme of work for the GCSE but for the A level it was just having to make it up as I went along because the teachers all left. So it was just me and Tim and he had only been teaching for one year but the unit I was teaching he hadn't taught before either – so we were both having to make it up.

Y: So that was a really big challenge for you. Did you feel you got enough support in that respect?

B: Up and down...so a lot of the time but that's more my own fault for not always going for help and trying to come up with the ideas myself and then I'd fall flat on my face ...it was something I realised that if I want to know something then just ask – it makes life much easier and we've got a scheme of work now which is nice.

Y: In terms of particular topics were there areas you found particularly challenging?

B: Well my area where I know the least about is biology because of chemistry and physics being my degree so I have had to just ask the biology teachers a lot of questions but I find human biology quite simple – it's the plant biology I'm a bit confused by a lot of the time.

Y: So this leads me to asking about your training plan – was there part of your plan that addressed your need to develop your subject knowledge in biology?

B: Not that I'm aware of really.

Y: It wasn't discussed when your needs assessment was done?

B: I had to do an audit of my knowledge but it wasn't something that was said "you have to do this or certain tasks or have to read certain books".it was just a case of "read the book a chapter ahead of what you've got to teach and then you know what's going on".

Y: Do you think it would have been helpful if you'd something specific in your training plan to address those gaps?

B: Maybe.

Y: Well you obviously found it in the end.

B: I think a lot of the students didn't mind because they've got so many biology teachers in the department that they didn't mind me saying "actually I don't know biology that well, ask one of the other teachers". They didn't seem to mind me just admitting I don't know.

Y: Talking about your mentoring arrangements – you mentioned you'd changed mentors.

B: Yes, my mentoring arrangements were interesting. Originally Tim was my mentor for about a week or so and he's an NQT – so that wasn't considered appropriate. So then I got moved onto Mary who's a biology teacher but I was asked to come in to teach her A level chemistry class because she didn't have the subject knowledge and then she was my mentor for a long time. Then Patsy [senior mentor] was concerned that I wasn't progressing because Mary is very chalk and talk and that really is her only style so she got Mo who's the head of department, Pete who's the AST for Teaching and Learning and Tim again observing me quite a lot and helping me a lot.

Y: So Tim was giving you subject specialist input in terms of observing you and then you were having input in terms of other aspects of your teaching. So Pete ended up being your main mentor?

B: Right at the end.

Y: So you had four mentors altogether?

B: Yes. I'm blaming the old head of department because he sort of just left everyone in a mess and didn't really plan anything properly so when I turned up ... "Oh, you're going in this lesson and this lesson" and then two weeks in "you're going to be teaching chemistry A level"... "Oh, OK" and then just being moved round a lot because then the two other physics teachers – one got fired and the other quit – so then everything changed again. So a bit of chaos really this year.

Y: So that was a challenge for you because it didn't get a clear pattern of mentoring...

B: Or classes.

Y: What about your timetable – how much have you been teaching?

B: I'm on 16 hours now.

Y: What did you start off with?

B: Only three for the first half-term and that was the A level chemistry class because I was having to develop a lot of subject knowledge because I was teaching the organic chemistry which was my weakest part of chemistry. So I had to learn all of that again – I was really excited when I left university – I thought I'd never have to do organic chemistry again but no good!

Y: Well it so often the case you have to teach what the school needs.

B: I still might have to teach chemistry next year because there are three A level chemistry classes and only one physics for each of year 12 and 13.

Y: Just going back a bit – how come you came to this school – did you try lots of schools?

B: I had an offer from here and Xxxx School - have you heard of it, it's in Xxxxxx?

Y: Yes, I have heard of it.

B: But they were just opening a new sixth-form and I was going to be in charge of physics and I was a bit wary of being in charge of A level physics with no scheme of work but then I came here and I also found they didn't have scheme of work.

Y: With several mentors how did your training happen in terms of the mentoring arrangements? Was it mainly through observation and feedback?

B: Yes, Mary only ever saw me with the chemistry A level classes because my timetable wouldn't fit into any of her other threes, Tim would see me quite a lot with 12's and with my original year 9 class and then Pete would just come in here and there where it was appropriate.

Y: And Pete is an AST for?

B: Biology.

Y: So different people were observing you within different subject areas within science. Did you do any joint planning, team teaching?

B: I did quite a lot of team teaching and I've done few differentiation by tasks lessons where I've had other teachers who aren't assigned to the class at all coming in as well so that we could plan together running different groups and they all feedback and it actually all works very nicely when that happens because you have someone keeping an eye on them at all times. Which was always fun but they were very effective.

Y: What if you needed – like you were saying earlier when you had to develop the scheme of work. Did you much opportunity where somebody would spend an hour with you helping you to look at resources, planning, ideas?

B: I usually got help if I had an observation lesson with Patsy because we want to please Patsy, we'd want the science department to look good. So I'd get a lot of help then. Tim was very good when he was with my Year 9 class but he got taken away after a while but I used to give him my plans and then he'd annotate them and change them for me.

Y: So that must have been very helpful.

B: Yes.

Y: So overall how do you feel about the whole training experience in how you developed your subject knowledge for teaching?

B: In terms of subject knowledge it wasn't very structured - it was just "what classes am I going to end up teaching this term? Ok I need to make sure I know what's going on with those topics" but because of all the timetable changes there was never much point planning far ahead because I knew I would not end up with the same class for too long.

Y: So you taught different classes at different times?

B: I had one year 7 class for one lesson a week for only for a month or so. I've got a new year 7 class which I've only just taken over for one lesson week. I had a brand new year 8 class which I had my partnership assessment on even though it was only the sixth time teaching them. I've got my year 9 class set 4 which I've had almost from the beginning, so they're consistent.... I've got a new year 9 class, which was the class you just saw. The year 10's I took over...I started going in twice a week in February ish and then I went off obviously and then came back from my second school. The year 11 I had briefly while Nora ...I was supposed to be helping Nora whose the one who quit – but then she would not turn up and not set any other work but not warn me in advance so I'd turn up to the lesson and find she's not in that day and I'd feel like “Aaah “and have to make that up. That was always a quite dreaded happening – every Thursday and every Friday – “Please tell me Nora's in!” so I had them for a while. Then they realised she wasn't going to come back, so they thought it was a bit unfair leaving me with them. Then the years 12's – I was originally in with the year 12 chemistry and then I got rid of them and now I have the year 12 physics which I got after Nora left and then the year 13's, I had year 13 chemistry all the way through until now.

Y: So only really two classes that you had all the way through.

B: Yes.

Y: So you started within 3 hours and you now have 16. What's the total number of periods?

B: Each period is one hour and there are five a day – so 25.

Y: So you've got 16 out of 25. Just to get an idea of percentage timetable. How much opportunity have you had to observe?

B: In the beginning when I had a very light timetable I went round lots and lots and then as it built up I observed less often. I try to do one a week but quite often people say at the last second “please don't come” which is fair enough if you're not that well prepared you don't really want a trainee sitting there writing away.

Y: So sounds like you've had quite a lot of opportunity to observe other teachers.

B: Yes, definitely.

Y: What about other subjects? Have you looked at other none science subjects?

B: Yes.

Y: In terms of support from Central College, how well did that work in terms of helping you to develop your subject knowledge for teaching?

B: From Central College, not a lot to do with subject knowledge. We don't often discuss...

Y: I was thinking about the joint observations. Did you have joint observations?

B: Yes. I had Xxx came in four times in total... or maybe more than that – five times.

Y: So when you had the joint observations did you have useful guidance in terms of that feedback?

B: They weren't usually subject knowledge driven they were usually more teaching and learning technique driven. So I had a lot more training in technique rather than necessarily the subject and...

Y: I was thinking about how you teach your subject – so it is about technique and how you put your subject over.

B: A lot was discussing about use of cards or writing frames and that kind of thing and I did a lot of that with Central College but obviously our group – you were there you saw them. There's a mixture of maths, law and all sorts.

Y: Do you think it would have helped to have some subject specific sessions at Central College ?

B: I think it would have been good maybe if like for an hour or two for part of each week just sit around with your science department and pick a topic that maybe is difficult and talk about that.

Y: You think in school?

B: Yes.

Y: So in school rather than that at Central College.

B: Yes.

Y: You said there wasn't s predominant style here but you felt that you were limited to some extent with Mary?

B: It's just that when you are taking over classes that you're just battling with the students who have got used to a certain way. This is my way, deal with it!

