

John P. Cuthell

***Steering the Supertanker: Transforming Teaching and Learning
Through the Use of IC***

JOHN P. CUTHELL is Research Director, Virtual Learning, 232A High Street, Boston Spa, Wetherby, West Yorkshire, LS23 6AD UK

(E-mail: john.cuthell@virtuallearning.org.uk).

Publication details:

Cuthell, J. P. (2005). *Steering the Supertanker: Changing Teaching and Learning* In: *Computers in the Schools: Technology Applications in Education (2005)* Ed. Maddux, C.

SUMMARY. The use of computers within the school curriculum raises critical pedagogical issues. Maddux (1991) classification of educational computer applications as Type I or Type 2 remains apposite. Type I applications simply reinforce existing teacher-learner paradigms, whereas Type II applications of ICT (Information and Communications Technology: the UK acronym for EdTech.) transform teaching and learning. This paper examines United Kingdom case studies predicated on the Type II approach. The government has, since 1997, invested considerable resources in educational ICT provision through the provision of computers, teacher training and broadband connectivity. Despite this considerable body of best practice some schools and teachers still find it difficult to change their existing praxis. This chapter examines ways in which some schools have changed course. In many ways schools are like supertankers: a change of direction requires a considerable amount of forward planning before it takes effect.

KEYWORDS. ICT, curriculum integration, whole-school change, transformation of teaching and learning, interactive whiteboards, continuous professional development, MirandaNet, Bath Spa University College

CHARTING THE COURSE

Initial Definitions

The use of computers within the school curriculum has posed a number of problems. That which I have found most critical is the way in which they are deployed within the school: This determines how computers are used to support student learning. It is easy to construct a curriculum in which the focus is learning about computers, or developing computer skills. Maddux (1991) classifies educational computer applications as being either Type I or Type II: it is as apposite today as it was more than 10 years ago. Type I applications simply reinforce existing teacher-learner paradigms, whereas Type II applications of Information and Communications Technology (ICT) transform teaching and learning. This paper is predicated on the Type II approach.

The case studies that follow are set in the context of the United Kingdom, the government of which has, since 1997, invested considerable resources in educational ICT provision. The majority of schools now have broadband online access; a National Grid for Learning (NGfL) has been established; pupil-computer ratios continue to improve; all teachers have been provided with training (known as the NOF program) to enable them to embed ICT within their teaching; and BECTa, the British Educational Communications and Technology Agency, the UK Government's lead agency for ICT in education (see www.becta.org.uk) and ICT curriculum development, has funded a range of programs and research aimed at developing and supporting teachers' ICT use.

Despite these considerable initiatives and the promotion of e-learning by the DfES (the Department for Education and Skills—the successor to the DfEE in the UK. Either acronym can

appear on publications) the number of schools that have changed their praxis is small. This paper examines some successes, some issues, and some solutions in the voyage to a transformed education system. Changing the course of teachers and schools is in many ways similar to changing the course of a supertanker: It takes a long time before anything appears to happen.

The Affordances of ICT: Toward a Pedagogical Understanding

The concept of affordance was developed by Wersch (1998): The properties of a system that is perceived by the user to allow the performance of certain actions, which in turn encourage specific types of behavior. From this perspective, computers should be seen as a tool, a vehicle for combining motor skills, language, images, and symbolic manipulation through practical activities. These practical activities reflect a series of often complex thought processes. They represent a cultural tool that enables the mediation of thought. The technology enables these processes to be amplified and developed in ways that reflect the integration of technology and the enhancements that ICT, used as a tool, provides. It creates a form of scaffolding in which learners build their knowledge and develop understanding through the creation of links between new concepts and those that already exist. This creates a growing framework of linking concepts.

ICT affordances facilitate enhanced learning opportunities independent of content or preferred teaching styles. For teachers whose approach to teaching and learning is predicated on a behaviorist or an information processing approach, the support provided by ICT, in terms of feedback to the learner, error messages, prompts, templates and wizards, provides a powerful reinforcement of learning. Indeed, these affordances underpin independent learning systems and many managed or virtual learning environments. Teachers whose pedagogy is grounded in constructivism, multiple intelligence theory, or learning styles will utilize the rich learning

experiences provided by diverse materials and collaborative working, where knowledge is inseparable from practice.

