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**CASE STUDIES OF THE WAYS IN WHICH INITIAL TEACHER TRAINING PROVIDERS IN  
ENGLAND PREPARE STUDENT TEACHERS TO USE ICT EFFECTIVELY IN THEIR  
SUBJECT TEACHING**

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# CASE STUDIES OF THE WAYS IN WHICH INITIAL TEACHER TRAINING PROVIDERS IN ENGLAND PREPARE STUDENT TEACHERS TO USE ICT EFFECTIVELY IN THEIR SUBJECT TEACHING

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## 1. Introduction

The report is part of an OECD comparative study, *ICT in Initial Teacher Training*, which aims to develop insights into how courses of initial teacher training prepare student teachers to use ICT effectively in their teaching.

Three English initial teacher training providers agreed to participate in the research. Visits to undertake the research took place in May and June 2009. In the case of institutions A and B, the main work involved in the study took place within the course of three days of visiting the institutions involved, in order to conduct interviews with teacher trainers, school mentors, course directors and personnel responsible for ICT issues. In the case of interviews with student teachers, these were a combination of individual, group and in some cases, telephone interviews. In the case of institution C, the research involved a visit to the person responsible for ICT issues, and telephone interviews with mentors, student teachers, and the course director for the programme. In addition to the interviews with course directors and tutors with specific responsibility for delivering and developing ICT practice in the partnership, interviews were conducted with twenty one teacher trainers, thirty one school based mentors and thirty two student teachers. In addition to the data obtained from interviews, 91 mentors, 19 teacher educators, 107 students and 5 course directors or directors of ICT completed the online questionnaires which complement the case study component of this study.

In addition to these three case studies, reference is also made to a major evaluation study in the area of ICT in initial teacher training<sup>1</sup> (ITT) commissioned by the Training and Development Agency for Schools (TDA). This evaluation focused on assessing the impact of a five year programme which provided funding for ITT providers to explore ways of improving the preparation of student teachers to use new technology in their subject teaching. The programme was intended to promote experimentation and to help create a culture of innovation and change which the TDA felt was central to developing activity and quality in initial teacher training. The funding rounds were competitive, dependent on the submission of detailed project bids from providers.

The final report on the TDA programme (Hadfield *et al.*, 2009) is informed by case studies of six ITT providers undertaken in January 2009 and a detailed analysis of a survey of 95 respondents from ITT providers undertaken in November and December 2008. Although the methodology involved in the study did not precisely match that of the OECD survey, there is a significant overlap in terms of the research questions which the study addresses. In terms of timing, the study was also very recent and presents an up to date picture of developments in England in the use of ICT in initial teacher training, and the report gives some consideration to the question of how best to evaluate research in this area. Consideration of

the six case studies reported by the project also makes it possible to provide a slightly broader and more representative picture of recent developments in the field of ICT in initial teacher training in England.

## 2. Context

Given that England has over 100 providers of initial teacher training, and the time and funding constraints involved in the project, it was difficult to conduct a study which could claim to be representative of all types, sizes and locations of ITT providers within England. In addition to geographical and demographic differences, England now offers five different routes into the teaching profession:

- The four year Bachelor of Education degree, which now accounts for 19% of English student teachers.
- The Graduate Teacher Programme (GTP). People who are already in possession of a degree can be paid a salary to work almost exclusively in a particular school, as a form of ‘apprenticeship model’ of entering the teaching profession. This route does not require the involvement of higher education institutions. This route now accounts for 11% of entrants to the profession.
- ‘School Centred’ initial teacher training (SCITTs), which involves consortia of schools collaborating to provide a programme of training. As with the GTP Programme, students spend all or nearly all of their time based in schools.
- The Postgraduate Certificate of Education (PGCE) course, consisting of partnerships between schools and university departments of education. This is a one year course where student teachers typically spend 60 days at the university and 120 days based in partnership schools. This is still the most common route into the teaching profession in England.
- The ‘Teach First’ Programme, which recruits between 500-600 outstanding graduates to commit to two years of working in challenging schools. This route accounts for approximately 1% of student teachers.

In line with the suggestions made at the OECD seminars in October 2008 and February 2009, an attempt was made to involve at least one institution which could be considered to be particularly effective or successful in the area of preparing student teachers to use ICT effectively in their subject teaching, and one institution which had the credentials of being a high quality provider, without necessarily being outstanding in the field of ICT.

Given the various assessment and auditing tools which are used in the English education system, it was comparatively easy to identify institutions which fall into these categories, through a combination of ‘league tables’, publicly available reports on the quality of initial teacher training providers, and an annual audit of newly qualified teachers’ views on various facets of their teacher education/training.

Institution A emerged as the leading teacher education provider in the most recent version of the influential Smithers-Robinson ‘league table’ of initial teacher training providers (*Guardian Education*, 12 May 2009). It is a ‘Category A’ provider in terms of its quality grades in the Office for Standards in Education (Ofsted) inspections of ITT. However, in the TDA’s annual survey of Newly Qualified Teachers (NQTs), the figures in response to the question ‘How well prepared do you feel to use ICT in your teaching?’ were roughly in line with (but slightly above) the sector average, whereas for many of the other indicators of student satisfaction with their course, the responses were significantly above the sector average.

Although Institution B is also regarded as a high quality provider, both in terms of Ofsted grades and reports, and also in terms of feedback from the annual NQT surveys, its figures from the NQT surveys relating to ‘overall quality of training’ are not as high as Institution A, but student feedback to the question ‘How well prepared do you feel to use ICT in your teaching?’ have been up to 16% points above the sector average.

Given the different types of providers within the English system of teacher education, it also seemed desirable to incorporate at least one case study which involved student teachers from employment based routes, so a combined SCITT/GTP provider was approached and agreed to take part in the study. This provider had at some points had feedback from its former students in the NQT survey that had sometimes been above average, including one year (2006) where 100% of respondents reported that their preparation to teach using ICT had been adequate/good/very good, with no students describing it as ‘poor’ (an uncommon occurrence), but at other points, feedback had dipped below the average for providers overall. This volatility may be explained partly in terms of the comparatively small sample sizes involved rather than changes to the course and personnel involved.

Another advantage of considering the data from the TDA 2009 evaluation study of ICT in initial teacher training (Hadfield *et al.*, 2009), is that the six case studies described in the report include a mixture of employment based and higher education based partnerships, as well as adding some breadth to the range of institutions providing data relevant to this study. In terms of the selection of the institutions which provided the six case studies, this was partly constrained by being limited to those institutions which had declared themselves willing to be involved in a follow up to the online questionnaire element of the project, and (within this constraint) it was also influenced by a desire to focus on institutions where ‘something interesting appeared to be going on’. There was also an attempt to ensure that case studies came from a variety of types of provider (i.e. the case studies did not come exclusively from PGCE courses, or employment based courses, but from a mixture of the two).

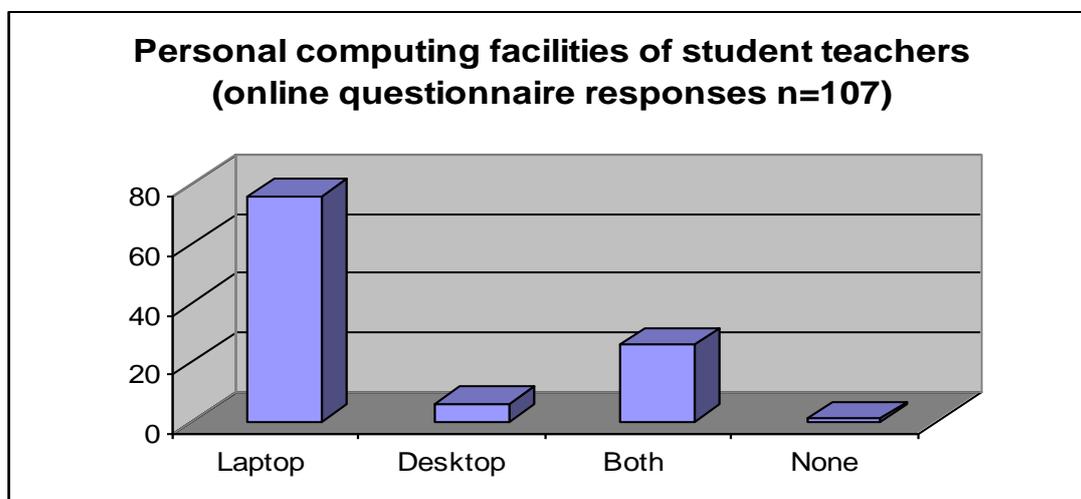
It should be mentioned that the author of this report is a member of faculty at one of the institutions which provides one of the case studies for this survey. Whilst acknowledging the dangers of ‘insiderness’ influences on the enquiry, the author has no specific responsibility for the delivery of the ICT component of the course, other than as one of the subject tutors on the course. There may also be some advantages to this position, given the degree of access afforded to those involved in the course.

Two further comments relating to context might be noted. First, politicians of all parties in England have been very enthusiastic in their belief that ICT has the potential to improve teaching and learning. Investment in new technology has consequently been very generous over the past two decades. Most English classrooms now have data projectors and some form of internet access, many are equipped with interactive whiteboards and many schools have other very expensive computer equipment such as voting technology (classroom response systems). Nearly all schools have Virtual Learning Environments (VLEs), and in the near future, it is expected that all schools will have the equipment and facilities for the construction of e-portfolios for all pupils. In all, 22% of the institutions involved in the TDA Evaluation Study (Hadfield *et al.*, 2009) reported that over a five year period, the TDA project had provided funds that were the equivalent of ten times their internal budgets for ICT. This has clearly made possible substantial improvements in the ICT infrastructure of ITT providers in England. I am aware that this level of investment has not occurred in all countries, or might have taken different forms, and that the position in terms of ICT infrastructure in schools might not be typical of the situation elsewhere. Consideration of conclusions, recommendations and comments made should take this into account.

Second: the vast majority of student teachers in England possess a personal computer; most commonly in the form of a laptop computer (see Table 1). Out of 107 students responding to the online questionnaire, only one did not own their own computer. This data was supported by comments from the

32 student teachers interviewed, all of whom possessed their own computer, and from internal course audits and interviews with trainers. It would appear that ownership of a laptop computer is increasingly been seen as an essential part of student teachers' professional identity.

Table 1:



### 3. National framework and requirements for ICT in Initial Teacher Training

After a period of having had a very extensive list of requirements and prescribed competences relating to capability in ICT, extending to over a hundred competence statements and 15 pages of text within the overall statement of competence required to be granted Qualified Teacher Status (DfEE, 1998), England has moved towards a much less detailed and prescriptive framework for assessing the competence in ICT required to be awarded Qualified Teacher Status. Out of 33 'standards' which have to be met in order to pass the course, four relate to ICT. Under current English regulations, in order to gain qualified teacher status (QTS), student teachers must be able to do the following things in relation to the ability to use ICT:

- They must have passed the online professional skills test in ICT. (The online test, which must be booked in advance, is taken at a registered centre which may be at some distance from the students' home and training institution and has to be completed within a time limit. The students must demonstrate the ability to make changes to slides in presentation software using a web browser, use e mail and various functions within e mail, use a text editor and e mail, update a spreadsheet, download resources from the internet and register for a newsletter).
- They must know how to use skills in ICT to support their teaching and wider professional activities.
- They must be able to design opportunities for learners to develop their ICT skills.
- They must be able to teach lessons and sequences of lessons across the age and ability range for which they are trained and in which they use a range of teaching strategies and resources, including e-learning (TDA, 2007)

Student teachers are expected to provide some form of evidence that they have met these standards by the end of their course of training. This may be in the form of documentation in lesson plans, examples of pupils' work produced through the use of ICT, e-portfolio evidence, or statements from supervising teachers or university trainers which support claims of competence in the aspects of ICT use detailed above. Providers of ITT courses are inspected by the Office for Standards in Education (Ofsted). Unless there are particular concerns about a provider, the cycle of inspection is generally a three year one. In

addition to visiting providers and interviewing student teachers, trainers and mentors, Ofsted inspectors also look at course documentation and the ways in which and the extent to which student teachers have evidence of competence in the 33 ‘standards’ which make up the competence framework for Qualified Teacher Status. This may be found in the ‘teaching file’ which students are expected to keep of the record of their teaching placement, including lesson plans and evaluations. Most institutions also require students to ‘track the standards’ in the form of a separate document where they detail inputs, experiences and any evidence which lends support to claims of competence in relation to each of the 33 standards, including the four that relate to ICT.

In terms of national evaluation of student teachers’ competence in ICT, in addition to research studies by academics interested in this field, the annual report of Her Majesty’s Chief Inspector of Schools has a section which addresses ICT, and from time to time Ofsted, the Training and Development Agency for Schools and the British Educational Communications and Technology Agency (BECTa) issue reports on ICT in ITT. Another very useful instrument for obtaining feedback on the effectiveness of student teachers’ preparation to use ICT is the annual TDA Newly Qualified Teacher survey, which asks teachers in their first year of teaching to report on how well their training prepared them in various aspects of teaching, including a question relating to ICT capability. This enables individual providers to compare the feedback from their own institution with the sector average. In the 2008 survey, in response to the question ‘How good was the quality of training in providing you with the knowledge, understanding and skills to use ICT in your subject teaching?’, 64% of respondents described it as ‘very good’ or ‘good’, 29% as ‘adequate’, with 7% describing it as ‘poor’.

**Table 2: Newly Qualified Teachers’ feedback on the quality of their training in terms of ‘providing you with the knowledge, skills and understanding to use ICT in your subject teaching’ (TDA, 2009 – reporting on student teachers who trained in 2007-8)**

<b>Very good</b>	<b>20%</b>
<b>Good</b>	<b>44%</b>
<b>Adequate</b>	<b>29%</b>
<b>Poor</b>	<b>7%</b>
<b>(Number of respondents =14,051)</b>	

Individual ITT institutions almost always conduct an initial audit of students’ general ICT capability, either at interview, at the start of the course or both, and the ICT audit is used to monitor and discuss students’ progress in ICT over the course of their training. Nearly all institutions also require an end of course evaluation of their course, which includes questions relating to preparation to use ICT.

#### **4. The case studies**

##### **4.1 Case Study A**

Provider A is a higher education based partnership which trains approximately 460 students a year through the PGCE course (see page 2). It deals with both primary and secondary routes into the teaching profession. It has regularly received outstanding grades in Ofsted inspections and is a ‘Category A provider’. In terms of the annual TDA survey of Newly Qualified Teachers, an exceptionally high proportion of students describe the overall quality of their training as ‘very good’. In the survey of the 2007-8 cohort, 25% of NQTs from this provider felt that their preparation to use ICT in their subject teaching had been ‘very good’, 5 percentage points above the average for higher education providers. The proportion of NQTs who described their preparation to use ICT as ‘very good’ or ‘good’ was roughly in

line with the average for the sector. Only 5% of students described their preparation to use ICT as less than adequate, below the national average.

### *Structure of the course*

As with most higher education ITT partnerships, students spend approximately 60 days at the university and 120 days in schools. It is a national requirement that all student teachers spend time in more than one school, so students will have extensive experience of working in two different schools, although their teaching load will be heavier on their second placement. There is a programme of Professional Studies which covers a range of educational themes and issues which are relevant to all student teachers such as differentiation, tracking pupil progress and behaviour for learning. The programme consists of a combination of faculty based conference, workshop and key note lectures and school based seminars. However, a feature of the course design of university based partnerships of ITT is the extensive amount of time dedicated to subject specific training sessions. Some tutors devote several 'dedicated' teaching sessions to particular aspects of ICT, others include elements of ICT within teaching sessions which focus on particular aspects of subject pedagogy and bring in ICT as and when it seems appropriate, but a high degree of autonomy is accorded to subject tutors in terms of how they deliver the subject course, and the ways in which ICT is included in subject based teaching sessions. There is no 'common programme' for students in ICT. This means that responsibility for the 'delivery' of ICT capability is very much in the hands of individual subject tutors. This is felt to be appropriate given the different ways in which ICT can be used in different subjects (for example, data logging is relevant to science teachers but of no interest to history teachers).

### *Institutional framework and requirements related to ICT*

As with the other case studies, all subject tutors were aware of the need to heed the national requirements relating to ICT and for students to have a secure evidence base by the end of the course which would demonstrate that they had reached the four standards defined by the English framework of competence in ICT. This took the form of a student teacher file which 'tracked' their developing competence in each standard over the course of the PGCE year, and which provided examples of having met the standards.

In terms of their views on the current framework for the ICT competence required to gain QTS, tutors who had worked with previous versions thought the current regulations were a considerable improvement, particularly in comparison to the 15 page list of competences detailed in the 1998 equivalent (DfEE, 1998). However, all respondents – trainers, mentors and students – regarded the online basic skills test in ICT as unhelpful, and tutors felt that 'the point' was not 'to use e-learning' but to be able to use ICT well, in a way that improved learning outcomes.

### *ICT facilities and support*

The Faculty of Education had recently moved into a new building which was described by several respondents (including both tutors and students) as 'state of the art' in terms of ICT facilities. In addition to several ICT suites, all teaching rooms are equipped with data projectors, interactive whiteboards and wireless access to the internet. The university had developed its own VLE, which was widely used and seemed to be integrated into the day to day practice of tutors and students. Generic courses were available for students who wanted to develop their competence in particular aspects of ICT. One student pointed out that if you were out on teaching placement at some distance from the university, it was difficult to access these courses, but other than this comment, all the students interviewed felt that facilities for ICT were very good at the university.

Tutors and students felt that either all students possessed their own laptop, or almost all of them. This chimed with Hadfield *et al.*'s (2009) idea that the laptop has acquired a 'social status' as a piece of technology that means that *'you are not regarded as a proper teacher if you haven't got one.'* All the students interviewed said that they had internet access at home and that internet access both at the university and whilst working in schools were unproblematic. Although some students had reservations about the navigating systems through the course VLE, none of them reported problems in accessing it. Students felt that they had good access to ICT for personal use, and for communication with the university and their placement school.

In terms of ICT facilities in placement schools, it was acknowledged by tutors, mentors and students that the situation was more variable, particularly in terms of access to interactive whiteboards and ICT suites. However, in terms of support, students regarded 'the human element' as more influential than ICT equipment. Having a 'role model' for ICT use in school, and a knowledgeable and enthusiastic tutor at the university was high in students' list of 'what helps you to become good at ICT'.

Another facet of ICT that was regarded as very propitious for the effective development of ICT capability was the high quality of technical support, both for tutors and students. The institution appeared to be particularly strong in this respect. In the words of the course director *'They are excellent here, unfailingly helpful, patient and expert in their advice. It makes a big difference to tutors' willingness to persevere and work through development and technical problems... you don't give up with something new you want to do because you know you will get help.'* A primary tutor commented, *'They are hands on, they have good communication skills, we have a Help Desk where they all really want to help.'* In some cases, good technical support was thought to have made a real difference to tutors' engagement with ICT; *'I think one of the reasons we have gained confidence here is that we have technical support... I have to say for me it's the biggest surprise of my life that actually I love it and use it.'*

Several of the students interviewed also spoke positively about the quality and helpfulness of the ICT technical support at the university and some suggested that it was related partly to the generally positive and helpful overall climate within the faculty building.