Y: You feel you've been able to develop your own style of teaching?

B: Yes, I have different routines with different class sort of depending on their ability really. So with my original year 9's they're quite low ability a lot of them are SENs so I have to be very strict – this is exactly what we do every single lesson they know what's going to happen and there's no surprises. Whereas top sets my new year 8 and my new year 9 “right we're going to investigate something, you're going to plan it, go!”. It's a bit chaotic and they're not liking it – the year 9's aren't. The year 8's are loving it, which is great “we get to decide what we're doing, we to decide what experiment we're doing?” ...”Yes, yes, you do”. They like it.

Y: Do you feel overall you've been able to try out lots of ideas and take 'risks'?

B: I try and plan risky lessons. I do strange things and the students think I'm a bit mental sometimes. Like bringing in piles and piles of shoes to learn about pressure and they're just like “why are there shoes on all the desks, Miss?”

Y: When you've had those kinds of lessons observed have you had good feedback?

B: I try to do new things as much as I can ...but sometimes they work and sometimes they really don't which is always funny. You just have to have plan B really.

Y: But you've had those opportunities.

B: Yes, Pete's really good at having really creative ideas, that kind of really his forte so it's like "you should hide things all around the room" and things like that.

Y: So he's been helpful in terms of being creative in your teaching so that's been good input. In terms of context it sounds like there's a good mixed ability range so you've been able to teach right across the ability range?

B: Yes but I haven't had much of the middle – the bottom and the top.

Y: Do you think that's limited your experience a bit this year?

B: To be honest you can't teach everything. You can't have the whole package really. Well I suppose I've been flitting around a lot and so it could have. But I don't mind not having had the middle sets. I suppose that in future as a physicist they are going to be pushing me to teach the triple sciences anyway and at key stage 3 I don't think it should be that difficult to adapt because you can do so much with key stage 3 because there's no exams. So you can just kind of play and take risks a bit more with them.

Y: How much second school experience did you do?

B: Six weeks at a grammar.

Y: Where was that?

B: Xxxxx County High. It's a boys' school.

Y: What was the focus?

B: Teaching single sex because Patsy identified that I don't get on with the boys as well as I get on with the girls and teaching high ability because at the time I hadn't get much high ability teaching and behaviour management was another target – it's always going to be a target really.

Y: How did you find that contrast?

B: I hated teaching them but I did get a lot of help from the teachers in terms of subject knowledge. That's probably where all my subject knowledge came in because they have a separate physics department so it meant that I could always continually be bouncing ideas off them – "cool, I'm teaching this next"... "You should do this, this and this, we've got all of this equipment". That's something I'm quite jealous of them for they've got loads of equipment. Whereas I think because there been such a lack of physics teachers here they haven't managed to buy in all the specialist equipment.

Y: So that's given you ideas of what to bring in?

B: Yes, I haven't written a list of things. They might say that will come to a good few grand, so maybe not.

Y: But should get some things I'm sure. So overall you found it challenging in terms of teaching the boys but good in terms of resources.

B: They are very, very chalk and talk – completely predominantly and the boys would almost refuse to do anything. They just hated thinking for themselves. They hated volunteering ideas because they didn't want to be wrong because they get laughed at if they're wrong because they're high achieving and they just want ... "why aren't you just telling us the answers, you're not teaching us". They were just against me – well it felt like they were against me because they just didn't want to find out for themselves. They just wanted to sit down, spend half an hour being talked at, writing notes on the board and then they answered questions. That's what they wanted to do. I battled against them the entire time trying to teach my way and it just never worked. So management of behaviour was a huge issue because they just didn't want to comply.

Y: It must have been quite a challenge for you. What was the feedback you got from the school?

B: They agreed with me that it would be a good influence having me in there. Because also the boys are very, very, sexist. It was... I'd never teach in a boy's school again unless I'm starving to death from unemployment – I really don't want to go into a boy's school again. They really don't respect women very much especially physicists.

Y: Maybe it's the culture of the school.

B: I think a lot of it's their parents.

Y: So positive in terms of resources and developing some aspects of subject knowledge for teaching...

B: It was really positive - I got on really well with the staff. I just really didn't get on with the boys.

Y: How useful did you find the central training at Central College? What were the most useful things that you got from it?

B: The main part was the social side really. Just being able like ...because there are GTs here now ...starting next year there's a few people starting. But I was by myself here a little bit. So it's so nice to be able to just go and vent – I did a lot of venting – timetabling issues were usually my vent.

Y: Well that's, important because although it good that you are a member of staff it can be a bit isolating especially if you're the only GT.

B: Well PGCE they have their own little group and they have their own sessions and the Teach First people also have their own little group and have their own sessions.

Y: You didn't have a chance to go to any of the sessions they were running here?

B: I had the 'dial' sessions which NQT and Teach First does – we do those together. But they're only twice every half-term. But they spend a lot more time together. They had weekly hour long sessions with Patsy.

Y: So they had a professional studies session. But you weren't given the opportunity to go to any of those?

B: No, and that could have been quite helpful for me.

Y: So the central sessions were good in terms of having a chance to meet with your peers and offload... ..

B: Learning wise, I loved the way that James always...he taught by example kind of thing. So whenever he did a little bit ...we always did activities and group work and writing stuff down so it was a lot of learning new pedagogy in terms of general pedagogy...

Y: And then you took it back and applied it your subject?

B: Yes.

Y: The TDA introduced this model of subject knowledge for teaching. Have you seen it?

B: I've seen that on a slide.

Y: The reason I mention it is because they were concerned about how trainees especially on the GTP developed their subject knowledge for teaching. This model has been put forward as a way of conceptualising the areas you need to link together.

B: Well there's the assignment which you had to look through and see common misconceptions and that kind of stuff and then there's one which is just national curriculum and you have to see how it goes from key stage 2/3/4 which makes you really think about what they learn at primary because you wouldn't really think of that otherwise if you didn't have that kind of activity. But that's only applied to one topic so maybe that's extra work to do it for other topics. But that kind of activity could have been very useful.

Y: One thing that sometimes mentioned in terms of developing subject knowledge for teaching not mentioned in the model is being aware about how your own experiences affects this development. Do you think that something that should be explored?

B: Just having activities that are generic and having your own spin on it?

Y: Well, it's about being aware of how your own experiences influence your approach – you've talked about it a bit already.

B: Specific topics?

Y: Yes, or teaching overall.

B: I could have done with more discussion. Something that we lack as a school are subject rooms. We don't have like a science room and that kind of thing is really supportive. When I had that at Xxxxx County – you all sit in one room and you could just be like “I'm doing this, what shall I do?” and you could just bounce off ideas really quickly. Here it's like going from person to person all shut away in their labs and being just asked.

Y: So if you had a departmental room where people congregated it would have provided informal learning opportunities.

B: You only get two curriculum team meetings a term so we don't actually get many at all and we usually spend them talking about BTEC coursework and I don't teach BTEC so it wasn't really that relevant to me.

Y: So that's something that would have helped you if there had been in office with more people.

B: Yes, I usually share with Tim. He would be working away and he's get me asking really bizarre questions at him like “what happens when this goes with this?”. At the moment we're all trying to decide what kind of graph you should plot if you're adding layers of insulation because AQA have changed their rules and there's no such thing as discrete data anymore. Is it either continuous or categoric and we're all trying to work out what the number of layers would be. Because discrete is apparently part of continuous so in theory we should be drawing a line graph of best fit. So we're kind of going along that line at the moment but it's a bit of an on-going discussion. Mainly between me and Tim because we're physicists.

Y: In terms of central session how well did they link to things you do here. Was there a feedback mechanism where you had a task to undertake?

B: Not very often. On the original plan there was sort of little activities, like for next week ...

Y: On your training plan?

B: Not on the training plan – it's on the original GTP plan that we were given – this is what we're going to be doing in the session, what you should do before the sessions, what reading you should do and then no-one stuck to it, everyone kind of went off went off at different tangents so they weren't necessarily that relevant anymore. It started off being relevant so you'd bring in copies of pupils' marked work or whatever and go through it and how to mark it properly but then we stopped.

Y: So there wasn't always a logical feedback loop?

B: No, not always.

Y: In terms of resources in developing your pedagogy have you made of internet resources, Central College library?

B: Lots of internet resources. I only used the library for the essay. I went and got a load of books on EAL. So they weren't subject knowledge, they were just teaching and learning.

Y: Just question about national initiatives – literacy across the curriculum – how good was the training on that?

