
Information Technology Literacy in Schools: Let's Look After the Teachers

James Henri

School of Information Studies, Charles Sturt University, Australia

If schools are to become information technology-literate communities, the needs of teachers must be addressed as a priority. It is not sufficient to leave this to chance; a planned approach to professional development is essential. Innovation in schools flows from the enthusiasm of teachers. To the extent that teachers are not enthusiastic about information technology (IT), innovation in its application to teaching and learning will not occur. The IT competencies that teachers need and the ways in which they are being addressed need to be considered.

During recent Australian State election campaigns, one might have been excused for thinking that there was a contest to see who could promise the most information technology (IT) for schools. The rationale for this frenzy of attention to IT was no doubt in part related to the growing community awareness of the Internet and the changing landscape of a global networked village. It may also have been a response to community perception that the wealthier private schools that place a laptop on every student's desk (or in every student's school bag) have widened the gap between information-rich students and information-poor students.

Although few critics would argue with the claim that schools need increasing doses of IT so that students can become IT-literate and so that schools can provide students with some understanding of the technology that is currently available in the workplace, I suspect that political imperative may have blinded the politicians to the real needs of schools.

The deployment of IT helps to address some of the barriers of time and space often faced by teachers. It allows teachers to converse with each other between schools, even across the world. It allows teachers to share ideas, test hypotheses, and exchange teaching materials. Effective use of IT in schools can enable schools to alter radically the way teaching and learning are structured. When IT is used well, it no longer makes sense to think in terms of rigid structures—closed classrooms, one teacher for 30 kids, inflexible timetables, subject-based curriculum, and so on. But teachers who have spent a lifetime living in "factory model" schools do not necessarily have a vision of what is possible, nor the technical competence to make the change.

The Student-Teacher IT Gap

Australian school students (perhaps students the world over) are more likely to have access to high-powered IT with the full range of "bells and whistles" than are their teachers. Not only do students typically have better access, either from IT located at home, from IT that parents use in the workplace, or to IT located in game parlors, but they typically are more inclined to seek information (for the purpose of study or pleasure) from IT than are their teachers who are typically print-oriented. This observation does not imply that all students are IT-literate; there are, of course, many students who have never turned on a personal computer, and many others who are competent in a small number of applications only. It does not ignore the fact that some teachers are at the cutting edge of the educational application of IT, but it does suggest that it is more likely than not that a number of students in any particular class are more competent with IT than their teacher.

The survey form in Figure 1, taken from Bennetto and Manning (1995), has been used by the writer in a number of school systems, to identify inconsistencies of understanding and use between students and teachers with respect to a range of information sources and services. The large majority of teachers indicate they believe that it is important that students become proficient users of the full range of resources. At the same time, few teachers indicate more than a familiarity with the resources in the top half of the list, while indicating that they are aware that some of their students are regular users of at least some of these. It is in fact not unusual for teachers to indicate that they have not even heard of many of the technologies at the top of the list.

Students are able to learn from each other when they collaborate. Sarason (1990) indicates that this learning will be at best sporadic unless teachers work in a culture that encourages them to act as role models. He argues that you cannot have students as continuous learners and effective collaborators, without teachers having those same characteristics. Fullan (1993) extends this challenge by claiming that teachers must succeed if students are to succeed. Thus teacher isolation is a major impediment to professional growth. Because teachers are "locked up" in their own classrooms for much of the school day, they often do not have the time at school to learn how to become information technology-literate. Because they are isolated, they do not have the opportunity to observe and participate with other teachers who are further down the information technology path and who are employing IT to enhance teaching and learning. If teachers are to become familiar with the technology and with its potential to change teaching and learning, they must have access to it and they must have time to "play" with it.

Consider each type of information source listed below, and tick the appropriate column

- A I am aware of ...
 B I have used ...
 C I can confidently use ...
 D I think it is important for students to use ...

RESOURCE

A B C D

Internet/other computer networks
 On-line databases
 Interactive television programs
 Virtual reality computer programs
 CD-ROM resources
 Databases on disk
 Library automated catalogue
 Library card catalogue
 Periodical indexes
 Periodicals
 Newspapers
 Current information files
 Video programs and equipment
 Local trade, industry and organizations
 State, national, international organizations and industries
 Reference books:
 Dictionaries
 Encyclopedias
 Yearbooks
 Atlases
 Directories
 Non-fiction books:
 Table of contents
 Index
 Appendices
 Statistics (tables, graphs, etc.)
 Bibliographies

Figure 1. (Bennetto & Manning, 1995, p. 64).