Three powerful elements of ICT provide drivers for e-learning. The first is the quality of ostensiveness built into the system: Young children correlate language with concepts by the act of pointing at things. This reinforces the learning. ICT systems utilize this through the use of the mouse, or, on interactive whiteboards, with the stylus or the finger. Visualization, and the ability to move backward and forward through the different stages of a process or a learning object, enables learners to recall the stages of learning. The final, powerful, reinforcement is provided by the ludic elements built into systems: Through games, competitive elements, and constant feedback, learning becomes fun. With constant feedback the learner is able to take greater responsibility for improving her or his work by refining and improving at regular intervals.

The challenge is to incorporate the affordances of ICT within a new pedagogy for e-learning. This will involve new learning on the part of teachers, together with the recognition, on their part, of the dynamic nature of a new pedagogy in which a process of continual change must be accommodated. For learners who are pupils or students, however, the existential reality will be one of living at the cutting edge of technology, where the tools they use and the concepts they forge are an integral part of the learning process.

Teachers' concepts of the learning process inform their pedagogical approach. The ways in which they feel they learned successfully inform the template of their own teaching. The successful implementation of e-learning into our education system will depend, to an extent, on teachers' personal uses of ICT and e-learning, whether for access to resources, continuous professional development, or communities of practice.

ICT applications, therefore, make possible teaching styles and learning outcomes that would not be possible any other way. The urgent task for those involved in Continuous Professional Development and school improvement is to shift teachers' thinking about what ICT can do and what it is for. The Department for Education and Skills has assembled a considerable body of evidence that shows that ICT use can improve both teaching and learning. The challenge for teachers and schools is to apply this to their own situation.

The Impact of ICT on Teaching and Learning: The OFSTED Reports

Analysis of OFSTED reports by BECTa focused on the impact of ICT on pupil attainment. OFSTED is the Office for Standards in Education, the official body that inspects all nurseries, schools, colleges, teacher training providers and local education agencies in England. Reports are published for each inspection. (See: <http://www.ofsted.gov.uk/>). The reports on the schools inspected show a strong correlation between the use of ICT within a primary school and the attainment of its pupils. Schools with better ICT resources enable pupils to achieve better grades for English, mathematics and science. More than half the schools with ICT resources classified as “very good” were achieving above national standards in science; a similar picture can be observed in English and mathematics. The evidence produces a strong argument for the role of ICT in raising standards. The data were weighted to account for socio-economic factors. (BECTa, 2000)

The ImpaCT2 study, commissioned by the Department for Education and Skills to evaluate the progress of the ICT in schools program, showed that ICT is positively associated with improvement in subject-based learning. Further, ICT exerts a positive effect on learning. However, while the study indicates that the majority of pupils have a rich ICT experience at

home, many of them feel that the school ICT curriculum underestimates their capability, and that much teaching focuses on skills that they already possess.

The U.K. government has collected a large body of evidence that shows teachers and schools the most effective uses for the ICT infrastructure that it has funded. It has also commissioned studies that show the ways in which the technologies can be implemented.

TRANSFORMING TEACHING AND LEARNING

A number of DfES-supported initiatives have enabled lead schools to implement technologies that have changed the ways in which teachers teach and students learn. More importantly, these changes have impacted on the ways in which the school is organized.

Digital Video

During the school year 2001-2 some 50 schools across the United Kingdom were supported by BECTa as they participated in a pilot to investigate the use of digital video in the curriculum, the aim of which was to gather evidence on the impact of the technology on attainment, engagement, and behavior. A further aim was to identify models of effective practice and disseminate these across schools.