B: We had a day talking about it at Central College . We talked about writing frames and about ‘pupil talk’. So we did have some actual training there on it and also here we had a twilight session about literacy and numeracy and different techniques that we should probably be using. I know I’ve got to watch my language now because I’ve got...I used to be very well spoken and I’ve almost purposely suppressed that and now I’ve got to remember to go back to speaking properly because it’s one for the teaching standards. So you’ve got to speak with good English.

Y: It’s also about terminology isn’t it, explaining things in language that children can find it accessible.

B: All my EAL essay and all that work it was so literacy focused so I read something called ‘Beyond Key Words’ which was all about how it’s not just about using key words it’s how to go about answering the question. So that gets integrated into lessons quite a lot now.

Y: So you felt you had good training on that. Well that’s all my questions. Is there anything else you’d like to tell me about your experience overall?

B: I suppose I should say that I have enjoyed it and I have learnt a lot. So if I have been griping, it’s not actually negative.

Y: I think the fact that you’re going to take a job here is good. It sounds like you’ve had challenging year and a bit more than it needed to be.

B: It was all beyond anyone’s control especially with people leaving and new people coming in so it was just a bit chaotic.

Y: Do you feel that it was difficult to make too much of a fuss about it because you’re employed by the school and didn’t want to ‘rock the boat’?

B: I suppose I haven’t really...I never really was complaining to anyone at school about all the things...

Y: Did you speak to your Central College about it?

B: No, she’s asks me every now and then what my timetable is and then she’d say “it’s completely different from your training plan.”

Y: Did she pick up on it and speak to anyone?

B: She spoke to Patsy and I think she spoke to the department and the department said “well tough”

Y: They couldn’t really change it but it wasn’t an ideal situation for a trainee. So it was raised but difficult to change it. Did you feel it was difficult to make a fuss and you might have done if the situation was different

B: Yes, I suppose I didn't really want to like moan "oh, I'm changing my timetable again am I?" It was just like this is the situation and I've got to go with it really. I can't say I refuse to teach A level chemistry and begging the head of department to employ a chemist so I don't have to teach chemistry next year!

Y: Well it sounds overall it's been a positive experience and you've learnt a lot from it.

B: Well I'm hoping that it means next year I can ready be prepared for almost anything. That's the plan at least.

Y: Well thanks so much for speaking to me and giving me your time. I think this research is important because the government is planning to expand school-based training but certain things need to be in place for trainees.

B: I think subject specific sessions would be really good and yes, having a long term plan of a training plan that stays the same would be really good.

Y: Your training plan was deviated a lot - the school had provided a timetable of what you were going to teach but actually you were teaching something quite different.

B: My very, very original timetable I only kept one class and that the Year 9 set 4.

Y: Well thanks so much again and good luck with everything.

Appendix 8

Sessions observed

1	<p>NineSG Training/information meeting for mathematics mentors Agenda: revised 'Cause for Concern' procedure; new QTS standards; new Ofsted grades; conducting SKfT focused meetings with GTs; volunteers to run SKfT central sessions in 2012-13.</p>
2	<p>NineSG Training/information meeting for science mentors: Agenda – as for mathematics mentors above</p>
3	<p>NineSG Mathematics SKfT session 'Assessment for Learning' Session focus - to gain a greater understanding and practical application of assessment arrangements in their subject</p>
4	<p>NineSG Science SKfT session 'Exploring New Initiatives' Session focus – to gain an understanding of new initiatives in the subject and new KS4 and KS5 specifications</p>
5	<p>Kingsview Mentor Conference: Agenda: new QTS standards; new assessment only route to QTS to be offered by Kingsview; changes to OTTP; SSD – Salaried Schools Direct/end of GTP; new Ofsted Framework</p>
6	<p>Kingsview Mentor Training Secondary GTP school-based training and mentoring Areas covered: Observation and feedback; school-based training model; presentation from GT and Mentor and GT role play</p>
7	<p>Central College GT Teaching and Learning session 10 2011-12 Areas covered: 'Leadership and Management' and 'End of programme review'. Main focus: opportunity to feedback on training experiences from the year and 'advice they would give to next cohort'; leadership and management and end of programme review.</p>
8	<p>Central College Induction session - 2012-13 secondary cohort GTs and Subject Mentors Areas covered: Initial needs audit and ITP; addressing subject knowledge gaps; teaching timetable; second school experience; role of subject mentor.</p>
9	<p>Central College Induction Day for 2012-13 for GTs only Areas covered: early concerns of trainee teachers – focus on thinking about themselves and their expectations with reference to e.g. Fuller (1969); Furlong and Maynyard (1993); lesson observation</p>
10	<p>TDA School-based provider Spring regional meeting Agenda: ITT criteria update; QTS standards Guidance; Self -Evaluation document feedback; 'Troops to Teachers'; Funding and Allocations; ICT test and non-cognitive testing; Ofsted consultation</p>
11	<p>TDA School-based provider Summer regional meeting Agenda: ITT criteria; update on Ofsted inspection framework; behaviour; Special Educational Needs and Disability; Skills Tests; Funding and Allocations; School Direct; Teaching Schools.</p>

Appendix 9

Four stages of NatCen data analysis process adapted from Spencer and Ritchie (2003)

<i>Four stages of NatCen data analysis process</i>
<i>Stage one - identifying initial themes and concepts</i> <ol style="list-style-type: none">1. Thorough review of the range and depth of data to produce a list of important themes and concepts.2. Themes compiled via logging concepts as they emerge through reading data or listening to tapes of interviews.3. Emerging themes and topics should be described in terms that stay close to the language and terms used in the data as imposing related concepts from existing literature distract analytical thinking.4. Introducing more abstract concepts should occur later as otherwise they cease to be grounded in the data. The time for theory building or constructs introduced from other literature comes late in analytical process.
<i>Stage two - constructing an index</i> <ol style="list-style-type: none">1. The initial list compiled in stage one allows the researcher to move to the construction of an index or codes.2. The index is constructed by identifying links between categories, grouping them thematically and then sorting them according to different levels of generality so that the index has a hierarchy of main and subthemes.3. These themes and sub-themes need to be sorted and resorted until there is a workable structure.
<i>Stage three - labelling or tagging data</i> <ol style="list-style-type: none">1. The index of themes is used to label the data.2. One interview response will often contain references to more than one theme and so will be 'multi indexed'.
<i>Stage 4 - sorting data by theme or concept</i> <ol style="list-style-type: none">1. At this stage the data is ready to be sorted or ordered so that material with similar content or properties can be linked together.2. This allows the researcher to focus on each theme in turn so that detail and distinctions that lie within it can be unpacked.3. Ordering may well be altered at a later stage but initial physical clustering of material allowed an intense review of content that will be needed for the analysis.4. NatCen framework uses a matrix format thematic structure: each index or theme heading is allocated a column on the chart and that each 'case' or interviewee assigned a row and will stay on the same location on every chart.

Appendix 10

Initial list of themes and concepts

Emerging themes merging theme/subtheme	
1	Felt like a teacher from the start
2	Greater confidence because of responsibility/ownership
3	Importance of peer support
4	Value of central training
5	Central training – GTP facilitates links between theory and practice
6	Timing of sessions not always helpful
7	Central training deficiencies
8	Community of practice very important in developing PCK/SKfT
9	EBITT tutor input in schools
10	Taking ‘risks’ - strong feature of GTP training
11	Predominant teaching style in some schools
12	Science and maths are difficult subjects for many pupils
13	Influence of GT’s prior experience
14	Observation of teaching one of best ways to develop PCK/SKfT
15	Importance of mentor
16	Mentor Inconstancies
17	Impact of staff changes on mentoring
18	Mentoring out of subject
19	GTs not all supernumerary
20	SSE - different approaches
21	Context limitations on training
22	Ofsted constraints

