

riences based on their background, individual talents, age level, cognitive style, interpersonal preferences and so-on.

As Papert puts it: "What I see as the real contribution of digital media to education is a flexibility that could allow every individual to discover their own personal paths to learning. This will make it possible for the dream of every progressive educator to come true: In the learning environment of the future, every learner will be 'special.'"¹⁰

The new university is a global institution reaching out to alumni and new students around the world to deliver network-based learning.

Peter Drucker's prediction need not come true for institutions that find within themselves leadership and the capacity to learn as an organization about what can be. Probably one of the most important things educators can do is listen to the students.

Endnotes

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by Deryn M. Watson

THE REALITY BEHIND THE RHETORIC OF INFORMATION TECHNOLOGY POLICY FOR SCHOOLS

Malgré toute la publicité et tous les investissements consacrés aux technologies de l'information, les recherches indiquent que leur impact sur l'enseignement, au Royaume-Uni et ailleurs, ont été décevants. Le problème tient essentiellement au caractère dichotomique des objectifs. Les TI sont-elles une discipline distincte qui possède sa propre base de connaissances et de compétences, ou sont-elles simplement un outil qui sert principalement à acquérir des connaissances dans d'autres domaines ? Selon l'auteur, l'échec des tentatives en vue d'implanter ces technologies tient à un ensemble de postulats culturels et économiques.

Over the last 20 years there has been a concerted effort to promote the use of Information Technology (IT) in UK schools. Alongside other nations, there have been substantial central government initiatives to put computers into schools; major reports have extolled the virtues of using IT in classrooms. From Computer Assisted Learning (CAL) of the early 1980s, to open learning through the use of telecommunications and the Web in the late 1990s, the rhetoric is the same. Information technology is equated with the modern world, economic success and the future. Schools must

embrace the technology.

The official perspective on the last 20 years is one of success. A biennial series of UK statistical bulletins shows that the number of computers in schools and the number of teachers who report using them has increased regularly since 1987. Ministers refer to "moving schools into an Information Age." One even stated:

*We are world leaders in IT at schools, recognising its vital importance to the future of all pupils. The figures show clearly the advances we have made in the field. It is an investment, not only in our children and their lives in the 21st century, but in our country's future as well.*¹

Nevertheless research reports that the impact of IT on schools, both in the UK² and elsewhere,³ is "a resolutely disappointing one."⁴ There is relatively little work attempting to understand this situation. Most focus on the apparent reluctance of teachers to use IT in their classrooms, relating this to a deficit model of teachers who are characterized as technophobic, or too traditional in their teaching style, or reluctant to adopt change.

An alternative analysis of this reluctance, which I propose here, is that despite the hype and massive injection of funds, this policy has been characterized by a lack of clarity of objectives. The overriding problem is a dichotomy of purpose. Is IT a subject in its own right, with a knowledge and skill base; or is IT a tool to be used mainly for the learning of other subjects? In this article I will argue that this confusion of purpose, compounded by the inevitable practical and technical difficulties of implementing a flawed policy in schools, needs to be more generally understood, and I will suggest that the failure of this innovation is rooted in a background of cultural and economic assumptions.

A dichotomy of purpose

Most recognize a distinct difference between teaching people with computers and teaching people about computers. But this distinction has become increasingly blurred until the role of the computer as a learning resource has become subsumed by a notion of Information Technology skills and competencies. Today, computers are used in secondary schools mainly for classes doing information skills courses, such as word processing. The relationship between these classes and the use of the computer to assist the learning of subjects, such as biology or geography, around which secondary schooling is based, is tenuous. It is as if pupils are taught about the functionality of the component parts of a car, such as steering wheels, gears and brakes, but never actually take a vehicle onto the road for the purpose of travelling from A to B. How has this come about?