#### *Responsibility for ICT strategy, course content and student experience of ICT*

The responsibility for preparing students to use ICT is delegated to a large extent to individual subject tutors, particularly in the secondary sector. In the words of the secondary course director, *'The students have to meet the standards for ICT and we operate within subject... we don't have a separate ICT training course, so ICT training is given within subject studies at the faculty and within schools... within subjects it's up to individual subject lecturers.'*

A significant part of preparing student teachers to use ICT is the input in subject specific taught sessions at the university. Generic training courses which aim to develop students' general capability in ICT are available for students who wish to improve their general technological competence, but in terms of the taught course (as opposed to school experience), the pedagogical skills needed to use ICT effectively with 'real live pupils' are embedded in subject specific sessions at the university. In the words of two of the university tutors interviewed,

*'We always used to have a separate assignment for ICT and now I see, as with most other things, because it's a fundamental aspect of work here, we expect it to be embedded in all of their work, and in a sense to treat it discretely does it a disservice.'*

*'When I first came here we had compulsory sessions on using, you know, the interactive whiteboard, and using this and using that, and a whole day, one day just going through how to use different programs, etc, but as I, as they became more technologically competent, you know, as the years have gone on, those sessions became redundant, so all we offer now, I think, is a session on interactive whiteboards, which is optional, the rest of the inputs on ICT come up as we are doing particular things in science.'*

Unlike the other two institutions, there were no lead lectures or a special day devoted to ICT, and secondary course director stressed that ICT was *'completely handled within subject'* by subject tutors and subject mentors. Nor was there a lead tutor or designated coordinator for ICT issues.

Some tutors did have dedicated teaching sessions related to particular facets of ICT. The ways in which ICT is approached is left to the discretion of individual subject tutors. Tutors welcomed this autonomy and thought that it enabled them to tailor ICT inputs in a way that was relevant to the subject and to the knowledge and expertise (both in terms of subject pedagogy and ICT) of the tutor. Courses in ICT were available to tutors, but these were for developing technical proficiency in particular ICT applications rather than developing pedagogical skills in ICT. It was acknowledged by one tutor that *'some tutors are more into ICT than others and spend more time on it than others'* but this was felt to be *'a price worth paying'* in terms of preserving tutors' freedom to do what suited them, their students and their subject best. This did mean, however, that students in some subjects had explored Web 2.0 applications in some depth, whilst others were unsure about what Web 2.0 was and acknowledged that they had not had much input on applications such as wikis, podcasts and blogs.

Where tutors had limited expertise in ICT, it was common for them to use an assistant tutor, seconded part time from partnership schools who were accomplished in subject related aspects of ICT. This appeared to work very well judging by feedback from both tutors and students. It seemed to act as a way of ensuring that ICT did not slip off the training agenda, and that ICT issues were in students' overall consciousness in terms of the profile of the course. It was interesting to note that student feedback was sometimes particularly positive in subjects where the tutor was not steeped in ICT experience and research activity, but had nonetheless devoted considerable time and thought into how to get students to work collaboratively to develop their ICT skills.

*What the course aims to achieve in terms of students' ability to use ICT: ideas about what it means 'to be good at ICT'*

Only one tutor defined this as a list of *'things that students would be able to do'* by the end of the course, (*'The admin, lesson planning and everything else, you know, they'll find things on the internet, they should be able to say, oh god I've got to teach a lesson on whatever into Google and teaching ideas and see what pops up, they should be able to search for things across the net, they should be able to create their own resources in simple programs, like PowerPoint for example'*), and even this was qualified by the statement that *'They should have an appreciation of what the limitations of things are...'*

A more common response was that it was not about having a list of ICT *'things'* which students had to be able to do by the end of the course, but about attitudes to ICT, open mindedness, willingness to try things out, and above all, developing a critical appreciation of the potential of various ICT applications. In the words of one science tutor (in response to the question, *'What will they need "to be good at ICT" as a science teacher?'*):

*'It's funny because in a skills set sense, I don't have a list... I don't think, they must be able to do PowerPoint, they must be able to upload a YouTube video and so on. It's more that when we cover things in science, particular concepts... we consider how various bits and pieces of ICT might help to get the idea or concept across more effectively and they just bump into lots of ICT things along the way.'*

All the tutors who were interviewed felt that it was to at least some extent about developing students' critical judgement about when and how to use ICT. In some cases the desired outcomes were attitudinal rather than technological. A selection of typical responses is given below:

*'Being good at ICT has two components, good at, proficient at actually using the machine and the technology, but proficient in it is different from being proficient in using it as a pedagogical tool... and they are light-years apart, the first one changes each year as our youngest cohorts come in with phenomenal technological skills at manipulating the hardware and knowing where to find stuff, being able to create powerpoints and, they all come knowing about spreadsheets, power points, and super duper word skills, now, plus an awful lot more, you know, ... our role is to show them ways in which the technology, ie an interactive whiteboard, can be used as an effective pedagogical tool not just an electric whiteboard... and how to use particular subject-specific packages as effective teaching and learning tools.'*

*'By the end of the course, they're basically competent in all the basic packages, they have a healthy critical perspective of the particular subject specific software, and they are able to make appropriate judgements as an NQT, they may then get forced into things that are used within the schools in which they're working, but, yes, I would say they're better now than they were 5 years ago.'*

*'Yeah, it is about just giving them the disposition to want to, to explore a bit further and, and get better, and have an open mind about ICT... to be sort of positive but critical about it.'*

Tutors were also keen to stress the subject specific dimensions of ICT relevance to students; data logging for science students, GIS software for geographers, dynamic geometry for maths students, although the situation was slightly different for primary tutors, given that primary trainees in the English system very often have to teach across subjects and are also responsible for the delivery of the National Curriculum for ICT.

#### *Barriers to the development of capability in ICT*

- Not having a 'role model' for ICT use, either at the university, or on school placement, or both

This emerged as the factor which students regarded as one of the most influential in determining the extent to which they would become effective users of ICT by the end of the course:

*'If your tutor isn't really into ICT... that comes across... it just doesn't feature in the taught course as much.... You only bump into it occasionally instead of gradually thinking of it as a day to day positive and interesting bit of being a teacher. Although it means you ought to do more on your own initiative to compensate for this, you tend not to, partly because you don't know quite where to start or where to go, but partly because you are not enthused or inspired to do it.'*

- Variations in ICT support for students in schools

University tutors were keen to make the point that there were some schools which were very propitious environments for student teachers overall, but that they were not necessarily all at the same point in terms of helping students to develop in ICT.

*'Some trainees come back from schools saying, you know, "Couldn't even get on the network... and others came back saying "We arrived there and there were 3 laptops for 7 of us that we could share and a dedicated computer for us to use and our own spaces and passwords set up", so you have an enormous range of experiences that they can have in schools.'*

As with other providers, part of the answer to this problem was trying to ensure that students got an 'ICT rich' experience in at least one of their teaching placements. More than one tutor made the point that it was more about people than equipment; that having teachers who were interested, supportive and enthusiastic about pedagogy and ICT was more influential on students' progress than excellent ICT facilities but limited guidance, support and professional dialogue about ICT.

- The online basic skills test in ICT

All the trainers interviewed were critical of the online basic skills test for ICT, as they felt that it was patronising and unhelpful for the vast majority of their students, and that it was an unnecessary and time consuming distraction from what they saw as 'the real business' of developing ICT capability; being able to use new technology to motivate and engage learners, and to make teaching and learning more effective. It was also felt that it caused an unfortunate degree of anxiety in some students, and if anything, gave them negative ideas and feelings about ICT. The following quotes are representative of tutors' feelings about the test:

*'It's just rubbish, complete rubbish, it's not even... it doesn't even mimic what they're supposed to be mimicking, it's just a complete pointless waste of time. It's just insane. It is honestly the most useless thing that I think I've ever encountered, erm, it doesn't test anything to do with ICT, and it's stuck, unless they have a continuing evolving model of what ICT is...'*

*'They're a complete waste of time, and the students think they're a waste of time... and the things that they ask them to do are so mundane and stupid and they come with such high level ICT skills in terms of being able to manipulate basic packages, that it is utterly condescending to ask them the stupid things they ask them.'*

*'I've never heard anyone say "Oh, it's really helpful", and I've certainly never heard anyone talk positively about it helping their ICT. Their comments have been about the frustrations of it.'*

Students were also very disparaging about the test. None of the students interviewed considered the test to be in any way helpful or relevant and there was resentment about the form and content of the test, the effect of the time limit, which was thought to significantly increase the amount of stress involved in taking the test, and the logistics of booking and travelling to the test.

- Limits on the time available to focus on ICT

Several tutors made the point that the ICT 'agenda' in terms of covering all ICT applications which might be used in teaching was now so vast that it was difficult to do justice to all facets of new technology, even if it was just a matter of introducing students to the full range of relevant applications, software packages and Web 2.0 programmes:

*'What's more problematic is finding the time in the programme' (Secondary Art and Design tutor).*

*'I'm very interested in ICT and would love to fit more into the sessions, but with the best will in the world, you've got to give due attention to all the other competences that they are required to develop. There is so much to cover, particularly on the primary PGCE' (Primary tutor).*

One tutor made the point that if students were struggling in other areas of the QTS Standards, it might be inappropriate to spend too much time focusing on ICT: *'If they are struggling with class management, or haven't got a clue about planning a lesson, the last thing you want is for them to be devoting time to some esoteric use of spreadsheets for doing their lesson evaluations'* (Secondary tutor).

Some students lamented the lack of opportunities to revisit and practice working with particular applications. As in other case studies, some students felt that more time could have been spent on the pedagogic aspects of PowerPoint. *'Because it is easy to pick up how to use PowerPoint, it is perhaps assumed that we will work out how to use it well... it would have been incredibly helpful to have had more input on how to use it in a more engaging and interactive way given how ubiquitous it is in schools these days.'*

- School firewalls limiting access to the internet

Students expressed a degree of exasperation at the extent to which school internet firewalls precluded use of potentially powerful and engaging resources for learning. Mentors acknowledged that there were sometimes ways round the firewalls for those who were experienced in using the school's systems and had the appropriate working relationship with ICT coordinators and technicians, but there appeared to be a variety of practice in terms of helping students to find ways round the firewalls.

- Reservations about some recent developments in ICT policy

Several tutors questioned the utility of some recent developments and investments in ICT, and these reservations came mainly from tutors who were deeply immersed in ICT rather than from tutors who were less interested in ICT issues. Not all tutors were convinced of the value for money or pedagogical utility of interactive whiteboards (*'like a very expensive mouse', 'just does eye-candy stuff'*), classroom response systems were described as *'an expensive toy'*, and three of the nine tutors interviewed were sceptical of the value for money and utility of e-portfolio software (seen as extra *'hackwork'* by students on top of having to keep a teaching file, and as something that could be done equally well by Web 2.0 apps that did not cost anything:

*'It's such a waste, we were, somebody, you know, about two or three years ago, who were from a company that was offering electronic professional management, you know, and I looked at it and I thought, it was far too constraining, you know, you had to tick particular boxes, it would have taken so much effort for the trainees to actually manage it, and I thought...'*

*'Investment in e-portfolio stuff, god, such a waste of money, awful.'*

*'Personally I'm not convinced that it isn't just, well let's jump on another bandwagon, you know...the cost of packages that do it was an issue... we've been touted by various companies that sell the stuff, and I was asked last year did I want to meet so and so, but then somebody else told me that it costs an arm and a leg anyway, so we simply said no.'*

## **Enabling factors and 'ways forward' in ICT**

- Students' prior familiarity capability and with a range of ICT applications

Several of the university trainers interviewed made the point that the fact that nearly all students were already quite accomplished in their knowledge and use of ICT when they started the course made it easier to concentrate time on the taught course to the pedagogical implications of using new technology, rather

than having to spend time going through 'how to use PowerPoint, how to resize images, how to use Word'. One tutor warned of the dangers of relying too much on the students' self-perception of their ICT skills:

*'Now they say, oh no I'm not very good, I only know Quark Express, and I suppose I can do animation to, to, erm, a professional level, but apart from that I'm not very good (laughs), so, you know, it's, it's not good enough to rely on their self-perception..'* (Secondary Art and Design Tutor).

Student attitudes to ICT were also thought to be crucial in enabling further development of students' skills in using ICT. Several studies of student teachers in England in the 1990s suggested that many students had an apprehensive or even phobic attitude to computers, but both trainers and mentors reported that attitudes to and interest in ICT were both very healthy and positive for the overwhelming majority of students. The following comment from a primary science tutor was not unrepresentative of trainers' perceptions of student attitudes to ICT:

*'They are "up for it" with ICT... we are knocking on an open door. They are generally intelligent and well motivated graduates who are curious and who have initiative and energy and they want to find out more about how ICT might help them to teach more powerfully and more effectively. Our job is to show them things they can try out and develop... so that they can explore how they might apply things in their teaching.'*

*'They're definitely not technophobic at all... they're interested, they're enthusiastic, and they will suggest things for each other, if somebody's doing something they will say, oh if you use so and so you can make it do what you've just taken 10 minutes to do in 5 seconds, you know, those kinds of things... I certainly don't think they're, they're defensive at all. I think that is, that's a complete 100% turnaround for me in the last 5, 10 years.'*

Several tutors stressed the importance of making the sessions relaxing, interesting and enjoyable ('High challenge, low stakes', in the words of one tutor – the exact opposite of the online ICT basic skills test), so as to make the students positive and enthusiastic about ICT. *'It's important not to ram it down their throats or make them anxious about ICT'* (secondary tutor).

- Having a VLE and tutors who have good ideas about what to do with it

The VLE at this institution was widely used by all subject tutors and students and many of the mentors involved in the course (albeit in quite different ways). Trainers and students were generally positive in their comments on the VLE, although a few of the students regarded it as '*rather clunky*' or '*a bit clumsy and slow to get to things*' compared to the social networking sites they were used to using.

All nine of the tutors interviewed felt that the VLE was very useful as a teaching and communication resource, and all of them used the VLE, although perhaps some tutors used it more extensively than others. For some tutors, the VLE had become a really interesting tool to explore, in terms of how to fully exploit its pedagogical potential, and all tutors used it as an administrative tool, in terms of their contact with students and as a repository for course materials. Some tutors had set up a 'Frequently asked questions' function on the subject section of the VLE, others used soundfiles and the 'wikis' function within the VLE to engage their students in collaborative work. One tutor had assembled 'toolkits' for particular facets of the course, for instance, resources related to teaching pupils who spoke English as an additional language. One advantage of the VLE was that it was possible to monitor student engagement with the materials, and to invite a response to the materials which were in the toolkits. Two tutors spoke of the 'dialogic' use of the VLE, which had the potential to change and move on students in their thinking about subject pedagogy, and to get them to engage in debate and discussion in what was thought to be a '*genuinely interactive*' and useful way.

- Getting students to work collaboratively

One of the answers to the problem of not having enough time to ICT, given the number of other strands of the QTS Standards that had to be attended to, was to get students to work in groups on particular problems and projects, and to then share the expertise and resources that the various groups had developed; it was a form of ‘sub-contracting’ of ICT and pedagogy agendas, which meant it was possible to cover more ground than would be possible with sessions that were entirely tutor led. Nearly all the tutors I interviewed appeared to have effective systems for peer teaching and collaborative working:

*‘You just start it off, and give them a basic skeleton, set up a structure, and then leave them to get on with it, they then contribute and develop ideas and examples... it’s a good way of using the time and not getting bogged down in technical issues... usually there is someone in the group who can show them all how to do the technical stuff.’*

*‘Peer teaching is an important bit of the course, particularly relating to ICT... In terms of image manipulation and web design... we see the greatest resources are the students themselves, and so, you know, they’re student-led sessions.’*

*‘It’s important that they work together in groups, particularly in areas like GIS systems, where sometimes students forget things if they haven’t used them for a while... it provides the reinforcement and revisiting of skills that gets things embedded and means that they are internalised and become part of their practice.’*

(Feedback from students on peer tutoring and collaborative working was unreservedly positive; all the students I spoke to felt that working in groups and teaching each other was both enjoyable and effective).

- Having tutors and mentors who are interested in ICT and who use ICT in their teaching

Several of the tutors on the course had research interests in ICT and were participants in funded projects exploring innovative uses of ICT. This did appear to have a positive effect on students, although this seemed to be more linked to their ability to model ICT use in a relaxed and confident way in their teaching sessions, rather than their research credentials. It did not seem to matter if it was not the lead subject tutor who modelled and talked about ICT. The university used a system of assistant tutors, seconded to the university from schools, and this was sometimes used to engage mentors who were enthusiastic and accomplished users of ICT. This appeared to work well. Similarly, if students had gone to schools where there was a comparatively ‘lean’ ICT experience, tutors would attempt to compensate for this by sending them to a school or department that was strong in ICT in order to compensate for this on their second placement.

- Exploration of the potential of Web 2.0 and mobile phone technology for enhancing teaching and learning

Several of the tutors and mentors who had a particular interest in ICT and who were acknowledged as accomplished in their use of ICT in teaching regarded Web 2.0 as an interesting area to explore. One suggestion was that *Ning* would be a much cheaper and more effective platform for the development of e-portfolios compared to more costly commercial alternatives. There was particular enthusiasm for the development of wikis as a tool for collaborative working and dialogic learning. As with Case Study C, there were some tutors who had reservations about the long term appropriateness of ‘a laptop for every child’ as an aim of ICT policy. One example of such sentiments is given below:

*'This idea of a laptop for every child across the world, well that's guff, because people in the developing world aren't using, don't see a laptop as your main bit of IT, and mobile phones I think will take off, with all their whistles and bells, will be much more important, I think, probably in about 10 years in classrooms, because I think they will be one strong route to resources and to learning... I think that will be a model which will enable something like an I-phone to become a device in the classroom.'*

Students on this course had very different experiences of learning to use ICT in subject teaching. Given the importance of subject specific pedagogy and ICT applications (data logging for science, GIS for geography, Q-base for music, photoshop for art and design and so on), this is understandable, but there were differences in the extent to which students had considered the potential of Web 2.0 applications and ICT appeared to have a higher profile in some subjects compared to others. However, all the students interviewed thought they had been well prepared to use ICT (and the 2008 TDA NQT survey suggested that 95% of students on the course regarded their course as satisfactory or better in terms of preparing them to use ICT).

#### **4.2 Case Study B**

Provider B is a higher education partnership which prepares students to enter the profession via the PGCE route. Each year it enrolls approximately 360 students, a mixture of early years, primary and secondary student teachers. As with Case study A, the institution is a 'Category A' provider, which means that it has received positive reports in recent inspections by the Office for Standards in Education. In the 2008 TDA survey of Newly Qualified Teachers, 80% of former students from this provider reported that their preparation to use ICT in their teaching was 'very good' or 'good', significantly above the average for the sector as a whole (64%). The ITT partnership involves the university working with over 80 schools, spread across two English counties.

##### *Structure of the course*

Over the course of 36 weeks, between September and June, students spend 60 days at the university and 120 days in schools. After 11 days visiting their first placement school for induction purposes in October, students undertake a 'block' placement in their first placement school in November and December. After a month back at the university in January and February, and six preliminary 'induction' days in February, students undertake a 'long' block placement at a second school from the last week in March through to the end of the course in June with two days back at the university at the end of the course to complete final administration tasks, which include an audit of ICT capability and experience, and monitoring of the evidence base to demonstrate that the 33 standards for QTS have been met, including the four relating to ICT. As with Case Study A, subject tutors have the main responsibility for developing students' ability to use ICT on the secondary course. All tutors devote several 'dedicated' teaching sessions to particular aspects of ICT and include elements of ICT within teaching sessions which focus on particular aspects of subject pedagogy and bring in ICT as and when it seems appropriate in day to day teaching sessions. There is no 'common programme' for students in ICT, as it is felt that subjects vary in terms of which ICT applications are of most relevance to students. ICT is mentioned in all subject course handbooks (varying from two pages to 15 pages), and ICT resources, tasks and reading are also made available through the course VLE. Again, for secondary students, this is predominantly subject based.