The study showed that pupil engagement with the curriculum was increased, the range of learning styles employed by pupils (and their teachers) was developed, and that all of the pupils were motivated and engaged. This was in contrast to traditional teaching methods: in other words, all of the pupils accessed the curriculum when they were engaged in this project. Teachers who participated found that the use of digital video technology, and the associated ICT, enabled pupils to use and extend other skills: problem solving, negotiating, reasoning, risk-taking, team working, and, most importantly, critical thinking.

Interactive Whiteboards

The use of Interactive Whiteboards (IWB) has had a profound effect on schools, teachers, and learners. A considerable body of evidence from schools across the United Kingdom has shown the transformational effect of the technology on teaching and learning (Cuthell, 2002, 2003, 2004). What the boards enable teachers to do is to support the whole range of learning styles of the learners in the class. The learners themselves feel empowered: The ability to visualize and recall the lesson supports learning; the range of resources that can be embedded within the IWB lesson software, and the interactivity itself has engaged almost all of the learners and enhanced their progress.

The significant effect of the boards, however, is seen when the structure of the lessons themselves is examined. Traditional teacher discourse modes have been modified: The role of the teacher is no longer to expound and the learner to listen. The interactivity of the boards has made the role of the teacher more interactive. The learners themselves see themselves as engaged with the process of learning, rather than simply progressing through the scheme of work.

Freedom from Cabling

The impact of wireless technology has also had a significant effect in some schools, although technical issues still inhibit full-scale implementation. The ability to use WiFi laptops and hand-helds in any classroom is important: It's easier to move the computer to the child than the child to the computer. Any area in the school can be used by students to access the school network. This is particularly important in small primary schools. Students can work individually in new learning spaces: corridors, common rooms, the school grounds, sports fields. "Any space is a learning space," says Alan Stevens, associate principal, Sawtry Community College, Cambridgeshire (Stevens, 2000).

Transforming the Classroom

“It is not just about learning at a computer: it is about learning informally by being together,” according to Sheila Perry, head teacher, Ladybrook Primary School, Stockport (Perry, 2000). The school is organized around a learning center: This reinforces the illocutionary message that researching is central to all learning, and that using ICT, integrated within all subjects, is another tool for teaching and learning. As a further example, integrating Web sites with school residential extends the learning, both before pupils leave for the residential, and as a means of sharing the experience with their families and the rest of the school. In the view of the head teacher, ICT has empowered both teacher and learner, and unleashed their creativity.

Extending the Classroom

Managed learning environments (MLEs) introduce new possibilities and continuities. One student, who had to take time out from his A-level course and travel to Australia, was able to remain part of his class, continue with assignments, and contribute to discussions and debates. When he returned from Australia he had kept pace with his peers (DfES, 2003).

Lessons in modern foreign languages – French, German, and Spanish—are introduced through e-learning for children from nursery years to age 11. The project in Merseyside links 90 schools through e-learning, e-mail links and video-conferencing with bilingual schools in France, Germany, and Spain (DfES, 2003).

Notschool.net is a project set up by a team led by Stephen Heppell at Ultralab Anglia Polytechnic University, for young people who have become disconnected from schools and conventional learning (see Ultralab: <http://194.83.41.152/flash/default.html>). The online learning environment, based on Oracle’s Think.com, allows the “researchers” (rather than

“pupils” or “students) to take control of their own learning with the support of online mentors and targeted content (see Notschool: <http://www.notschool.net/>).

Lessons for Schools

Evidence from all of these initiatives shows that ICT, used in innovative ways, does effect significant change in the learning process. Beacon schools can demonstrate good practice. The question then is: How does a school change? And then one asks, How long does it take to implement the change? The input of new ideas and practices, dissemination among colleagues, and application to the curriculum demand time and space for reflection and reflective practice. So the question is, How can a school involve the maximum number of staff in meaningful in-service education training (INSET) and change school praxis? Traditional options for staff in-service training are external one-day courses, twilight sessions (either in-house or external) or whole-school training days.