Appendix 11

Indexes of concepts, themes and subthemes

PROGRAMME LEADER CODE INDEX	
PLB1 <i>Title</i>	How long in role
PLB2 <i>Background</i>	Background: prior experience how did they come into the role?
PLB3 <i>Role</i>	Responsibilities
PLB4 <i>Constraints</i>	Constraints on role
EBITT BACKGROUND & DEVELOPMENT	
PL ED1 <i>History</i>	Origins of EBITT, HEI led, school-led etc.
PL ED2 <i>Mission</i>	Needs of schools? Address subject shortages?
PL ED3 <i>GT numbers</i>	GT nos.; are all GTs supernumerary? Self-funded GTs? Nos.? On what basis?
PL ED4 <i>Programmes offered</i>	Focus - programmes offered - primary, secondary, OTTP ; PG Cert; masters credits
PL ED5 <i>Special projects</i>	Working with specific types of schools; TDA funded work
EBITT SELECTION PROCESS	
PLES1 <i>Overall process</i>	How do GTs apply; find own school?
PLES2 <i>Selection criteria</i>	Degree/academic/subject requirements (includes how they address candidates not fully meeting requirements)
PLES3 <i>School involvement in selection</i>	Vested interest in GT and link to commitment to training
MENTORING ISSUES (PROBLEMS) & TRAINING	
PLMP1 <i>'Rogue school'</i>	Time for role; training attendance; release time; different levels of expertise, mentors change every year etc.
PLMP2 <i>Inconsistency</i>	Inconsistency examples
PLMP3 <i>Subject match</i>	Subject match – science? How dealt with?
PLMP4 <i>Mentor model</i>	Mentoring arrangements; mentor model - traditional
PLMP5 <i>Communication with schools</i>	Communications between school/mentor and provider/tutors
PLMP6 <i>Mentor training</i>	Mentor training - generic? How to feedback? SKfT - Sub spec training? Evaluation/feedback → changes; mentor accreditation?
PLMP7 <i>Teacher to teacher educator</i>	Teacher to teacher educator - importance of shared understanding of expectations; importance of strong dept. coaching ethos; mentors don not know what we mean by pedagogy;
SKfT RATIONALE & DEVELOPMENT	
PLSKR1 <i>Rationale</i>	Rationale/role in development? TDA model used?
PLSKR2 <i>Further development</i>	Changes & further development of SKfT delivery
PLSKR3 <i>SKfT assessment</i>	Portfolio model used for recording/monitoring/ assessing SKfT
SKfT DEVELOPMENT IN PRACTICE	
PLSK1 <i>Teacher identity</i>	Larger timetable – ‘immersion’; NQT year easier; ‘in at the deep end’; able to take more risks; ‘get in there and try it’

PLSK2 <i>Predominant one school model</i>	Pros and cons; mainly in one school can be narrow - 'mini-me' syndrome
PLSK3 <i>Behaviour management</i>	Behaviour for learning - learning styles
PLSK4 <i>Central training</i>	Central training - how run, what's covered – 'what went well' (WWW)
PLSK5 <i>Central training development</i>	Central training - evaluation and feedback of training- how to use the findings? - lots of data but not used it to best advantage
PLSK6 <i>Community of Practice</i>	Learning from GTs; depts. working together to train GTs
PLSK8 <i>External Training</i>	External & other training opportunities as part of programme e.g. attendance at PGCE sessions etc.
PLSK9 <i>GT challenges</i>	Challenges for GTs - stress etc.
PLSK12 <i>EBITT tutor role</i>	Provider tutors role - Tutors as trouble-shooters - link to centre/part of support system to resolve issues etc.
PLSK13 <i>Orientation</i>	Teaching styles - opportunities to learn about and try; mainly in one school with one mentor can limit opportunities
PLSK14 <i>Influence of GT's experience</i>	Influence of own school experience/unrealistic expectations about teaching and programme
PLSK16 <i>SKfT resources</i>	Resources available to GTs? School-led provider advantage - exam board information/guidance
PLSK17 <i>Mentoring</i>	Mentoring/SBT on SKfT – WWW
PLSK19 <i>School ethos</i>	School T&L ethos - benefit where strong T&L ethos - whole school commitment to ITT
PLSK20 <i>Pedagogy</i>	PK pedagogy development.; subject specific issues; importance of X curricula link; how addressed in training
PLSK21 <i>SMK/Subject knowledge per se</i>	Degree & subject match – audit
PLSK23 <i>Second school experience (SSE)</i>	Rationale, selection, length, focus, impact on SKfT
PLSK24 <i>Individual Training plan (ITP)</i>	Training Plan - how written - how much of the ITP refers to development of PK and SMK? SMK audit?
PLSK25 <i>Tasks/assignments</i>	Task/Assignment - how used? marking and grading
PLSK26 <i>Context limitations</i>	Context limitations/parity of school experience; training for profession not for school; demographics/diversity; pupils' ability, expectations of pupil especially in maths; school teaching style, provider; equipment, labs, ICT;
PLSK27 <i>TDA Framework</i>	TDA SKfT model - deficiencies?
PLSK30 <i>EBITT tutor training</i>	How are they trained; ongoing training?
OTHER	
PLO2 <i>Quality assurance</i>	QA issues
PLO5 <i>ITT changes</i>	Schools Direct and other ITT changes - concerns - quality/access to resources? Apprenticeship model

SUBJECT LEADER CODE INDEX	
SLB1	SL background
SLB2	How long/how took on role/how trained & prepared for role
SLB3	SL responsibilities and how operationalised
SLB4	Constraints on role?
EBITT SELECTION PROCESS	
SLES1 Overall process	How do candidates apply; find own school?
SLES2	Degree/academic/subject requirements (includes how they address candidates not fully meeting requirements)
SLES3	PHD GTs
MENTOR ISSUES (PROBLEMS)	
SLMP1 <i>Rogue school</i>	Mentor not released for training; not attending training; lack of time for role
SLMP2 <i>Inconsistency</i>	Mixed messages; assessment; support
SLMP3 <i>Mentor match</i>	Subject match; mentor not subject specialist; age, experience match
SLMP4 <i>Mentor model</i>	Mentoring model - traditional
SLMP5 <i>Communications between EBITT & school</i>	Communications with mentor/school often an issue
SLMP6 <i>Mentor Training</i>	Mentor training - sub training - mentor's own subject knowledge - need more training
SLMP7 <i>Teacher to teacher educator</i>	Role involves training as well as mentoring; losing control of classes; QTS standards; marking assignments; pedagogical terminology; training GTs to be 'reflective practitioners'; delivering central sessions
SLMP8 <i>Paperwork</i>	Paperwork/portfolio - onerous, electronic portfolio limitations; assessment limitations; clarity of what's required
SLMP11 <i>Mentor understanding of SKfT</i>	Mentors do not always know what we mean by pedagogy
SKfT RATIONALE & DEVELOPMENT	
SLSKR1 Rationale	Rationale/how developed? TDA model used? Different opinions
SLSKR2 <i>Role in SKfT development</i>	SKfT - SL role in original EBITT model dev.; subsequent changes/developments
SKfT DEVELOPMENT IN PRACTICE	
SLSK1 <i>Teacher identity</i>	Larger timetable – 'immersion'; NQT year easier; able to take more risks; 'get in there and try it'
SLSK2 <i>Predominant one school model</i>	One school - pros and cons - mainly in one school can be narrow - 'mini-me'
SLSK3 <i>Behaviour management</i>	Behaviour for learning - learning styles
SLSK4 <i>Central training</i>	Central training model and activities/link into school-based training' peer support aspect - important but limited opportunities
SLSK5 <i>Central training</i>	Central training evaluation/further development - GT

<i>development</i>	feedback, ITT changes; PGCE better on SKfT - GTP needs more SKfT input
<i>SLSK6 Community of Practice</i>	Maths & science depts. are especially good on this. - big staff etc.; GTP used to develop school involvement in ITT?
<i>SLSK7 GT profile</i>	Bring wide experience which benefits schools; allows more reflective model of central training; drive own programme
<i>SLSK8 External training</i>	External & other training e.g. PGCE sessions, guest speaker, subject assoc.
<i>SLSK9 GT challenges</i>	Challenges for GTs - stress etc.
<i>SLSK10 Observation</i>	Observation as training - inconsistent observation opportunities observing in other subjects important
<i>SLSK11 Primary to secondary</i>	Challenges in dealing with pupils' transition from KS2
<i>SLSK12 EBITT tutor role</i>	Provider tutor role: 'policing' role but not as effective as limited contact; mentor training as part of visit; role in compiling TP & portfolio; monitoring; QA
<i>SLSK13 Orientation</i>	Predominant? Opportunities to try/use a range of teaching styles
<i>SLSK14 Influence of own schooling</i>	Approach to teaching; unrealistic expectations re teaching and programme
<i>SLSK15 Recent school experience</i>	Recent/pre-programme school experience - impact on SKfT development
<i>SLSK16 Resources</i>	Resources - improved resources access in schools; reading imp in developing PK - needs to be monitored
<i>SLSK17 Mentoring & school-based training 'good'</i>	Mentoring on SKfT – what worked well
<i>SLSK18 Mentoring & school-based training 'bad'</i>	Mentoring/SBT on SKfT - what worked badly (WWB) mentors have gaps in sub knowledge - how to improve it
<i>SLSK19 School ethos</i>	School teaching and learning ethos - benefit where dept./school has strong ethos with training etc. - engagement of GT/school crucial - weak school/weak GT etc.
<i>SLSK20 Subject pedagogy</i>	Subject pedagogy: Maths - strong on Community of Practice; well-resourced; very specific pedagogy; abstraction; understanding is key rather than rules; Science PK issues; Factual knowledge to understanding - what teaching and why; X-curricula links imp; adapting for context; language,
<i>SLSK21 SMK/Subject knowledge per se</i>	SMK - Degree & subject match – audit
<i>SLSK22 Supernumerary v non</i>	Pros and cons
<i>SLSK23 Second School Experience</i>	How used in their EBITT?; big impact in 'moving GT on'; not used to advantage
<i>SLSK24 Training plan</i>	Training plan - individualised/SMK gaps/