Arrangements for primary students are rather different, with input on the taught course on generic aspects of ICT which would enable all primary students to be able to teach the National Curriculum for ICT effectively, as well as subject specific inputs.

### *Institutional frameworks and requirements related to ICT*

All the eleven tutors interviewed were aware of the need to comply with the demands of the national requirements for Qualified Teacher Status relating to ICT. An important element of this was the process of getting students to 'track their progress' against all 33 of the competence statements in the course of the 36 week course, so that by the end of the course, they had documentary evidence that they had used e-learning in their lessons, helped pupils to develop competence in ICT, and were able to use ICT 'to support their teaching and wider professional activities', as well as passing the online QTS basic skills test in ICT.

All students are required to complete an audit of their ICT skills at the start of the course, and there is an end of course audit which focuses specifically on students' experiences and competences relating to ICT so that the course has 'good intelligence' in this area.

Tutors shared students' reservations about the usefulness of the online skills test but were resigned to the fact it was part of statutory arrangements and so encouraged the students to just 'get on with it' and 'get it out of the way', encouraging them to take the practice tests which are available online to help students to prepare for the test.

The current competence framework for ICT was regarded as more sensible, appropriate and manageable than previous versions, but tutors saw developing students' ability to use ICT to engage and motivate learners and to improve teaching and learning outcomes as the most important part of their responsibilities relating to ICT, rather than simply ensuring that students used ICT in their teaching. Many of the tutors made the point that ICT could be used well or badly, and that developing students' critical understanding of when and how to use ICT to best effect was the central concern of their teaching in ICT.

### *ICT facilities and support*

Interviews with course directors of the primary and secondary course, with tutors with specific responsibility for ICT, and with subject tutors and students confirmed that overall, facilities for ICT were very good, and massively improved compared to a few years ago. This was attributed in large part to the funds made available by the TDA investment programme for ICT in ITT in recent years, which annually provided over ten times the amount available for ICT investment from internal resources. This had effected what was generally regarded by tutors as a transformation in the ICT infrastructure within the School of Education. In addition to two dedicated ICT rooms, there were now several sets of tablet and laptop computers available for teaching sessions in any room, and all teaching rooms were equipped with data projectors, interactive whiteboards and wireless access to the internet.

The end of course secondary ICT audit for the 2008-9 cohort of students revealed that 84% of students owned a laptop at the start of the course, rising to 99% by the end of the course. 98% of the students reported that they had internet access at home. The course VLE was seen as an increasingly useful resource to support ICT development and general communication by all course tutors and 83% of students reported that they had found the VLE to be a helpful resource.

In addition to a designated ICT technician to support course tutors, the university had an ICT help desk for students, but there was no course specific ICT help within the School of Education. There had been an experiment with paying student teachers who were 'experts' in ICT to act as support for students on the course for several hours a week but this experiment has now stopped. Students who were interviewed reported that ICT support was obtained either informally and *ad hoc* by asking fellow students

within subject groups who were known to be accomplished in ICT, or through tutors who were known to have an interest in ICT, or if all else failed, through the general university help desk.

One resource which was thought to be particularly useful by tutors was a university support unit which was dedicated to pedagogical innovation in ICT. In addition to running courses for university tutors in areas of ICT which might be of interest, setting up blogs and wikis, video conferencing, making websites, using voting technology, making best use of the VLE etc, members of the unit would sometimes do sessions on Web 2.0 for student teachers, or provide one to one help to tutors in applying new ideas for ICT use in teaching. Some trainers made more use of this service than others, but all of them regarded it as extremely helpful, both in terms of 'keeping up to date' with what was happening in ICT, and in terms of giving practical help so that new ideas and ways of working with ICT could be implemented and used in teaching sessions.

### *Responsibility for ICT strategy, course content and student experience of ICT*

As with Case Study A, the responsibility for preparing students to use ICT on the secondary PGCE course is delegated to a large extent to individual subject tutors,

For secondary students, although there are lectures on the professional studies course which focus on ICT, the main part of preparing student teachers to use ICT on the taught course is the input in subject specific taught sessions at the university. Generic training courses which aim to develop student teachers' general capability in ICT are available for students who wish to improve their general technological competence, but take-up of these courses is low. Tutors interviewed felt that students have a strong preference for ICT experiences and inputs which are closely linked to what they will have to do in their subject teaching and which are 'contextualised' within subject pedagogy. Students mentioned lack of time to fit such sessions in '*on top of everything else,*' was also a factor.

All secondary tutors have dedicated teaching sessions related to particular facets of ICT, and focused on how the ICT is used to teach a particular subject. If the tutors are not expert in particular facets of ICT, external tutors are brought in to lead the sessions, most commonly, school mentors who are known to be expert practitioners in particular aspects of ICT (websites, use of whiteboards, blogs and wikis, dynamic geometry, GIS systems) are brought in to do sessions.

The delivery of ICT on the primary course is rather different. This stems largely from the fact that primary teachers in England are generally required to be able to teach across subjects, and the aim of the course is that all student teachers who qualify will be in a position to teach the National Curriculum for ICT. This means that they have to be competent and confident in a range of ICT applications; there are therefore more taught sessions focusing on particular ICT applications, which all students are required to attend. This is not to say that less importance is attached to subject pedagogy in ICT, rather that there are additional requirements for primary student teachers, who needed a sound understanding of a wide range of both generic and subject specific applications.

Unlike Case Study A, there are particular trainers in both the primary and secondary teams who have specific responsibility for ICT. On the primary course, there are two tutors who are particularly accomplished in terms of their use of ICT, and in terms of teaching ICT in primary schools. In addition to taking the generic ICT sessions for primary students, they attempt to provide leadership and guidance for the primary course as a whole. This involves working with the rest of the primary team to ensure that they are up to date with recent developments in ICT, and to show how such developments might be modelled with students. Similarly, the secondary course has a tutor who is designated as being responsible for ICT development across the secondary course as a whole. In addition to auditing and monitoring student progress, it also means keeping a strategic eye on whole course developments in ICT.

A particular feature of institution B is the series of ICT workshops which have been run over the past three years for tutors involved in ITT. These have covered a range of applications, including sessions on 'How to make PowerPoint less boring', how to use an interactive whiteboard, how to (best) use voting technology, what might be done with a wiki and so on. The sessions, although voluntary, have been consistently well attended and tutor feedback in the interviews suggested that they had been helpful both in terms of keeping tutors up to date (particularly in relation to Web 2.0 applications), and enabling them to embed some of these innovations into teaching sessions and work with students.

One of the tutors who takes a lead in ICT felt that it was helpful to have at least some 'early adopters' of ICT in teaching teams, in order to influence tutors who were not necessarily at the 'cutting edge' of ICT developments, but who nonetheless wanted to do a 'decent job' of ICT with their students.

*What the course aims to achieve in terms of students' ability to use ICT: ideas about what it means 'to be good at ICT'*

When attempting to evaluate the effectiveness of approaches to preparing student teachers to use ICT, it is helpful to keep in mind trainers' ideas about exactly what they are attempting to do. Of course, trainers are not free agents; they have to ensure that they comply with the competence frameworks for ICT laid down nationally. Moreover, the (generally) triennial pattern of inspection of ITT providers is a very powerful tool for ensuring that national frameworks are adhered to. Providers can lose their authority to licence teachers if provision is found to be unsatisfactory. Nonetheless, nationally laid down competence frameworks have to be interpreted, and beyond basic compliance, trainers' views about 'what it means to be good at ICT' are likely to influence the way that ICT training is approached.

As in the trainer testimony from other institutions involved in the survey, the main concern of tutors in the area of ICT was that their students could use ICT skilfully in their subject teaching, and make sound decisions about which applications to use for particular purposes, and when not to use ICT. Some tutors made the point that the ability to be able to use programs was a prerequisite for developing pedagogical skills in making use of the application, and that therefore some technical expertise was necessary, but that technical expertise *per se* was a 'necessary rather than sufficient' condition for being able to use ICT effectively. Some tutors felt that it was more about creativity related to ICT rather than technical grasp of applications:

*'If they're creative people then they will have a go and they will look for ways of making it relevant and exciting and interesting, and try things out, even they don't always work, it's about them thinking about what sorts of things you can do with Twitter, or PowerPoint or whatever'* (Primary science tutor).

*'The bottom line for me is about their professional judgement when using ICT. At the end of the course I want them to have the knowledge, judgement and experience to know when to use ICT and how to use it to best effect'* (Secondary Science tutor).

*'I see my job as to open their eyes to things they can do with ICT in Maths... in my curriculum sessions I probably cover 20 to 30 things that you can do with ICT that I think makes the learning more powerful.. I don't ram it down their throats and say they've got to do this stuff... I want to signpost the opportunities and seduce them into exploring the possibilities of what ICT can do in maths and how fantastic you feel as a teacher if you can do this stuff for kids'* (Secondary maths tutor).

*'It's more about their attitude to ICT than their technology skills... it's certainly not about how much they use ICT – PowerPoint and whiteboards often don't add value to pupils' learning.. it's about them thinking about how ICT can support teaching and learning and coming up with some good ideas that work*

*to improve lessons. I just know that some of them are very focused on finding out more and more about how ICT can help them to teach their subject more effectively and that they will go on doing that throughout their teaching career, after this course is over'* (Secondary religious education tutor).

*'It's actually about creativity and flair in thinking of how best to deploy ICT and this can be one of the things that makes teaching such an interesting and rewarding job'* (Secondary PE tutor).

In some cases, ICT use was considered in terms of how it linked to conceptions of the subject being taught:

*'I want kids to read confidently, knowledgeably and critically. In what way can ICT help me in this?'* (Primary English tutor).

*'ICT has to play a major role in science, there are some bits of it which are difficult to do if you can't engage with the technology... reading light and sound... using data logging, digital photography, digital microscopy'* (Primary science tutor).

To promote critical judgement about ICT, and sound decision making in terms of when not to use ICT, primary trainees were given primary software that was known not to be very useful (without being told this), and told to explore how it might be used, to see if they could work out for themselves that the software was not very useful.

#### *Barriers to the development of capability in ICT*

- Variations in ICT support amongst partnership schools

As with other partnerships, it was acknowledged (by school based mentors as well as university trainers) that students encountered a wide variety of experiences related to ICT when they went out on their school placements. This was felt to be as much about working with helpful, interested and encouraging colleagues as about levels of ICT equipment, (although provision of interactive whiteboards was an issue for many students on placement). There are some issues of convenient access and compatibility of equipment, but it was felt that good mentors could overcome these obstacles:

*'When people start blaming "kit" it is generally an excuse... There are some teachers who haven't quite got the energy to set things up... who don't see or can't be bothered to notice what a difference it can make to children's learning when data logging is used well.'*

*'It's an absolute minefield... some students come back and they've had an absolutely fantastic experience, one of the students I supervised a couple of years ago, her Year 1 class, 5-year-old children, had produced a video themselves of a play that they'd written, the script, everything from start to finish, and they'd got computers in the classroom, they accessed when they wanted to... other students still unfortunately... they can use the computer suite once a week and then it's timetabled out and they have real problems...'*

It was widely accepted (again, by school based mentors as well as university tutors) that in some cases, student teachers were used to lead staff development in ICT in their placement school:

*'If the class teacher lacks confidence, or competence... then the students, sometimes, actually show the teachers how to do things, and we've had quite a few examples of where our students have done some inset (In Service Training), and I always put that on their reference. Schools have got interactive whiteboards, and students were going in and teachers, some of them didn't know how to use them, so the students showed the teacher how to use them.'*

- Differences in interactive whiteboard provision and variable platforms and software versions

Interactive whiteboards emerged as very high profile in students' thinking about ICT. Comments about interactive whiteboards accounted for approximately 40% of students' comments about ICT in the end of course evaluation – more than any other application. There were very few comments to indicate that training and opportunity to use whiteboards had been satisfactory or effective. These reservations revolved around the lack of consistent compatibility between equipment at the university and what was available in schools. Even within individual schools there were problems with regard to software compatibility, and many students reported that they had neither the depth of training in whiteboard use at the university, or sufficient opportunity to practice and develop their whiteboard expertise on school placement. Given the high profile of whiteboards (and perhaps their 'social status' as a technology application), this appeared to induce a degree of anxiety on some students.

- Dissonance between what students see at the university and what they see in schools

As well as problems in terms of equipment compatibility between schools and the university, there was thought to be an issue in terms of practice. Three university tutors made the point that they used programs which they felt were really important for their subject, but that often students did not see the programs used in schools, with the result that the program became 'invisible', and some students started to doubt the practical use of such equipment, seeing the university as 'not the real world of teaching.'

*'There is some software that is absolutely transformative in my subject in terms of giving powerful, instant feedback to pupils, but if they don't see it used with pupils in real live situations in schools, they don't get the message... they lose confidence in their own ability to use it and they lose belief in me as a tutor. They think "If it really was any good, teachers would use it."'*

*'Some teachers get a bit lazy... it does take a bit of time and trouble to set it up, but if they (the student teachers) could see the difference it makes to lessons when it is used, it would get them to go the extra mile and get using it.'*

This was also thought to be partly about the visibility or 'profile' of ICT in the department or the school. Tutors spoke of the importance of 'habituation' in ICT: *'In one school, they hand out laptops like you would hand out paper or pencils... it's ingrained in school practice... in others, stuff is locked away in cupboards and you can get it out if you really want to, if you make an effort and badger people about it.'*

- Limits of the time available to devote to ICT

All the tutors interviewed spoke of the pressures to ensure that every possible aspect of the framework of competences for Qualified Teacher Status was covered in the 36 weeks of the course. This inevitably placed limits on the amount of time which could be devoted to ICT. Showing students what ICT could do in ICT specific sessions, including 'hands on' activities for students was considered to be the most powerful way of getting students to use ICT, but it was thought to be essential to also work in 'bits and pieces' of ICT into day to day teaching sessions, partly to model ICT integration, but also in terms of covering the breadth of ICT applications which might have the potential to improve learning in the subject. It was acknowledged that in order to introduce students to a wide range of subject relevant ICT applications, sometimes tasks on the VLE or prescribed reading had to be the answer given the limits of taught time, but this was felt to have less impact on students' practice.

*Enabling factors and 'ways forward' in ICT*

- The importance of modelling ICT

Feedback from both trainers and students stressed the importance attached to the skilful modelling of ICT, both in university based training sessions and in schools. In the end of course evaluation for ICT, 77% of students reported that they had encountered a good ‘role model’ in their school experience. In interviews with students, they frequently made reference to particular moments when they had seen something demonstrated that they wanted to be able to do, and that this had (often but not always) motivated them to develop the ICT competence which had been demonstrated. A primary science tutor said that he felt impelled to show his students what ICT could do, including ‘cutting edge’ applications, because if they did not see such practice in schools, they would consider it as ‘*pie in the sky and not a practical and realisable possibility.*’ A secondary science tutor reported that he felt he had to use the interactive whiteboard in his teaching sessions, even though he did not believe they were not particularly useful in science teaching compared to many other applications:

*‘I am absolutely spitting inside because I think whiteboards are a waste of money... the data projector plus the internet and the opportunity to use multimedia animations are what is valuable, but I feel I must not close their minds, I must get them to try it out and find out for themselves. With data logging, it is a battle for hearts and minds... I have to persuade them that it is worth the time and trouble to set it up and use it because of the fantastic difference it can make to children’s learning in science.’*

Another tutor mentioned the impact of a single lecture, where the lecturer used a range of ICT applications in an effective way:

*‘X’s lecture has a huge impact on them which is why we have moved it towards the start of the course... they can see straightaway what a big impact ICT could have on their teaching and children’s learning... he is a confident and talented role model and they leave the lecture determined to get better at ICT and explore some of the things he has used in the lecture – which is not actually about ICT.’*

- Developing the use of the course VLE

The trainers responsible for the development of the VLE acknowledged that the system had initially been underused by tutors and that it has taken some time to a) get all course tutors and students to make extensive and regular use of the VLE and b) organise materials in the most efficient and user-friendly way. However, it was now thought to be invaluable and was regarded as the first port of call for students and tutors in terms of course communications. Use of the functions of the VLE had expanded from being mainly a repository for course information and messaging, to the use of online surveys, filesharing and e-conferencing, with some tutors moving to exploring wiki and blogging tools on the VLE. Disappointment was expressed by some tutors that the university had not chosen to buy the e-portfolio tool for the VLE in order to experiment with e-portfolio approaches to assessing and recording trainees’ progress in the QTS Standards, and some tutors had been to training sessions on ‘Elluminate’, a tool for live audio and video conferencing within the VLE. In the past 18 months, regular use of the VLE had extended to school mentors and all tutors interviewed felt that the VLE had now become an indispensable part of the course:

*‘The students have to log on to the portal every day, to the VLE, and... most things are done through that now, so it’s looking at the use of IT as an administrative tool for when they’re teaching... and it seems to work really well... especially in the last year or two. It’s been a process we’ve refined and developed, when I look back over the last 16 years I’ve been working here it’s, it’s just amazing the progress that’s been made.’*

*'The VLE was a bit of a mess originally, there were no clear and obvious pathways through it but now we have got it sorted and it is easy to find things. This sends such important messages to students, even just at the level of getting them to organise their stuff better on their laptops.'*

- Supervised collaborative working

Nearly all the student teachers who were interviewed spoke positively about the advantages of working together on 'group tasks'. However, some tutors made the point that they still liked it when the supervising tutor was there to prompt, respond to queries and problems, and draw things together for some form of plenary evaluation of the work done:

*'So they are making a small film or something... there are lots of incidences on the course where they have that sort of experience, but it isn't about sending them off to find out things, they'd much, much rather have a tutor, or some expert, in the room... demonstrating, but also acting as an aid, or a facilitator, and afterwards they put the finished product, whatever it is, and to evaluate it as a group, that's really useful as well.'*

Also, students liked working with different colleagues over the course of the PGCE year, rather than always being with the same people, in the same groupings (see Haydn and Barton, 2007 for further development of this point).

- Easy and convenient access to equipment

Both in schools and at the university, this was thought to be a factor which impacted on how much ICT was used. One trainer suggested that the availability of ICT equipment also sent messages to students about the status of ICT – that if it was hidden away in cupboards and needed to be located and then got out and assembled – hard pressed students were more likely to drift into a habit of not 'going the extra mile' to use ICT equipment:

*'It's also got a lot to do with the organisation and management and availability of equipment, now sometimes it's more effort than it's worth to actually set it up, so if the whole situation in school is well organised so that people have got a common sort of understanding that it's a good thing to do, then it can perhaps take 10 minutes, whereas if you have to go and look in cupboards and check everything, and teachers are busy and it's really difficult for them, so I think there is a mixture, there is a mixture of personal attitudes, but also of making decisions about is it worth it, you know.'*

This was not just an issue that influenced ICT use in schools; one trainer pointed out that when the university got sets of laptops from TDA funding, they were initially underused because of the time required to book, unlock, get out and put back the equipment for recharging.