Development of Teachers' IT Literacy Needed

There is no doubt that schools need IT and that an emphasis should be placed on the attainment of IT literacy among students, but this will not be achieved without a concomitant targeting of teachers' IT literacy. Whitstock (1990) highlighted this need in her analysis of the challenges associated with information skills training in schools. Whitstock concluded that we do not need further research about how students acquire information skills. Rather, we need to focus on why teachers are not able to assist their students to learn these skills.

Innovation in schools, like innovation in other places, is likely to be as good as those who deliver the innovation. The more informed, the more visionary, and the more technically competent the change agent, the more likely it is that the innovation will bring about significant change. In schools,

teachers are the key change agents. Without significant, active support from the teacher, improvement in educational outcomes will remain mere rhetoric.

The first task in the process of IT reform in schools is not to provide schools with truckloads of computers, but rather to make certain that teachers themselves are IT-literate and have a vision for the way that the continuing introduction of IT might affect (for the better) the style and quality of teaching and learning in our schools.

It is a truism that the benefits of educational innovation will be determined by the interest and understanding of the teachers. There are two elements here. The first is that teachers must understand and have regular hands-on practice with IT. Teachers must use IT as part of their living, not as something that they do to keep one step ahead of the kids. Morrow (1994) suggests that, in Australia, for example, perhaps 30% of teachers are computer-literate. This statistic indicates that we have a long way to go.

The research suggests, however, that unless support is provided, teachers are not likely to place a premium on becoming IT-literate. Hounsell, Martin, Needham, and Jones (1980) found that the information that teachers believe they ought to have, would like to have, or have requested is most likely to be of a practical nature. The needed information is most likely to be classroom-oriented and related to a particular teaching topic. Studies undertaken by Juchau (1984), and Dillon (1992) support this finding and indicate that teachers are not particularly inventive in their search for professional development.

This contention is supported by Beswick (1987) and O'Connell (1997) who indicate that teachers tend to find solutions to information problems by following an established pattern and employing a small number of favorite sources. More importantly, O'Connell (1997) found that although teachers believed that their students ought to use the skills of the teacher librarian as an information mediator, they did not perceive the same need for themselves. O'Connell suggests that teachers see students as cognitive apprentices, but themselves as mature information users not needing support from information specialists. The implication of this is that often a teacher is not aware of the need to act as an information-literate role model to his or her students and is unable to act as that model. Goodlad (1990) identified this mismatch between teacher and student practices as a major impediment to school improvement. He suggested that teachers "must be diligent in ensuring that no attitudes, beliefs, or practices bar students from access to the necessary knowledge" (p. 699).

Supporting Teachers' Learning

The work of Nias, Southworth, and Campbell (1992) is helpful to our understanding of the themes that underpin an awakening of the need for teachers

to seek continual improvement. The research undertaken by Nias et al. identified that a school climate of support from powerbrokers, combined with a commitment to learning together, generated a more, rather than less, questioning approach to improvement, and more rather than less risk-taking. They found that:

Both teachers and heads saw professional learning as the key to the development of the curriculum and as the main way to improve the quality of children's education. Although they responded during the year to internal and external pressures for change, the main impetus for their learning came from the shared belief that existed in all the schools that practice could always be improved and hence that professional development was a never-ending process, a way of life. (p. 72)

Teachers who wanted to improve their practice were characterized by four attitudes: they accepted that it was possible to improve, were ready to be self critical, and to recognize better practice than their own in the school or elsewhere, and they were willing to learn what had to be learned in order to be able to do what needed or had to be done. (p. 73)

Professional development of teachers is of paramount importance. Not only must teachers have the opportunity to be involved in formal professional development programs, but they must also be enabled to have time to visit (and become involved in) other classrooms in their own schools, as well as time to visit other schools. School administrators must likewise become familiar with alternative structures for teaching and learning and provide appropriate incentives for teachers to make better use of both IT and more traditional information resources. Principals would do well to encourage teacher librarians to take a lead role in the development of information literacy programs, because they are information specialists who have a whole school responsibility for the development of information-rich, student-centered learning.

Research undertaken by Lupton (1996) suggests that

successful professional development programs revolve around real life examples or problems through which the participants would be guided by knowledgeable leaders who provide the flexibility needed by adult learners. Sufficient support and guidance would be given to assist the learners to develop to the stage where the use of the technology becomes unobtrusive, leading to transference to the learners' own pursuits. (p. 26)

Lupton refers to research undertaken by Rushby (1992) that outlines key principles of good practice with respect to continuing professional development. Good practice recognizes that:

- Teachers are recognized as adult learners;
- Differing modes of delivery, particularly innovation-fused and action research, are adopted;
- The school rather than fragments of the school is the focus;

- Relevant internal and external support services exist, and joint planning by committed stakeholders is a feature;
- Deliberate opportunities for continuing professional development are created and incentives offered;
- Systems, institutions, and individuals commit themselves and their resources (Lupton, 1996, p. 26).