The blurring of the distinction between learning about (vocational) and learning with (pedagogic) has been reflected in three policy documents that lie at the core of current national perspectives of IT that now influence schools. The first policy articulation came in one of the national Curriculum Matters series (1989).⁵

This set out "to help schools devise a coherent strategy for making effective use of IT, both in the enrichment of existing subjects and in learning about the technology itself." But the pedagogic emphasis came first, as "through the use of IT in the curriculum, schools will also be helping pupils become knowledgeable about the nature of information, comfortable with the new technology and able to exploit its potential."

Although IT was to be delivered through subjects, both pedagogic and vocational purposes are reflected in the detailed aims; thus using IT is both "to enrich and extend learning throughout the curriculum," and "to help young people acquire confidence and pleasure using IT and become familiar with some everyday applications."

This dichotomy of purpose continues in the first National Curriculum document⁶; teachers are exhorted to use the computer in both roles, but one message, that of IT skills, appears to be more important than the other, that of curriculum use. Indeed, not only are the vocational aspects dominant, they are also increasingly technocentric. For while pupils "should be able to use Information Technology to communicate and handle information; design, develop, explore and evaluate models of real or imaginary situations; measure and control physical variables and movement;" they should also "develop confidence and satisfaction in the use of information technology; develop the flexibility needed to take advantage of future developments in information technology." It is less easy to relate these last capabilities to a subject-centred curriculum.

By 1995 it was apparent that the attempt to maintain the dual role of IT as a tool to deliver the curriculum and as a subject with a skills basis in its own right was under substantial strain. In the Dearing National Curriculum review, IT capability is characterized by an ability to use IT tools and information sources to analyse, process and present information, and to model, measure and control external events. It is only necessary "to give pupils opportunities, *where appropriate*, to develop and apply their IT capability in their study of National Curriculum subjects."

So the role of a tool to support subject-based learning has been reduced to a mere recommendation. The pedagogic notion of CAL has been made more diffuse by the increasingly vocational notion of separate IT skills.

Reconciling the conflict

IT co-ordinators have been appointed in secondary schools to implement national IT policy. This includes not just tackling hardware and software resourcing, network maintenance and management, and staff in-service education and training, but also reconciling the different perceptions of how, where and why IT should be used. Nor have they been starting with a level playing field. Some schools have been active in IT for many years, resulting in local patterns of use and resourcing highly dependent upon the interests and enthusiasms

of particular staff. Because of the dictates of the National Curriculum, it is inevitable that an overriding priority is to ensure that pupils are given opportunities to develop IT skills progressively as they move through the school. But two issues follow: who is to provide the teaching for these IT skills and where will it happen?

A common strategy has been the development of the IT skills courses, which focusses attention and resources on the vocational rationale. But Inspectors have reported a frequent mismatch between a school's intentions behind an IT policy and their operation in practice. Pupils are often practising low level skills, and there are often insufficient opportunities to apply the IT skills, learnt in separate IT classes, to work in other subjects. As Ragsdale has noted,⁷ knowledge of IT skills do not mean these skills are always applied. Indeed, acquiring IT tool skills may be relatively easy but gaining wisdom to use them effectively is not.

Pupils are hampered from gaining such wisdom because they are learning these skills in isolation. It is sad to see pupils use a spreadsheet without a genuine need to explore and model a relationship in the data they are manipulating. They need to learn IT skills with a real task in mind, and practice them regularly so that they become familiar and taken-for-granted skills to exercise and tools to use. This suggests that they should use these skills regularly in the normal subject-based classroom.

So the alternative is for different subject departments to deliver the component parts of the IT curriculum. A familiar pattern is for history or geography to take on databases, English for wordprocessing, and science or mathematics for modelling. This apparently logical approach has hit a number of snags. First, while subject departments may indicate a theoretical willingness, in reality they find their existing timetable is already squashed with competing curriculum demands. Second, a number of staff have been reluctant IT users themselves, and have balked at taking on an IT teaching load. Even for confident IT users there have been problems. Where geography teachers may chose to use a data base to encourage pupils to pose and test hypotheses about a topic, *e.g.*, population growth, at the same time they are now being asked to teach about data retrieval and ensure that a specific and measurable IT capability is delivered. This adds complexity and potential conflict of purpose in what is otherwise a clearly geographically focussed agenda. There is little doubt that this approach is also failing.