<i>(ITP)</i>	enhancement course
SLSK25 <i>Tasks/assignments</i>	Tasks, assignments; PGCert requirements provide opportunities for more theory
SLSK26 <i>Context limitations</i>	Context limitations/parity & 'fairness' of school experience; training a prof not school; demographics/diversity; pupils' ability, expectations of pupil especially in maths; school teaching style, provider; equipment, labs, ICT;
SLSK27 <i>TDA framework</i>	TDA model limitations - how used; could be adapted to other subject; 'attitudes' - maths PGCE - more opportunities to learn
SLSK28 <i>Ofsted</i>	Ofsted - expects to see a PGCE; not assessed like PGCE
OTHER	
SLO1 <i>Bad press</i>	'Bad press' - putting people off coming into teaching; 'maths not cool'; other jobs pay science & maths spec better
SLO2 <i>QA</i>	QA issues; feedback on own effectiveness?
SLO3 <i>Final assessment procedures</i>	Final assessment model/process
SLO4 <i>Dropout rates</i>	Drop-outs; GTP good at 'weeding out' early unsuitable/failing trainees
SLO5 <i>Salaried School Direct</i>	Schools Direct' & other ITT changes - concerns - quality? Apprenticeship model - with there be access to up to date resources?
SL06 <i>Tapping into expertise of experienced teachers</i>	Imp of using experience teachers as Teacher Educators rather keeping them in schools.

MENTOR CODE INDEX	
MB1 <i>Background</i>	Mentoring GTP - how long?
MB2 <i>Own ITT</i>	Own training - GTP, PGCE etc.
MB3 <i>Subject</i>	Subject specialism
MENTOR SELECTION & WHAT MAKES IT WORK	
MS1 <i>Mentor selection</i>	How took on role
MS2 <i>Advantage of own training</i>	Advantage if trained via GTP oneself/ trained more recently oneself
MS3 <i>School selection of GT</i>	School involved in selection of GT; vested interest /more accountability; GTP - used for shortage subject recruitment ; 'grow your own'
MS4 <i>School commitment to ITT</i>	Importance of; implications if lacking
MENTORING ISSUES (PROBLEMS)	
MMP1 <i>Rogue school</i>	Enough time-needs to be timetabled in; release time for training; payment no use if insufficient time
MMP2 <i>Inconsistency</i>	Inconsistency - mentor/school/provider/approach
MMP3 <i>Mentor match</i>	Profile .e.g. age, background; subject match especially science; mentoring out of subject

<i>MMP4 Mentoring arrangements</i>	Model in GTP is 'mentoring' rather than training - traditional?
<i>MMP5 Communications with EBITT</i>	Not advising of visit times; supportive
<i>MMP6 Mentor training</i>	Mentor training - school? Provider? Outside? Self - from experience - WWB; 'even better if' (EBI) - SKfT training?
<i>MMP7 Teacher to teacher educator</i>	Role involves training as well as mentoring; losing control of classes; QTS standards; marking assignments; pedagogical terminology; training GTs to be 'reflective practitioners'; delivering central sessions
<i>MMP8 Paperwork</i>	Paperwork/portfolio - onerous, electronic portfolio limitations; assessment limitations; clarity of what's required
<i>MMP9 QTS standards</i>	Understanding QTS standards
SKfT DEVELOPMENT IN PRACTICE	
<i>MSK1 Teacher identity</i>	Larger timetable; NQT year easier; 'in at the deep end'; able to take more risks; 'get in there and try it'
<i>MSK2 Predominant one school model</i>	One school mostly with one mentor - better development/assessment/more time for reflection
<i>MSK3 Behaviour management</i>	Behaviour for learning (B4); teaching alone more often - develops behaviour management quicker
<i>MSK4 Central training</i>	Central training - WWW - smaller groups; peer group support; GTs 'better' at linking to practice;
<i>MSK5 Central training development</i>	Central training - what would be better? - less central sessions - GTP can be isolating; need more theory
<i>MSK6 Community of Practice</i>	Learning from GTs; depts. working together to train GTs; GTP used to develop school involvement in ITT
<i>MSK7 GT profile</i>	Nature of GT profile maximises potential; GTs more mature and able to take on teaching role; able to drive own programme
<i>MSK8 External training</i>	External training used by school (LA; Subject Association; Prince's Trust)
<i>MSK9 GT challenges</i>	GT challenges - stress etc.
<i>MSK10 Observation</i>	Observation as training activity - needs to be directed
<i>MSK11 Primary to secondary</i>	Primary to secondary transition; pupil levels; being able to teach at the appropriate level
<i>MSK12 EBITT tutor role</i>	Provider support - ITP help; mediation; joint observation → more objective view; learn aspects of mentoring; enforces rules; triangle of support
<i>MSK13 Orientation</i>	Teaching styles - one size can't fit all; range taught; predominant style? Mini-me - do it my way
<i>MSK14 Influence of own schooling</i>	Influence of GTs own schooling; unrealistic expectations about teaching and programme demands
<i>MSK15 Recent school experience</i>	Recent/pre-programme school experience - impact on SKfT development
<i>MSK16</i>	Resources used - impact; good ICT resources in school; contrast to Uni); difficulty in accessing
<i>MSK17 Mentoring & school-based training – effective</i>	Mentor-led SBT training activities - ways worked together, e.g. team teaching

MSK18 <i>Mentoring & school-based training – areas to improve</i>	Mentoring/SBT - what didn't work well/what could be improved
MSK19 <i>School ethos</i>	School teaching and learning ethos - benefit where strong ethos/GTs attend staff meetings/CPD etc.
MSK20 <i>Pedagogy</i>	Subject specific PK - Maths - 'attitudes: not 'cool' to like; more behaviour issues than other subjects; ways of teaching the basics; Science: curriculum different to degree; difficult topics
MSK21 <i>SMK/Subject knowledge per se</i>	SMK gaps; training out of degree subject; learn as you teach
MSK22 <i>Supernumerary v non</i>	Pros and cons – less time for observation, reflection, research
MSK23 <i>Second school experience</i>	Cons - selection can be difficult; 'losing' GT; receiving side - no focus; 'pros' - big impact in 'moving GT on'
MSK24 <i>Training plans</i>	Training plan – how used? individualised/SMK gaps/enhancement course
MSK25 <i>Task/ assignments</i>	How used to develop SKfT
MSK26 <i>Context limitations</i>	Context limitations/parity and 'fairness' of school experience; demographics/diversity; pupils' ability, expectations of pupil especially in maths; school teaching style, provider; equipment, labs, ICT
MSK27 <i>TDA framework</i>	Are they aware of? Deficiencies?
MSK28 <i>Ofsted</i>	Ofsted - outcome not process; driving the agenda; GTP schools 'selected'/approved on basis of Ofsted outcomes
MSK29 <i>Attainment</i>	Attainment - better recruitment rather than better training?
	OTHER
MO1 <i>Bad press</i>	'Bad press' re GTP, teaching in general: putting people off coming into teaching; 'maths not cool'; other jobs pay science & maths spec better
MO2 <i>Quality assurance</i>	QA issues – parity with other routes
MO3 <i>Final assessment</i>	Criticism of final assessment model/process
MO4 <i>Dropouts</i>	Dropouts; GTP good at 'weeding out' early unsuitable/failing trainees
MO5 <i>Salaried School Direct</i>	Schools Direct' & other ITT changes - concerns - quality? Apprenticeship model - with there be access to up to date resources?

