How and why do student teachers use ICT?

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Abstract

This paper examines how and why student teachers made use of ICT during a one year initial teacher education (ITE) programme from 2008 to 2009. This is a mixed methods study involving a survey (n = 340) of the entire cohort of student teachers and a series of semi-structured interviews with a sample of the cohort (n= 21). The study explored several themes including the nature of student teachers' use of ICT; variation in the use of ICT; support for, and constraints on, using ICT; and attitudes to ICT and to teaching and learning more generally. It was found that nearly all teachers made frequent use of ICT during their placements (internship) experience and that use was dominated by the Interactive Whiteboard (IWB). More *extended* users of ICT gave greater opportunity for pupil use of ICT while *innovative* users were defined by the frequency with which they used ICT, the range of that use and the effort they made in overcoming factors which discouraged use. ICT use was seen as emerging from a mix of factors: chiefly student teachers' access to ICT; their feeling of 'self-efficacy' when using ICT; and their belief in the impact of ICT on learning. Mediating factors on ICT use included mentoring, training and support. Variations within the use of ICT are discussed and explored in the light of the wider literature.

Keywords

Student teachers, use of ICT, survey, encouragers of ICT, constraints on ICT

Background

This paper reports on the nature of student (pre-service) teachers' use of ICT and their reasons for using or not using it in their teaching. This topic is important as ICT might offer benefits such as supporting personalised pathways; monitoring progress; providing for 'anytime anywhere' learning; enabling independent and collaborative learning; and developing new modes of learning (eg Davies, Hayward and Lukman, 2006; Underwood et al 2009). However, while there is great deal of teacher support for using ICT in the classroom (in England see NFER 2008) the use of ICT appears challenging for some, perhaps many teachers requiring a combination of access, individual competence and general motivation (Becta, 2008).

Student teachers can be expected to encounter personal and environmental challenges in developing their use of ICT and factors which encourage or discourage that use (Barton and Haydn 2006; Kay, 2006; Hammond et al, 2009). At the individual level, student beliefs and pedagogic orientation are important and there is a suggestion that those with constructivist beliefs about teaching and learning may be more likely to use classroom computers (Sang et al, 2010). In contrast, resistance to using ICT might be explained by the absence of a belief in its having a positive impact on learning or a belief that the use of ICT might even impact negatively (Russell et al, 2003; van Brack, 2001) irrespective of students' own use of technology. Other areas of importance include the student teacher's sense of self-efficacy or 'confidence to perform specific tasks' with respect to teaching in general (eg Smith, 2005) and skills that are specific to ICT (Albion, 1999).

At a whole school level, access to ICT continues to be an important factor (Hammond et al 2009; Selwood and Pilkington, 2005) alongside the technical support which makes access realisable (Dexter and Rieldel, 2003). The wider culture of a department or school, combined with the enthusiasm that existing members of staff display with respect to using ICT in the classroom, will be a further influence (Almas and Nilsen, 2006; Barton and Haydn, 2006; Summers and Easdown, 1996). The role of a mentor, or supervising teacher, in school is an important mediating factor (Dexter and Riedel, 2003). The mentor can act as a positive role model (Barton and Hadyn, 2006), though the assumption that a subject specific mentor is confident in ICT should not be made

(Mutton et al, 2006). The mentor is, of course, also an assessor and this is likely to affect the focus on, or away from, ICT.

Student teachers' engagement with ICT is worthy of further critical investigation as there is an opportunity, noticed by Clift et al (2001), for new teachers to act as agents of change when they start their teaching careers. In the case of ICT, younger student teachers will have grown up with extended experience of using new technologies in their daily lives (Simpson et al. 1999). However, the pedagogical application of ICT is new for these teachers and the expectation of leading curriculum change might be misplaced, or over optimistic. Whatever the case not enough is known about student teachers during their training: What kind of use do they make of ICT? They are assumed to view the use of ICT positively, is this true? Is use consistent across sectors and subjects? Is using ICT a matter of access, belief or support? What constrains their use of ICT?

