EXCELLENCE IN SCIENCE

THE ROYAL SOCIETY

Online survey of E&E (enrichment and enhancement) provision in ICT/Computing

Report written by James Berressem

Introduction

The Royal Society is carrying out a study looking at the way that ICT/computing is taught in schools and colleges across the UK. Through this study teachers, academics and other members of the computing community are coming together to address growing concerns that the design and delivery of the ICT and computing curricula in schools is putting young people off studying the subject further.

As part of this study the Royal Society conducted an online survey of teachers in UK schools and colleges to investigate the continuing professional development (CPD) available to ICT/Computing teachers, and the availability of curriculum enrichment and enhancement (E&E) for pupils, i.e. activities that extend beyond their usual, formal learning. The survey comprised 20 questions, of which eight invited respondents to provide answers in a "free text" format.

The survey closed on Monday 2 May 2011, and attracted 114 responses. These responses includes submissions from individual teachers of ICT and computing, ICT leaders in schools and colleges, heads of departments and senior management (head teachers and assistant head teachers) alongside lecturers in higher education institutions and other interested parties (CPD and E&E providers, awarding bodies, educational consultants etc).

This report summarises the key themes identified by an analysis of the respondents' four answers on E&E.

Summary

Of the 114 respondents to the survey over two-thirds (77) were based in secondary schools and 13 were based in colleges. The sizes of these institutions were evenly spread across the ranges 500-1000, 1000-1500 and more than 1500 students. In addition to responses from teachers based in primary and middle schools and those contributed by E&E providers, comments were also received from lecturers in high education institutions and other interested parties (local authorities, awarding bodies, teacher trainers). Nearly 70 per cent of respondents were based in England while just over quarter were based in Scotland, the remainder were equally spread across Wales and Northern Ireland.

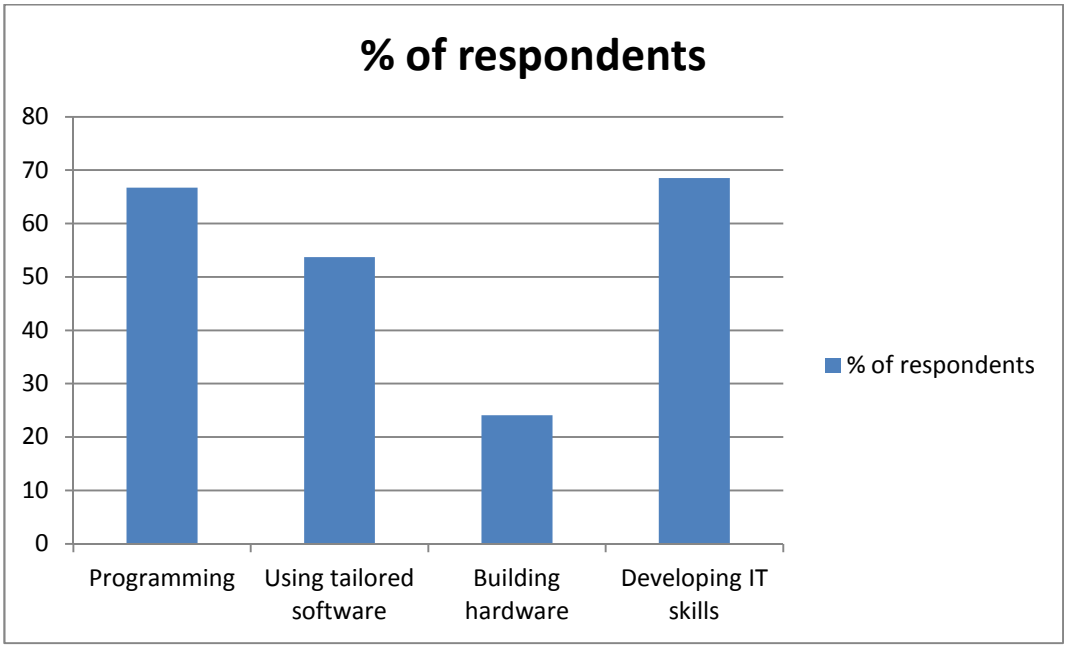
Key E&E themes emerging from the survey:

- **Teachers' CPD is vital to promoting more E&E opportunities** for young people in schools.

- **A coordinated national website/database of CPD and E&E opportunities** would ensure more teachers can identify appropriate courses and resources.

17. What types of ICT/Computing enhancement or enrichment activity are you aware of?

	% of respondents	Response count
Programming	66.7	36
Using tailored software	53.7	29
Building hardware	24.1	13
Developing IT skills	68.5	37



Q18: Can you give an example of 'good' provision of computing enhancement and enrichment opportunities.

Thirty-six out of the 114 respondents provided details on E&E opportunities. Some respondents provided details on events, courses and resources aimed at teachers that focused on developing E&E opportunities in the classroom. These included:

- Game to Learn: Take 2! Conference organised by Learning Teaching Scotland's Consolarium;
- CPD courses offered by AOK Learning, such as the VB 2005 programming course;
- courses for teachers offered through Nacce's ICT CPD 4 free scheme;
- courses and meetings offered by VITAL.

