“It would have been nice to know about that piece of software! ” Preparing Early Years Practitioners for the challenges of embedding the use of ICT into their professional practice – what are the challenges?

Keith Turvey*, Philippa Totraku & Jennifer Colwell
University of Brighton

This is a common response from student teachers when evaluating our provision for ICT in the School of Education, at the University of Brighton. The reply from tutors is usually to point out that it is a bit like saying to English tutors, ‘it would have been good if we could have read that book before we went on teaching practice.’ Due to the range and fast-changing pace of new technologies, combined with the complexities of making effective use of these within diverse pedagogical contexts, the ICT team have based their provision in ICT upon a model that aims to develop a critical and sustainable approach to technology in education. It is a vision in which student teachers are encouraged to develop the confidence to explore and make effective and critical use of changing technologies throughout their careers. Despite the understandable concerns of student teachers to develop their competence with specific ICT software and hardware, a recent research project provided us with further evidence of the importance of underpinning our ICT provision with a much broader and potentially far-reaching vision of the development of teachers’ ICT capability; that is a view grounded in the notion of teachers taking critical responsibility for their own professional development in relation to technology.

Throughout 2008-2009 a small start-up research grant from the Teacher Training and Development Agency UK (TDA) facilitated research into the quality and nature of the Early Years and Foundation Stage (EYFS) student teachers’ experiences with ICT both within the University and in professional practice. The overall aim was to inform module development with regards to the role of ICT within EYFS practitioners’ professional learning and practice. In order to address this aim the following key research questions were identified namely:

- What are student teachers' experiences of using ICT as a pedagogical tool across the range of EYFS settings?
- How can the university-based training be further developed to support EYFS students’ professional development with ICT?

There is a well established corpus of research on ‘good practice’ with ICT in early childhood highlighting the opportunities for young children to develop a range of capabilities from social skills, collaboration and communication to creativity and positive dispositions towards learning (Yelland, 1999: Siraj-Blatchford & Siraj-Blatchford 2004 & 2006: Plowman & Stephen, 2005 & 2007).

However, what is less clear is how the university and professional practice-based experiences student teachers encounter during their course enable them to develop their professional practice in line with such suggested notions of 'good practice.'

Professional learning - a complex mix

In attempting to evaluate and identify key features of university-based approaches to learning about professional practice with technologies in the Early Years a complex view of professional learning was adopted. That is, a view that goes beyond technicist views or what Pachler refers to as approaches ‘predicated on a view of teachers as technicians and deliverers,’ (2007, P.249). Professional knowledge and understanding has long been established as being more complex than the straightforward application of a range of competencies to a particular professional context. As Eraut (1994) suggests the ‘segmentation and packaging of knowledge for credit-based systems seems inappropriate preparation for professional work which involves using several different types of knowledge in an integrated way’ (P.10). Similarly others argue that knowledge is often transformed in practice. That is, it can be found to be lacking, or in need of reconfiguring (Eraut, 1994; Schön, 1987: Loveless, 2007). The application of theory to practice or indeed the deriving of theory from practice is viewed here as a complex process. Shulman captures the complexities of such professional knowledge in his classic
theoretical model of pedagogical content knowledge, (1986) which highlights the importance of what he terms teachers’ ‘strategic understanding’ and professional judgement when faced with the contradictory or conflicting issues authentic cases of professional practice often present. Mishra and Koehler (2006) have recently developed Shulman's earlier model of pedagogical content knowledge to incorporate the integration of technological tools. They suggest:

“Quality teaching requires developing a nuanced understanding of the complex relationships between technology, content and pedagogy and utilizing this understanding to develop appropriate, context specific strategies and representations” (P.14).