Context

This research took place in a higher education institution (HEI) in England which offers, in partnership with over 300 local schools, a one year programme of initial teacher training to students studying to teach early years (children aged 3-7); primary (aged 5-11) and seven secondary curriculum subjects (drama, economics and business studies (EBS), English, history, information and communication technology (ICT), mathematics, modern foreign languages (MFL), religious education (RE) and science) within the 11-18 age range. The cohort being studied undertook training from September 2008 to July 2009. This intake was broadly representative of the national profile in age and its imbalance of females to males in the early years and primary sectors and in certain secondary subject cohorts. The training provided by the partnership has been assessed by Ofsted (the government inspection service in England) as offering very good provision for its students. Within the HEI *university tutors* have responsibility for planning the programme and modelling practice. However, two thirds of the programme is undertaken in schools under the direction of supervising teachers (hereafter *subject mentors).* Each school has a *school mentor* with overall responsibility for all student teachers. As regards ICT, apart from a general introduction to facilities, most ICT is modelled within taught secondary subject sessions within the HEI, and within several specialist ICT sessions within the

primary and early years programmes. Subject mentors, alongside their teacher colleagues, support students' use of ICT in school and, in addition, most school mentors will organise some generic training.

Methodology

This study set out to explore: the nature and scope of student teachers' use of ICT; the factors which lead them to use ICT; and the constraints on that use. In order to get a broad picture, a survey of the entire cohort of students was undertaken, while to explore their experiences in more depth a subset within the cohort were interviewed. The survey covered nine themes: biographic details; access to ICT in school; support for using ICT; constraints on using ICT; use of ICT; attitudes to ICT; attitudes to professional development; general beliefs about teaching and learning. There were opportunities for open comment but otherwise the survey mostly contained closed questions, for example Likert and frequency of use scales. Where appropriate, questions over the frequency of use were comparable to those within an NFER survey of in-service teachers (NFER 2008) and the section on pedagogy used, with permission, an inventory developed by Snider and Roehl (2007). The survey contained questions about age, gender, age phase / subject taught. Responses were entered into SPSS software and results aggregated and analysed using descriptive statistics. Internal reliability was explored with Cronbach's alpha calculated at above .75 for all sections of the questionnaire except one (that covering professional learning) which is not discussed in the paper. Pearson's chi square tests of association were carried out and where significant are reported (see Appendix 1).

This survey was carried out at the end of the training programme after students had completed an extended placement. Questionnaires were distributed after a debrief session (primary and early years) and at the close of final tutorials (secondary). In this sense participants were a 'captive sample' though it was made clear that there was no obligation to complete all or any part of the survey. This was a long questionnaire with over 150 items and it took most students over 15 minutes to complete. No empty forms were returned but some questions were left blank due to what was almost certainly a lack of time. There were 340 survey returns out of a possible 367 course completers, these are broken down by subject and sector in Table 1. Missing from the survey were those who were absent from the institution due to factors such as

sickness, job interviews, or time in school to 'make up' due to earlier absence during the placement. The mean age of those completing the survey was 26.2 years - secondary subjects 26.2; early years 26.3 and primary 26.1 years. The overall median age 24.0 and the mode was 22. The standard deviation was 6.17 years.

Insert Table 1 about here

The survey was followed by interviews with a sample of volunteer students (n = 21). Due to a clash of commitments, the sample did not contain student teachers taking the early years programme but it did contain primary teachers who had experiences of teaching early years pupils and who had a commitment to teaching this age group. This was not by design a strict quota sample but a range of experiences, and different levels of commitment to ICT, were sought. The sub group contained nine primary teachers, of whom two were male, and 14 secondary teachers (six male) and included three EBS, mathematics and science teachers, two English, drama and MFL teachers and one history teacher. Interviews were semi structured and lasted from 20 to 45 minutes, notes and transcriptions were coded and collated around themes of ease and difficulty in using ICT; what helped / limited use of ICT; plans for using ICT in the new school; associations made with ICT and pedagogy.

Data collection took place after students had completed all their assessment requirements and members of the research team did not give questionnaires to, or interview, the student teachers they had taught. All questionnaires were anonymised.

Findings (1) Student teachers and their use of ICT

Student teachers across all three sectors used ICT frequently with that use dominated by the IWB. Nearly all routinely used the IWB to present prepared presentations and as a shared space for notes and diagrams ('boardwork') during whole class teaching. A key difference between sectors was that secondary students tended to carry out less boardwork as shown in Table 2 - note in these and other tables data have been aggregated for concise reporting. No other ICT tool was used as frequently as the IWB. Primary and early years student teachers did use computer games in half or more of lessons (Table 3) though it is not clear whether these games were played at the IWB. Secondary teachers were much less likely to use computer games but much more likely to ask pupils to access online resources for homework (Table 4).