GT CODE INDEX	
BACKGROUND	
GTB1	Age
GTB2	Gender
GTB3	Subject for QTS & age phase
GTB4	School type
GTB5	Degree subject
GTB6	Degree class
GTB7	Supernumerary?
GTB8 <i>Prior experience</i>	Experience/job pre GTP

GTB9 <i>Teaching why?</i>	Science GTs - research isolating; love of subject; to make a contribution
GTB10 <i>Why GTP?</i>	Need to earn; wanted hands on programme; did not want to spend time at university
EBITT SELECTION PROCESS	
GTES1 <i>Selection for GTP</i>	How did the process happen? Issues with degree/subject match?
MENTOR ISSUES (PROBLEMS)	
GTMP1 <i>Rogue school</i>	Rogue school' behaviour; GTs not getting their entitlement; power relationship
GTMP2 <i>Inconsistency</i>	Inconsistency - mentor/school/provider/approach
GTMP3 <i>Mentor match</i>	Mentor match - profile .e.g. age, background; subject match especially science
GTMP4 <i>Mentoring arrangements</i>	Mentor model: co-mentored? Pattern of meetings?
SKFT DEVELOPMENT IN PRACTICE	
GTSK1 <i>Teacher identity</i>	'in at the deep end' - seen as teacher from start/timetable - larger/plan more lessons/ keep classes/ length of time in school/NQT year easier/development of 'reflective practice'
GTSK2 <i>Predominant one school model</i>	One school mostly with one mentor - better development/assessment/more time for reflection
GTSK3 <i>Behaviour management</i>	'get in right first', B4L
GTSK4 <i>Central training</i>	WWW? Use of generic approach; include literacy and numeracy?; peer support; which sessions most useful? Opportunities to meet with peers? Discuss and reflect way from school?
GTSK5 <i>Central training development</i>	What could improve it? More theory input? link to school-based training; sequencing of sessions; timing; more subject specific; duplication; some sessions not useful e.g. ICT
GTSK6 <i>Community of Practice</i>	GT peer support; dept. office; didn't want to 'rock the boat' - 'work arounds'; not so accessible if no dept. office or not based in dept. office; lots of informal learning
GTSK7 <i>GT profile</i>	Transferable skills from prior work - confidence, working in teams, drive own programme; GTP does not suit all
GTSK8 <i>External training</i>	External & other training opportunities - directed by the school/provider? e.g. subject association, LA EDC training
GTSK9 <i>GTP Challenges</i>	Early stage - amount of planning; no schemes of work; behaviour management; work-home balance
GTSK10 <i>Observation</i>	Observation as training activity - learn from 'good and bad'; means more later on; teaches behaviour mgmt.
GTSK11 <i>Primary to Secondary</i>	Pupils often struggle with transition - differing levels of sub knowledge; lit & numeracy issues
GTSK12 <i>EBITT tutor</i>	Provider tutor input/support – include any issues re inconsistency
GTSK13 <i>Orientation</i>	Range & opportunities 'what works with one class doesn't work with another'; risks; Ofsted limitations?
GTSK14 <i>Influence of own schooling</i>	Positive and/or negative influence
GTSK15 <i>Recent school</i>	Value of in SKft development: gave head start

<i>experience</i>	
GTSK16 <i>Resources</i>	Resources used - impact; good ICT resources in school; library not used much; difficulty in accessing journals/up to date research if not with HEI-led EBITT
GTSK17 <i>Mentoring & school-based training – effective</i>	Mentor- led/SBT training activities - include team-teaching, joint planning; SBT is best way to develop SKfT
GTSK18 <i>Mentoring & school-based training – what could be improved</i>	Mentoring/SBT - what didn't work well – limitations on time with mentor
GTSK19 <i>School ethos</i>	Benefit where dept./school has strong teaching and learning ethos with training etc.
GTSK20 <i>Pedagogy</i>	Subject specific PK: maths - difficult for many pupils; very well-resourced; Science - demystify language/use appropriate language – difficult topics
GTSK21 <i>SMK/Subject knowledge per se</i>	SMK - degree match/gaps/ learn as you teach/other training
GTSK22 <i>Supernumerary v non</i>	Supernumerary v non supernumerary - negative and positive impact on programme and development of SKfT - especially less observation opportunities/less feedback and release time
GTSK23 <i>Second school experience</i>	SSE - selection, focus, impact
GTSK24 <i>Individual training plan</i>	Individualised/SMK gaps/enhancement course; how was it put together? How was it used during training?
GTSK25 <i>Tasks/ assignments</i>	How used to develop SKfT? Examples
GTSK26 <i>Context limitations</i>	Parity & 'fairness' of school experience; demographics/diversity; pupils' ability, expectations of pupil especially in maths; school teaching style, provider; equipment, labs, ICT
GTSK27 <i>TDA SKfT framework</i>	Awareness of? Used specifically in training?
GTSK28 <i>Ofsted</i>	Outcome not process; driving the agenda; place limitations on teaching
	OTHER
GTO1 <i>Bad press</i>	Bad press re teaching; lack of information about GTP as ITT route
GTO2 <i>Quality assurance</i>	Parity between ITT routes: programme requirements and assessment
GTO3 <i>Final assessment</i>	Parity/fairness of final assessment process

Appendix 12

Extracts from findings analysis matrices

	Secondary Programme Leader – Kingsview	Programme Leader - Kingsview	Programme Leader – Central College	Programme Leader NineSG
PLSK4	<p>"It's a hard one to crack. It's difficult. You're doing everything but giving them subject specific"; "So there's activities, they have to do research, and there's an academic strand here so they have to be read, it has to be researched, there's assignments, etc. etc. so it just needs to be well structured in that way."; Central sessions are generic & steered towards sub spec SKfT thro tasks etc. "Well because in our sessions here we teach generic pedagogy don't we? We're not teaching specific so that's where that question is coming for. So in the pre and post-session tasks, through the subject enrichment document and then tasks they are steered towards their on pedagogies"; "so in all the reading, the pre and post-session tasks because we don't have subject specific lectures all of those things steer them ...they take their own lead into the session and lead out of the session and while they're leading in and being led out those tasks are directing them to their own subject" ;; have to keep a reflective diary which shows how they have understood & dev. SKfT "the reflective diary is crucial as well – and that the mentor in secondary has to sign it as well. So it's the pedagogy bit there that is steering them more and more and they are understanding it..." Central trainers model teaching styles "</p>	<p>"When they come here for Thursday training sessions one of the things that each of them does is a taster so they are presenting to the rest of the group something they think is appropriate, inspiring hopefully in terms of what they are doing in their subject. So that's just a small thing which will help them develop their subject"; Matt referred to eval & fdbck which had shown the impact of SKfT initiatives - GT exit survey - they are asked "how confident do you feel in these areas?" + summary of Tutor fed of prog fdbck: "Then it goes back the exit surveys we're doing. As I say there's another document somewhere that shows the Tutors saying no problems with peoples' subject knowledge. That does quite well as a balance to the NQT survey because it's the exit survey whilst it's fresh in their minds."; bringing new IT based survey for 2012-13 which shd be easier to collect although will depend on ability "Yes. It will be very easy to collect data for this from Tutors. Not so easy from Mentors because it depends on how IT savvy they are but all we're asking them to do is put a number in a box and it will also be easy to collect the same data from trainees so we have the comparison".</p>	<p>The main 12 central trng days are generic but GTS are banded into subject groups for central sessions but with several subjects in each group "...Also what we've tried to do this year we've banded them in relation their subjects – so we've got three teaching groups at secondary so we've banded them so they're with their subject colleagues in that grouping so we've got a group with the science and maths with a subject specific science and maths tutor and we've got the arts in another one and the English in another. So that we've banded them which we've never been able to do before because of the way the numbers and the structure has been done. So in that taught session around subject knowledge development there will be more of a focus on science and maths stem subjects rather than a generic broad brush.". Also "a different model for subject teaching which is to offer twilights followed by school-based days. Now it's still in its infancy. We've got it bedded in for primary and for some subject areas for secondary and still working on it this year."; B said they had these sessions for maths but not for sc - sessions were arranged but GTs weren't turning up because not originally timetabled & not compulsory.</p>	<p>Prog of central run session including 8/9 sub spec sessions; also prog of weekly sessions laid down with mentor with certain topics to be covered "Yes there are quite a few sessions calendared where we say to the mentor 'this is your week where you go through the 'skift' document' or 'you go through the subject folder' or 'you check their E-portfolios'. So some weeks it's actually a taught session – so this is 'assessment for learning' in mathematics or another session it would be monitor the 'skift' folder."; also trng thro CPD alliance and 'expert' seminars "we do this CPD alliance – so we just had that last Friday – timetables were suspended across our nine schools so all subject teachers were receiving additional training in one of our consortium schools – so the English would all go to Xxxxx Xxxx School for example and the maths would all come here to Xxxxxx. So they all had a programme of subject specific training and our GTs and our SCITTs joined that training. So quite a few opportunities and also within the subject specific GPSs we have what we call an 'expert seminar' so I say to Subject Leaders whatever you think would be a need for this particular group of five or nine or however many trainees you've got..."</p>

