Student Science Teachers’ ICT in the classroom: Is it effecticve?

# Meeting the Standards for using ICT in Science Teaching

Student teachers have to prove that they can meetseveral standards in order to obtain qualified teachers’ status (QTS). Number 2.5 relates to students’ own knowledge:

They know how to use ICT effectively, both to teach their subject and to support their wider professional role.

Number 3.3.10 relates to students use of ICT in teaching:

*They use ICT effectively in their teaching*.

Textbooks about science education usually contain a chapter, which offers a rationale for the potential of ICT as a tool for teaching and learning Bennett (2005) for example. However, little exists in the way of exemplar materials for trainees or a rationale about *how and why* specific resources could be used.

The project aimed to answer three questions:

* What ICT do science student teachers use in their school experience?
* How are students using ICT in their teaching?
* What reasons do students give for using particular ICT resources?

The project also aimed to identify resources could be usefully shared with other students (and probably teachers too). Biographical material about the students was also collected so that future students could recognise the variety of ICT skills and backgrounds that students will bring to their course. It is envisioned that exemplar case studies will be presented on the web.

# The Case Studies

Data were collected from a student teacher sample of fifteen: four PGCE students from each of the three ITT providers and three GTPs. Each participant was asked to estimate their different ICT usages, such as the Internet or interactive white board during their current teaching practice, each was observed during a lesson in which ICT was used and they were also interviewed about why particular types of ICT had been used in their teaching.

A case study for each student was assembled in a similar format: A short biography of the student: Male/female, age, degree subject, previous work experience and how they had used ICT in the past. Students described which forms of ICT they used in lessons, an “estimate” of how often they used each type of ICT tool and an explanation of why they used that particular method for teaching.

# Frequency of Use of Different ICT tools

The graph summarises the frequency of usage of different ICT tools over a total of 1407 lesson recorded according to the Key:

1. Data logging

2. Interactive whiteboard used just as a projector screen

3. Interactive whiteboard - used interactively

4. Multimedia

5. Excel spreadsheet

6. Internet access

7. Word processing

Most frequently used was the interactive white board used as a screen. Data logging and spreadsheet were the least used.

# Students Teacher Reasons for Using ICT

Despite the few lessons in which some technologies were used, student teachers were able to rationalise their use of ICT, both from observations and discussion with the interviewer about lessons that they had previously taught. Their reasons were categorised guided by groups used by Ruthven Hennesey and Deaney (2004) in their study of ICT use by experienced teachers.

*1. Saving time and increasing efficiency*

Many students admitted that using ICT helps then get through the lesson quickly, saves time writing on the board and quickly puts up information. ICT helps maintain pace because ready-made slides or presentations are quick and snappy to use. Pupils have less time to “chat” or become distracted while the teacher writes on or wipes the board. Increasingly schools are buying in proprietary lesson packages pre-prepared and comprehensive, requiring minimal preparation, which are professionally produced and attractive.

Most students also saved time by putting “three key objectives on the board” or to summarise a section and getting pupils to copy thereby following the KS3 Strategy guideline. Bullet points on the board were used as a starter or a plenary or for exam revision. Students used it to get key facts and information up on the board quickly and efficiently.

*2. Motivation*

For an audience of pupils that are imagery sensitised and activated, images can give huge variety of visual stimulus to support and enhance teaching or support material Animations were thought to help pupils to visualise difficult concepts or to understand the mechanics of processes especially if a practical is not easy to see or follow, or not available for demonstrating.

Students used video clips to bring reality to the lessons, particularly experiences not normally possible within the classroom. Data logging shows immediate, real time results as an experiment is progressing and this immediacy holds interest and concentration and the ability to respond/ ask questions/ discuss at the moment of action.

*3. Conceptual Learning*

There was limited evidence of the use of ICT for conceptual understanding, although when used in this way it was a powerful tool used to model something that cannot be easily seen, for virtual experiments in which parameters can be quickly changed and to see an effect in real time. An important aspect of science education is tohelp pupils to arrive at an understanding of scientific concepts. When we think of the Key stage 3 themes particles, cells, energy, interdependence and forces, there are concepts in all of these that are difficult to explain.

*4. Pupil Research/Presentation*

In very few instances were pupils able to research and present back to their peers. When they did, pupils used ICT imaginatively. Occasionally they presented to their peers using Power point, made leaflets that were available in classrooms, and, in one case, sequenced digital images to present the concept of subduction. There were several instances when pupils undertook Internet research and some instances of Internet revision and test website use.

*5. Adding authenticity*

To make science more credible to the average secondary school pupil, the work can be put into a context that pupils will recognise as important in their lives and ICT was particularly helpful where practical applications were difficult or dangerous to demonstrate. Showing pupils results in ‘real time’ was another way to give authenticity, particularly for pupils’ own results.

 *6. Trainee teacher survival.*

This grouping of students’ comments about their reasons for using ICT could not be fitted into the established theoretical groupings and we grouped them in a separate category specific to the work of student teachers

Student teachers use an extensive range of survival techniques in which ICT plays a part sometimes on the flimsiest of justifications to ‘cross off’ one of the standards. Many use ICT as a way of overcoming their own shortcoming such as poor handwriting and a few trainees mentioned class management and collecting resources for their future teaching.

**Surviving Teacher Training and Use of ICT**

The majority of student teachers seem to have the skills to use ICT in their teaching and professional role (standard 2.5) and many are proficient in using the Microsoft packages (or appear to be from interviews and audits). However, these skills are not necessarily used ‘effectively’ in their teaching (standard 3.3.10) and most trainees adopted a teacher-centred approach to ICT with little to encourage independent learning or a collaborative style of ‘learning together’ observed in primary classrooms (Sutherland et al., 2004).

Students may follow established school practice during placements in an effort to fit in with the rest of the staff because they may have concerns about the assessment of their teaching proficiency (Furlong and Maynard, 1995). They adopt a top-down approach to science teaching, heavily influenced by central policies designed to ‘improve standards’ such as the Secondary Strategy and its guidance, and the National Curriculum and GCSE syllabuses, perceived by teachers and students to be over prescriptive and burdensome. We found no evidence of mentor initiatives to encourage more creative approaches to ICT use

## . **Recommendations**

# This research suggests that teacher training providers should examine practices in their institutions and in partner schools to establish new priorities for the purposeful use of ICT in students’ science lessons and to provide the necessary mentor training. ITT providers could explore strategies for the “effective” use of ICT in science such as more integration of ICT in teaching and pupil involvement. In particular the use of data logging, almost exclusively used in science, could be more extensively explored and encouraged. In the light of new syllabuses that have an emphasis on ‘how science works’ we must seek opportunities for the context specific use of ICT.

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