Insert Tables 2, 3 and 4 about here

In order to explore variations in the frequency with which students reported using ICT, a scoring system was introduced based on those (305) who had completed responses to all 14 questions in which this was covered. For example, the use of the IWB in most lessons scored 5; more than half of lessons 4; around half of lessons 3; less than half 2; rarely or never scored 1. The full range of scores (14 - 70) were recorded with a mean of 45.5, a median of 45 and mode of 44 and a standard deviation of 8.6. Figure 1 shows that the scores approximated a normal distribution with a long tail of high users and a short tail of low users. Of particular interest were these 'tails' – the highest and lowest ten per cent. ICT student teachers were, not surprisingly, the most likely to use ICT (nine appeared within the thirty most frequent users) followed a long way back by four EBS student teachers. At the other end of the scale mathematics, drama and RE, with seven, two and two students respectively, were in proportion to size of intake more likely to be low users of ICT. Primary (with four students) and early years (six) were over represented within the highest ten percent of users and under-represented (three and four students respectively) within the lowest. The data on frequency of use was then broken into lowest and highest quartiles and used to band low users, mid range users and high users among the cohort. This enabled tests of association to be made (Appendix A) and there was found to be a significant association between secondary subject and frequency of ICT ($p < .001$).

Insert Figure 1 about here

The raw data showed frequency of ICT use, the interviews explored types of use in more depth. Some student teachers (ten using a best fit) explained they tended to restrict their use of ICT to IWBs, or other projection devices. An important opportunity offered by the IWB was to project prepared presentations – ones which incorporated text, images and on occasion 'movie' clips. These student teachers tried

giving pupils opportunities for using software, including the IWB, for themselves but only in a few lessons. Meanwhile others (seven as a best fit) gave examples of more varied use of the IWB, for example to project interactive quizzes they had downloaded, and were more ready to carry out 'boardwork'. They sought opportunities for pupils to use software for themselves, not only the IWB but general purpose programmes, such as spreadsheets, Paint and Draw packages and word processing software, as well as subject specific software such as dynamic geometry in mathematics and data logging in science. Finally, there were six further examples of students who had introduced activities which were unusual in the departments or schools in which they worked. For example one secondary teacher had set up forums within the school learning platform and had pupils create and share podcasts; another had experimented with Wikis; and a history teacher had pupils create voiceovers to clips of old newsreels. In a primary school a student teacher used design software to help pupils to mock up toy vehicles they would like to see made and later set up a web site for pupils to follow his progress in a charity international car 'rally'. Another had pupils act out and record role plays using Digiblu cameras – easy to use cameras with very restricted storage - which this student teacher had bought herself.

Findings (2) Factors which affect the use of ICT

The factors which affect the use of ICT are reported in respect to personal factors; access factors and other environmental factors.

Personal factors

Overwhelmingly student teachers believed the use of ICT was beneficial to teaching and learning and this view was shared across subjects and sectors. Table 5 shows that only three per cent disagreed with the idea that ICT made learning more effective and only five per cent disagreed that pupils enjoyed lessons more when ICT was used. The areas of most uncertainty regarding the use of ICT were the time taken to find digital resources and its differentiated impact (items 8, 10 and 11 within Table 5). Attitudes were broadly consistent across age, gender and sector though for reasons of space these are not broken down in the table. It was found, not surprisingly, that those with more positive attitudes to ICT tended to report more frequent use of ICT ($p < .001$).

Insert Table 5 about here

In alignment with these positive attitudes student teachers had a high degree of confidence in their ability to use ICT 'effectively' (Table 6). Again not surprisingly, those who felt least self efficacy in respect to ICT were amongst the least frequent users of ICT - 24 out of 27 reporting that they felt not very, or not all, effective in using ICT were within the lowest use quartile regarding ICT use. There was a significant association ($p < .001$) between self efficacy and frequency of use (see Appendix A).

Insert Table 6 about here

Positive attitudes to ICT were confirmed within the interviews in which there was repeated insistence that using ICT helped engage learners; could be used to support clearer explanations; and allowed more innovative ways of working. Above all pupils were seen as 'liking' ICT.

Wider associations made with ICT were then explored within the question 'if all you knew about teacher was that they used ICT, what could you say about the kind of teacher he or she was?' All, naturally, felt they needed more information and three could not offer a response at all, but associations were made between ICT and 'youthfulness', innovation and willingness to take risks. The only less positive associations were with using ICT for 'its own sake' or in an undiscriminating manner (Table 7).

Insert Table 7 about here

In contrast, a further question was asked about teachers who did not use ICT. The most frequent associations (12) made with these teachers were 'being old fashioned', 'stuck in their ways', 'near retirement' and 'resistant to change'. Students did not intend to be condemning about teachers who did not use ICT, the point was more that this was not the type of teacher they wanted to be.