Barton and Haydn (2006) similarly warn against approaches that overload student teachers with skills-based approaches focusing merely upon the development of competencies within ICT applications. They also suggest that engaging student teachers in collaborative activities with ICT offers them a 'high challenge, low threat learning environment' as attitudes and anxieties towards technology can be significant factors (P.265). These conclusions were drawn from a survey of student teachers' attitudes to their training and school-based experiences. In order to address the inadequacies of purely skills-based approaches to ICT capability, Angeli advocates a case-based method. In such an approach student teachers study other teachers' use of ICT in teaching and learning through rich descriptions of cases (2004). However, in such an approach it could be argued that it is impossible to capture all of the nuances within a description of a case of ICT practice in the Early Years however rich the description. As Chen suggests, in the Early Years setting 'teachers adapt computer use to accommodate children's varying levels of skills, differing personal interests and optimal social groupings' (2006, P.181). From such a perspective it is difficult to see how a purely case-based approach could represent such fine-grained nuances within a case.

Despite the merits or limitations of different university-based approaches to developing student teachers' professional knowledge and understanding of the use of ICT in the Early Years, the implications of a complex view of professional knowledge are that personal ICT capability is merely one of a range of factors student teachers will need to engage with in order to develop their professional practice with ICT. A broader view of professional knowledge requires approaches that locate the development of student teachers' personal competencies with technologies in a wider professional discourse of appropriate pedagogy for the Early Years, questions about how ICT might be used flexibly and creatively to represent subject knowledge differently according to different learners' needs and also reflection upon their own attitudes and perceptions about teaching and learning with ICT. This broader framework of professional knowledge and practice it is argued is predicated not merely upon competencies but upon an openness to professional development and a willingness to adapt to the challenges encountered through professional practice; a process that locates the individual student teacher at the centre of their own professional development with ICT tools. So how did we go about capturing the student teachers’ perceptions and attitudes about their university and school-based experiences?

**Methodology**

We adopted a mixed methods approach. From a quantitative perspective, a questionnaire was given to the whole cohort of EYFS undergraduate student teachers as well as the cohort on a primary undergraduate route. The intention was to compare the attitudes and experiences of these two cohorts, covering both their experience of the university-based ICT provision and their school-based experiences with ICT. The questionnaire design was based upon Barton and Haydn’s work (2006) and did invite some qualitative responses. Questionnaire responses were coded and analysed using the social science software package SPSS. In order to gather more fine-grained qualitative data a self-selecting focus group of four student teachers from the EYFS course were given two digital cameras each to take into their placement settings and a digital voice recorder. The digital cameras were designed for use in EYFS settings. The rationale for giving the student teachers the digital cameras was that they would have ownership of the technology and being a relatively small and flexible technology it would be easier to trace the keystone effect of the technology upon the classroom environment as it was integrated into the student teachers’ pedagogical practice. Qualitative data was collected via audio diaries kept by the focus group during their final placement and sent to us by e-mail. The students were prompted to reflect on how they had incorporated the use of the digital cameras in their practice. A research officer based in the Education Research Centre also carried out a final focus group interview.
The students did not know the research officer. This was felt to be appropriate as they were, at times, being asked to comment on the ICT provision they had received during their course. The data set is illustrated in Table 1

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<thead>
<tr>
<th>Data</th>
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<td>Focus group interview transcripts</td>
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Table 1 - Data set

Another methodological aspect that also facilitated this project was the use of an open source wiki to collate the diverse data set including links to relevant literature. This also enabled the three researchers to comment upon and contribute to the development of the report to some degree.

Quantitative responses and analysis

Table 2 compares the mean responses to the questionnaire of the Primary students (1) and Early Years student teachers (2). As expected with any such sample size (N = 120) there was variance in the means across a range of attitudinal variables between the Primary and the EYFS student teachers. Both groups of students were asked to indicate their levels of confidence, comfort and enjoyment in using ICT to facilitate children's learning. The EYFS practitioners consistently rated these categories lower than the Primary student teachers with mean differences of 0.608 (Confidence), 0.285 (Comfort) and 0.484 (Enjoyment). Whilst it is interesting that the EYFS students consistently rated these factors lower than their Primary counterparts, the P value on these variances was >0.05 rendering them statistically insignificant.

