

# The Changing Culture of Teaching and Learning<sup>1</sup>

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**T**his chapter is a personal view of the proposition that education technology (the application of information and communication technology (ICT) in the Northern Ireland education service) is already changing the nature of teaching and learning, and, over the next 20 years, has the potential to transform schools themselves.

By 2020, what will our schools look like? Will they provide a curriculum that is considerably more flexible and broadly based than the Northern Ireland Curriculum of the previous century? Will learning for each pupil be genuinely personalized? Will timetables be individualized, flexible for those who are self-sustaining learners, tightly managed for those who have not yet developed independence? Will there be a range of 'para-educators' working alongside teachers, the roles of all becoming more diversified, as learners demand more of them? Will learning be guided by individual feedback, some of which comes from tutors who do not even live in Northern Ireland, never mind work in the same school, and some from computer-based testing? Will each student 'sit' their public examinations, on-line, just when they are ready to take them? Will learning extend well beyond the traditional school day? Will the participants in the same lesson be in different places, as likely to work from home or the local library, as in schools? Will email and video-conferencing be forms of interactions that are as common as face-to-face teaching? Will professional support for teachers be delivered in a similar way, by video conferencing? Will study be spread over a four or five term year? Will expensive school buildings be used day, evening and weekend, by a range of community and social groups for educational activities, using modified classrooms containing expensive specialist resources, as bookable spaces for individuals and groups? Such scenarios are proposed by West-Burnham and Bowring-Carr (1997 and 2000).

## *E-Learning*

The belief that technology has the power to transform, ranges from the vision of Richard Fothergill, director of the Microelectronics Education Programme (set up 20 years ago, to develop the use of computers in British schools) where the aim was:

To help schools to prepare children for life in a society in which devices and systems based on microelectronics are commonplace and pervasive. (Fothergill and Anderson, 1981)

to the blunt assessment by John Gardner, awarded a chair in education at Queen's University, Belfast in 1995 that: "... the future has been a disappointment".

Since 1975, when Methodist College, Belfast became the first of a small number of schools in the UK to use the computer to assist in the management of learning in a sixth form science course, ICT has looked set to enrich learning, but has not delivered on its promise.

In this millennium, unbridled change has been brought about by the mass home ownership of multi-media computers with Internet access, 'pervasive computing' in the shape of web-enabled, mobile phones, and by the liberalization of telecommunications policies and tariffs. According to Forrester Research, on-line access will be available to one-sixth of the world's population by 2005. Change has been evident in the worlds of telecommunications, business, trade, entertainment and leisure, and in the professions: finance, medicine, the law and, perhaps finally, in education.

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<sup>1</sup> In Gardner, J. and Leitch, R. (Eds) (2000) *Education 2020: A Millennium Vision: Issues and Ideas for the Future of Education in Northern Ireland*, pp159-168, Belfast: Blackstaff Press

That ICT can change learning, is no longer a question. For teachers and learners who have Internet access at home, and for the minority who use computers regularly at school, it has done so in a number of ways.

As Bill Gates (1999), writing about the business world, puts it:

The successful companies of the next decade will be the ones that use digital technology to reinvent the way they work. These companies will make decisions quickly, act efficiently, and directly touch their customers in positive ways.

Gates believes that if companies do not reinvent themselves as e-businesses, they will go out of business. Will this happen to schools? What is the nature of e-learning and if schools do not promote e-learning, what is their equivalent of going out of business?

The European Commission recognizes the challenge in its 'e-Europe' policy, which contains a major 'e-learning' component (EU 2000). Commissioner Vivienne Reding, launching 'e-learning' in February 2000, described the central role of the education service in each European country in responding to the threats and opportunities posed by the globalization of world markets. Governments need their education services to nurture independent learners, with a capability for life-long learning; who are able to work, both independently and collaboratively, in the information economy of the 21<sup>st</sup> century. She identified the northern European countries as those that are making the most effective response. The British government has made an unparalleled investment – some £2 billion across the UK in three years - through the National Grid for Learning, the New Opportunities Fund for teacher education in ICT and, in Northern Ireland, through the Education Technology Strategy(1997).