The generational dimension re-emerged when students talked about their past use of ICT. All interviewees made some mention of using ICT for learning within their degree courses and in their training for teaching; nearly all used ICT for recreational and social networking. As one put it 'we have grown up with ICT and expect to use it' (female primary) and another suggested that 'we are the ICT generation' (history female secondary). These and similar comments were offered as an observation of how things happened to be, they expected to use ICT day-to-day. None of the group could be easily described as technophiles or 'geeks' though two did have particularly advanced technical skills; one was, not surprisingly, the ICT teacher (male) while the other (male primary) had developed these skills through recreational and vocational activity.

Individual teaching style and view of subject

An attempt was made to explore student teachers' views about pedagogy and its impact on use of ICT. Of interest was the widespread agreement on the importance of seeking to engage learners by responding to pupils' 'learning styles'; providing tasks which were meaningful for learners and 'making learning fun'. There was, too, a strong belief in eclectic modes of instruction (Table 8). Note students were asked to choose between competing propositions, not simply agree or disagree with the proposition. For example, 42 percent expressed a preference for authentic learning against 7 per cent whose preference was for teaching skills and concepts systemically and directly with the majority 'balanced' between these two propositions.

Insert Table 8 about here

Interviews reinforced this pragmatic and eclectic view of teaching. All recognised the importance of 'getting pupils on side' and 'having them wanting to learn'. Very few associated the use of ICT per se with a particular stance on pedagogy though there was some discussion over the nature of subject boundaries and the constraints of the curriculum. For example infrequent users of ICT seemed to be held back by the context in which they were working rather than pedagogical belief per se or a narrow view of their subject. Two student teachers of mathematics explained they had intended to use ICT more and had wanted to be more learner centred in their teaching but they were worried about 'letting go of the class'. 'Letting go' here covered

worries about both the behaviour of the class and the consequences of straying from syllabus and textbook content. Student teachers of ICT as a subject, in contrast, did not experience the same constraint, as one put it 'obviously we use ICT, we are ICT teachers'. EBS teachers also saw the use of ICT as inherent in teaching the subject and gave as an example the use of spreadsheets for teaching financial modelling – 'how else was I expected to do it?'. In addition teachers of both these subjects taught vocational courses in which there was much less formal pen and paper exam preparation and greater expectation on the submission of ICT products for assessment. Primary teachers, too, taught ICT as a subject at times in their schools and had attended several specialist sessions on the use of ICT, more than most secondary teachers. However while all secondary teachers had a strong sense of subject, primary teachers did not. They felt strongly that their focus was 'on the child' not the subject. In contrasting the different sectors, one (female) student teacher explained she needed to 'work harder at engaging children than secondary subject teachers' and felt she would be more likely to use ICT than secondary colleagues because of this.

Access

Overall trainees tended to have good access to IWBs (Table 9) but less access to other tools (Table 10). No other item of ICT was provided on such a scale as the IWB though many teachers had access to one or more voice recorders, laptop or tablet computers in their classroom. Nearly all schools were seen as having secure networks, many had access to learning platforms or VLEs though this was more consistent in the secondary sector (Table 10). There was a significant association between access and level of use of ICT ($p < .01$).

Insert Tables 9 and 10 here

In interviews students said they were often surprised by the availability of resources as this was on a larger scale than they recalled from their past schooling. One (female primary) had a language specialism which enabled her to teach abroad for a period of time during the year and she further noted 'there was nothing there on the scale of what we have here'. However the interviews also showed that the numerical data concerning access needed to be treated with caution. Some students spoke about having access to an IWB but found it unusable - it was positioned inappropriately for

grouping the children or daylight shone on the screen making any text difficult to read. In one case the light bulb on a projector had gone and there 'seemed no-one in charge to get it replaced' (male primary). Most had access to computer rooms but spoke about difficulties of booking ahead or finding the move 'disruptive' to the routines they had developed. Similar difficulties concerned the use of learning platforms, for example in some cases it took several meetings, and some time passing, before student teachers could secure user names. Two (one primary and one secondary English) were denied access rights to the school VLE outright 'due to the Data Protection Act'.