- Collaboration between tutors on the course

In addition to the occasional continuing professional development sessions on ICT which were attended by most primary and secondary tutors, there was a strong culture of informal collaboration and support within the primary and secondary teams. There were several instances where tutors explained that a fellow tutor had taken the time to introduce them to 'doing surveys on the VLE', or 'learning to do digital editing' or 'make sound files'. It was probably also helpful that several tutors in both the primary and secondary teams had a strong interest in ICT, so ICT had a strong 'profile' in professional dialogue about the course. Some tutors also mentioned that the university's support group for the pedagogical development of ICT had been invaluable in getting subject websites up and running, explaining what wikis could do, demonstrating voting technology and so on.

- The role of ‘subject booster courses’

Some students are required to attend pre-course teaching in order to bolster their subject knowledge. In the case of Religious Education students, this is done through an online course and materials. This was thought to be an excellent opportunity to embed ICT into the students’ consciousness even before the start of the main course.

Feedback from students on the course, in the interviews and in the end of course evaluations for ICT was generally very positive. 99% of the secondary students reported that they had used ICT in their teaching, and over 80% of them felt that being able to share ideas with other students had been helpful, 83% had found the VLE helpful, and 99% said that they felt competent to make use of ICT to support their classroom teaching in their first year of teaching.

### **4.3 Case Study C**

Provider C trains approximately 100 students each year. It trains both primary and secondary teachers. It is a school centred ITT partnership, combining a mixture of SCITT student teachers and GTP students (see ‘Context’ section, for an explanation of these terms). It is spread across two neighbouring counties and the schools involved are thus spread across several thousand square miles. This in itself means that digital communication needs to play an important part in communications and in the general running of the course.

As with other types of ITT provider, the institution is subject to the same competence framework governing the award of Qualified Teacher Status (QTS). Four of the 33 standards which are defined as being essential to demonstrate competence in order to enter the profession relate to ICT, including passing the online basic skills test for ICT, and being able to use ICT in subject teaching. Thus, although the nature and format of the course is very different to the PGCE route, the requirements to qualify as a teacher are exactly the same as for PGCE student teachers.

#### *Structure of the course*

Whereas PGCE students typically spend 60 days of their course at the university and 120 days in schools, SCITT and GTP student teachers spend all or almost all of their time in schools. Some SCITTs have links with university departments of education and might send their students there for some days of the course, but others conduct training entirely with a school based environment, with little or no input from higher education sources. In the case of Institution C, students do not spend any time in university departments of education, and ‘training days’ take place at schools within the schools in the partnership.

#### *Institutional framework and requirements related to ICT*

Students on the course undergo an initial audit of their general ICT capability (as well as one for literacy and numeracy). At an early stage of the course they also have to draw up a training plan which includes a section on ICT, so ICT is identified as a development agenda, right from the start of the course. Once they start the course one day a week of the one year course (which runs from September to July) will be devoted to a whole course training day, devoted to a particular aspect of teaching, one of which focuses on ICT. In addition to these whole course training days, they will also do sessions focusing on ICT in their placement schools, both in ‘general professional studies’ sessions, which are generally held once a week, and as part of their subject specific tutorials and day to day interactions with their subject mentors. Some days are also set aside for subject specific training days, one of which will also focus on ICT. As well as featuring in course documentation, the VLE also features a range of inputs on ICT, including short ‘coffee

break' sessions designed to be digested and practised in around 10 minutes, which were particularly popular with students. The students therefore have a range of inputs relating to ICT. Close attention is paid to the nationally determined requirements for competence in ICT and in addition to passing the online 'basic skills' test in ICT, a portfolio approach is taken to the building up of an 'evidence base' which demonstrates that the student has met the other three standards relating to ICT capability. National inspection programmes also focus on the robustness of the providers' systems for ensuring that trainees have met the 33 standards required to be awarded QTS, including the four standards related to ICT, so this provider, as with the other two case studies, works hard to ensure that the necessary evidence to support the claim for competence in ICT has been accumulated by the end of the course

### *Responsibility for ICT strategy, course content and student experience of ICT*

There is one person who is responsible for overall direction of ICT development and strategy across partnership schools, and he delivers the one day whole course 'lead session' on ICT. All students therefore have the same input for at least one day of their training. The course director felt that the fact that one person within the partnership had particular responsibility for ICT was helpful and ensured that ICT was not marginalised or neglected as an important professional agenda. Moreover, the person in question has a national reputation as being an accomplished and inspirational speaker and deliverer of in-service training. He is also used by the local university teacher education provider to deliver a lecture on global citizenship which makes extensive use of new technology, and the feedback from students, both at the university, and from the SCITT based students, is extremely positive, and is seen as a very important factor in encouraging students to explore the potential of the ICT applications which he had modelled. He also has run sessions for subject specific courses at the university, which again have received very positive evaluations. The course director attributed a large part of the success of the ICT component of the course to the role of the lead person for ICT. However, much of the 'day to day' experience of developing ICT capability is of necessity delegated to the schools in the partnership, given that SCITT and GTP students spend nearly all their time at the school in which they are based (with a requirement to spend some time in a second school in order to gain some breadth/diversity of school experience).

### *ICT facilities and support*

Personal access to ICT in the form of a laptop or desktop computer, internet access and access to the course VLE was regarded as universal or almost universal. It was regarded as exceptional for students not to have access to their own computer, usually in the form of a laptop which afforded internet access. Access to a computer within school was also regarded as being no longer problematic. The view of the lead tutor for ICT, and all the mentors interviewed was that ICT facilities across all schools had increased in quality over the past few years, and that nearly all schools provided access to a VLE, data projectors and internet access in classrooms, and Training Schools were particularly well equipped, with one containing a room where students' lessons could be videotaped for analysis after the lesson. Access to computer suites was still an issue in many schools, with a need to book well ahead in some cases, and the provision of whiteboards in classrooms was variable across schools. Reliability of equipment was still thought to be a problem by some students and two of the mentors interviewed, and access to interactive whiteboards was problematic in some schools (see section on 'Barriers').

Where access, equipment or support was thought to be weak, the partnership tried to cater for this by placing the student at a school where ICT provision was good for their second school placement.

*What the course aims to achieve in terms of students ability to use ICT: ideas about what it means 'to be good at ICT'*

Whilst acknowledging the need to comply with national regulations for meeting ICT competence, some aspects of the requirements were clearly regarded as more important than others by the lead tutor for ICT, and by the mentors interviewed. The online test of 'basic skills' in ICT, designed to ensure that students knew how to use skills in ICT to support their teaching and wider professional activities' (TDA, 2007) was universally regarded as a complete waste of time by the lead tutor, all the mentors and all but one of the students interviewed. It was widely thought that students either already possessed these competences when they started the course, or that they quickly and easily acquired them as a result of everyday experience in the course. As with mentors from the other case studies, the most important element of ICT capability was thought to be developing students' ability to improve learning outcomes by skilful and effective use of ICT in subject teaching. This emerged as a much more influential goal than the requirement simply 'to use e-learning' in their teaching, and 'to design opportunities for learners to develop their ICT skills.' This did not come across as an attempt to subvert or circumvent national requirements, but to add to them and to shift the emphasis towards critical, creative and imaginative use of ICT in subject teaching.

It is interesting to note that this lead person for ICT does not have an academic or professional background in ICT; he was an advanced skills teacher in modern foreign languages who developed an interest in ICT as a way of helping to engage pupils in learning a language in order to teach the subject more effectively. He has subsequently moved into the area of teacher education within the school and the local authority that employs him, and is director of one of the 'Training Schools' in the county (schools which receive extra funding and take extra responsibility for initial teacher training), as well as playing a lead role in the SCITT here described, and being involved in a number of research and development projects in the areas of ICT and initial teacher training, and global citizenship.

As with many other teacher trainers, he was at pains to stress that it was not about developing advanced technological expertise in student teachers, but about developing creative, imaginative and pedagogically effective ways of using new technology, and developing also the critical acumen to know when not to use ICT, and which applications had most potential for enhancing teaching and learning in particular subjects and situations:

*'I always start off by saying, don't go anywhere near a computer, unless there are these rare occasions where using a computer helps you to be able to do something... if you haven't got a good idea in the first place, just shoving up a PowerPoint isn't going to do the job... What we're trying to do is how to do clear communication, and that we're using the computers to help us to do that so the focus really is on communication. It's not enough just to have information and give it to the children, you've got to mould it some way that makes it easier for the children to access it... for them to be able to learn from.'*

He described the 'lead day' for ICT as a particularly difficult and challenging session, partly because of the sheer range of things that it is possible to think about related to ICT, and partly because of the differences in the sorts of ICT that might be most helpful to teachers in different subject areas;

*'As well as using ICT with the children you've got things like your mark book, use of email... making worksheets... they need to be taught about the classroom management side of using computer rooms... how one might use Excel, how to use PowerPoint in a more creative way, how to organise files... the list goes on and on. So the day is very much making them think about using a computer as a professional person, so they're looking at ICT in lots of different ways.'*

There was an acknowledgement that as well as getting students to understand the breadth of ICT agendas, all this had to be done in a way that enticed and encouraged students to find out more about and explore the use of ICT for themselves, rather than presenting it as a daunting and potentially unpleasant ordeal. Other tutors commenting on the success of this and other sessions explained it not in terms of

coverage or clarity of exposition, but in terms of the alluring way ICT applications were modelled in the sessions, in a way that made students wish that they could use new technology to such effect, and in such a relaxed and confident way; in a way that made them want to 'do some ICT' rather than in a way that put them off.

### *Barriers to the development of capability in ICT*

When discussing how the lead day in ICT was followed up, it was acknowledged that the extent and the effectiveness of follow up and consolidation might vary according to which particular school the student teacher was based in:

*'Schools are one of the variables, some schools are better equipped, some schools have more people who are really interested in seeing how ICT can improve teaching and learning. It's partly about equipment but from what the students say, it's also about people as well.'*

Although consistency of provision across schools in general was thought to be improving, there were still some areas that were problematic in terms of access and equipment, particularly in the area of interactive whiteboards, as the following extracts indicate:

*'A serious problem that the trainees will face is that, for example, a school has gone with Smartboards... they might have Smartboards across the whole school if you are lucky, but they won't be running with the same piece of software, so in different rooms they will be running with different versions... and then they go to a different school which has a different system or different versions of the software... so, phew... that's a real headache. We're still in an experimental stage with whiteboards, there isn't the consistency that you need.'*

*'Lots of schools went down the road of investing in a few interactive whiteboards and then they bought a few more interactive whiteboards and now they've got this terrible problem that they're out of date or they haven't got the right software or whatever... if would have been better if they had just bought data projectors.'*

(Similar, but less extensive reservations about consistency were expressed about the VLEs that the scheme was working with, but these were expected to be resolved more quickly than the problem with interactive whiteboards).

In terms of feedback from students, as in the other case studies, school placements emerged as 'variables' in the students' experiences with ICT. The variability of interactive whiteboard availability and consistency bore out the concerns of the lead tutor for ICT, and it seemed that use of the local authority/partnership VLE was more developed in some schools than others.

Another factor which was considered to be a variable in terms of school based experience was the extent to which it was possible to get access to a computer suite for a 'hands-on' lesson with ICT. In some schools, ICT rooms were colonised by particular subjects such as Business Studies for a substantial portion of the week, whereas in others ICT rooms were underused as more and more teachers switched to more portable and flexible forms of ICT use in the form of tablet PCs or laptops on trolleys.

As with students from the other two case studies, the compulsory online basic skills test for ICT was vilified and described as 'useless', 'a waste of time', 'awful', 'dreadful', but unusually it evinced one positive comment: 'It perhaps helped me with Excel a bit.'

Students had few criticisms of the way that the partnership had prepared them to use ICT, but it was suggested that the ability to use PowerPoint in a powerful and effective manner was to some extent assumed and they would have liked more follow up in this area after the lead ICT day. Similarly, interactive whiteboards was thought to be an area where more practice and reinforcement would have been helpful.

In terms of barriers to the development of expertise in ICT, pressure of time was cited as an important issue. In the words of one student, *'ICT is not the only agenda you have to make progress in, and sometimes it gets crowded out by other things, especially if your mentor doesn't prompt you and give it some time.'*

#### *Enabling factors and 'ways forward' in ICT*

One of the key factors thought to be helpful in moving forward both teachers and student teachers in their use of new technology was the move to taking school registers electronically:

*'The key factor actually has been the register taking... because most schools have gone to a digital register, they've had to put a computer in every classroom, connected to the network, so they can do that register... well that means you've then got automatic internet access as well, two for the price of one, so that when you connect that to your data projector then all of a sudden you've got this potential of being able to use the internet.... Not just the teachers but the pupils as well.... To be able to share ideas together as a group.'*

In terms of more advanced or 'cutting edge' ICT applications, there were some differences of opinion as to which new developments were likely to become influential, and which peripheral. In the two other case studies, reservations were expressed about the potential of e-portfolios (seen by many as 'the next big thing' in terms of government policy). However, several of the tutors and mentors in this partnership felt that e-portfolios would become an influential and important part of e-strategy in schools, as the following example indicates:

*'So, here I am as a trainee competing against five other people wanting the post... it just so happens I've got a spangle e-portfolio and as part of my application I say "Oh, by the way, if you want to see all the things I've been up to, click here... well, I'm going to get the job, you know.... So I've got a clear need... can you imagine what the competition will be like with the credit crunch, schools are not going to be appointing loads of extra people, job.'*

On the other hand, there was little enthusiasm for another recent (and expensive) ICT development, the use of classroom response systems, or what is sometimes termed 'voting technology':

*'It does take a long time to get the thing plugged in and up and running and all that, so by the time the logistics of the thing have been sorted, for a five minute activity...? And when you've got one set of kit across the whole school...? I could actually do the same thing with a whiteboard.'*

Across all the students and mentors interviewed in this case study, there was positive interest in and enthusiasm for both the VLE as a tool for collaborative learning and the sharing of resources, and also for Web 2.0 applications, and wikis in particular. These were applications which were seen as having the potential to radically transform teaching and learning, as the following testimony demonstrates:

*'Teachers started using the VLE as a content delivery system... "This is how I give you your piece of work, this is how you give it back to me'... but once you've given it to the kids, they haven't seen it like that*

*at all, they've seen it as a collaboration tool, so the children have actually been challenging the teachers' understanding of how to use it, they're using it much more for collaboration and sharing, so they've started to unlock all these additional tools, so it starts off just swapping things round and then you suddenly unlock "stickies", or you unlock a blog, so the children at the beginning of a lesson are saying what their lesson aims and objectives are, rather than using an exercise book, but then they're beginning to reflect on their learning and able to see what others are doing and then that moves forward to using a wiki where we're really going to work together on something. And that is going to be a key area for the future of education really... this idea of us having to work together, so whereas in the past we were all doing exams and I can't look at what you're doing and you can't look at what I'm doing, because that would be cheating actually...' (from interview with ICT lead tutor).*

In terms of what applications might be a good investment for the future, the lead tutor for ICT suggested that cheap small portable basic portable computers would be a way forward:

*'Every child is going to have a little laptop, diddy little thing, very basic, so you'll be able to do, you know, most of your basic things, accessing the internet, sharing files and bits and bobs... that's the way in which schools are going to go. The days of us having classrooms with a whole load of computers.... There's no rooms left to do that in. Laptops and wireless.. just don't even go there, it's just a nightmare, the attrition rates of the machines is scary, because the laptops aren't designed for kids to be carrying them round and bashing them about but a little computer is much more robust and they seem to be working well, they've got much better battery lives now, with the big ones, after an hour and a bit, you've drained it.... So it's these very small computers which have got a little bit of functionality, that's the way forward.'*

In terms of mentor perspectives on what interventions, experiences and inputs they felt were helpful in moving student teachers forward to becoming confident and effective users of ICT, the following statements were put forward by mentors in this ITT partnership:

- *'Encouragement and support is crucial... it doesn't matter if you are not an expert in ICT as long as you are positive and enthusiastic about ICT... point them towards things... remind them about the ICT agenda when they've got a bit of free time... don't let it slip off the agenda and learn from them – ask what they've been doing in college, what some of their peers are doing... and let them see you modelling it in a relaxed and confident way, even if it's not particularly ambitious and complex use of ICT.'*
- *'Convenient access is crucial... data projectors in our teaching rooms was one of the things that turned things round for this department... laptop and data projector... that's an essential basis, then it's about their ideas, initiative and application. Allowing them to share the resources that are up on the intranet so they can see the treasures that are out there and that they should be contributing to.'*
- *'Just spending £25 on a pair of decent speakers transformed the impact of moving image extracts played in class.. it made them realise that sometimes quite small things can make a big difference, it's the same thing with memory sticks... for a few pounds they can store a massive collection of good resources for lessons, quickly collected from the intranet, colleagues' collections, the departmental archive and a few carefully chosen sites.' Sometimes people forget that one of the most powerful assets of ICT is the facility it affords to share and collect things quickly and cheaply. It used to take years for teachers to build up archives of materials on a range of topics to enrich lessons, now you can do it in a couple of months. It's not a hi-tech, sophisticated use of ICT but it's a very useful one and it gets them into realising what ICT can do... they then go on to explore other avenues...'*

- *'Easy access to ICT makes such a big difference... I've put together an 'ICT suitcase that lives in one of the history rooms... it's got three digital cameras, some voice recorders and a camcorder, all in the same case. I'm trying to put a second suitcase together because the first one has been used so much. Because it is so handy to use, you don't have to rush round the school before the lesson picking things up, it's really moved people on from just using the data projector and PowerPoint... they are starting to use multimedia and letting the kids produce things... interviews, film trailers... and they can see how positively the kids respond to doing things that are a bit different, a bit more active.'*
- *'The VLE is fairly new, and it's not significant yet, but it will be huge in a few months time when the stock of materials... the critical mass has built up. It will make a big difference to students in their few weeks of practice in terms of getting hold of resources for their lessons – something that used to take an age before the VLE and the internet.'*
- *'It's important to revisit things, to go back again and see if anyone has actually done something with an idea, an application, and to show them more examples and different ways of doing things with an application... otherwise they often have good intentions but the sheer business of a student teacher's life means that they don't get round to following things up, of internalising things so that it becomes ingrained practice and they are doing it without thinking – just things like using the scanner, resizing digital images, using windows moviemaker...'*
- *'The biggest single influence on their ICT practice is seeing teachers modelling the use of ICT... when they see the teacher doing something, and the kids enjoying it... and they think, I'd like to be able to do that, and they go off and quickly do it themselves before they forget or sort it out with some of the other students who are interested in ICT.'*
- *'A lot of students are pretty good at ICT even at the start of the course and we are quite happy to draw on their expertise, to use them to show other students how to do things, or even to lead professional development sessions, or departmental meetings... it's not abusing having a student teacher, they actually enjoy it, it's good for their confidence. We get the students to all do a presentation session using ICT and then gently debrief on how things might be improved.'*
- *'If you are not brilliant yourself, it's not cheating to bring outside experts in. I get someone in who is great at showing them how to do podcasts and they love it... they nearly all try it out and produce their own podcasts and some of them go on to use it with the kids. There is nothing more powerful than seeing someone do something that you would like to be able to do and offering to take you through how to do it in a patient, cheerful relaxed manner.'*
- *'It really helps if the teachers in the department model the use of ICT in their lessons. Students can be timetabled so that they work with those teachers. Just the routine things like searching for vivid images on Google and embedding them in PowerPoint, finding good moving image clips through history websites, embedding moving images into PowerPoints so they are less boring... easy things that bring "quick wins".. it just gets them into ICT, it gets them going at an early stage.'*
- *'I really encourage them to have a go... to take a chance, not to be afraid to take risks... stressing that it doesn't matter if it doesn't always work perfectly, it won't kill them, they won't fail the course. I think it can be quite helpful when they see something not work for me and for me to be calm and just go on to something else or "plan B".'*

- *'I sometimes use a tablet PC and wireless keyboard so that I can annotate text on the whiteboard while sitting with the kids or moving round.. it's very liberating and I can see that it opens their eyes a bit about what they can do... that's what it's about, opening their eyes to the possibilities with ICT.'*

I was only able to interview five students from this particular ITT provider, which clearly limits the robustness of any conclusions which might be drawn from such a small sample. However, there were some common themes that emerged from the interviews. All of the students felt that although they had more to learn, they had been well prepared to use ICT in their first year of teaching, and felt generally positive and confident about using new technology, and keen to make further progress in it.