MENTORS

	M1 Science Bev (9SG) (Penny)	M2 Science Jasmine (9SG) (Tom)	M3 Science Harriet (9SG) (Cathy)	M4 Maths Rita (9SG) (Paul)
MMP4	<p>Some elements of sub mentrg shared with Jean who was SM & also acting Head of Phys because Bev wasn't a physics spec but felt roles were clear ": Yes, there was not issue. I was very clearly Penny's mentor but I couldn't help her plan for Key Stage 5 physics but there was always someone there to do that."; "No, it didn't at all because our Senior Mentor is a physicist and she was acting Head of Physics so she was there to do all of that subject specific stuff. So my trainee had that"; "Yes. I was kind of mentoring, doing all the paperwork but when it came down to being a part of the physics department that was our Senior Mentor. She took that on and she did that.</p>	<p>Because J wasn't a sc spec there was a three-way mentrg arrangement - Jean acting Head of Phys provided physics input and Tess Sub Ldr for Sc based at the sch helped with portfolio compilation: "Yes, to my knowledge he had regular meetings with Jean. I think once a week but they see each other all the time because they team teach as well. Then Tess sort of organised a meeting with him as well once a week as well. And obviously I had my meeting with him once a week. So he's got like three meetings"; arrangmts a bit unclear to start with "Yeh, we were quite clear what we were doing. Well, we had a little bit of a...we weren't quite clear at the beginning and then went into a pattern and we knew which job roles that we had to do."; felt it would have been better model if main mentor was sub spec with generic input from SM as it was for most other GTs.</p>	<p>Usually subject mentor is sub spec in same sub so that there is no need for other sub spec input which was the case with her "...we generally try to keep the same subject – so we try to keep chemists with chemists but I say I'm training a chemist but she's not a chemist... she's a biologist training to be a chemistry teacher. "; found that mentrg arrangement worked well in terms of time "my trainee takes some of my lessons so in my head the time that I would be planning that lesson is either the time that I either take to help her to plan it or to do the paperwork associated with it and feed it back. So it has worked that way in that she has taken some of my lessons so I kind of see that as freed up time. Not that I'm not in the classroom with her but it's time that I don't have to plan that lesson and so it hasn't been something that I've personally have found"</p>	<p>As Rita is also Asst HT & HoD there is a Co-mentoring arrangement with Ken who is an AST "In actual fact you see for the last year, this year and next year actually I hope I've shared the role of mentoring with Ken which has been quite good and he's the AST in the faculty so he's got a lot of good skills to teach...of how to engage students, keep the pace and what a lesson should be. So he does a lot of training on that."; "Ken is fixed base so he will do a lot of work with the interactive whiteboard. It also enables us to share out the classes so that he will therefore take say a Key Stage...there isn't a pattern necessarily but he might take the Key Stage 4, I will take the Key Stage 3 and so he's working with that type of thing..."</p>

SUBJECT LEADERS

	Maths Subject Adviser Kingsview	Science Subject Adviser Kingsview	Maths specialist Tutor Central College	Central Trainer for Science & Maths Central College
SLSK5	<p>Felt that coming in for central sessions far less than PGCE was a down side of the GTP as they weren't getting the same level of input & opps to be with other trainees "I think it's comparable to the PGCE in some respects. I think what the training probably lacks is that ability to be with a group of maths trainees and share experiences and that's where they miss out. But through what I do I try and incorporate that as much as possible with the things that we do. But it's not easy in schools getting time out and so on"; "They're probably not getting that input because it's about teaching and getting on with that rather than thinking a bit outside the box in a sense. I think on the PGCE course what you do get is getting them to think a little bit more about to change their attitudes about mathematics teaching and so on. So they have a wide input of information and so on."; altho Sam tries his best to incorporate GTs in as many training sessions s poss it's very 'hit and miss' ". "Because I had some people from say AQA coming to talk about GCSE developments but they couldn't come out so it's a bit hit and miss in a sense but wherever possible we try and incorporate them in the events if possible."; had seen that Jan 2012 cohort of maths GTs were arranging to meet regularly which supports his view of the GTs need for this aspect of training "the January cohort ... they try and get together in a little group and maybe begin to share resources and things and share ideas and I think that's where they kind of miss out...."</p>	<p>Concerns about limited no. centre-based days "Yes, one thing that worries me a little bit about spending virtually all the time in one school; having very restricted number of centre-based days, limited contact with other student teachers in other experiences..."; "...on the PGCE they have a lot more specialist contact time – centre-based training; 60 days altogether of which a proportion is professional studies but here the balance is 3 to 1 in terms of subject training. So quite a lot of subject training in comparison"; "Personally, I favour the PGCE as a model for training teachers. I think most of the trainees on those routes always seem to give positive feedback about their subject studies because I help evaluate all the elements of provision. They do like school experience but they do rate subject studies highly."; PGCE trainees rate/value sub spec sessions more than generic yet GTP only get generic "The area that has always been least popular is the generic element of the centre-based training and that's the strongest feature of the GTP model. So my view is that they would improve that model with more subject training because that's the part of the centre-based training that (PGCE) trainees appreciate the most."</p>	<p>Was disappointed that the sessions he ran were not being continued because he covered diff areas of maths ped "Yes. I did do them for a couple of years. I didn't run one last year though because I think Barbara was trying to arrange twilight sessions. I don't know what happened with that. I did for two years run one where I specifically addressed this point because I thought it was very interesting..."</p>	<p>Subject spec sessions for GTs have been run in the past but are constrained by nos. of GTs and the viability of running sessions for small nos. "the trainees are offered a range of subject specific support whenever we can but it's not always straightforward. If we've got one or two people in a subject it's very difficult to give them subject specific support. But in the past for instance I've run IT subject specific sessions when we've had 8 to 10 IT trainees and their subject mentors are invited to come at the same time and join in."</p>

GRADUATE TEACHERS

	Elaina GT8 Maths (Kingsview)	Valon GT9 Maths (Kingsview)	Karen GT10 Science (Kingsview)	Nicole GT11 Science (Kingsview)
GTSK12 – EBITT tutor support	Support from KV Tutors and EBITT was overall v good "they were very supportive in terms of when I had problems... with problems I mentioned with my mentor they were very supportive and they were there for me when I wanted to discuss it." KV Tutor wasn't a ma spec & she felt it wd have been better if he was: "I had a tutor and I had a Subject Adviser as well. I felt that the tutor helped me in building the portfolio and the subject adviser helped me within my teaching techniques. But the Subject Adviser came less often than the tutor. So if my tutor was my subject adviser at the same time, so it was one person rather than two, it would have been better" Sub Adv came in twice - feedback, direction to resources & sub spc trng days had huge impact on her SKfT dev. "Both of the times that he came in he gave me lots of resources and explained to me how to use the resources. He signed me up for seminars to go to – one of the seminars was 'building motivation in maths' and ever since I've been to that seminar I've used all the resources and it was those resources that made me go to the 'outstanding' lessons"	Support from provider tutor was v helpful "Through the feedbacks that I got, I got lots of encouragement and ideas how I could have improved the lesson or even various methods about how you would explain something so that did help me. And we kept in contact with emails as well so I would email if I needed something , so I had replies back on certain topics so that did help and I was advised certain books that I could read from the tutor."	Provider supp & Tutor visits really useful; "He was really helpful; he gave lots of help, he was a bit talkative so like it would take a long time but no, he was really, really helpful and friendly and gave me lots of advice"; Input from Sub Adviser partic assist SKfT dev "Yes, he gave me really good feedback. He said he was really impressed and that was one of the kind of points when I felt that I'm finally getting there so that was nice and he just kind of agreed with everything that my Tutor was saying. So there was that feedback and he also sent in the written feedback which I'd asked for which was nice because I know some of the quality assurers didn't send their written feedback. But it was really good to have that"	Very good support from EBITT staff - own Tutor, SA & Sec Prog Leader: ": Extremely helpful..... I think I was the only person who had Roger as a tutor – very, very helpful; excellent communication – I'd email him he would email me back straightaway. Muge is exactly the same – any question, instantly she replies to you even on a Sunday she would reply to you. If she was outside she has an iPhone and she would reply to you as well. Excellent communication and gave me a lot of help always. Always positive – explained several things to me; put me in the right direction. Lesson observation straightaway after the lesson I would get it the same day; targets – always checked everything. Excellent.": although Roger wasn't a sc spec she had supp form SA & that worked well ": No. no, he's not. I'm not sure what he used to teach actually...I think it was humanities. Not a science teacher, no. But I had a science specialist, Xxxx, Muge's husband is a science specialist, he (came in and) observed one of my lessons as well. But I don't think it was any problem." SA & Roger did one joint visit & obs "Yes, that was Xxxx Xxxxxx, who came to observe me once. That was a joint observation as well with Roger. So yes, they agreed on the same things as well – it was a difficult Year 10 group...so they agreed on the same things which was mostly behaviour; nothing wrong with the science knowledge; it was mostly behaviour. That was very helpful..."