#### *Automate or informate?*

How ICT impinges upon, supports, and modifies the learning processes central to every subject, was mapped with commendable clarity in a report produced in 1989 by a Ministerial Working Party on Cross-Curriculum Information Technology (IT). The working party was chaired by Tom McMullan, Director of Classroom 2000, who (at the time of writing), is procuring the managed ICT service infrastructure required by schools to address the two remaining obstacles to the widespread adoption of ICT; namely, teacher competence and pupil access to the technology.

Of course, we might well ask, where, and to what extent, has learning been transformed in schools since IT became a statutory educational theme ten years ago? Alan November cites Professor Zuboff<sup>(1998)</sup>, who describes the two main ways in which ICT brings about change in any organization: by *automating* existing practices without necessarily adding value; or by *informating* and transforming them, thus enabling new ways of accessing information and creating new practices.

In school administration and management, Northern Ireland has, since 1991, implemented a uniquely comprehensive suite of computer-based school administration software in nearly 1000 schools. Inspectorate surveys of the implementation in secondary schools in 1996, and in primary schools in 1999, reached similar conclusions. In the vast majority of schools, principals had, in Zuboff's terms, used the software successfully to *automate* school administration. Only a minority had *informed*, or transformed, their decision-making by using the value-added analyses, which the software provides, to inform value-for-money judgements about the effectiveness of curriculum planning, of the quality of teaching, and of school management.

As far as teaching and learning is concerned, published inspection reports from the Education and Training Inspectorate lead us to conclude that for some pupils, with some teachers, in some classes, in some schools, some enrichment has been taking place, but only exceptionally has transformation been evident:

In some 47% of schools, the provision in ICT was judged to be entirely satisfactory or better. In over 50% of schools, however, there were weaknesses or significant weaknesses. The main weaknesses...where provision for ICT was poor (included) the fragmented and patchy nature of the work in ICT; little evidence of progression over the 7 years of primary education; (and) the narrowness of the children's experiences in ICT, often limited to word processing for presentation purposes, and the use of games.

Many Northern Ireland teachers, who use ICT, are enthusiastic about the improved motivation, attention to task, perseverance, effective group work, and learning which their pupils experience in computer-enabled classrooms. Those who document the improvements are, however, the rare exceptions.

To see what e-learning really looks like for school-age pupils, it is necessary to look at what is happening at home, in cyber-cafes, in public libraries and in community centres. ICT-enabled young people go directly to the Internet and CD-ROM reference resources to find information, to get explanations and advice, and to learn. They use distance-teaching and self-assessment materials, to glean ideas for essays, or to understand better a difficult topic. They contact specialist, professional organizations and individuals, and even the authors of their set texts, directly by email. Depending on the subject, they can submit their work on-line and get critical advice from other students and teachers. At present, American colleges more often publish on-line curriculum, for example the Virtual High School in Orange County, Florida, has published 57 on-line school courses, but in a few years time the whole curriculum for British schools will be on-line. In the UK, a number of web sites provide contact with teachers who help with homework on-line, for example:

- [www.bbc.co.uk/education/revise](http://www.bbc.co.uk/education/revise);
- [www.homeworkhigh.com](http://www.homeworkhigh.com);
- [www.digitalbrain.co.uk](http://www.digitalbrain.co.uk);
- [www.learnfree.co.uk](http://www.learnfree.co.uk);
- [www.gcse.com](http://www.gcse.com);
- [www.revise.it](http://www.revise.it).

The Minister for Culture, Media and Sport has claimed that, in 1999, 70% of all GCSE candidates used the BBC's on-line *GCSE Bytesize* service, which comprises teaching modules, self-assessment tests and access to teachers for advice:

Those that did use the service appeared to improve their exam results on average by something like one point on their grades over and above what they would otherwise have achieved.

In the first operational month of Channel Four's on-line homework advice service, Homework High, the 97 teachers who provide on-line advice had answered over 6,000 questions posed by over 17,000 pupil visitors a week. Pupils are using the technology to *disintermediate*, that is to sidestep school and curricular controls on their access to information. In Alan November's terms (November 1998), they are 'growing up digital' and many teachers are not aware.