The lead ICT day was thought to be very helpful by all five students, not just for the range of issues effectively covered in the time available, but for the effect on students' motivation to engage with ICT and make progress in it. As one student remarked 'It made you want to go out and get going with ICT straightaway... it got you interested and wanting to become one of those teachers who could make learning fascinating and enjoyable by the skilful use of technology.'

More than anything, the students wanted to work with teachers who regularly and adroitly used ICT in their everyday teaching so that they could see it being modelled, and they wanted friendly, patient and tolerant mentors who would give their time cheerfully to passing on their expertise. They all also expressed positive views about doing paired and group work with ICT. In terms of equipment, laptops, data projectors and internet access in classrooms emerged as the most desirable things to have, and all of the students said they would like to have more time to explore Web 2.0 applications.

In terms of barriers to the development of expertise in ICT, pressure of time was cited as one of the most salient factors; there are 33 Standards which have to be addressed in order to acquire Qualified Teacher Status, and ICT features in only a handful of these. There are other massive agendas such as assessment for learning, inclusion and behaviour management. Students have to make hard choices in terms of which of the QTS Standards they choose to focus on (and which facets of ICT to explore and develop further). Institution C appeared to be successful in persuading students of the central importance of being able to use ICT as a teacher, and it appeared to be successful in presenting the issue of 'what it means to be good at ICT' in a positive and engaging way.

#### ***4.4 The six case studies described in the 2009 TDA Evaluation Study***

A key facet of the TDA programme to develop ITT providers' ability to prepare student teachers to use ICT effectively in their subject teaching was that it allowed individual providers to explore whatever aspects of ICT they thought would be most worthwhile. There was no attempt to impose a prescribed ICT agenda or to sub contract funding to different aspects of ICT in order to achieve 'coverage' of a wide range of applications. One of the advantages of this approach has been to provide feedback on a wide range of ICT applications. Even where case studies focused on the same facet of ICT, for example the use of Virtual Learning Environments (VLEs), institutions often used these in very different ways and explored different avenues of working with them. The total amount of funding made available for ITT institutions to bid for in order to develop their ability to prepare their students to use ICT was £20 million (e mail correspondence with Head of Technology in Learning & Teaching Team, Training and Development Agency for Schools), so this represented a significant investment in the development of ICT use in ITT by English standards.

The following section is a brief summary of the range and scope of the six case studies; more detailed description can be found at <http://www.tda.gov.uk/partners/quality/developingprovision/ictinitt.aspx>.

- i) The first case study, carried out at a school centred ITT partnership, focused on the impact of the purchase of laptops and digital cameras through the extra funding made available by the TDA project. In terms of impact, the availability of laptops was seen as crucial in terms of moving towards a position of what was termed ‘ubiquitous technology’. The difference between constant difficulty and frustration in trying to book an ICT suite which characterised student teacher and teacher feedback on ICT just a few years ago in England, and being able to deploy ICT resources at any time, anywhere, emerged as being one of the most influential transformations in teachers’ use of ICT, and their attitudes towards its usefulness. There was also a conscious attempt to focus on what were termed ‘21<sup>st</sup> Century literacies’, with the use of blogs and wikis for communication and support. Just the ability to share resources quickly and easily was seen as one of the key characteristics of ICT which made it useful to teachers: ‘By putting it on the wiki, we’re actually spreading the knowledge about good sites.’ The combination of laptops and digital cameras was felt to have had a profound impact on basic, everyday pedagogy: as one student teacher reported, ‘It made us all a bit less chalk and talk.’ The case study also focuses on some of the attitudinal factors relating to ICT use by student teachers, reporting a transformation in some initially reluctant trainees’ attitudes towards using ICT in their teaching practice.
  
- ii) The second case study was carried out at a university based primary ITT department. The focus of the report is on the video conferencing (VC) facilities provided by the TDA funding. These facilities allowed the department to offer and develop curriculum enhancement projects with a small number of partner schools and evaluate the use of video conferencing within schools. This case particularly looks at its use for curriculum enhancement to combine in-school learning with out-of-school projects. Video conferencing was used to link up with a range of museums and educational venues. The facilities also gave tutors an opportunity to see their trainees work with pupils in their specialist area of the curriculum. The introduction of video conferencing facilities has also provided the opportunity for extending and developing its uses beyond what was originally envisaged. A school-based tutor in one school has gone on to develop their use of video conferencing pedagogy as a means of providing greater out-of-school learning opportunities for pupils. A mentor has developed his own work using the video conferencing facilities with the county’s archive services so they can share materials they do not normally take into schools. It is also felt that the VC facility improved weekly review processes with students. The weekly review process through the VC link allowed higher education institution tutors to observe the review by the school-based mentor. As with other projects, the report was keen to emphasise that ‘It is the pedagogical use that is vital in terms of transfer. Staff have discovered and pioneered new approaches to teaching and learning by using real-time video. It is this that is likely to establish this type of technology within teacher training.’
  
- iii) The third case study focused on an employment based ITT provider involved in both primary and secondary training. In the first instance, the TDA funding was used to try to ensure that all the student teachers on the course would have a laptop computer, subsequent funding was used to set up and develop a VLE. The laptops were seen as being a key step forward; almost a *sine qua non* for being a ‘proper professional teacher’. The report notes that ‘Without exception, all interviewees noted that the laptop helped their organisational skills by using it to plan and update evaluations, reviews and lesson plans on a regular basis. This allowed the trainees to work flexibly and alleviated some of the pressures of modern living.’ Trainees felt laptops to be: ‘Vital...absolutely vital. I’m lost when I don’t have it because everything is done electronically at both schools we are training at. It’s a case of not being able to take the register if you haven’t got a laptop.’ One trainee equated the necessity of having a laptop in teaching as: ‘It’s like having a pen nowadays.’ Having a laptop also enabled a means of communication with tutors, school, mentors and peers. They were able to share assets, give and get advice and support, and take part in peer coaching across a distributed network. This facilitated emotional and professional support

networks. The introduction and development of a VLE evinced similarly positive responses from students in terms of its impact on student teachers' use of ICT, but in terms of overall impact, the verdict was that possessing a laptop computer was a seminal step towards 'internalising' ICT into the day to day fabric of life as a teacher. The message was, 'If you haven't got a laptop, you can't be a fully functioning teacher.' (This bears out earlier research from the Open University in England on the effect of having a personal laptop and the development of student teachers' use of ICT).

- iv) The fourth case study focused on an institution that was involved in all four routes into teaching, and which provided courses for both primary and secondary student teachers. The funding was used to provide laptops for trainees, video capture and analysis technology and, latterly, the introduction of a virtual learning environment (VLE). The case study focuses predominantly on the impact of the VLE on students' ability to use ICT effectively.

It was felt that the introduction and development of the VLE had a range of impacts on students, all of them positive. 'The changes it offered in terms of programme delivery provided additional access and support to mature students for out-of-hours study, so they could fit learning into and around their domestic responsibilities. The extended materials also improved trainees' subject specialist knowledge in literacy, PE, geography and assessment. Trainees were able to get anonymous and instantaneous feedback when they used online assessments. Tutors could identify areas that were a common problem and target these in their sessions. Trainees were able to e-mail requests and the tutors could direct them to particular resources on the VLE. Trainees used threaded discussions over their placements mostly on issues around ICT usage, but linked to issues such as classroom management. They also pooled ideas.' An interesting facet of the case study is the strategy used to try to persuade the students to engage with the VLE. In the words of a trainer respondent, '*We didn't force it on people, but in our own minds we were clear we were not going to say: "Do this because it's good for you," but rather: "This is what it can do, and then people came to us."*

- v) The fifth case study, which was based on the experiences of an employment based ITT provider involved in both primary and secondary ITT also focused on the impact of a VLE which had been funded from the TDA initiative. However, the VLE had in this instance been used in a different manner to the previous case study. The VLE was used by student teachers in order to construct an e-portfolio of their progress against the QTS Standards (the 33 competence areas required by the English national framework in order to become a qualified teacher). This was done through the use of a commercial package designed to enable student teachers to plot their progress against each one of the QTS Standards using graphical representation of their progress. (in this case the package was *Bluesky*, but a range of e-portfolio systems are now available for purchase by ITT providers in England). It was interesting to note that student teacher feedback on the use of the e-portfolio was (according to the case study) entirely positive. The following comments are representative of student teacher feedback on the e-portfolio tool;

*'The QTS skills self-assessment thing is really useful. It's a good way of collecting evidence of continuing professional development (CPD) and working out what you need to do.'*

*'It's absolutely the most important part of the VLE (the QTS standards evidence base).'*

*'Everything is well structured; you have all the training day dates so you can plan ahead.'*

*'You can check your evidence for meeting the standards and address any weaknesses in a focused way.'*

*'I can use it for my NQT year as well.'*

*'You know exactly where you are in relation to the QTS standards. It's so obvious rather than having reams and reams of paper... plus you know you're never going to lose anything.'*

This case study is interesting as other studies (see, for instance, Cowan, 2009) and other respondents within this survey expressed reservations about the use and potential of e-portfolio systems. E-portfolios emerge (like interactive whiteboards and voting technology) as one of the contested areas of investment in ICT, with some respondents expressing very positive views about them, and others questioning their value.

- vi) The sixth case study took place in a higher education ITT partnership which was entirely PGCE based, and which covered both primary and secondary sectors. The TDA funding was used for a range of projects, including effective use of a virtual learning environment (VLE), laptops, interactive whiteboards and subject-specific software and hardware. This funding was at least ten times greater than the provider's budget for ICT. This is an important point in terms of grasping the scale of the investment involved in the 5 year programme as a whole. As in other case studies, in terms of impact, the availability of laptops was thought to be crucial to immersing students teachers in an ICT environment, however, one trainer noted that *'More recently it would be the multimedia – MP3 recorders, still and moving cameras, MP3 recorders – so students are now able to record and reflect on some of the things they're doing, and encourage children to do the same when they go into school.'*

Another interesting facet of the case study was the extent to which student teachers were expected to use their own initiative to develop their grasp of a range of ICT applications, given that taught time was so precious and so crowded with other agendas. To some extent it was seen as the trainers' role to introduce and model ICT applications, and then for the students to work collaboratively to explore how they might best develop their use of the application in their teaching: *'They're intelligent graduates and want to do it well so you can subcontract things to them – you find out about blogs, you find out about wikis. And then they feed back because there aren't enough hours in the day to cover all applications. You just couldn't do it or it would be very superficial.'* There was also a move away from 'coverage models' for ICT, in the sense of trying to devote taught sessions to every conceivable ICT application. It was thought to be more helpful for student teachers to explore in depth the potential of some applications, rather than have superficial knowledge of all of them: *'I've stressed a lot less about coverage than I used to. I pick a relatively small number of areas that I want to focus my attention on. When I see the number of students who are actually using ICT in their teaching and what they're doing with it, it strikes me that's a sensible way to go.'*

#### ***4.5 A summary of some of the key issues arising out of the six case studies in the 2009 TDA evaluation study***

Respondents participating in the evaluation study were asked for their views on what factors influenced the impact of the ICT innovations which had been funded by the TDA. It was widely acknowledged that impact on trainees varied considerably and depended on a range of factors, notably the culture of placement schools and trainees' prior familiarisation with a technology. In terms of the impact on the institutions involved, variations in the impact of the extra funding to promote ICT development were accounted for in terms of trainers' willingness (or resistance) to change.

Thus, both in schools and training institutions ‘culture’ in relationship to innovation and change was thought to play an important role. The extent to which schools and training institutions fostered a culture of collaboration was also thought to have a bearing on impact. Where trainees were able to share new ideas and approaches with peers and school colleagues, they appeared to be able not only to develop their own practice but also to change schools’ views of ICT. There were widespread variations in the impact projects had on trainers. Certain technologies, such as the use of video and other multimedia approaches, appear to have generated greater initial take-up by tutors, trainers and mentors. Similar impact was brought about through ICT-led enhancements to existing administration and support systems used by staff.

In terms of ‘key variables’, Hadfield *et al.*, (2009: 6-7) identified three generic groups of factors whose interaction they felt determined the success of any ICT initiative or innovation. These were: the status of the technology being introduced; the ITT organisation’s capacity for innovation; and the degree of alignment between the innovation and the needs and concerns of individuals and teams in the organisation.

The report notes that certain forms of technology have a high ‘social status’ in the world of education – both for teachers and pupils. There is evidence in the case studies that students felt that unless you had and used a laptop, ‘you weren’t a proper teacher’, ‘you couldn’t even take the register.’ Similarly, in at least some cases the ability to use an interactive whiteboard expertly was seen as something that marked one out as an effective professional – both in the eyes of fellow student teachers, and in the eyes of pupils. (In Case Study A, a Religious Education trainer acknowledged that ‘*Although it’s a sneaky agenda, RE teachers have street cred problems and being good with this sort of thing (ICT) is good for our street cred*’).

Student perceptions of the learning status of laptops and interactive whiteboards were thought to enhance the motivation of students to develop expertise in these areas. A crucial point of course, is that at some stage students need to move on to understand and exploit the ‘learning status’ of the technology; that is to say, its potential for enhancing teaching and learning.

Capacity for innovation was defined by the following characteristics:

- recognition of individuals’ existing understanding of the technology and encouragement for them to use this to support others
- sequential and focused support for a limited number of individuals who then mentored others
- integration of opportunities to model different uses of the technologies throughout existing provision and across the different contexts in which trainees operate
- encouraging teams to experiment and take risks
- building an ethos of openness and shared learning
- developing structures and process to support sharing between project participants
- providing discipline through enquiry and evaluation
- offering leadership support at all levels and creating additional leadership capacity.

(Hadfield *et al.*, 2009: 6-7).

The report argued that aligning the needs and concerns of individuals and teams was the factor which appeared to have the greatest influence on whether an ICT initiative was successful or not: 'The technology being implemented and how it was designed to be used had to meet a significant number of individuals' needs and add substantively to the quality of the core activities of key groups and teams.' (Hadfield *et al.*, 2009: 7).

#### ***4.6 Evaluation approaches and theoretical models used for assessing the effectiveness of investment in ICT in initial teacher training in the TDA evaluation study***

In the TDA Evaluation Study, ITT providers were asked to assess trainees' and organisations' use of a technology before and after the TDA-funded projects. Their assessments were analysed using a five point e-maturity scale derived from Hooper & Reiber (1995). In this model, the five stages of ICT use were identified as: familiarisation; utilisation; integration; reorientation; and evolution. The report suggests that the overall shift for student teachers and training providers brought about by the projects was from utilisation (stage 2) to integration (stage 3). This meant that they had moved from a point at which they had some experience of using the specific ICT to one where they had integrated it into their practice and it had enhanced teaching and learning. At the beginning of the projects, 17% of respondents felt that their organisations were at a stage even before 'familiarisation'(stage 1), that is they were unaware of the potential benefits to practice of the ICT project in question before it began. After the projects 90% of trainees were thought to have moved into one of the higher three categories – integration, reorientation or evolution. The most dramatic shifts in use by both trainees and organisations were associated with projects that focused on laptops in particular, and on interactive whiteboards.

In order to address the question of how likely it was that the vast range of projects that had been funded would lead to a profound and lasting impact upon ITT providers and their trainees, Coburn's (2003) model for scaling up educational initiatives was adopted. This model highlights that for projects to become sustainable sources of change they need to have achieved a broad scope of implementation; a certain depth of change; and to have transferred the ownership of the project from its initial advocates and leaders so that it has become an established way of working.

In terms of scope, the TDA project is estimated to have involved over 13,000 student teachers over the past five years. In terms of depth of engagement, considered in terms of both the take-up and application to practice of various technologies, by trainers and student teachers, and in terms of the consistency with which students encountered others professionals using the technology and with which they encountered supportive individuals and contexts, the report notes that 'students experienced widespread variations in practice and ethos both across training providers and within schools. A key issue in terms of trainees having an impact on schools and pupils was that ITT providers found it difficult to engineer widespread coordination of ICT developments with schools. This meant many trainees were unable to develop their practice within placement schools

In terms of transfer of ownership, the report states that 'Project leaders were more successful in transferring ownership when they used technology which had a high social status, where trainees saw its use as a key part of becoming a 'teacher' rather than an imposition. Certain technologies, such as laptops and IWBs, have already reached the status of being professionally ubiquitous in that their absence in a professional context is more likely to be noticed than their presence. For pupils, high social status was associated with technologies that linked out of school learning with learning in school and which provided them with different opportunities to express their views and learning (Hadfield *et al.*, 2009: 9).

## 5. Transversal observations on case studies

The following points attempt to pull together some of the key issues emerging from the study. Much of the feedback which emerged from the three case studies conveyed the same or similar messages in terms of respondents' views on what factors were thought to be helpful or unhelpful in enabling student teachers to use ICT effectively. In some cases, the point details what might be termed 'key variables' in the systems for preparing student teachers to use ICT effectively in their subject teaching, in other cases, the point relates to 'lessons learned' from mistakes that have been made in the past. Other points refer to things that large numbers of respondents felt were particularly important factors which should be kept in mind when considering improving policy and practice in this area. I have also attempted to summarise what were perceived to be 'barriers' to skilful and effective use of ICT and what factors were 'enablers' of effective ICT use.

### 5.1 Lessons learned from past mistakes

#### *It's more about pedagogy than technological capability*

Nearly all the university and school based trainers interviewed were at pains to stress that 'being good at ICT' as a teacher was not principally about levels of technological expertise but about the sophistication of teachers' judgements about the potential benefits and possible disadvantages of using various forms of new technology. Students need to understand what it means 'to be good at ICT' as a teacher, in terms of being able to assess the potential of various new technology applications to improve teaching and learning and then being able to use them to best effect. This often involves high order thinking, creativity and imagination rather than just the technological ability to make the ICT application work. The use of PowerPoint is a case which illustrates this point. Is there anyone reading this page who has not at one point or another been severely bored by watching a PowerPoint presentation? This often occurs not because of the failure of the presenter to master the technical functions of the application but because they have lost sight of how to engage the audience with the ideas and content of the presentation. Technical capability is a necessary but not sufficient condition for being able to use ICT effectively. On the whole, teacher education programmes in England have moved on from mechanical and generic 'industrial' training models which focus solely on technical capability, but there are still some dull PowerPoints, dead blogs, overcomplex graphics, pointless mindmaps and meretricious quiz games out there. In spite of 'Death by PowerPoint' being a common affliction, several students reported that effective use of PowerPoint, and the development of high-order pedagogical skills in PowerPoint tended to be assumed (*"There was part of a session on PowerPoint and then you were pretty much left to get on with it"*). The same criticism was made of training in the use of interactive whiteboards.

The distinction between education and training (see footnote 1) is perhaps not just a philosophical one, and there is a case for arguing that effective preparation of teachers to use ICT is more a matter of education rather than training. Training generally implies instructing learners that there is one correct way to do something. Using ICT effectively generally means being able to use applications in a range of different ways.