<table>
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Table 2 SPSS Mean by route (1 = Primary 2 = EYFS)
Another group of questions on the questionnaire were designed to capture the student teachers' perceptions regarding their own professional knowledge and understanding in relation to using ICT in their practice. They were asked to indicate the degree to which they felt able to learn about and develop skills with new applications independently (Independence), and the extent to which they needed support in this (Help). Another question in this category asked them to indicate the extent to which they were able to identify how ICT and new technologies can facilitate teaching and learning in their practice (Vision). In all of these categories both groups were very closely matched with the mean difference ranging from only 0.010 (Vision) to 0.227 (Help). Furthermore the responses to these question from both groups were essentially positive, implying that a high number of student teachers on both routes had positive attitudes towards taking responsibility for their own professional learning and development with ICT and incorporating it into their own practice.

In order to gauge the student teacher's perceptions and attitudes regarding the relevance of ICT within their practice, both groups of student teachers were asked the degree to which they agreed with the statement that 'ICT makes teaching and learning easier' within their age phases (Facilitates). On the primary course there was a higher incidence of student teachers agreeing with this statement with a mean of 7.22 compared to a mean of 6.55 amongst the EYS practitioners. Significance tests on this variance revealed a P value of 0.009 indicating a statistical significance in this data.

Interpreting the student teachers' responses in isolation is of limited value and inconclusive. However a more holistic interpretation of their responses is more interesting. For example the statistically significant variance between attitudes regarding the extent to which ICT is believed to facilitate teaching and learning would appear to imply an underlying perception that the relevance of ICT in teaching and learning increases with the age group the students are training to teach. That is, in comparison with the Primary student teachers the EYFS students found ICT to be less significant in the EYFS phase of teaching and learning. This combined with the slightly lower levels of confidence, enjoyment and comfort the EYFS students expressed at using ICT in their practice would appear to be important when seen as a whole. Whilst the evidence in the questionnaire responses was inconclusive the sense of relevance ICT is perceived to have by student teachers within the Early Years environment would appear to be an important observation potentially impacting upon their broader attitudes and perceptions about the use of ICT with young children. Such broader attitudes and perceptions could only be accessed through the interrogation of the qualitative data collected.

**Perceptions, attitudes and values - qualitative responses**

The qualitative data highlighted the problematic interface between university-based provision and school-based experiences in applying ICT in professional practice. What emerged from the qualitative data was the richness and complexity of students' experiences in using ICT in their professional practice. Such complexity and richness is particularly difficult to make provision for in university-based courses but it is argued here that such nuances need to be reflected in university-based provision for ICT.

The complexity and richness of the students' school-based experiences was manifest in a number of themes within the data. A key theme related to the issue of coverage and content in university-based provision compared to the range of professional settings. This had different facets in that on the one hand it was recognised by the students that there was a significant range of continually developing hardware and software they were likely to encounter in settings and on the other hand it was impossible for them to be given hands-on experience of all of these prior to their school-based experiences. However another facet to this issue was a distinction they made between the use of ICT for their own professional purposes - creating presentations, keeping records, planning - and the integration of ICT for the direct benefit of children's learning. During the focus group interview the students clearly expressed the attitude that university-based provision should not focus on 'basic' skills in for example Microsoft Office applications that could be used to support them in their general professional role as illustrated by this response from the focus group interview:

*And because I think, to start off with, I know some people don’t even have the basics in ICT. But I don’t think that that necessarily should be what we learn on the course; you know, things like*
PowerPoint and a few bits like that. I could see that some people were really struggling, but that shouldn’t be what we have to focus on, because it’s not actually to do with our Early Years training. Like, with actually teaching in the classroom, it’s all about the admin side of things, ../... I think that people should have that basic training before they come to the university.