Other respondents were aware of a variety of examples of discrete E&E opportunities that benefit students directly. These included:

- Computer Science Inside resources offered by the University of Glasgow;
- Undergraduate Ambassadors scheme run at the University of Glasgow, which puts final-year computer science students in schools where they work with teachers in developing and delivering computing workshops for students;
- First Lego League, hosted by the University of Edinburgh;
- Animation competition run at the University of Manchester;

- National Cipher Challenge, which is popular with students of all ages, interests and abilities;
- British Informatics Olympiad, which has more limited appeal to keen programmers and good mathematicians;
- Computing at School meetings, such as its sixth form conferences;
- the wide range of talks from visiting speakers offered through the BCS Academy of Computing;
- visits to local university computer science departments, organised via the Computing At Schools initiative;
- industrial visits to, for example the Imagineering Jaguar Land Rover Partnership Centre at Gaydon JLR Design and Engineering site where students see the application of ICT in real-world contexts;
- The Java-based programming software Greenfoot, maintained by Michael Kölling at the University of Kent;
- Linux boot camps run by the University of West of England, which offers A-level students the opportunity to explore practical technical computing using Linux operating system;
- Robot ARM simulation, offered by Rickitt Educational Media;
- Extra-curricular ICT clubs run by teachers.

According to some respondents, awarding body websites, such as OCR's GCSE computing site and AQA's A-level computing site, provide regular E&E opportunities. Regional ICT leader meetings were also identified as a useful way of disseminating good ideas for E&E activities.

Contributors who teach ICT/computing in Scotland identified Learning and Teaching Scotland's Glow national intranet for education as a good source of E&E resources.

Q19: What do you think should be done to improve ICT/Computing enhancement and enrichment opportunities for young people?

Less than a third of respondents (39) answered the question. The most common suggestion was for teachers to receive training to enhance their knowledge and skills, with a particular focus on developing their computing skills such as programming. This should be supported in schools with simpler teaching tools which help teach students about computing and its fundamental concepts.

Several teachers believed that schools should look to involve local universities through developing E&E workshops. Others mentioned involving local business to develop business-related ICT/computing E&E opportunities for students. However, one respondent pointed out that companies, such as EA Games, had stopped funding their educational programmes.

Respondents pointed out that venues that host E&E activities, and the types of activities on offer, need to be publicised more widely. Teachers would welcome an easily accessible website or online database of E&E events, venues and resources.

Additional funding for schools to offer extra-curricular computing courses was also on the wish list of respondents.

There were several suggestions relating to changes to the curriculum that might improve ICT/computing E&E opportunities for students. These included: encouraging the introduction of computing principles; ICT at Key Stages 1 to 3, through teaching computing as a discrete subject from Key Stage 3 onward; and rewriting the ICT component of the National Curriculum so that it delivers relevant skills and knowledge, including computing elements such as programming, in engaging and creative learning experiences.

One respondent suggested that teachers were put off by the administrative burden (risk assessment, form filling etc) associated with arranging for students to take part in activities outside school. Either this must be reduced or more opportunities to host guest speakers, seminars or workshops within schools and colleges need to be introduced.

Rather than ban the use of websites such as Wikipedia, YouTube, Twitter etc, one respondent suggested that these sites are used as resources to support learning and teach students how to use them responsibly. Students could also be encouraged to create resources for their peers, which they could disseminate under Creative Commons licenses on the web.

Other suggestions received included:

- more fun, multimedia-based events;
- a programming club supported by simple pre-prepared resources, such as games, which could be modified and extended by students;
- a "build a computer" scheme, where students recycle parts of old computers to construct web or game servers;
- more opportunities for students to work together online across regions and internationally as demonstrated by "Mathelectics";
- pay teachers for running after school computing clubs;
- Universities encouraged to value programming skills and experience since these demonstrate students' critical thinking and logic skills.

Q20: Do you have any further suggestions for improving enhancement and enrichment opportunities in the areas of ICT and Computing?

Only 20 responses were received to this final question of the survey. Several respondents agreed that provision of quality and up-to-date CPD for teachers was important to improving E&E opportunities for young people. A national drive, led by a national body, was again suggested as a means to ensuring the issue of CPD is addressed.

One respondent suggested local education authorities adopt an approach similar to that used by the American Collegeboard, which will not verify a school's course as acceptable before teachers have undertaken appropriate CPD cover. One respondent suggested that CPD should develop teachers' understanding of how computers work (the hardware such as integrated circuits and silicon wafers) as well as programming, which they can then use to add the "wow" factor to students' learning experiences.

Several respondents suggested that more links with industry should be encouraged, e.g. local companies 'adopting' schools, with the aim of offering industrial visits, work experience and opportunities for students to see the application of ICT and computing in real-life situations.

Schools should also continue to develop links with universities, which have the resources and expertise to offer E&E opportunities. One respondent wanted to see ICT/computing staff make more use of people outside of school to supplement the teaching of ICT/computing, in particular those people aged 25 and under who are familiar with the latest technologies and their applications.

One suggestion from a teacher was for companies to be set the challenge to create new tools (e.g. an operating system) for teaching computing that help students understand the fundamental concepts of computing. The respondent described this as a 21st century version of the work done by BBC in the 1980s and added, "We are at a huge advantage, young people are hooked on technology, we should tap into this and tap into their thirst for knowledge and understanding or they will just be users of it and not creators of it".

Other suggestions put forward for improving E&E opportunities were:

- getting ICT/computing a higher priority on the school timetable so that, at Key Stage 4 for example, the qualification is not run in one-third of the time devoted to other subjects such as maths.
- more opportunities for students to celebrate their achievements in ICT and computing;
- a website or online database with details of relevant events, competitions, resources etc;
- more discrete computing lessons in schools;

- training for teachers to improve the use of ICT in other lessons and to improve the cross-curricula delivery of the subject, such as analysis with Excel/MiniTab, use of Wolfram Mathematica in maths lessons etc.