Other environmental factors

In general, students considered the attitudes to the use of ICT among in-service teachers to be more positive than negative though, as Table 11 suggests, not overwhelmingly so. Nonetheless they were able to call on a wide range of support in using ICT in school. This is shown in Table 12 though note that the data refers to direct support for using ICT in the classroom and not the modelling of ICT in which the impact of university tutors was reported as more influential. The table suggests that informal support, from other teachers and peers, was particularly helpful. Also noticeable was that the university tutor appeared to play a direct role in supporting students in some schools, particularly in the early years sector where there appeared to be more limited technical support and where attitudes to the use of ICT amongst staff were less positive (Table 11). The picture is then a mixed one indicating an environment in which ICT use was supported but not routinely so. There was a significant association between level of support and use of ICT ($p < .01$).

Insert Table 11 and 12 about here

Interviews showed how support could influence use of ICT. Students felt that they needed to be encouraged and some were looking for 'permission' to use ICT, in the sense of conforming to expectations. They needed an external 'push' in addition to the internal 'pull' – but this 'push' was sometimes missing. For example they spoke of seeing models of ICT use at university but several (this was mentioned specifically by seven) were frustrated when they were not encouraged to carry out the same or similar

activities in school. They could cite useful sources of support in school but the expectations on them to use ICT was more, as one secondary teacher put it, 'do as I say not as I do'. Another student explained that she had been told to 'use ICT in your lesson it will impress your visiting tutor' (female primary) and while this provided an encouragement, and a permission to use ICT, it did not provide the coaching or modelling that she felt she needed. Seven students were asked the question as to whether their use of ICT was as a result of their efforts or the environment in which they were trained. Not surprisingly both factors were seen as important but three stressed that they were proactive in their use of ICT and only one saw environment as the more important.

Constraints on using ICT

While there were sufficient conditions for nearly all student teachers to develop their practice using ICT there were important constraints as Table 13 shows. The chief problem was that of restricted access – this was significantly associated with frequency of use ($p < .001$). Access concerns were followed, at a distance, by lack of time, lack of knowledge of resources, lack of belief in the impact of ICT and low sense of self-efficacy.

Insert table 13 about here

Discussion

The first question asked in this paper concerns the nature of student teachers' use of ICT. As seen, nearly all used the IWB and most gave pupils opportunities for using ICT for themselves, though in some cases these opportunities were restricted. This is broadly in line with survey findings for in-service teachers (eg Becta, 2008; NFER, 2008). However, student teachers in this survey appeared more likely than in-service teachers to use ICT and, in particular, to use more recently introduced tools such as learning platforms. Students were less likely than their in-service colleagues to view other teachers as positive about the use of ICT because, it is argued, they had higher expectations that ICT should be used.

Student teachers' use of ICT was differentiated and three levels of that use can be abstracted from the data. At a *routine level* use was dominated by the IWB with limited opportunities for pupils' 'hands-on' ICT. At an *extended level* greater opportunities for 'hands-on' use of ICT were offered. At a further level – that of *innovative* use - ICT was opened up opportunities not normally offered to pupils.

Introducing these three levels of use is helpful for understanding variation within this and other cohorts of student teachers and for highlighting that even at a routine level student teachers are regular users of ICT. The levels can further help in setting out expectations of progression for student teachers though it should be made clear that no *necessary* progression is implied. Student teachers may well continue to work within one level unless *something happens* such as a change in access, a move to a different school as they start their teaching career, or a powerful modelling of a tool by a mentor. While these types of use relate to nature and frequency with which ICT is used they should also recognise effort expanded. For example the use of an IWB is *routine* in nearly all schools in England but the use of learning platforms is not (Ofsted, 2009; BESA, 2009). Hence the student teacher using blogs, Wikis and indeed podcasts, as well as the student providing online learning resources for out of school access, would be working at an *innovative* level in many schools.

Notwithstanding their value, the levels do not properly consider a second dimension - that of the quality of use. For example a student teacher may be working at a routine level but be a particularly skilful and discerning user of an IWB. Here judgments about ICT use are inextricably bound up with judgments about teaching and learning. Such judgements will be contested and context bound with previous work (eg Mishra and Koehler, 2006; Fisher, Higgins and Loveless, 2006) helpful in developing a more rounded evaluation.

The second question posed in this study concerned the factors that result in student teachers using ICT. The answer appears to be a mix of access; confidence in using ICT; and a belief that ICT will impact on learning. This has been described as mix of first order (environmental) and second order (individual beliefs and intentions) factors (Becta 2003). Findings in this study support much of the literature cited earlier and back up a study of a previous cohort at the same institution (author). The constraints on using ICT offer a mirror image of the factors which encourage use: restricted

access; uncertainty as to impact; lower sense of self-efficacy. Findings are consistent within both sets of data though the interview data provide a more detailed picture. For example access was a key issue in use of ICT but when talking about their experiences student teachers saw access as more than having the machines physically present: access required procedures (such as routines for booking machines, for checking equipment and replacing defective parts) and expectations (eg encouragement from other teachers).