On another level this was encouraging as it also indicated an acceptance of responsibility for their own professional development when faced with the need to acquire basic ICT skills. Indeed, such responsibility for their own professional development with ICT was a recurring theme throughout the focus group interview in relation to their school-based experiences. The student teachers frequently referred to the need to make time during school placements to engage in play to explore ICT resources which were similar to those they had experienced in university but not quite the same or to simply investigate completely new resources. Their responses illustrated clearly that the application of ICT to practice was rarely straightforward but always nuanced by the particularities of the context and the need to balance professional development issues in ICT with the competing demands upon the student teachers' time as indicated in this comment:

I’d say you’ve got different resources on each of the different Interactive Whiteboards, so you’ve got different Maths resources that come with it. It has built-in programmes for their Touch Board, or whatever. But then again, you wouldn’t find that out until you get there. So you just work with what you have. If you’ve got time to play around with it and to really get to grips with it, then some of the resources are brilliant.

That is, on-the-job learning was a key professional skill that was identified throughout the focus group interview as an important factor in making appropriate use of the technological resources available within the setting. Furthermore, they identified key dispositions that they believed were important in order to facilitate the development of their own professional practice with ICT. Adaptability and collaboration were referred to in their responses. One student teacher commented that with varying levels of understanding with regards ICT amongst colleagues, 'help[ing] each other is a part of working as a team.' This respondent also commented that she was now 'much more adaptable' compared with her earlier experiences in school at the beginning of the course. It is a fair assumption to make that such adaptability and recognition of the importance of collaboration is more the product of the nuanced experiences of both successfully and unsuccessfully applying ICT in professional practice over time. However, this could also have significant implications for the kinds of ICT-based experiences students engage with in university. Arguably the more experience they have in collaborative work with ICT at university the more they will be able to work collaboratively to both support colleagues and receive support from colleagues in developing their professional practice with ICT when in school. From a similar perspective, it was also interesting to note that the richness of the professional context gave the student teachers the opportunity to reflect on the importance of harbouring positive yet critical attitudes and dispositions to professional development with ICT.

The student teachers were critical of what they perceived to be pressures to incorporate ICT into teaching and learning for its own sake. For example, one commented that:

"ICT does make teaching and learning easier...... [but] being forced to use ICT does not make teaching and learning easier, in the sense that because there’s such a drive on using ICT in different areas of learning cross-curricular, and that sort of thing, there’s a definite pressure which is actually quite unnecessary, and if we were left to get on with it, I think, us now, as NQTs, would be more than willing to get ICT in there."

Such 'pressure' was perceived to come from university and school-based mentors as well as policy and the increased technological provision they had witnessed over the duration of their four-year course. However, it was encouraging that they retained a critical view of ICT integration and were able to discuss examples of where they had used technology in their teaching and it had not been the most effective tool to use. Similarly, alongside the use of technological tools to support children's learning some of the student teachers expressed the importance of not using these to replace other beneficial methods to support children's learning in the Early Years. For example:

"Yes, but even with money, you’ve got lovely resources on the Interactive Whiteboard to do different money calculations and that sort of thing, but sometimes I actually think it’s nice for them to have the plastic money, and get their hands into it and be more kinaesthetic."
Whilst the students retained a critical view of the use of ICT in their professional practice, this was also balanced by recognition of the importance of being open to new developments. Indeed one student teacher who had benefited from participating in a school-based interactive whiteboard training session noted the potentially negative impact of a lack of openness to new technologies on professional development commenting:

“I went to some Interactive Whiteboard basic training that was done in the school, and some of the teachers had decided that they weren’t going to be able to do it before they even got there. And I think it’s also about the attitude behind the introduction of new resources.”

It was clear from the focus group interview that student teachers' experiences of integrating ICT into their pedagogical practice and their professional development with ICT was nuanced by a range of factors ranging from the reliability and quality of the resources at their disposal, their own and others' attitudes towards the role and appropriateness of ICT to the children's learning and the effective management of diverse professional responsibilities to create appropriate opportunities to adapt and learn on-the-job where necessary. Such adaptability was also evident within the audio diaries that the student teachers recorded whilst on practice.