The cost of sending staff on one-day courses is high: you have to factor in a day’s supply cover, transport, the cost of the course itself, and the cost of the extra work that the teacher has to provide for the day’s classes. It is often difficult for teachers to map what they have learned from a course to the context of their classroom. A survey of teachers conducted by the MirandaNet Fellowship on the effectiveness of ICT training concluded that one-day training sessions did not work—they proved to be the least effective vehicle for change. (MirandaNet-www.mirandanet.ac.uk-is based at the Institute of Education, University of London. The MirandaNet Fellowship, which was founded in 1992, strives to span national, cultural, commercial and political divides to provide an innovative and inclusive forum for professionals.)

Twilight sessions offer an alternative: Teams of staff can be involved; the work can be focused on specific aspects of the curriculum and school. Training at the end of the day,

however, is less effective than at the beginning. Staff are tired, are often deflected by issues that have arisen during the day and which need to be resolved: The conditioning context of the school itself often inhibits successful learning (Cuthell, 2003b). The transfer of work done during the twilight session into the daily lesson routine remains, at best, problematic.

Whole-day whole-school INSET on training days can be an effective way to achieve organizational change, but all too often the program is finalized at the beginning of the school year to accommodate government directives, syllabus changes, and the latest initiative. If there is any free time during the day, the imperative is always to utilise it on urgent administrative tasks.

A further solution is a staff residential at a hotel and conference center, from late Friday afternoon to late Saturday afternoon. When staff receive an invitation to attend, and accommodations and meals are paid for from the staff development fund, the perception of teachers is that they are being given something by the school. The focus of the weekend can be on improving teaching and learning, rooted in the specific context of the school and the application of information and communication technologies. Since the sessions are organized on a collegiate basis they are characterized by a high level of enthusiasm—and fun.

This was the context for Castle View School, Sunderland, in the north east of England. The school has a teaching and learning group concerned with improving attainment and learning through innovative teaching methods, all of which involve ICT. This group work in a number of ways: conventional meetings, twilight sessions, and weekend residential. At one such residential, the question arose as to ways in which the work that they were doing in changing the curriculum could be recognized or rewarded. Two members of staff were engaged in action research projects (funded by Promethean, Ltd.) that investigated innovative ways in which interactive whiteboards could be used. Two other members of staff were participating in a course

for e-facilitation. Other staff were investigating the uses of concept-mapping software in the curriculum.

The Way Forward

There was considerable impetus among a significant number of staff for innovative uses of ICT that changed the learning experiences for the young people in the school. The critical support for this process was the ongoing whole-school development in teaching and learning strategies, underpinned by the investigation of learning styles and the investigation of teaching strategies. The challenge was to embed this approach within all of the curriculum and support teams and involve all of the staff. The issue, therefore, was one of student entitlement to an innovative and challenging education. Teachers were already using video cameras to record a colleague's lessons as a focus for analysis of teaching styles, and this was extended to focus on the ways in which both teaching and learning utilized ICT. This reflective practice enabled teachers to identify further opportunities to embed ICT into their classroom practice to support learning.

A range of software tools was used to further the transformation of learning for the students. With interactive whiteboards the focus of the classroom, teachers used concept maps and presentation software with the students to provide them with opportunities to construct knowledge in novel ways. Students worked in small collaborative groups: They worked on "what if?" scenarios, mysteries and critical thinking exercises and then presented their work to other groups (and other classes) on the IWBs and across the network. The students themselves were also involved in evaluating the teaching and learning project. They gave regular feedback on its effectiveness, and the ways in which it had enhanced their learning. While one would not expect every student to express whole-hearted enthusiasm, what was significant was the relatively few

young people who saw education as being something that was “done to them”, rather than something in which they were active (and almost equal) participants.

Scholarship Programs

What was needed was an accreditation framework that acknowledged the innovative work being undertaken by the staff: an academic wrapper that could be used for continuous professional development. I had contacts with Bath Spa University College. They were developing a framework for master’s-level accreditation for a 60-credit Work-Based Action Enquiry module. This module, funded by the Teacher Training Agency, constitutes one third of the requirements for a Master of Arts or Master of Teaching degree. This appeared to be an ideal solution for teachers at the school. They would receive accreditation for work that they were already doing; everything was rooted in the school context; there was no cost involved for the teachers or the school. This blended learning program, with regular workshops, online resources, and forums and online research, now provides another strand to the development of school policy. For the teachers it provides validation for what she or he is doing. For the school it aids recruitment and retention.