The interviews further help in exploring cause and effect when the student teacher is deciding to use ICT. There is, for example, clearly an association between belief in the value of ICT and the frequency with which ICT is used but they are strongly interrelated. Student teachers explained they would quickly reconsider their beliefs about the value of ICT if faced with adverse reactions on the part of pupils.

Further factors in the use of ICT are raised in the study. Support was important for all student teachers though some could describe overcoming limitations in support in a way that they could not overcome difficulties of access (except in the extreme case of buying one's own equipment). In this sense support appears more as an intervening or mediating factor than a causal condition for the use of ICT. There was, too, a subject dimension in that ICT and EBS teachers were more likely to use ICT. It is easy to dismiss the experience of ICT teachers as special case, but the message here is startlingly simple: if a goal of an educational system is to have teachers use computers in the classroom then these teachers must be provided with access and work to a pupil assessment process that assumes the use of ICT. There was, further, a sector dimension in this study in that early years and primary students were more likely to use ICT than secondary. More work needs carrying out here but a tentative explanation is that teachers in the former sectors were less focused on printed texts, felt more responsibility for developing ICT skills and were more receptive to using ICT within game-like contexts.

A further line of investigation concerns an association between use of ICT and a commitment to social constructivist pedagogy as suggested in the context of in-service teachers (e.g. Ertmer, 2005; Gobbo and Girardi, 2001; Van Driel, Bulte and Verloop, 2007) and discussed by Sang et al (2010) in respect to student teachers. The study provided little support for this. There was little basis for seeing any of these

teachers as committed to an exclusive or explicit social constructivist pedagogy, rather they had a pragmatic and eclectic approach to teaching. The key tenet of social constructivist pedagogy (a belief in authentic learning) was not found to be significantly associated with the use of ICT ($p>.05$). Instead student teachers, including innovative ones, seemed driven by strategic, though not superficial, concerns in which the overriding aim was to engage pupils at affective and behavioural levels. Nonetheless, pedagogical associations made about the use of ICT do require further exploration. In particular the examples of innovative use given in interviews typically involved a measure of handing over of an element of control to pupils and opportunities for pupils to learn from each other. It may well be that these examples carried more significance for pedagogical innovation than the student teachers realised. This would not be surprising - this is a study of teachers at the start of their careers who will undergo further professional development before their use of ICT becomes discerning (Deaney, 2007).

Other factors to be considered in the use of ICT include age and gender. Age was a consideration in that many student teachers had themselves grown up with extended experiences of using ICT. It appeared that these experiences had given them a strong sense of identity as an ICT user and left them with a 'habitus' (Greenfell, 1996) or disposition to use ICT. However, age should be explored cautiously; older students were not less likely to use ICT than younger ones ($p>.05$) and the challenge of transferring knowledge of ICT into new contexts should not be underestimated. Finally, gender might be expected to be a factor in student use of ICT (though see the nuanced reporting of Markauskaite, 2006), but this was not apparent within either the quantitative or qualitative data.

Appendix A: Associations with ICT use (Pearson's chi square testing)

For reasons of space the full list of items tested against *frequency of ICT use* are not reported, only ones for which there are significant associations or those otherwise mentioned in the text.

item	variable	value	df	asymp. Sig (2 sided)
1	secondary subject grouped by discipline (a)	20.787	4	.000
2	sector (early years; primary; secondary)	34.181	4	.000
3	attitude to ICT (b)	48.483	2	.000
4	sense of efficacy (c)	26.217	2	.000
5	teacher access to ICT (d)	11.397	2	.003
6	support (e)	10.519	2	.005
7	access difficulty (f)	11.620	2	.003
8	age (g)	1.450	2	.484
9	gender	0.651	2	.722
10	authentic learning (h)	4.541	2	. 103

Notes

(a) Secondary subjects were grouped as business and technology (ICT and EBS); language and communication (drama, English, history, MFL, RE); science (maths and science).

(b) Attitude to ICT: scores were calculated based on responses to seven items covering beliefs that ICT allowed learning to be more relevant; more personalised, more effective and more enjoyable. More / less positive groups of students were categorised.

(c) Responses to the question 'How effective do you feel you are using ICT to support learning and teaching in the classroom?' were conflated to group higher / lower self efficacy students.