Location and access

Today most schools have a couple of computer rooms, with other clusters of machines in some subject specialist areas. For many years the type and configuration of hardware has dominated debate on resourcing. But talk of MSDOS, speed of processing, multimedia and now Internet access has made IT in schools synonymous with technical matters, and with the associated power base for those "in the know" and who

"understand these things." This has been both overtly and covertly damaging. Decisions about purchase and computer room layout are frequently made on the basis of technical specification rather than educational purpose. Not many teachers like facing classes where all pupils have their backs to them, sitting at machines located around the walls "because of the wiring." This compounds a sense of alienation, not being part of the inner circle of those who know about and can use "the machines." This phobia, which teachers do not display in other fields where machines are involved, has developed into a subtle myth. Many teachers own and use computers for their own administrative work, but never use them in their classrooms.

The nub of the matter is of course that they are not using them in their classrooms — they are having to book a timetabled fixed resource and move the class there for a limited time. It is ironic that limited time may be available for the very open-ended exploratory work that IT can facilitate, but which demands flexibility. It is not the resource itself, but the restricted access to it, that causes the problem. And the amount of time available for subject teachers to book the rooms have been severely limited by the blocks of IT skills classes.

Schools do not have nearly enough hardware to allow them to plan sensibly for coherent progression in IT skills used appropriately within curriculum settings. Learning with computers has severely declined in this climate. In essence, schools are attempting to implement IT policies that cannot be realistically delivered. Until there is a ratio of 1.25 machines to every pupil, and every teacher has a personal computer on their own desk, it is unrealistic for schools to be asked to deliver a balanced IT curriculum. It is certainly impossible to do justice to the very real and important conceptual issues about the nature of information and communication handling, and their role in society.

The subject teacher's perspective

In reality, not many teachers are actually using computers with their classes. And computers are not contributing substantially to the learning of pupils. The 1989 survey of IT use in schools showed that although half the teachers in secondary schools had been on initial awareness training, less than 25 percent reported to have made much use of computers, except for in computer and business studies classes, and on average less than 10 percent reported that IT made a substantial contribution to teaching and learning. The 1997 statistical bulletin still shows less than 10 percent of teachers reported IT making a substantial contribution to teaching and learning; little change in eight years. The McKinsey report⁸ also makes this stagnation perfectly clear.

The rhetoric to introduce Information Technology in schools has all the hallmarks of an imposed, mechanistic, top-down model of change, with a particular focus on the nature of technology within a wider

national economic agenda. Many teachers have responded by articulating a number of barriers to using computers, including the confusion of purpose and problems of implementation, which inhibit adoption. The technocentricity of the innovation, in isolation from the curriculum focus, disturbs them. In effect they have recognized and rejected the dichotomy of purpose.

Research evidence from classrooms in Canada, England, the Netherlands and Spain suggests that the few teachers who do use computers in their classrooms tend to be those who can clearly relate the use of IT to their pedagogic strategy for their own subject.⁹ It is the keen IT for CAL users who manage, despite considerable organizational difficulties, to obtain access to resources and who are flexible in their approach to its use. In particular, it is these teachers who recognize and enjoy the pedagogic potential of IT because it relates to their own philosophical underpinnings about teaching and the nature of their subject. They often refer to the open-ended exploratory work that can be generated as crucial. They recognize the way that IT is actually changing the nature of the subject that they teach. But they are rare. So the success of this innovation, IT use in schools, resides in the professional competencies and interests of only a few teachers. For them the focus is not a future "information age," but the fact that it supports the nature of the learning in their own subject.