#### *The move away from specialist computing rooms and towards flexible and 'easy access' use of ICT in 'ordinary' classrooms and outside school hours*

One of the lessons learned from earlier experiments in the development of ICT in English schools is the need to ensure that ICT can be used as the need arises, when and as required, not as a one-off 'special occasion' lesson. One of the earlier models which dominated English policy in the area of ICT in schools was that pupils should have 'hands-on' experience of working with computers in dedicated computer suites, so that they would become proficient in basic applications such as Word, Excel, and PowerPoint. At

one stage the idea of ‘curriculum mapping’, whereby different subjects would ‘deliver’ proficiency in different ICT applications (history would do databases, modern languages would do desk top publishing...) was commonly used in English schools (see, for example, Haydn, 2004). One of the most important lessons which has been learned is that most teachers are interested in the potential of ICT for improving teaching and learning in their subject, they are less passionate about being used as ‘service agencies’ to deliver ICT competence. Much of the money invested in ICT in the late 1990s in England was spent in building ICT suites. Most respondents in this survey supported the move towards more mobile and flexible deployment of ICT, with one respondent describing ICT suites as ‘*dinosaur rooms*’.

The TDA evaluation survey (Hadfield *et al.*, 2009) shows that most of the funding made available to providers was used to ensure that ICT could easily be used in any teaching session through the use of laptops, data projectors and wireless connection, and that student teachers could easily communicate with their university tutors, their colleagues in school and each other, through the use of VLEs. For an application to become commonly integrated into day to day practice, it needed to do something that was helpful, but it also needed to be easy and convenient to use. The evidence from Case Study C demonstrates that because interactive whiteboards were not easy to use, they became to at least some extent, a problem rather than an asset. The investment in an ‘ICT suitcase’ in Case study C proved to be helpful in moving student teachers away from over reliance on the data projector and PowerPoint, and into experimenting more with digital cameras, microphones and camcorders. Many student respondents reported that convenience and flexibility were major factors in luring them into exploring what ICT might offer.

Several respondents who were clearly very accomplished in their use of ICT (and who were in some cases involved in ‘training the trainers’) also made the point that it was not just about getting ICT used in schools, but getting pupils to use ICT for learning outside the school, in their own time. As one experienced mentor pointed out, ‘*Some kids are still having to do fairly dull worksheet exercises for homework, others are being told “Make a website on....”, or “Do me a film trailer on...”.* There is no question in my mind which of these types of homework is best for pupils’ learning.’

*It’s not about how much ICT is used, it’s about its impact on teaching and learning, and the skill with which it is used*

Early Department for Education surveys of the use of ICT devoted some attention to finding out how much computers were used in classrooms (see, for example, DfEE, 1997). This was perhaps understandable when so much money had been invested in computers. However, it is now generally accepted that computer use *per se* is not necessarily a good thing. Several of the trainers involved in the survey were concerned about student teacher reliance on the use of data projector and PowerPoint, or data projector and interactive whiteboard. In case study C, a respondent noted that in one school, pupils had presented a petition to the head teacher to protest about the staple diet of PowerPoint which dominated their school day. Care must also be taken not to equate entertainment with learning, and novelty interest in a new application with high value pedagogy. There was divided opinion on several recent innovations in ICT, even amongst expert practitioners in ICT (for instance, those who train the trainers). Some experienced practitioners regarded interactive whiteboards as very useful, others thought they had little to offer in some subjects beyond ‘*eye candy stuff*’. Some respondents felt that voting technology had real potential to increase genuinely interactive learning, discussion, debate and dialogic argument, others saw them as little more than an expensive toy. Opinion was similarly divided on the virtues of software packages for compiling e-portfolios, with some trainers feeling that Web 2.0 applications would do the same job at no cost. Several respondents noted the commercial pressures on schools to purchase particular hardware and software packages, and one referred to these commercial pressures as ‘*a slightly different but just as unhealthy equivalent of the military-industrial complex.*’ With all these applications (some of them extremely expensive), there is a need for careful trialling and evaluation before substantial investments are made.

Nearly every trainer interviewed stressed the importance of developing students' critical faculties in using ICT, so that they developed good judgement in terms of when to use or not use ICT, which applications had most potential for enhancing teaching and learning in particular contexts, and how to use ICT to best effect. A representative selection of extracts from trainer testimony is given below:

*'I just say, I want you to be critical consumers and, and everything I do I want you to do... make an assessment of the pedagogical aspect as well as the substantive aspect.'*

*'It's about quality and creativity and imagination in deploying ICT, not "they can all do lots of stuff."'*

*'I want my students to think "Why am I using this.... Is it helping? I want them to use ICT critically.'*

#### *The dangers and limitations of coverage models of ICT capability*

An earlier competence framework for ICT in initial teacher training (DfEE, 1998) detailed over 100 statements of competence in ICT, stretching to over 15 pages of documentation. Student teachers had to demonstrate competence in every one of these areas in order to pass the course. This was widely found to be cumbersome and unworkable and there seemed to be general acceptance from most trainer respondents that the more recent 'slimmed down' competence framework for ICT was more sensible and appropriate. The range of ICT applications has become so vast that it is difficult to cover them all in depth, and several trainers, particularly those closely involved with ICT, felt that apart from a few basic things like being able to use a word processor, e mail etc, it was not necessarily desirable for student teachers to develop capability in all facets of new technology, and perhaps preferable for them to explore, develop and 'specialise' in aspects of ICT which they felt had particular potential. As one trainer remarked, *'I don't want them all to have to develop their own website, blog, wiki... I would rather they focused on one thing and made it a really good, worthwhile, educationally sound wiki or whatever.'* In the words of another tutor, *'It's not good enough to put a tick, can use PowerPoint, tick, can use moviemaker... it's about how well they can use it.... Whether they can use it in a powerful and effective way and in different ways, to perhaps do different things.'*

#### *Providing funding in a way which allows providers to pursue their differing interests in the development of ICT in ITT*

One of the facets of the TDA programme for investing in ICT which was very favourably regarded by respondents was the flexibility it afforded for institutions to pursue aspects of ICT they were particularly interested in. Flexibility rather than prescription was regarded as a much better way forward, partly because it made those involved 'volunteers rather than conscripts', and partly because it was helpful to have trainers exploring different ICT agendas and possibilities in order to share the outcomes in due course. As one trainer said *'There aren't enough hours in the day to keep up with everything however keen you are so it's helpful to be able to sub contract things.'*

#### *The online basic skills test in ICT: a lesson unlearned?*

One lesson still 'unlearned' by policymakers in England is the almost complete uselessness of the compulsory online ICT test for student teachers. (The test, which has to be taken at a special test centre, under timed conditions, tests students' ability to do basic tasks in Word, Excel, PowerPoint and E-mail). As indicated in the case studies, hardly anybody – trainers, mentors or students – has a good word to say for the test. It is regarded as redundant, flawed, a time consuming nuisance and something that puts student teachers off ICT. It has cost millions of pounds to develop and implement, and still costs substantial

amounts of money in terms of administration and the costs of the test centres. How bad does an innovation have to be before policymakers consider the possibility that it might not be working well and should be discarded?

## **5.2 Key variables**

### *Trainers*

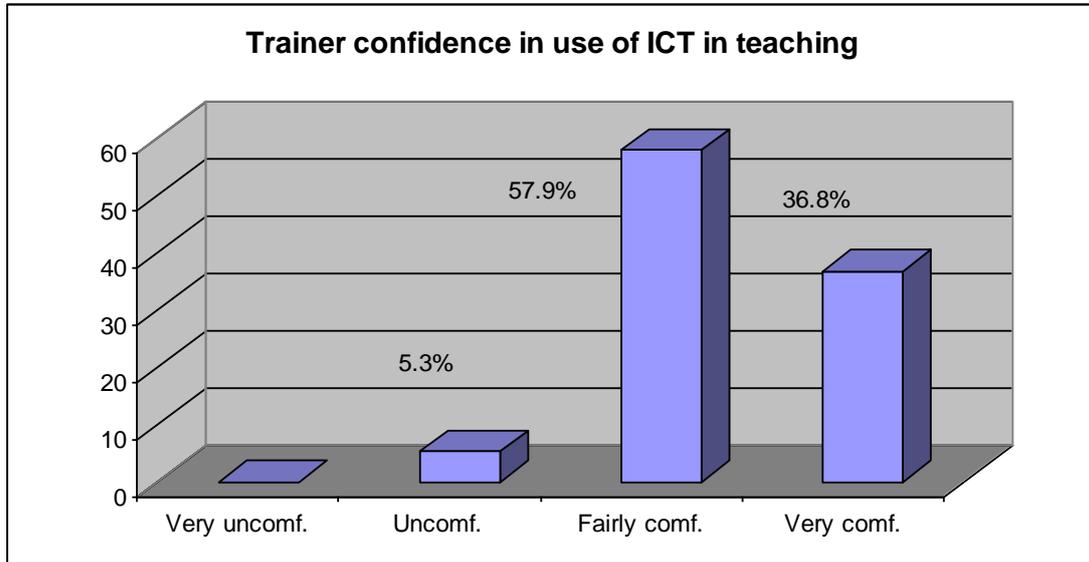
This emerged as one of the most important factors influencing the extent to which student teachers would be in a position to use ICT effectively by the end of their course of training. It was particularly influential in secondary PGCE courses, where generally, the responsibility for developing students' ability to use ICT rested to a considerable extent with their subject tutor at the university. It should be stressed that trainers' ability to prepare students to use ICT was not simply a function of their personal expertise in ICT, but was seen as multifaceted by students, mentors and trainers themselves. The following section attempts to 'unpack' some of the variables which were thought to influence trainers' ability to prepare students to use ICT effectively.

Particularly in terms of student feedback, a particularly influential factor was thought to be the tutor's ability to regularly model ICT use in a persuasive and powerful manner (and in a relaxed confident way). However, it was also thought to be about course design, and the extent to which ICT would feature in the taught course. Where it was felt that the tutor was either not interested or not confident in the use of ICT, students believed that ICT would have a lower 'profile' on the course; there would be fewer dedicated sessions focused on ICT, there would be fewer instances of it being used as part of a day to day session, and there would be less awareness of 'what is there to think about in ICT?'. Part of it was seen as just being aware of applications which might be used in subject teaching, with a quick demonstration, leaving the students to follow it up as they wished. 'Keeping up to date' with developments in ICT was thought to be an important requirement for trainers, both in student and mentor feedback. Reinforcement and follow up was also thought to be helpful; revisiting elements of ICT to check on progress, refresh memories and keep ICT in students' minds so that they were always on the look out for ways that ICT might help them to teach more effectively. Several students also felt that the tutor's attitude to and familiarity with ICT impacted on mentors' attitude to ICT – if they knew that it was considered an important facet of subject teaching by the university tutor, they were more likely to devote time and attention to ICT when they were working with the students in their school based practice. It is perhaps important to note that advanced *technological* skills were not thought to be as important as the effective modelling of ICT in regular teaching sessions. Trainers, mentors and students all reported that enthusiasm, awareness, ICT 'presence' and modelling of ICT in teaching sessions were more important determinants of students' end of course capability than having a 'tekkie' (ICT expert) as a tutor. The extent to which trainers were able to provide differentiated support for their students, and their understanding of the psychological influences on student teachers' engagement with ICT were also thought to be important variables in tutor expertise in ICT (see point 4, below).

The importance of the role of the subject tutor at the university was also confirmed by evidence which emerged from the 2009 TDA Evaluation study of ICT in ITT, which suggested that projects had to focus on raising trainers' awareness of ICT before developing their confidence in using it.

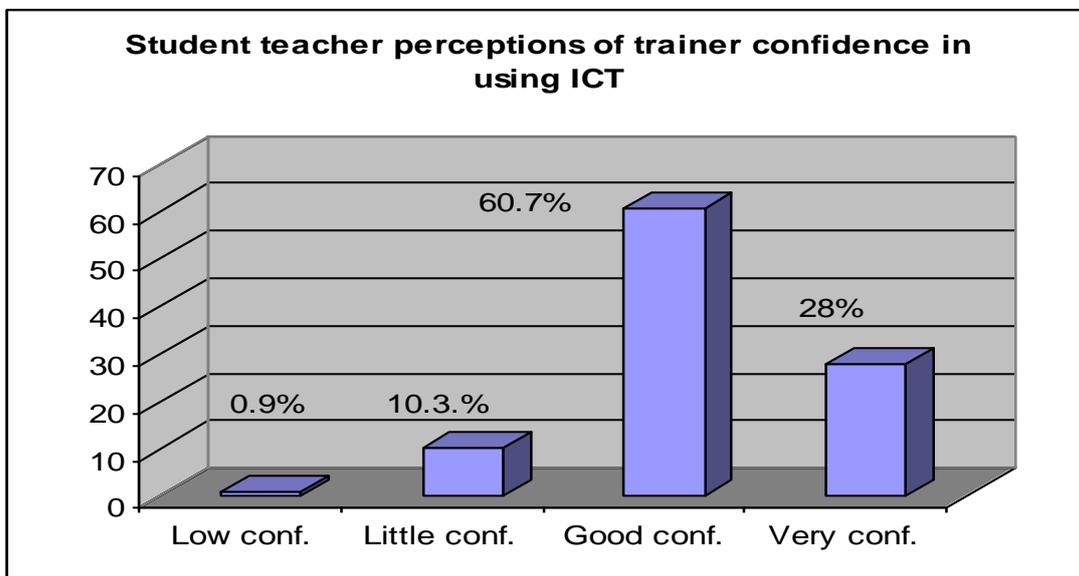
Variations in the degree to which teacher trainers were confident and accomplished in their pedagogical knowledge and use of ICT emerged as one of the 'key variables' in the process of preparing student teachers to use ICT in their subject teaching. Trainers themselves acknowledged that they had different levels of expertise in ICT, although only one of the respondents self-reported as being uncomfortable or very uncomfortable using ICT in their teaching (see Table 3).

**Table 3: Trainer confidence in using ICT in teaching**



A slightly different picture of trainers' confidence in using ICT was presented by examining student teachers' perceptions of trainers' confidence in using ICT, but nonetheless, over 85% of students rated their trainers' confidence in using ICT as 'very good' or 'good'. However, only 28% rated trainer confidence as 'very good' (see Table 4).

**Table 4: Student teacher perceptions of trainer confidence in using ICT**



There were also variations in students' perceptions of the importance which their trainers attached to ICT. Although the majority of students reported that tutors placed either 'quite great' or 'very great importance' to ICT (77.5% of the sample), this still leaves over a fifth of respondents feeling that 'the messages' that their tutors were sending were that ICT is of little or no importance. Almost 80% of trainers reported that their academic department had a policy to foster and sustain ICT based innovations in

course teaching. Trainers' interest and expertise in subject oriented pedagogy in ICT may also be influenced by institutional factors. 84.2% reported that support was available with regard to pedagogical use of ICT, but only 63% of this was regarded as 'good' or 'very good' in terms of quality.

The 'gap' between trainers is further accentuated by the fact that many trainers were clearly closely involved in innovative projects involving ICT and pedagogy, and some were at what might be termed 'the cutting edge' of exploring the educational potential of a range of new technology applications. Almost half (47.5%) reported being involved in projects aimed at using ICT in new and innovative ways, and this was to a large extent corroborated by student teacher feedback, with around a third of respondents reporting that they had been involved in projects aimed at using ICT in innovative ways, initiated by their tutors. Given the scale of investment in interactive whiteboards in ITT in England, it was interesting to note that more than half the trainers who completed the online questionnaire reported that they either never used interactive whiteboards in their teaching or used them only 'sporadically'. Interviews with trainers revealed that some of them did not feel that interactive whiteboards were a particularly useful form of technology, and several of those who were critical or negative about whiteboards were expert practitioners in ICT rather than trainers who were not confident about ICT.

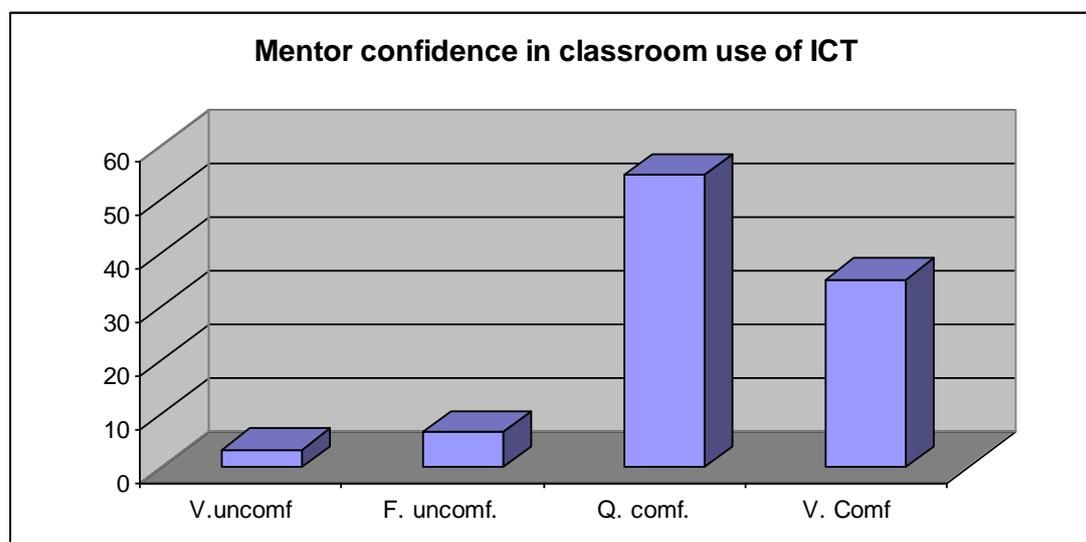
### *Schools*

It should be stressed that some schools were thought to be exceptional in terms of their ability to develop students' use of ICT (*'When they come back to the university, they are ahead of you'* one tutor remarked). The problem is not schools lagging behind ITT courses in their use of ICT, it is about how to share and disseminate best practice.

However, there is evidence from all of the case studies that some schools were more propitious environments for helping to develop student teachers' ability to use ICT than others. This was only partly about equipment and facilities. A majority of trainers felt that 'the human element' was more influential than the munificence of equipment. The expertise, interest and encouragement afforded by supervising teachers and departments was regarded as the most important factor impacting on student teacher progress in ICT.

Mentor confidence in the use of ICT emerged as one of the significant variables in the school based elements of training. As with trainers, the majority of mentors reported that they were either fairly or very comfortable using ICT in the classroom. There may however, be quite a big difference between having a mentor who is 'quite comfortable' using ICT as against being 'very comfortable' in terms of the impact that this has on student teachers. Table 5 gives mentor responses to the question of how comfortable they felt in terms of their classroom use of ICT.

**Table 5: Mentor confidence in classroom use of ICT**



Approximately three quarters of mentor respondents (74.7%) reported that pedagogical support relating to ICT was available in their schools, but this was perceived as being very variable in quality, with approximately half of the respondents describing pedagogical support as good or very good, and half describing it as poor or mediocre. This was also reflected in the responses of students. Although a majority reported that pedagogical and technical support was available, there were widely differing views as to its quality. This was also borne out by interviews with mentors and student teachers.