### *Evidence of change?*

In the context described, the planning and preparation of teaching needs to change. The potential for learning is diminished if teaching does not take account of the use of education technology by the *digital learners* in the class. Home-based e-learning needs to take place in step with school-based teaching. If a teacher complains that pupils have done their homework by 'simply' copying text and images from a CD-ROM, or from the Internet, then the task set may not have been appropriate. The teacher may have missed the opportunity to design a more challenging and worthwhile task, which would anticipate and takes advantage of the ready access to digital information by the majority of the pupils. It will also be essential to consider how to support those who are disadvantaged by their lack of Internet access at home. Furthermore, the teacher's assessment of the work needs to take into account the technological and information competence demonstrated, or must avoid being unduly inflated by the surface slickness of a word-processed essay or multimedia presentation. Finally, if the learners' information skills themselves are poor, there should be explicit planning to raise the standard of their information literacy.

In some cases, inspection and project reports do provide glimpses of transformational change and I recount some of these below.

- An English teacher, realizing that only a third of her class have access to the Internet at home, arranges the pupils carefully into groups of three. She asks each group to use the

Internet, for homework, to research the set play, each from a different perspective: the life and times of the playwright; the historical background to the main characters; reviews of the various films made of the play; costume design for stage productions; actresses who played the lead; and so on, and then report their findings to the whole class.

- ⊙ A home economics teacher in a non-selective secondary school finds that the project work on packaging of food products carried out by first year pupils reaches GCSE standards when they organized themselves in groups to carry out research in each other's homes. The pupils used the Internet to search for food packaging companies and evaluate their products. The collectively applied computer-aided design and paint tools for the packaging designs, and created web-based and multi-media presentations for the advertising and marketing aspects of the brief.
- ⊙ An art and design teacher in a grammar school teaches his pupils to use the Internet for extensive research into companies engaged in the design of men's couture. The influence of the research raises their GCSE project work to 'A' level standard, and the 'A' level work to that of a good commercial quality.
- ⊙ A geography class, studying land zoning on the Internet gets caught up in, and makes well-informed contributions to a real debate in the community about the siting of a toxic waste dump.
- ⊙ In a science class, each group of pupils uses computer data-logging with temperature sensors to test the effectiveness of different insulators. The teacher realizes, after the experiment has started, that they do not need to wait until each group has copied the results to make comparisons, and allows the groups to move around the classroom comparing the different dynamic temperature graphs.
- ⊙ In an all-girls' school, a political studies class emails the leaders of all the local political parties with questions on the current political agreement. All but one leader replies in person giving detailed answers. When the girls email the local councillor from the one party that did not respond, to point out the discrepancy, a detailed response arrives at once by email.

Given the potentials of multimedia, pupils, working both individually and collaboratively, can engage in a *constructivist* approach to learning. They can improve their knowledge and understanding of a topic, developing the skills of teamwork. They can develop their ability to communicate with an audience, by constructing professional presentations, which combine graphics, text, animation, video and sound, and thus demonstrate to others and make explicit for themselves their newly acquired knowledge.

### *Information Literacy*

There are sufficient examples of good practice in our schools to be clear that the potential is not specific to any one subject, but lies across the curriculum, with *information literacy* at its heart. Yet, it is evident that standards in information literacy in our schools are low:

The main weaknesses in provision were not subject specific, but rather were evident across the curriculum, in the quality of teaching and in the pupils' learning in such areas as their interpretation and use of information, and their ability to explain their understanding of what they were learning. Even in the final sample of inspections...weaknesses outweigh strengths in the use of information and community technology (ICT) in almost half of the schools. (DE 2000a)

In most schools, the educational themes, notably ICT, were under-emphasized in teaching and learning within and across the subjects (DE 2000b).

What exactly is information literacy, and how can it be improved? There are many definitions. Michael Marland (1981) described the nine stages of effective *information handling*, which starts with the learner deciding what the subject matter is, refining the question to be asked, selecting appropriate sources and resources, being selective about the information found, and ending with an evaluation of whether the information selected answers or modifies the question originally asked.