(d) Access: scores were calculated based on responses to seven items concerning teacher access to cameras, video cameras, laptops, iPods, IWBs, PDAs, IWB and laptops. Students with higher / lower access were grouped.

(e) Support: scores were calculated based on responses to eight items concerning level of support from technicians, teaching support staff, mentors, tutors, resources, peers, pupils and resources. More / less supported students were grouped.

(f) Responses to the question 'I find ICT difficult to access in my school' were used to group higher / lower access students.

(g) Students were grouped as younger (aged 20 – 24) and older (25+).

(h) Responses to the question 'The best way to ensure success for all students is to provide authentic learning experiences' were used to group students.

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Sector / subject	survey returns	percentage male
early years	44	7
primary	109	21
secondary:		
drama	11	20
EBS	22	65
English	29	15
history	9	0
ICT	12	25
mathematics	34	64
MFL	15	25
RE	13	45
science	40	27
missing	2	
total	340	26

Table 1: Survey returns by subject and gender

Question: How frequently:	early years	primary	secondary
do you create your own presentations to use with IWBs?	78.6	90.8	65.4
do you create your own presentations with images and sound?	59.5	82.6	74.0
do you use an IWB for freehand writing to support whole-class discussion?	59.5	78.9	29.5

Table 2: Percentage of student teachers who used the IWB for different purposes in *half or more than half of lessons.*

Question: How frequently do you get pupils in your lessons to:	early years	primary	secondary	all
play educational computer based games?	63.6	51.4	17.3	34.6
use the Internet ?	34.1	27.5	20.4	24.6
create products such as texts, films or presentations?	11.4	26.6	22.2	22.2
use testing and revision programmes?	7.0	19.3	17.2	16.6
play recreational computer based games?	50.0	11.9	6.7	14.1
use VLEs?	11.6	4.2	12.3	9.8
data capture (e.g. data loggers, electronic microscopes)?	6.8	5.5	9.5	7.8
use blogs, Wikis or email discussion forums?	4.5	2.8	8.9	6.3
use social networking sites such as Second Life or Facebook?	2.3	.9	3.9	2.7

Table 3: Percentage of student teachers who used ICT for selected pupil activities *in half or more of lessons*.

Question: How frequently:	early years	primary	secondary	all
do you set homework which includes ICT?	9.5	20.4	36.7	27.8
do you create online resources for students to access?	28.6	24.8	23.6	24.6

Table 4: Percentage of student teachers who used online resources for students in *half or more of lessons.*

	Statements	strongly agree	agree	neither agree nor disagree	disagree	strongly disagree
1	ICT makes learning more effective.	22	52	22	3	0
2	ICT is particularly useful in helping me to support the diverse learning needs of pupils.	19	53	24	5	0
3	Pupils enjoy lessons more when they use ICT than when they don't.	21	45	27	5	2
4	ICT helps me to use a wider range of assessment tasks.	10	45	33	11	1
5	ICT helps attainment.	7	47	38	6	1
6	Using ICT in my teaching saves me time.	13	36	27	21	2
7	ICT resources can help in giving individualised feedback to pupils.	6	42	39	12	1
8	It is difficult to find the time to try out new digital learning resources.	7	40	28	20	4
9	ICT helps me to personalise the learning of each pupil.	5	39	43	12	1
10	ICT is not relevant for every subject.	10	28	24	30	7
11	It is easier to find relevant teaching materials in textbooks than on the internet.	8	17	28	39	9

Table 5: Percentage of student teachers agreeing or disagreeing with propositions about ICT.

How effective do you feel you are using ICT to support learning and teaching in the classroom?	not at all effective	not very effective	quite effective	very effective
early years	0	2.5	78	19.5
primary	0	3.9	73.8	22.3
secondary	0.6	14.5	62.9	22
all	0.3	9.2	68.6	21.8

Table 6: Student teachers reporting of self-efficacy in respect to the use of ICT, reported as percentages.

Codes	number of times mentioned by interviewees
innovative, creative, open to new ideas, more learner centred	11
willing to learn by trial and error / prepared to take risks	7
young, cutting edge,	7
may lean too much on the technology	5
flexible	3
accepting of children getting excited	2
seeks engagement through use of images	2
ambitious in career	2
discriminating in use	1
seeks varied fast paced teaching	1

Table 7: Frequency with which different associations were made with ‘the teacher who uses ICT’. Total frequencies > 21 as more than one association was made by some interviewees.