The action research projects currently underway range from the development of emotional intelligence for underachievers in mathematics, through alternative strategies for assessment in history, to the use of electronic voting systems to facilitate instant feedback for students in multiple-choice tests. Much of the work is integrated with the development of resources and strategies for the school’s Promethean ACTIVboards. The school is linked with schools in Prague, in the Czech Republic: The Citizenship co-ordinator is using a Web-based environment called World Ecitizens (<http://www.worldcitizens.net>) to develop concepts of European citizenship by and for the young people themselves.

The online activities that form part of the teachers' program should contribute to their understanding of the issues involved with using ICT for learning, and should therefore embed them in their own professional practice. David Litchfield, Castle View head teacher, has a vision of his school as a learning community. Already one third of his staff are engaged with the process of professional development and reflective practice. This represents a critical mass of teachers: If another third of the staff participate next year the transformation will have been achieved. Teachers' expectations will then be that CPD and action research is an integral part of teacher professionalism.

At the beginning of the school year teachers were engaged in a number of initiatives grounded in innovative ICT uses: General Teaching Council Scholarships, Promethean/MirandaNet Action Research Scholarships to explore innovative uses of interactive whiteboards, and MirandaNorth Fellowships to test ways in which laptop computers could motivate underachieving students. The activities tended to be regarded as individual: At best they fed back into departmental policy. With the implementation of the work-based action enquiry projects all of the teachers involved see themselves as working together—to achieve the qualification, and to contribute to school improvement. The creativity and collaboration of the staff have already had an impact on the curriculum.

As more and more hands take to the helm the school, like a supertanker, will change its course. It will become a 21st century school for 21st century teaching and learning, rather than a 19th century school in a 20th century building with 21st century kids.

REFERENCES

- BECTa (2000) *A preliminary report for the DfEE on the relationship between ICT and primary school standards*. British Educational Communications and Technology Agency
Coventry, England.
- Cuthell, J. P. (2004). *Interactive whiteboards survey*. Retrieved February 24, 2004, from http://www.virtuallearning.org.uk/2003research/whiteboards_survey.doc
- Cuthell, J. P. (2003a). *New tools, new pedagogies, new learning?* Retrieved February 24, 2004, from <http://www.virtuallearning.org.uk/iwb/index.html>
- Cuthell, J (2003b). *Next steps for ICT teacher education: ICT for active learning*. In Price, J., Willis, D., Davis, N., & Willis, J. (Eds.), *Proceedings of SITE 2003* (pp. 2740-2744). Norfolk, VA: Association for the Advancement of Computing in Education
- Cuthell, J. P. (2003c). *Virtual Learning* In J. Kirjonen (Ed.). *Knowledge work and occupational competence, (pp.23-37)* Jyvaskyla, Finland: Institute for Educational Research.
- Cuthell, J. P. (2002). *How do interactive whiteboards enhance learning?* Retrieved February 24, 2004, from http://www.virtuallearning.org.uk/iwb/Learning_theories.pdf
- British Educational Communications and Technology Agency (2002). *ImpaCT2 The impact of information and communication technologies on pupil learning and attainment*.
Coventry, England.
- Maddux, C. (1991, October). Integration versus computer labs: An either/ or proposition? *Educational Technology, 31* (pp. 36-43).
- Perry, S. (2000). In: *Towards the classroom of the future*. (p.14) London: Department for Education and Skills.

Stevens, A. (2002). In: *Wireless networking in schools*. (p.17) London: Department for Education and Skills.

Department for Education and Skills (2003). *Towards a unified e-learning strategy*. London.

Wertsch, J. V. (1998). *Mind as action*. Oxford: Oxford University Press.