### *Students*

Several trainers made the point that the students on ITT courses were also in a sense, one of the variables in the process. In the words of one trainer from Institution B:

*‘They all get pretty much the same input... at least in the taught course at the university... and yet some of them get much further in their use of ICT than others and it doesn’t seem to be just about which schools they have gone to for their placement. There are psychological and attitudinal factors at work here... it’s about attitudes to risk and new experiences, about initiative and perseverance. Some of them are full of good intentions but don’t stick at it and move on with things... They say “That’s great... that’s really interesting... and then go away and forget all about it. It’s a bit like being a football manager. You’ve got to know who to push and remind and cajole and who you can just leave to get on with it. You’ve got to nurse the confidence of some students and persuade them that they are not hopeless at ICT... you can give them some “quick win” easy stuff that gets them going, things that are technologically easy but which can have a big pay-off in terms of impact on lessons. Others you’ve got to challenge and give them harder stuff which they will thrive on... especially working in a group of “advanced” students.’*

Another facet of trainer expertise in ICT is their grasp of the factors which influence student teachers’ attitude to ICT, and ability to provide differentiated experiences for different types of student. There is also a case for mixing the composition of student groups whilst working on ICT over the course of the training year, rather than settling for stable and constant ‘mixed ability’ groups (see Haydn and Barton, 2007).

*‘Some of them are full of good intentions but never get round to it.. others are very dogged and persevering... “I’m going to stay behind in school every night this week until I can do this”... you need to*

*get across to students these points or they think of it just in terms of being good or bad at ICT as a sort of genetic thing.'*

Some tutors appeared to be particularly adroit in providing differentiated and psychologically astute provision for their students:

*'Providing some stuff which is really easy to learn gives them some quick gains and changes the attitude of the wobbly ones... but you also sometimes want some more challenging things that the able ones can wrestle with, and which teaches them about perseverance... there are timing and balance issues here, and sometimes having them do different things within the group' (Secondary English tutor).*

*'We have voluntary catch up "clinics" for the less confident ones, and they are very popular... they nearly all come.. and we make sure the sessions are really enjoyable and good fun... you've got to get across the idea that if you are a student teacher, new technology is your friend' (Primary Science Tutor).*

*'It's partly about the tutor's empathy and skills in working with the students who lack confidence and think that they are no good at ICT.'*

*'Yeah, and you pick up, I mean even without an audit you pick up who are the proactive ones, who are the skilled ones, who are competent, and you make them do tasks together, so, you know, they learn from each other.'*

Mentors' and trainers' ability to provide differentiated provision for student teachers, and their understanding of the factors influencing student teachers' engagement with ICT (the affective domain of ICT) emerged as important factors in student teacher testimony.

In terms of initiatives and investments which might help to increase and improve the integration of ICT into courses and classroom teaching, the three groups of respondents had differing views about what would be most helpful. It is interesting to note that in spite of recent improvements to infrastructure in schools and universities, access and reliability were still considered to be important areas for improvement by students and mentors. More time to devote to ICT and courses for the development of both technical and pedagogical skills were prominent in the ideas of all three groups of respondents, with 'better policies' and 'incentives' evincing much less support. The views of the three groups of respondents are given below in Tables 6 to 8.

**Table 6: Percentage of students rating particular investments and initiatives to improve the integration of ICT into teaching as 'of very great importance'**

<b>Suggestions for improving ICT integration</b>	<b>% viewing this a v. important</b>
<b>Reliability of equipment</b>	<b>68.2%</b>
<b>Technological hands on training/courses</b>	<b>58.9%</b>
<b>Training/courses in pedagogical use of ICT</b>	<b>52.3%</b>
<b>Time to prepare, explore and develop ICT</b>	<b>50.5%</b>
<b>Better access to technological equipment</b>	<b>44.9%</b>
<b>Availability of high quality equipment</b>	<b>36.4%</b>
<b>Pedagogical ICT support (e.g. hotline)</b>	<b>25.2%</b>
<b>Technological support (e.g. hotline)</b>	<b>24.3%</b>
<b>Policies on using ICT across the curriculum</b>	<b>19.6%</b>

**Table 7: Percentage of mentors rating particular investments and initiatives to improve the integration of ICT into teaching as ‘of very great importance’**

<b>Suggestions for improving ICT integration</b>	<b>% viewing this a v. important</b>
<b>Reliability of equipment</b>	<b>87.9%</b>
<b>Time to prepare, explore and develop ICT</b>	<b>80.2%</b>
<b>Better access to technological equipment</b>	<b>65.9%</b>
<b>Technological hands on training/courses</b>	<b>54.9%</b>
<b>Availability of high quality equipment</b>	<b>50.5%</b>
<b>Training/courses in pedagogical use of ICT</b>	<b>42.9%</b>
<b>Technological support (e.g. hotline)</b>	<b>28.6%</b>
<b>Pedagogical ICT support (e.g. hotline)</b>	<b>19.8%</b>
<b>Policies on using ICT across the curriculum</b>	<b>09.9%</b>

**Table 8: Percentage of trainers rating particular investments and initiatives to improve the integration of ICT into teaching as ‘of very great importance’**

<b>Suggestions for improving ICT integration</b>	<b>% viewing this a v. important</b>
<b>Time to prepare, explore and develop ICT</b>	<b>57.9%</b>
<b>Reliability of equipment</b>	<b>52.6%</b>
<b>Technological hands on training/courses</b>	<b>42.1%</b>
<b>Technological support (e.g. hotline)</b>	<b>42.1%</b>
<b>Better access to technological equipment</b>	<b>42.1%</b>
<b>Availability of high quality equipment</b>	<b>42.1%</b>
<b>Training/courses in pedagogical use of ICT</b>	<b>36.8%</b>
<b>Pedagogical ICT support (e.g. hotline)</b>	<b>26.8%</b>
<b>Policies on using ICT across the curriculum</b>	<b>21.1%</b>
<b>Task related incentives (salary, promotion etc.)</b>	<b>10.5%</b>

### *Exposure to Web 2.0 applications*

Students’ exposure to Web 2.0 applications was one of the variables which emerged from the case study strand of the research. There were some students who had not heard of the term ‘Web 2.0’ and reported that their course had not focused on things like blogs, wikis and podcasts, and others who talked with considerable enthusiasm of their experiments with these applications. Similarly, some tutors had a passionate interest in exploring the potential of Web 2.0 in teaching, and were involved in funded research projects in this area (see section below for further development of this point).

### **5.3 Barriers to the development of capability in ICT**

#### *Lack of time to explore, develop and reinforce ICT capability*

Trainers from all the case studies mentioned the problem of lack of time to fully explore, develop and revisit all relevant aspects of ICT within the one year course. Even keeping fully up to date with ICT development in one’s subject was considered to be a challenging task, given the plethora of developments

in ICT in recent years. Some mentors made the point that sometimes student teachers had more urgent agendas to address if they were having severe problems with planning or class management, and that there were times when ICT was not the most pressing agenda for some students.

One of the answers to the time problem was thought to be getting students to work collaboratively on ICT outside the taught sessions, and to use precious time in taught sessions to focus mainly on pedagogy issues rather than technology skills, given that often some of the students could help others with technical agendas.

It should also be remembered that ICT is only one of several competing priorities for teachers' time; there are several other high profile agendas for teacher development. Kent (2009: 40) notes that over the past eight years, 459 documents have been issued to schools just on the teaching of literacy. Unless a conscious attempt is made to guarantee dedicated time for ICT development, there is always the danger that it will be crowded out by other issues and concerns.

#### *Limited compatibility between university and school ICT facilities*

This seemed to be a particularly big problem with regard to the use of interactive whiteboards, but there were also instances where schools used different VLEs to the university, or had different datahandling and image manipulation software. Having the ability to cope with different models and software might be one of the skills which institutions might seek to develop given the entrenched nature of some of these issues.

#### *Failure to guarantee a 'role model' for ICT use and development for every student teacher*

This was a variable in both the university and in schools. In university based ITT partnerships, institutions A and B both adopted a policy of getting in outside help in cases where the university subject tutor was not accomplished in subject based uses of ICT, and this strategy appeared to work well. Another way of coping with variations in schools' and departments' ICT strengths was to 'compensate' over the course of the two placements to ensure that the student got a good experience of using ICT in at least one of the two placements.

According to student testimony, having a mentor or tutor who was knowledgeable, expert and enthusiastic about exploring ICT agendas, and who could model effective use in their teaching sessions was one of the biggest factors influencing end of course competence in ICT.

#### *The requirement to take the online basic skills test in ICT*

This was not seen as an insurmountable barrier to developing ICT capability, but it was thought to be off-putting and a waste of time that could have been spent in more productive ways.

### **5.4 Important factors to keep in mind**

*There is no necessary correlation between expense and sophistication of new technology applications and their potential for enhancing teaching and learning.*

England has seen a substantial financial investment in installing interactive whiteboards (IWBs) in schools and ITT institutions. Hadfield et al. (2009) felt that some of the most dramatic shifts in ICT use by both student teachers and organisations were associated with projects that focused on laptops and interactive whiteboards. There were some respondents (including some trainers, mentors and students) who spoke very positively about the 'learning status' or potential of IWBs. However, there were also some respondents who were dismissive of the educational potential of IWBs, including a number of interviewees

who were obviously very experienced and accomplished in their use of ICT. Moreover, some English research indicates that interactive whiteboards have had a limited and variable impact on classroom practice and pupil learning (see, for example, Moss *et al*, 2007; Somekh *et al*, 2007). Two respondents suggested that so much money had been invested in interactive whiteboards in England that there is now pressure on teachers and teacher trainers to justify this investment, with less attention invested in considering whether or not interactive whiteboards have significant potential for improving teaching and learning. Convery (2009) argues that there has a tendency for recent research on the use of ICT in education to blame ‘Luddite’ teachers for the limited education ‘yield’ of various ICT applications, rather than acknowledging that the deficits might stem from limitations from the technology itself. Several experienced and accomplished users of ICT also expressed reservations about the utility and ‘value for money’ of classroom response systems and e-portfolio packages, suggesting that Web 2.0 applications offered the opportunity to provide the same or similar learning opportunities without major financial investment.

Microsoft Photostory and Microsoft Windows Moviemaker were two applications which evinced praise from several respondents, as examples of free programmes which were comparatively simple and straightforward to learn and use and which were thought to have a high ‘yield’ in terms of enhancing teaching and learning for limited investment of ‘learning time.’ In terms of ‘killer applications’ in ICT, one respondent made the point that the nearest thing to a ‘killer application’ (an application with particular power to transform teachers’ use of ICT), was probably the data projector, with wireless, memory sticks and small hard drives close behind: *‘The real transformation has been teachers’ ability to use ICT in ordinary classrooms without tracking down to the ICT suite... and being able to share and build up collections of powerful resources very quickly through the use of ICT.’*

#### *Collaborative ways of working to make progress in ICT*

Where trainees were able to share new ideas and approaches with peers and school colleagues, they appeared to be particularly enthusiastic about the educational possibilities of using ICT. Some providers and tutors appeared to have better ‘systems’ than others for maximising the potential of peer teaching and collaborative working.

Collaborative working and the sharing of ideas was a factor that also applied to providers themselves. In some cases subject tutors tended to ‘do their own thing’ in ICT and there was limited sharing of ideas and good practice. There are not just differences *between* providers, in terms of how well they equip their students to use ICT, there are differences within providers, with a mixture of outstanding practice, and quite ordinary practice.

#### *The need to use ICT to promote ‘active learning’ strategies and knowledge construction by pupils*

Student teachers and mentors who were positive and enthusiastic about the potential of ICT for enhancing teaching and learning frequently mentioned the potential of new technology to get pupils to be actively involved in the process of learning (as against receiving information from teachers and writing down what they were listening to). This was the case with respondents from all the case studies described above. There was particular enthusiasm from students and mentors who had experimented with a range of Web 2.0 applications. As Hadfield *et al*. (2009: 15) argue, ‘Providers and schools should be aware of the digital habits and skills of their pupils. ICT interventions should build on these skills to engage pupils and motivate them to voice their views and create their own content.’

Some trainers and mentors from all three case studies commented on the danger of students becoming over reliant on particular forms of ICT, and in particular, drifting into the habit of having the data projector and PowerPoint or the data projector and interactive whiteboard on all through the day, right through every

lesson. Moreover, their ways of using PowerPoint and the whiteboard were often very teacher-centred, with the emphasis on the teacher or student teacher controlling and manipulating the presentation software ('Look what I can do with a whiteboard!') in a way that actually increased didactic teaching and reduced active pupil participation in the lesson. Heppell (2010) describes this 'unintended outcome' of whiteboard technology as an unfortunate reversion to a 'stand and deliver' mode of teaching (see also Walsh, 2006 for further development of this point). This was thought to be potentially unhelpful, not just in terms of varying ways of using ICT, but in terms of students being able to develop teaching skills that did not depend on new technology:

*'I'm making them deliberately do without ICT... which is quite interesting because I got them storytelling and they couldn't do it, because they had to use themselves... so I think, you know, so I think I probably have to keep a wary eye on that, because they forget how to do the simple things.'*

*'PowerPoint, yes... where good teaching goes to die. I suspect that this is a problem that affects other subjects, not just science... how to use PowerPoint in an effective way that makes pupils think rather than as a boring way of transmitting content.'*

*'I think most of them are aware enough of death by power point being the same thing as death by worksheet used to be... I think they work out that they can't do it too much. But I find at the moment if I have to teach them anything it's how to use their bodies and their presence, it's really odd.'*

*'I think the worst moment was when one of students said to me, "Can you actually teach without it now?", and I thought, oh there's an irony (laughs)...*

*The importance of reinforcing, revisiting and 'embedding' (Hadfield et al., 2009) of the use of ICT applications*

Students frequently reported that they had encountered things in ICT which they wanted to be able to integrate into their practice, but that lack of time to follow up initial inputs and interventions led to a failure to implement good intentions, given other pressing agendas such as lesson preparation, marking, and having to attend to other areas of the QTS Standards. Hadfield *et al.*, (2009:12) stress the importance of trying to 'embed' students' incremental gains in ICT competence, so that they do not 'evaporate and 'so that they can make full use of the affordances of ubiquitous technologies.' In the view of some students, this also extended to the importance of following up audits of ICT capability, which were often undertaken at the start of the course but not necessarily followed up and developed as the course progressed other than in terms of the end of course 'tracking of the standards' which was sometimes seen as a paper based exercise, to prove that students had used ICT, rather than having developmental use. Students in all three case studies reported being given one or at most two sessions on the use of interactive whiteboards, but then not having the opportunity to practice with them and revisit 'whiteboard skills', so that the learning tended to 'leak away'. This would require more dedicated time to be afforded to ICT in what is already a very crowded programme, unless ways of setting up collaborative peer teaching groups could be established.

*Does it help to have a named individual responsible for ICT development?*

Although trainers valued their autonomy and freedom to pursue the facets of ICT which they thought had most 'learning status' in their subject, there might be a case for having a named person responsible for ICT development; not in terms of setting a common agenda or training programme, but with more of a coordinating and promoting role, making sure that ICT stayed 'on the agenda' and was not crowded out by other things, trying to facilitate the sharing of good practice, and liaising with the university where there was a support team which focused on pedagogical innovation in ICT across the university. Without this,

there may be a danger that good practice is not shared and ‘everyone does their own thing’, in a way that does not make best use of collaborative learning.

### *The potential of Web 2.0 applications*

The lead tutor for ICT in one ITT partnership surveyed the year 8 cohort (12 year olds) at his school and found that over 80% of them had some form of online presence. Given pupil engagement with Web 2.0 applications, it seems perverse that more thought does not go in to considering how pupils and teachers might work together to use Web 2.0 for educational purposes. Recent JISC surveys suggest that although most young people use Web 2.0 applications, only a minority of them use them for educational purposes. Most teachers were aware of and used a variety of Web 2.0 applications, but only a minority actively used Web 2.0 applications in their teaching, although a larger number were interested in exploring such possibilities. Again, lack of time to fully consider and explore the potential of Web 2.0 might be a factor inhibiting progress in this area. Other ICT agendas such as the development of VLEs, fully exploiting the potential of interactive whiteboards, and the development of e-portfolios may be more pressing policy agendas, but feedback, particularly from tutors and mentors who were ‘experts’ in the pedagogical application of ICT were very positive about the potential of wikis in particular, for involving pupils in learning beyond the school gates and outside school hours. As a Secondary English trainer pointed out:

*‘What constitutes literacy in relation to ICT... in terms of text, register, appropriateness? In some schools there is still a lot of handwritten work, but young people don’t write things much these days with texting, e-mails, Twitter... it’s partly about making connections with pupils.’*

*The importance of moving students from thinking about the social status of ICT applications (Hadfield et al., 2009) to their learning status*

Hadfield et al. (2009) make the point that a major influence on trainees’ use of ICT is the ‘social status’ of ICT applications; the idea that ‘you are not a proper teacher if you don’t have a laptop’ or ‘you can’t use a whiteboard.’ This has some advantages in terms of trainees’ engagement with ICT, but given the importance which trainers attached to the critical use of ICT and the importance of developing good judgement about which applications had most potential for enhancing learning, it is important to move trainees on in their thinking and get them to question the relative merits and potential of different facets of ICT in their subject.

### *Progression from teacher use to pupil use of ICT*

ICT capability was often seen not principally in terms of ‘coverage’; i.e the breadth of ICT applications which the student was able to use, but ‘depth’ of capability, in terms of being able to use some applications really well – so well that the teacher can get pupils to be able to use the software or application, independently and usefully, in terms of their learning. In this model there might be thought to be several levels of capability:

1. Student teacher awareness of the application and of the fact that it might be used to develop pupil learning.
2. Student teacher ability to use the application themselves.
3. Student teacher ability to use the application (to some good learning purpose) in a classroom context (with real, live children)
4. Student teacher ability to get the pupils using the application autonomously and usefully.

The following extracts are an example of this model of progression in the use of ICT:

*'To use ICT competently as a primary teacher I think students have to have the skills to be able to use the equipment and the programs. Once, once they've got that then to be able to make decisions, which are part of planning of how it's going to be implemented into their lesson plans... and to go a bit further from that, so that children actually make decisions and choices about accessing programs themselves and making good use of them for their learning' (Primary science tutor)*

*'In the long run it's about enabling kids to express themselves digitally, through podcasts, video, animation, audio' (Primary science tutor).*

### *School use of social networking sites and mobile phone technology*

Most schools in England have firewalls which prevent use of social networking sites given concerns about e-safety and cyber bullying. Pupil use of mobile phones in classrooms is also prohibited in many schools. However some schools are beginning to explore the educational potential of social networking sites and mobile phones given the ubiquity of pupil use of these technologies and the shift in cultural literacy towards texting as a form of communication (JISC, 2008). Heppell (2010) has argued that UK schools have tended to respond conservatively to new technologies rather than embracing and exploiting them and that less defensive approaches are needed in order to fully realise the learning potential of ICT.

At the time of writing, evaluation of experiments with the use of mobile phones for learning are limited but newspaper reports of 'early adopting' schools can be found in articles by Hurst (2009) and Lightfoot (2009).