So the conundrum we are presented with is that the majority do not use it, inhibited by the rhetoric, while the minority who do use it do so for reasons in contradiction to policy implementation. Teachers, whether they use or do not use IT, want to focus on the pedagogic rather than vocational rationale.

Symbolic function of technology

It is clear that the national rhetoric for the use of computers in schools is flawed with dichotomies. Technology today appears to hold a major symbolic function in society, associated with imagery of the new, positive change and renewal, and of economic revival. Papert¹⁰ and Gates¹¹ relate the technology to future images of revolutionary changes to learning and society. From LOGO to the Superhighway, education has been drawn into the confused notions of a technocentric society.¹² As Bryson and de Castell state, there are a wide range of policy documents that

*....urge educators to grapple with the implications of an 'explosion in knowledge, coupled with powerful new communication and information processing technologies' and therefore promote widespread 'technological literacy'. Arguments that enthusiastically promote the widespread implementation of educational computing typically predict that these technologies will 1) facilitate teaching processes, and 2) promote significant positive gains, both academic and vocational, for students.*¹³

Evaluation studies however, such as Cuban and Bowers,¹⁴ suggest that unreflexive and unabashed optimism about the necessarily transformative nature of new educational technologies is both naive and histor-

ically unfounded. Fullan¹⁵ has reminded us that the focus today on technology comes only 20 years after a similar focus on science which was stimulated in part by the space race and global political needs. Indeed Miller and Olson consider that:

*The history of innovation in education should teach us to be cautious about predictions associated with new technologies. However there is something about computers that seems to negate this caution. Whenever computers are discussed, words such as revolution, powerful ideas, microworlds and student empowerment occur frequently.*¹⁶

From a socially critical perspective, a critique of this imposition of a technocentric culture on schools is long overdue. Preston¹⁷ claims that a technocentric culture distorts knowledge by processing it as information. This relates to Habermas' notion of "instrumental rationality," where the all-pervasive logic of economic rationality takes over from other areas of human culture.¹⁸

A direct relationship can be traced between an instrumentality perspective and the dominance of school training for IT skills with the emphasis on information rather than the knowledge it can impart. Using the computer to assist learning can be located within a pedagogic cultural agenda where knowledge and reflection are still important. In comparison, a technocentric approach, lauding the notion of skills to manipulate information technology, is a function of instrumental rationality. Hence the clear confusion in UK national policy, which results in conflicting senses of education and training, of pedagogy and vocation.

Thus the reality behind the rhetoric reflects not an inadequacy of teachers but rather a proper professional reluctance to engage in a deeply flawed national rhetoric. Teachers reject the symbolic functionality of the technology as too removed from the professional purpose of schooling. If the focus should shift toward a pedagogic cultural agenda, there is a greater chance that teachers will embrace IT.

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by Philip H. Winne

TECHNOLOGY AND EDUCATIONAL REFORM

Ce n'est pas en parachutant des logiciels de traitement de texte, des langages de programmation, des ordinateurs plus avancés ou des outils d'accès à l'Internet dans les classes qu'on va forcément améliorer la qualité de l'éducation, dit l'auteur. Si on n'est pas attentif à la façon dont les étudiants et leurs enseignants se servent des systèmes et aux principes fondamentaux de l'apprentissage qui doivent servir de base à l'efficacité des systèmes d'éducation, il est difficile de prédire les résultats de ces aventures technologiques entreprises au nom de la réforme. Certaines expériences peuvent être désastreuses. Et même si elles ne le sont pas, il faut se demander si elles sont rentables. Aussi bien du point de vue professionnel que du point de vue légal, les enseignants ont la responsabilité d'organiser l'enseignement de manière à faciliter l'acquisition des connaissances par les étudiants. La façon dont ils s'acquittent de cette responsabilité compte plus que ce qui apparaît sur les écrans d'ordinateur.