Appendix 13

Extracts from observations of mentor and GT training sessions

NineSG maths mentor training 26.6.12 - extract.

Role of Subject mentor – Phil, Subject Leader stressed “Subject focus is a large part of the weekly meeting with your trainee”

General Professional Studies – Wed pm 2.30 – 4.30pm – same as they have always been. Most sessions are generic some are subject specific.

List of sessions to be run in 2012-13 were circulated and Phil took names of volunteers:

- “need volunteers to lead subject specific sessions – one for each
- Subject Leader does first session on 17th September
- There are two ‘expert’ seminars and these can be on anything the mentors feel would benefit – can use outside speakers

There have been last minute drop-outs in the past and Phil wanted to avoid this happening: “I really would like to make commitment even if you don’t get a trainee” – you will receive £50.00 for preparation time.

There will be half-termly mentor training next year as usual and an induction programme.

NB GT final assessment is done by an ‘External Assessor’ not the mentor – NineSG has a ‘team’ or ‘panel’ of assessors for each subject – a lot are ex NineSG staff.

Central College GT Teaching and Learning session 15.6.12 led by James - extract

Main focus of the session was about leadership and management and opportunity to feedback on overall experience from the year. Noted here are key points from session that relate to SKfT and SKfT development

Lesson observation – school staff tend to observe lessons in Ofsted terms which is not appropriate to training.

GTs were asked to discuss in groups what advice they’d give to next year’s GTs – two or three bullet points

- “Second school experience should be arranged straightaway and should be a good contrasting experience – mine wasn’t!”
- “Plan portfolio early and gather evidence as you go along”
- “You have the power to negotiate your workload!”
- Inconsistency of mentoring “demands of each mentor are very inconsistent”
- “Retain sense of humour at all times”
- “be leader of the process” (Reva)
- “Don’t be afraid to ask for help”
- “Don’t try and reinvent the wheel – there will always be someone with lesson plans you can refer to”

Appendix 14

EBITT models for mathematics and science SKfT delivery

Aspect of delivery	Kingsview	Central College	NineSG
Pre-course tasks	<ul style="list-style-type: none"> •Tasks to address subject knowledge per se gaps if needed 	<ul style="list-style-type: none"> •Tasks to address subject knowledge gaps if needed •Subject pedagogy reading 	<ul style="list-style-type: none"> •Tasks to address subject knowledge gaps if needed •Specific SKfT tasks
Individual training plan	<ul style="list-style-type: none"> •Four days of subject-based training •Cross-referenced to tasks in the maths and science 'Enrichment ' handbooks 	Detailed personalised SKfT training undertaken in school with tasks for GTs to complete	SKfT topics covered at weekly Subject Mentor meeting with personalised tasks set during training
SKfT materials and tasks	Subject 'Enrichment 'handbooks which included: an audit; direction to resources; SKfT tasks.	VLE provided subject specific resources and references but no tasks.	VLE provided subject specific resources and references but no tasks.
Assignment Work	Subject specific topics were optional and chosen according to training needs	Two subject enquiries : one on SKfT and the second on subject teaching skills	One SKfT assignment
Central training	<ul style="list-style-type: none"> •19 generic full day central sessions focused on SKfT topics •Some sessions GTs worked in cross-subject study groups 	<ul style="list-style-type: none"> •14 two or three sessions within a 10 day central 'Teaching and Learning' programme •Maths and science GTs grouped together - generic SKfT training with maths and science focus 	<ul style="list-style-type: none"> •Nine half day training sessions provided separately for mathematics and science •GTs were grouped with SCITT trainees
Central training pre/ post session tasks	Detailed pre-post session tasks	Pre session tasks for some training days	Pre session tasks for some training sessions
Other SKfT training: PGCE & or external	Four SKfT training days which were selected from PGCE sessions or external training e.g subject association	Attendance at some PGCE sessions & external training was optional	External training was optional according to needs
SKfT assessment	Recorded on a paper portfolio builder. Final assessment confirmed that SKfT elements were met.	Recorded on a paper or electronic portfolio. Final assessment confirmed that SKfT elements were met.	Recorded on a separate SKfT tracker within an electronic portfolio. Final assessment confirmed that SKfT elements were met.
QA of SKfT	Via: <ul style="list-style-type: none"> •Programme evaluations •QA visit to each GT in second term undertaken by Subject Advisers and QA tutors •SKfT progress monitored via scrutiny of 'Progress' file at central training days 	Via: <ul style="list-style-type: none"> •GT and mentor programme evaluation •Central College tutor for each GT had QA responsibility to monitor and ensure quality of school input 	Via: <ul style="list-style-type: none"> •GT and mentor programme evaluation •Subject Leaders monitored quality of electronic portfolios submissions

Appendix 15

Examples of SKFT central training and mathematics and science specific tasks

Aspect of delivery	Kingsview	Central College	NineSG
Pre-course tasks	Logon to the VLE and post a subject related question on your forum	Logon to the VLE and complete tasks e.g. Pedagogy and Practice: Unit 3 - Lesson Design for Lower Attainers	Familiarise yourself with the new Framework for Secondary Mathematics
Individual training plan (ITP)	Complete all Subject Knowledge for Teaching (SKFT) enrichment tasks for Mathematics.	Personalise some of the new Core Science schemes of work after teaching topics.	Complete GSCE Additional Science GCSE papers under controlled conditions and then mark it to further assess areas for development.
SKfT materials and tasks	From the science enrichment document - <i>Task 3c</i> Observation 2: Science assessment. How does the teacher assess students? Before undertaking this observation, read chapter 6 of the Science Strategy Framework where issues of Science assessment are discussed.	SKfT materials provided on VLE but no additional tasks outside the ITP	SKfT materials provided on VLE but no additional tasks outside the ITP
Assignment Work	Postgraduate level assignments on SEN and ECM with subject focus	Science subject knowledge inquiry on progress across Key Stages 2/3/ 4 within one topic	Delivery of KS5 topics within A level chemistry
Central SkfT training	Assessment for Learning Behaviour Management Explaining & Modelling New Secondary Curriculum Planning for Learning Starters & Plenaries	Planning for learning Assessment for Learning Subject Knowledge SEN Using ICT in the Classroom Literacy and Language	Assessment for learning – separate sessions for maths and science Teaching and Learning - separate sessions for maths and science
Central training pre/post session tasks	<i>Explaining & Modelling Pre Session</i> • Bring a lesson plan which includes 'explaining and modelling' • Bring along two definitions of explaining and modelling..... <i>Post Session</i> Invite someone into your lesson to observe the explaining / modelling and ask them to feedback.	<i>Planning for learning</i> Teaching styles – before the session observe a lesson and note what styles were used and read some literature on this area	For a year 9 worksheet or activity, consider how you would adapt delivery of it to a top set yr7 and a lower ability yr11 set. Please bring a copy, electronically if possible for sharing.
Other SKfT sessions: PGCE & or external	Behaviour Management for Science – subject association course Mathematics resources – PGCE session	Formative assessment in mathematics – PGCE session Central College of Physics – external courses	Teaching styles – external LA EDC run course