## **6. Conclusions and recommendations**

### **6.1 For policymakers:**

*Invest in high quality subject specific professional development for trainers and mentors, focusing on the pedagogical use of ICT*

Recent investment in ICT in ITT has focused to a large extent on improving ICT infrastructure in training institutions. Although this appears to have been very successful and much appreciated by providers, future investment might consider a change in emphasis with regard to investment. In terms of the evidence emerging from this survey, ensuring that all university subject tutors and lead tutors in employment based ITT partnerships are confident and well informed about ICT in teaching their subject would be one of the most effective forms of investment in this area in future. Hadfield *et al.*, (2009:12) also stress the need for funding to be targeted on trainers and mentors. There is a case for shifting the balance of funding towards high quality subject specific professional development for trainers. In most subjects there are a number of people who are exceptionally experienced and accomplished at using ICT effectively to teach a curriculum subject. Providing funding for them to work to improve the knowledge and pedagogic skills of trainers would be an effective way of ensuring that the much improved ICT infrastructure now largely in place in English institutions is deployed to best effect. Many student teachers and mentors felt that this was perhaps the single most important step that could be taken to improve student teachers' expertise and effectiveness in ICT. The training should focus principally in the subject specific pedagogical application of ICT rather than generic ICT sessions (i.e., 'Here's what might be done with a class wiki with a history group', 'This is how to get pupils able to produce high quality film or documentary trailers in English using Windows Moviemaker', 'This is how to use GIS software to best effect in Geography').

In the words of one trainer from Case Study B:

*'The more training I've had, the more secure and confident I have become in my ICT sessions and general use of ICT... the better the ICT component of the course has been. They really enjoy the sessions, they follow things up and develop them... they are now much better in their use of ICT, partly because they learn from each other, but mainly because I am better at ICT now.'*

*Get rid of the online basic skills test in ICT, at least in its current form*

The test does not appear to work well or be helpful. Hardly anyone has a positive word to say for it. Many respondents – tutors, mentors and students – thought that it was not just useless, but that it did harm, because it put student teachers off ICT, and it was a time consuming distraction from more worthwhile activities. Some consideration should be given to seeing whether there is an online test for student teachers that is more appropriate and worthwhile in use elsewhere in OECD countries. If not, there is also the question of whether there needs to be an online instrument for assessing competence in this area. Does assessment in ICT for student teachers have to have an online testing component? Many ITT providers appear to have robust systems for ensuring that student teachers are capable users of ICT by the end of their course of training. Another suggestion was that the test should be taken before students start their course of training so that it does not waste time on the course which could more profitably be spent on more creative and valuable facets of ICT capability.

The basic skills test sits uneasily in an educational climate which stresses the importance of differentiated provision and personalised learning. Apart from concerns about the *format* of the test, England currently makes all student teachers spend time preparing for and taking a test for which probably has no use or relevance for over 90% of the cohort because they already possess the skills which the test examines on entry to the course.

*Consider how best to share good practice in ICT across schools and ITT institutions, including opportunities for face to face as well as virtual collaboration.*

One of the biggest problems is the gap between best practice and less effective practice in ICT in ITT. Although not all respondents agreed with every item on the list of 12 characteristics of effective practice in ICT in ITT drawn up by the TDA, ITTE and BECTa (see appendix 1), the list provides a useful reference point for discussion, debate and updating in the light of ongoing developments in ICT.

Some recent studies suggest that although web based professional development for teachers and trainers has improved in recent years, there is still a case for providing support for teachers and trainers which will provide them with dedicated time to explore ICT agendas in their own departments and faculties, combined with face to face meetings of subject groups of tutors and trainers, so that they can share the outcomes of their work. Communities of practice in this area are very much subject based, and such meetings (of subject trainers and subject mentors) offer the best prospect of relevant and focused work in ICT. Given respondent testimony about 'lack of time' to explore ICT agendas, the provision of funding to guarantee *dedicated time* for trainers, teachers and student teachers to develop ICT integration offers a way forward in this area, and offers an alternative to the 'top down' roll out of national training programmes for ICT which have had limited success in England (Leask, 2002, Preston, 2004). There is some evidence to suggest that allowing teachers and trainers to choose which facets of ICT they want to explore, and providing funding to give them guaranteed time to support this might be a better way forward (see Hadfield *et al.*, 2009 and Haydn and Barton, 2010 for exemplification). Student testimony in this study also suggested that skilful modelling of ICT integration, direct instruction and practice, and group working and reinforcement was a stronger model for the development of ICT capability than reliance on online tuition and collaboration.

### *Investment in exploring the potential of Web 2.0 applications and mobile phone technology*

Some of the ICT applications which have had a high profile in England in recent years, interactive whiteboards, classroom response systems, VLEs and more recently support frameworks for the development of e-portfolios are expensive to invest in and take-up of their use has been variable. Several of the experienced and accomplished trainers and mentors who had a particular interest in ICT expressed the view that more time and attention focused on the potential of Web 2.0 applications might be a more productive and cost effective way forward in ICT. Two respondents believed that a combination of mobile phone technology and Web 2.0 applications would provide a less expensive way of undertaking classroom response activities and similar interactivities. One experienced exponent of ICT use felt that *Ning* offered a more propitious hosting environment than some of the commercial e-portfolio platforms currently available. It was felt by some to be a missed opportunity, especially given pupil and undergraduate use of Web 2.0 technology. A survey of over 1,000 first year undergraduates notes that ‘In spite of emerging evidence that student-driven ICT is very beneficial in their learning... and that the majority of students use Web 2.0 applications... only a quarter feel their lecturers or tutors are encouraging them to use Web 2.0 features in their learning (JISC, 2008: 1-2).

It might also be worth noting that amongst the leading edge practitioners who were interviewed, other ICT avenues thought to be propitious areas for investment and development over the next few years included exploring the potential of mobile phone technology, exploiting the potential of inter-institutional VLEs, and experimenting with learner use of robust, basic netbook computers.

### *Continuing support for ITT institutions to experiment with and explore different ways forward for developing student teachers’ ability to use ICT*

There was strong support from trainers for the latitude which had been afforded to explore whichever facets of ICT they wanted to make progress in, in terms of the bids for extra funding to support ICT development. Future funding for ICT in ITT should continue to offer institutions the freedom to explore the ICT issues which they think will make most difference to their students’ ability to use ICT well.

### *Continuing to refine ideas about ‘what it means to be good at ICT’*

The next revision of the competence framework for ICT in ITT might focus more explicitly on the need for students to make effective use of ICT to enhance pupil motivation and engagement in learning (in other words, not that they can use ICT, but that they do so in a pedagogically effective way). The majority of trainers and mentors involved in these case studies believed that this was the most important and valuable task related to ICT. This would align the competence framework more closely with the aims and values of trainers and mentors, and particularly those who seem to be very experienced and accomplished in their use of new technology.

### *Focusing on the ‘learning status’ of ICT applications and approaches*

As well as focusing on impact evaluation related to the introduction of new technology in ITT, in terms of the extent to which ICT innovations are embedded into student teachers’ day to day classroom practice, it is important that evaluation also focuses on what Hadfield *et al.* (2009) call ‘the learning status’ of ICT applications. There was some evidence emerging from this study, particularly in Case Study B, that the substantial investment in interactive whiteboards (IWBs) – in schools and in ITT institutions – is putting pressure on trainers and mentors to ensure that whiteboards are used and that time and effort is devoted to ensure that student teachers can use them confidently and effectively. Certainly in terms of

student testimony, whiteboards emerged as a common concern. In Institution B, 26 out of 61 comments about ICT preparation in the end of course survey related to interactive whiteboards – much more than any other application. They appear to have acquired high ‘social status’ as ICT applications. However, in terms of the ‘learning status’ of whiteboards (their potential for improving teaching and learning outcomes), the jury appeared to be ‘still out’ in terms of expert practitioners’ views about their usefulness. Some respondents spoke very positively about IWBs, others were dismissive of what they had to offer in terms of enhancing learning. In addition to the division of opinion about the usefulness of IWBs, there were also logistical problems in terms of compatibility across institutions and consistency of software packages. Many of the most experienced and accomplished tutors and mentors in ICT expressed reservations about how useful they were and about the ‘value for money’ of investing in them compared to other less expensive avenues for ICT development, such as Web 2.0 applications. This is not just an issue about interactive whiteboards; the same questions could be asked of commercial e-portfolio software (seen by some as ‘the next bandwagon’ by some respondents), and classroom response systems. Future policy decisions about investment and evaluation in ICT need to pay close attention to the question of the ‘learning status’ of ICT applications. The question ‘How much use are they?’, is perhaps more important than ‘How many people are using them?’ and ‘How much are they being used?’ (PowerPoint is being used by lots of teachers, in lots of lessons in England, but is this necessarily a good thing?)

## **6.2 For ITT institutions**

### *Informed and intelligent choices about focus in ICT*

There are hard choices to be made about ICT, both for tutors and student teachers about which aspects of ICT to explore and develop. The ICT agenda is now so vast that it is difficult to cover every application, every avenue, in depth. Given that different applications are more relevant to some subject than others, that there are differing views about the utility of different applications, and that tutors and mentors have different enthusiasms and interests in ICT, it seems unhelpful and unrealistic to go back to the ‘coverage’ model for ICT competence that prevailed in the 1998 version of the QTS Standards (DfEE, 1998). As one trainer pointed out, *‘If they’ve got a really good wiki, do they really need to know how to design a website? I want them to be able to use some things... and I’m not specifying which... really well, in a way that makes a positive difference to pupils’ engagement with learning. And I want them to have the initiative and enthusiasm to keep exploring the possibilities and potential of ICT... it’s partly an attitudinal thing that links with their overall professionalism.’* In terms of progression models for ICT, some thought might be given to how far and to what extent students have successfully explored particular strands of ICT application rather than audits and capability being predominantly ‘coverage’ based. Have they demonstrated that they can focus on some elements of ICT and use them in a worthwhile way in their teaching? If they can, is it not likely that they can extend their repertoire in similarly worthwhile manner post qualification?

### *Making best use of peer tutoring and collaborative modes of working*

Some courses and subjects appeared to have particularly good systems for getting students to work collaboratively to develop their ICT skills both during and outside the taught sessions. This helped to solve the problem of not having enough time in taught sessions to devote to all the aspects of ICT which might be relevant to students. It was still thought to be important to have some time for ‘lead sessions’ and introductions to aspects of ICT, so that the potential of the ICT applications could be powerfully and effectively modelled for students in order to enthuse and inspire them, and give them a starting point, and resources to follow things up and develop them. However, many university tutors felt that given the ICT accomplishments of some of their students, and the fact that most ITT students are intelligent and capable graduates, mastering the technical details of an application could be sub-contracted to the students themselves, with the idea that if they really wanted to be able to do something with ICT, they could work it

out for themselves. One course had a five stranded wiki which introduced students to a range of Web 2.0 applications, with supporting materials and links, and a choice of tasks which involved developing one strand of Web 2.0. A science tutor saved time in taught sessions by uploading videos onto YouTube containing the explanations and instructions for how to set up blogs, wikis etc. *'I just say, watch this... and they have to pick up a new technology, whether it's using a mobile or whatever... and go and write a page on the wiki and then do a presentation...I just let them get on with it.'*

Students were very positive about collaborative working, although not necessarily in 'fixed' groups. There were felt to be some advantages to changing the composition of working groups (and not necessarily always having 'mixed ability' groups). Students did not just feel that group working on ICT was more enjoyable and sociable, they felt that it led to quicker and more sustained learning.

### *Exploring the potential of ICT to develop dialogic learning*

In all nine of the case studies mentioned in this report, it appeared that VLEs (and in some cases wikis) were being used very effectively and extensively, and were demonstrating the potential of ICT in assisting effective communication in ITT systems. However, some 'specialists' in ICT development, and mentors who were advanced/expert in their use of ICT questioned whether institutions were always making the most of the potential of VLEs and other communications platforms to promote dialogic learning and what McFarlane (2009) has termed 'learning conversations'. In an analysis of 'traffic' on VLEs and other communications platforms, it was found that only 16% of all exchanges could be said to be 'learning dialogue' which offered the opportunity to change respondents' minds or reconsider their opinions and positions. It was found that 84% of content was statements of opinion or emotion which actually closed down learning exchanges and possibilities, or were 'cut and paste' exercises without real engagement with learning possibilities. McFarlane suggests that there is sometimes 'a lack of understanding of the role of dialogue in developing learning', and a tendency to use VLEs primarily for the transmission of information, rather than for argument, debate and discussion. This view was supported by some of the respondents in the survey, particularly from those particularly interested in the potential of ICT for enhancing teaching and learning. It was pointed out the often VLEs were used primarily as a repository for course information, and for messaging and announcements, and that their full potential for getting students involved in 'learning conversations' was still comparatively unexploited. One respondent used the term '*shovelware*' to describe the main function of VLEs, arguing that they were used primarily '*to shovel information around the system.*')

For schools involved in ITT

- Have a named member of staff to act as ICT support for each student teacher on placement in the school

This would usually be the main subject mentor for the student, but in cases where the lead mentor is not strong in ICT, it could be another member of the department or teaching faculty. It is unusual for a school not to have at least some members of staff who are expert practitioners in ICT. It is clearly best if it is someone who works on the subject area as the student given the subject specific nature or some ICT applications, but even a non specialist would be better than the student not having some form of mentoring in ICT, so that ICT does not slip into the background and become something that is quietly ignored or neglected unless the student brings it up.

- Investing more time and resources in exploring the potential of Web 2.0 applications

Both trainer and mentor feedback from respondents who were ‘experts’ in the use of ICT suggested that providing the time, resources and training courses for tutors and mentors to explore the potential of Web 2.0 applications (particularly, involving trainers who were experienced and accomplished in developing subject based use of Web 2.0) may be a particularly helpful investment in ICT in ITT. In some cases this may be a question of using Web 2.0 expertise that exists within the school, in others, it may be a case of ‘buying in’ from outside sources or establishing networks with other schools.

- Joint staff development events with subject tutors from ITT institutions

This could be simply a component of routine mentor meetings between subject tutors and subject mentors, but it could also extend to once a year half day sessions which provided an opportunity to share current developments and initiatives and perhaps initiate collaborative projects in ICT between schools and the university.

This could also involve closer communication between schools and ITT providers about software and platform choices.

- Providing reliable and convenient access to ICT facilities

Testimony from trainers, mentors and students suggests that the reliability of ICT systems and equipment is still a major issue which acts as a barrier to the regular integration of ICT into everyday teaching. It was seen by all three groups of respondents as more important than having access to high quality equipment (see page 55). In interviews with student teachers, occasions when the technology wasn’t there, or didn’t work exerted a powerful negative influence on their use of ICT. Schools need to develop robust systems for minimising the possibilities of such occurrences. This again emerged as a ‘variable’, with some students speaking effusively about the quality of support systems, and others much less so.

## **7. Last thoughts**

The substantial investment which has been made to ITT and school ICT infrastructure over the past decade does seem to have brought about significant improvements in student teachers’ ability to use ICT effectively in their subject teaching. Approximately two thirds of student teachers now feel that their preparation to use ICT has been either ‘very good’ or ‘good’ (TDA, 2009). The overwhelming majority of trainers, mentors and students are now proficient in using ICT for personal use and to communicate with tutors, mentors and peers, and to access online course documentation and resources. There is less evidence to suggest that all student teachers have reached the level of what BECTa term ‘e-maturity’, that is to say, the ability to use ICT in a way that positively impacts on the learning outcomes of pupils, and which fully exploits the potential of new technology to improve teaching and learning (BECTa, 2008). Three of the factors thought by student teachers to be most influential in determining their ability to become effective in the use of ICT were having trainers and mentors who could persuasively model the use of ICT in their teaching, having ‘dedicated time’ to pursue ICT agendas, and having easy access to reliable ICT facilities. Although there are now many ITT trainers, mentors and student teachers who are accomplished users of ICT, and who are able to use new technology to enhance teaching and learning, there are still wide variations in the proportion of trainers, mentors and students who have reached ‘e-maturity’, both between and within training providers and schools involved in ITT. The biggest issue in terms of how to improve student teachers’ ability to use ICT skilfully and effectively is how to most effectively share and disseminate the good practice that undoubtedly exists in some departments, schools and ITT institutions. In the words of William Gibson (1984), ‘The future is already here, it is just not very evenly distributed.’

## **Footnote**

1. In England, the terms ‘initial teacher education’ and ‘initial teacher training’ mean the same thing. Higher Education institutions tend to prefer the term ‘initial teacher education’, and politicians and some policymakers tend to use ‘initial teacher training’. Whilst there might be some important philosophical issues around this distinction (most parents in England are fairly comfortable about the idea of ‘sex education’, but might be less sanguine about ‘sex training’), to all intents and purposes, the two terms mean the same thing in terms of the English system.

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**APPENDIX 1:  
'CHARACTERISTICS FOR THE PROVISION AND USE OF ICT THAT ALL TEACHER  
TRAINING PROVIDERS SHOULD BE AIMING TO ATTAIN' (2009) TDA, ITTE, BECTA,  
LONDON, TDA.**

(Online at [www.tda.gov.org/upload/resources/pdf/i/ictforproviders.pdf](http://www.tda.gov.org/upload/resources/pdf/i/ictforproviders.pdf), accessed 14 September 2009).

The TDA recently published a list of 'characteristics of good practice' in the area of ICT in initial teacher training. The list was compiled in partnership with ITTE, the subject association for IT in Initial Teacher Education, Becta and colleagues within teacher training. The aim was to provide simple, measurable criteria against which teacher training providers could assess their own provision for ICT as well as their use of ICT.

The characteristics were developed with a wide focus on Government policy and not simply with TDA objectives in mind. The characteristics claim to reflect established good practices which training providers should be aiming to implement, rather than a working model of what should already be happening. It is claimed that since the characteristics are a collaborative effort, the rationale behind them is based not only on research evidence but also firsthand experience of the particular benefits and challenges of working with ICT in ITT.

The characteristics are to be regularly reviewed by the TDA, ITTE and Becta to keep them in line with Government policy and changes in technology and teaching practices. (This list of characteristics was formulated in May 2008).

It should be stressed that not all of those surveyed in this study necessarily agreed with all points on the list or felt that it was comprehensive. Some of the most experienced researchers and practitioners (including the respondents who in effect 'train the trainers') had reservations about points 3 and 8 in particular, but there was broad agreement over most of the points listed and the list may serve as a useful agenda for considering progression and effectiveness models in this area.

Characteristics for the provision and use of ICT that all teacher training providers should be aiming to attain'

- 1) All trainees have personal access to mobile computing and are able to access and transfer data between their placement school(s), their home and their training centre.
- 2) Trainees and trainers are offered opportunities to use a range of digital multimedia technology, e.g. subject and phase specific hardware and software.
- 3) The training provider is proactive in ensuring that the trainee has access to, and training in, the use of interactive whiteboards.

- 4) The training provider is proactive in ensuring that a trainee has access to whatever VLE is available, (e.g. school, local authority, Regional Broadband Consortium and ITT provider) when the trainee is on a school placement.
- 5) The training provider allows access to a range of web-based applications and also wireless technologies and infrastructure that support the needs of ITT, e.g. wikis; social bookmarking.
- 6) E-based support is an integral part of the provider's training programme and all documentation and materials are available online.
- 7) The training provider is proactive in ensuring that trainees have opportunities to make up for any poor or mediocre experience they have had in using ICT during their school placement(s), e.g. to visit schools that make innovative use of ICT.
- 8) Where appropriate, trainers and trainees have opportunities and are encouraged and assisted in developing a professional level e-portfolio.
- 9) Trainees have opportunities to research into innovative use of ICT.
- 10) There is an integrated approach to the professional development of teacher trainers in the use of ICT in teaching and learning which is reviewed on an annual basis. This approach is preferably modelled by ITT trainers.
- 11) The training provider is to have regular, effective and productive links with other training providers on ICT issues across all phases and subjects.
- 12) There is an integrated approach to e-safety training that is not limited to the classroom but includes the acceptable and professional use of ICT