More radically, Myron Truman (1992) believes that computers do not merely *subvert* and *exhaust* the *literacy of print*, but that *online literacy* is nothing less than a redefinition of literacy itself (and, of course, numeracy as well)

...technology generally affects... our most basic understanding of what it means to be literate or to be educated, even to think. It is a new way of shaping that most compelling image of who we want to be.

For Peter Scrimshaw (1997) *network literacy* is

the capacity to use electronic networks to access resources, to create resources and to communicate with others.

For Alan November, in his *Teaching Zack to Think* ([www.anovember.com](http://www.anovember.com)), information literacy is not just about how we communicate, but is also about how we relate to each other. He insists that it is about a major shift of control in access to information. We should go further, he believes, define information literacy as a basic skill, and teach children the *grammar of the Internet*: how information is constructed on-line; how to check the sources, and how to validate and value what they find.

In summary, information literacy is the learner's skilful ability to validate and interpret selectively information from digital sources, relating it, with discrimination, to what is already known, transforming it into enhanced further knowledge, and improved understanding. Some learners can do this for themselves, are perfectly capable of *disintermediation*, but many need to be taught the skills. They need the teacher to plan and structure digital learning activities that engage them purposefully. This step would take us out of the classroom and into the virtual library, with inevitable consequences for the culture and place, the rhythm and pace of the traditional classroom lesson.

#### 2020 vision

I believe that we do have the necessary vision, we can see where ICT works in practice; but do we have the technology? Classroom 2000 will provide a comprehensive managed service for ICT for 1224 primary, secondary and special schools, which will include the infrastructure needed by every teacher to develop their competence in using the technology for teaching and learning. £10 million has already been spent between 1998 and 2000 to prepare the ground, through the 'Connecting Teachers' initiative. The initiative provided preparatory training for a cohort of teachers in each school, as well as 6,000 laptops, to allow the first third of the 20,000 full-time teachers to get started. The projected investment of some £350 million over the next 10 years will provide the foundation for transformed Ulster schools. It will change both classroom practice and professional development for teachers. It will allow the best management practices, derived from the computerization of school administration and management, to spread throughout all schools.

One of the most significant design features of Classroom 2000 will be access, from home to the school network, by teachers, pupils and parents. This double-edged sword has the potential to deepen parental involvement in learning, to the benefit the learners' achievement. Many schools already strive to improve relationships with parents through their home-school links policy. Improved access can also address an insistent, and growing, demand for accountability in education. In the USA, some 300,000 parents in 600 schools already subscribe to Internet services (e.g. [www.thinkwave.com](http://www.thinkwave.com) and [www.homeworknow.com](http://www.homeworknow.com)) where both parents and children can see information on their children's programmes of work and progress at any time, receive individualized reports on homework, coursework and tests, and keep track of attendance. Parents can contact and get advice from teachers by email: 90% of the American teachers involved say that this level of communication improves grade scores.

Northern Ireland generally, and especially its economy, stands to benefit considerably from this investment in the education service. The Province could become a world reference site for a workable business model for public/private partnerships in ICT managed services, if it were able to demonstrate the development of the following essentials:

- ⊙ high standards in information literacy;

- ⊙ a safe on-line learning environment, accessible from anywhere, and at low cost at the point of use;
- ⊙ an environment to support learning, which is not only highly individualized, but is also collaborative;
- ⊙ on-line collegial communities of teachers, capable of mentoring and supporting each other through career-long professional development;
- ⊙ strong, interactive, home-school links;
- ⊙ empowerment of educational communities to publish their own resources, designed according to open and distance learning principles;
- ⊙ a thriving market-place of on-line educational content, including diagnostic assessment and high-stakes examination services.

Education technology is already bringing cultural transformation to learning in Northern Ireland. Over the next 20 years will schools become *e-schools*, or go 'out of business'? Given that the best way to control the future is to invent it, the answer is up to Northern Ireland's teachers and schools. Our children, however, are not waiting for their answer, they are *growing up digital* and are inventing their own future.