Wisdom in practice

Over the course of the eight week school-based practice the student teachers developed a range of strategies for incorporating the use of the digital cameras they had been given into their pedagogical practice and the children's learning. Whilst all of the four student teachers found they were able to incorporate the use of the cameras into the various topic-based work they were doing, they went about this in different ways putting emphasis on different aspects of the work and activities. In the initial stages some of them modelled the use of the cameras to the children whilst others simply made the cameras available to the children as a resource during free choice for them to explore. In order to facilitate this one of the student teachers put the cameras and leads in a small box under her chair but let the children borrow it whenever they wanted to take photographs of each other carrying out different activities. In response to the initial high demand for the camera this teacher decided to limit the number of photographs the children could take at one time. Another student teacher modelled some of the extra features on the cameras for the children such as adding effects and video capture as they were quite familiar with digital cameras. Yet another student teacher asked the children to imagine and explain what they wanted to take a photograph of before being given the camera. What the audio diaries reveal is that such decisions were based upon the student teachers' evaluations of the children's initial responses demonstrating their developing professional judgement and wisdom about how to integrate the technology within the specific context and what they had gleaned about the children with whom they were working. For example, one of them recognised that several of the children were very familiar with using the cameras due to their experiences from home so she asked these children to act as demonstrators for others who needed help.

Similarly, as the student teachers adapted further to the integration of the cameras into their professional practice other differences emerged. One of them exploited the interoperability of the cameras combining them with the interactive whiteboard in order to use the children's photographs as discussion points to develop their speaking and listening skills as well as their confidence in using the interactive whiteboard. For example, she commented:

“It also built on the children social skills and they were encouraged to share and work together when taking pictures. It built on the children’s speaking and listening skills and some of the children showed others how the camera worked. I would often transfer the pictures onto the interactive whiteboards, we shared these as a class and the children really enjoyed looking at themselves and the pictures that they had taken.”

However, despite having the facility to use an interactive whiteboard another student teacher thought that the camera work became a more real and rewarding experience when the children were involved in printing out the photographs and using them to create a physical display.
In this way the audio diaries reflected a range of different approaches emerging as the student teachers developed and adapted their professional practice according to the nuances of their context and their children. Whilst all of the student teachers facilitated both planned and independent use of the cameras with the children clear variations emerged in how this actually looked in practice due to the different ways in which the student teachers adapted and responded to their differing contexts. What then can be learnt from these student teachers’ experiences of incorporating ICT into their pedagogical practice in the Early Years and what conclusions can be drawn about how to adapt the experiences they are given within university to prepare them more effectively for the challenges they face in practice?

Conclusion and recommendations

It is inevitable that due to the fast-changing pace of new technologies, some student teachers will experience anxiety regarding their own ICT skills and this was certainly reflected in the qualitative responses on the questionnaires from both the primary and the EYFS cohorts. However, regardless of the level of competence a student teacher might exhibit, a willingness and confidence to engage in on-the-job learning seems key to adapting to the complexities of the professional context. All of the teachers in the focus group accepted a high level of responsibility for their own professional development with ICT, being prepared to experiment with and explore technological tools. This would suggest that in the design of university-based ICT provision we would do well to create the kinds of opportunities that mirror the experiences student teachers have in school; characterised as they often are by exploration, adaptation, collaboration and taking responsibility for one’s own professional development with ICT. It was particularly encouraging to hear the student teachers reflecting critically on the appropriate use of technology to support learning and teaching, and it was also encouraging the ways in which they responded first and foremost to their children in developing their own nuanced strategies for incorporating the technologies into their practice. Our challenge now within the university-based ICT provision is to design and create further opportunities that challenge student teachers to take ‘control over the process’ of innovating with technology (Laurillard, 2008, P.144). The capacity to explore, adapt, collaborate and reflect critically upon new technologies appears to be far more vital to the effective integration of ICT into professional practice than knowing about a particular piece of software. Although skills within particular applications are an important factor in the development of EYFS practitioners’ pedagogical application of technology the assimilation of new skills with unfamiliar technologies and the ability to adapt existing knowledge, understanding and skills remains the central challenge in preparing student teachers to make effective pedagogical use of technology.

References


n the Reflective Practitioner*, San Francisco: Wiley & Sons.

Educational Review, 57*, 1-22.

Trent: Trentham.

curriculum for early childhood education*, Stoke-on-Trent: Trentham.

University Press.