Statements	agree	agree with a competing proposition
The best way to ensure success for all students is to provide authentic learning experiences.	42.6	7.6
Teachers should facilitate learning, rather than teach directly.	49.7	3.5
Individual learning styles should be an important factor in deciding how and what to teach.	57.9	11.2
There is no best way to teach all students; an eclectic or balanced approach to instruction is best.	53.5	9.4
A great teacher cares about students and makes learning fun and interesting.	40.3	6.2

Table 8: Percentage of student teachers expressing alignment with selected propositions about teaching.

Question	early years	primary	secondary	all
In the teaching room or rooms you used most of the time was there a IWB or other display device?	83.0	99.1	95.5	89.9

Table 9: Percentage of student teachers who had access to IWBs.

Question: in your recent placement schools was there	early years	primary	secondary	all
secure access for ICT work?	90.9	98.2	92.9	94.3
access to school resources from home?	43.2	45.3	73.9	60.6
access to a VLE or learning platform?	28.6	40.6	68.2	54.3

Table 10: Percentage of student teachers who had access to storage, out of school access and to a VLE.

Question	early years	primary	secondary	all
how many teachers are positive about the use of ICT in your school / department?	38.6	54.1	51.9	50.9

Table 11 Percentage of student teachers who felt other teachers were positive or very positive about the use of ICT.

Question: to what extent have you received help from the following when using ICT in school?	early years	primary	secondary	all
other teachers	34.1	46.3	50.0	46.7
student teacher colleagues	47.7	37.1	46.4	43.6
university tutor	61.4	41.3	31.5	38.6
ICT technician	18.2	27.5	36.6	31.3
school mentor	22.7	24.8	35.2	30.1

Table 12: Percentage of student teachers finding *a lot* or *a fair amount* of help from different sources.

Statement	secondary	primary	early years	all
I find ICT difficult to access in my school	50.3	39.4	56.8	47.6
I don't think it is time effective	25.5	23.1	15.9	23.5
I don't know where to find ICT resources	18.2	25	20.5	20.7
I don't know how to use ICT resources	11.6	17.4	6.8	12.9
I don't think it benefits learners	13.9	10.2	11.4	12.3
I don't feel confident using ICT in my lessons	12	8.3	13.7	11.1
The learners don't like using ICT	6.7	6.5	11.4	7.2

Table 13: Percentage of students agreeing with selected statements about the use of ICT in *some or most classes.*

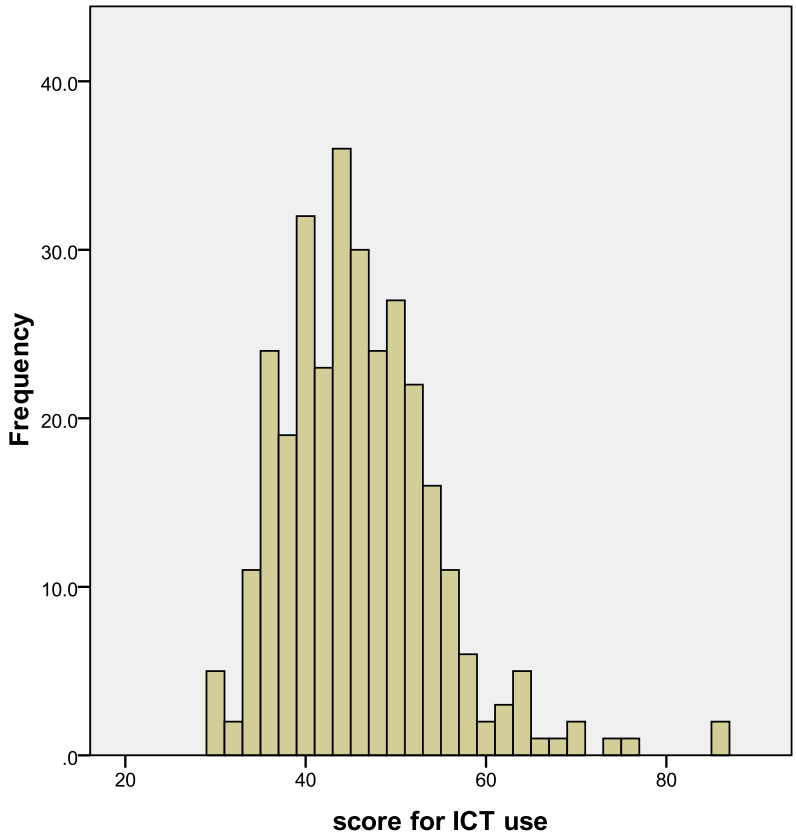

Figure 1: Scores for student teachers use of ICT.