IT Competencies Needed by Teachers

At the heart of the professional development program for teachers, with respect to IT, is a need to define those key technological competencies that teachers need to acquire. In my view, it is only after this objective has been achieved that it becomes realistic to focus on the technological competencies that students should acquire by the time they leave school. The cost, capability, and potential use of IT is changing so rapidly that this objective can at best be tentative and must be reviewed at least every year. When decisions have been made about levels of competency it becomes time to address the software and hardware considerations that will enable the achievement of these required competencies.

Even when teachers are information technology-literate, there is still a second precondition to success. Teachers must relate their IT expertise and the availability of IT to the teaching and learning program. They must identify the ways in which IT can enhance the speed and quality of learning. The mass introduction of IT and communications technology will probably mean that teachers will have to develop new teaching skills. Employing a sophisticated "box" as a bells-and-whistles typewriter is akin to employing an Aston Martin for transporting the kids to school. Morrow (1994) claims that

Significant learning experiences are being provided in some schools with relatively modest equipment. In some of the others with more lavish provision, the students are using computers primarily for clerical tasks such as spreadsheets and word processing. There are even examples of teachers using videos of themselves talking at the class. "Access to a remote teacher" you may think. Not necessarily: I've seen some teachers sitting with the class, watching themselves in action as an on-screen "talking head!" (p. 5)

Approaches to Developing Teachers' IT Literacy

A number of innovative approaches to developing teachers' IT literacy have been identified across Australia. Lupton (1996) refers to the Computer Literacy Inservice Course (CLIC) instituted by Carmel Wickman, an IT consultant to the Brisbane Catholic Education Office. Each CLIC is tailored to the particular needs of a school community and at the conclusion of the course, the IT remains at the school. The "Cybrary Show" developed in Western Australia is another innovative approach to professional development. This program described by Baird and Tremlett (1996) is an IT road show that has

travelled across Western Australia, introducing teachers to the Internet. Part of the program funding is made available to relieve staff from class. The Australian School Library Association of New South Wales has pioneered the 1-2-1 program that provides funding to allow members to visit with another teacher-librarian on a one-to-one basis for work shadowing and individual professional development in specific skills and knowledge. The concept of work shadowing is a particularly powerful one that is well advocated by Langford (1996).

Teachers in some schools have ready access to a range of IT, whereas some teachers have not even seen much IT at all. A major issue that this dichotomy helps to clarify is that of addressing a baseline for the information-poor. We know that some schools have access to greater per capita funding and/or to a wider range of funding sources than do others. We also know that the cost of linking to the Internet is not a constant. For some schools, access costs are based on local call rates. For others, access will be billed according to a long distance telephone (STD) rate. Although these charges may in fact be modest when compared with the cost of school excursions or equipping the school football teams or orchestra, they are an additional and uneven cost that schools will need to bear.

All students, regardless of economic or geographic considerations, should be entitled to a basic IT environment that addresses questions of access and opportunity. The funding of such an infrastructure is complex and should not be left to individual schools to decide alone. Issues such as equipment and software compatibility, budgeting for obsolescence, and leasing and purchasing options must be carefully considered by individual schools and, more essentially, by government. If this is not done, some schools, particularly those that are replete with IT Luddites, may soon find that their school leavers are severely disadvantaged.

If teachers are to have the opportunity to become IT-literate they must be given time out. Teachers cannot learn from each other from behind closed doors. But it may be that governments have to think more laterally about the way they spend their money. Most teachers have more "free" time at home than they do at school. To this end, it might make sense to provide teachers with a tax break so that they can install a personal computer with Internet access at home and place a priority on providing a home-school link (for teachers initially, and then for students).

Simple solutions to information resource problems have not worked in the past and will not work in the future. When government is anxious to lavish IT funding on schools, it is worth remembering that, in the IT world, today's Rolls Royce can quickly become tomorrow's model T Ford. Solutions that begin with the continuing professional needs of teachers are on the right track and will provide the basis for better teaching and learning. Teacher-librarians have demonstrated that they are leaders in the delivery of IT

professional development, and their actions through such initiatives as Kids Connect and the ITEC virtual conferences (Hughes, Henri, & Hay, in press) should be built on.

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