Computer Literacy in the Information Age

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Talk to any of the teachers from the Suva area about educational technology and very quickly the conversation turns to computers. This is where they are planning to spend their money if they have not done so already. Mention other forms of instructional technology such as audio, video or the overhead projector and the answer seems to be the same; it is either broken, under-used or locked away to make it impractical to use. Something more than just convincing sales hyperbole has built a strong belief in teachers that computers will be different. However, this difference needs to be integrated into any strategic planning on how computers will be used in education or in the training of the people expected to use them. Without careful thought as to how they will fit across the curriculum, computers are destined to join the list of technology which teachers see as being too impractical to use in the classroom.

A sign of the times is how quickly this rapidly changing technology has embedded itself in education. Of greatest concern is the fact that we have even less time to become aware of the role this new way of doing things will have in education. Schools are trying to follow industry’s lead that has demonstrated that the computer can be used to improve modes of production. In other words, they are trying to use computers to do things more efficiently than in the past.

Mathematics teachers are the most common recruits to secondary computing positions, mainly because the computer is still seen as an advanced calculating instrument. Their influence on the curriculum is such that it is dominated by programming and hardware. It is self-evident that you need to understand the mechanistic skills to make the machines function, but to focus purely on the machine is to severely limit the possibilities. Educators around the world are beginning to come to terms with the concept of computers as the tools of a post-industrial age which will redefine the skills needed for basic education.
Although the computer found its first acceptance in replacing the typewriter, its present functions have gone well beyond that. The 1990s are now portrayed as the decade of networking, linking all of these computers together. You only need to read any one of the growing mainstream press articles on the world-wide network of computers called the Internet, to know that an isolated computer is one which is effectively neutered, cut off from the bulk of the resources that are needed to make it productive.

Even in today’s terms, the amount of information that has become available through the computer is simply staggering. The average 7cm computer disk can contain approximately 200 pages of text. The capacity of a modest computer hard disk would be equivalent to 576 floppy disks. Once a computer becomes linked through a network, this 100,000 pages of text per computer becomes instantly eclipsed.

The quality of this information varies almost as much as its availability. There is a lot of chaff to be sorted through to find the wheat of the Internet. Until software is developed to make it easier, it will continue to take some skilled and focused searching to find anything useful. By becoming networked the evolution of the computer has irreversibly taken it beyond text processing into a tool for communication, but the skills of the average computer user still suffer from a misconception of how we communicate.

Communication

In the telephone system paradigm of communication, the process is often described very simply. One person sends a message to another who receives it. The rule-of-thumb is that if the message is sent and it is not understood then there was no communication. It takes someone to receive and understand the message and for them to tell us that we have communicated. In this situation the basis of communication is the message.

By the 1950s it was shown by the work of people such as Carl Rogers (1951), that each of us sees things from a different point of view. Communication involves the interaction between people, and, it was argued, analysis should be focused on the relationships involved rather than
on the message. He observed that the major barrier to communication was the natural tendency of people to judge and evaluate, to approve or otherwise the message that is received.

In his seminal work on communication, Jurgan Habermas (1981) outlined how this humanistic point of view did not take into account the culture of the institutions in which we live and work. He makes it clear that communication is a social and cultural phenomenon and needs to be based on understanding. In this case the communication is a result of the individuals constructing a shared meaning in a social context. His answer to effective communication is to learn to understand the processes of sharing these constructions of meaning.

As computers blend with telecommunications, it will become even more important that the skills of cross-cultural communication are addressed in the computer classroom. In our information-rich urban environments, messages are sent and received at a startling rate. Because all these messages are filtered through our cultural perceptions, there is little chance that they will reach their destination unaltered. The student who is taught that computers are a tool similar to a telephone, will fail to appreciate that all these messages are dependent on the rules, status and roles that drive our daily lives. The story of employees being dismissed for sending abusive email to senior executives has already entered the realms of computer mythology. True or not, it illustrates that just because a technology has the potential for democratisation does not mean we can ignore the social and cultural consequences of using the technology.

To become an effective communicator in the society that is evolving, a student will need to become aware of the position that culture plays in communication. The consistent criticism of graduates from Australian tertiary level computer courses is that they lack the social skills that are required in the modern working environment. What has been identified as more important than a graduate with pre-requisite knowledge, is a flexible and adaptive worker who is capable of dealing with our new information-rich work environment.
The Information Society

All this would be of little consequence if it only affected the computer community. Industrialisation is seen by many (see Mathews 1989, for an overview) as a wave of change that radically restructured the workplace. After centuries of workers being artisans and craftspeople, came the regime of disciplined working hours, management theories, specialisation and competition among the workers. This enforced climate of the workplace has become increasingly hard to maintain among businesses that have come to rely on computerisation to become more competitive. The very nature of computers means they are being designed to fit into a wide variety of stages of production. The mastery at work no longer comes from the mastery of machinery but comes from mastery of the software—the instructions that communicate to the machinery to make it perform a specific task. Operating computer-assisted equipment is increasingly becoming a dialogue between the human operator and the machine.

In his book *Megatrends*, John Naisbitt (1985, 5-27) outlines how these changes have affected the United States. He concludes that America has undergone a transition to an information society. In 1890 farmers were a third of the work force, its largest single occupation. By 1984 they were 3% of the work force and the clerk had become the largest classification of worker in America. Naisbitt is convinced that the information society is not something that will happen in the America of the future but is the reality of today. By 1967 the information economy accounted for 46% of America’s Gross National Product and nearly 75% of all jobs in the US today involve computers in some way.

The Fiji Context

In westernised countries the trend from an agrarian to an industrial society relied on strict management control and technological innovation to increase productivity. In the transformation from industrial to information societies we are seeing a reliance on flexible workplace strategies to provide a competitive edge.

Fiji is also moving away from industrialising its work-force. While the Government continues to try to attract overseas manufacturers, it is through
the service industries that Fiji is earning the majority of its foreign currency. While agriculture remains an important contributor to the GNP, in 1993 tourism was the major employer and earner of foreign currency (an estimated $328.5 million compared to $241.6 million for sugar) for Fiji. In comparison the largest manufacturing industry, the garment industry ($128.7 million) is encouraged by government tax incentives and preferential trade agreements, but is still described as noncompetitive in terms of wages when compared to other developing countries in South-east Asia and South America.

While there are limited employment opportunities for Fiji school leavers, tourism is one area consistently presented as providing the greatest possibility for growth and for employment for young people. In many ways tourism characterises the move from an industrial to an information society. Tourism is an industry which thrives on information and it requires flexible management to remain competitive. It is heavily service-oriented and needs to respond quickly to market demands.

This should by no means be seen as an attempt to identify career opportunities for students. Neither can it justify the types of skills that are necessary to make them competent workers. Looking at industry can help us identify important trends, particularly because market pressures quickly penalise the inefficient. What industry shows us is that we need innovative and flexible thinkers not more narrow and rigid experts. In our new information society, the work-force is becoming as different from the industrial society as we are now from the agrarian one. In our schools, literacy will require students to be able to process information.

Impact on Education

Social constructivism shows that any description of cognition that isolates learning from social interaction is seriously incomplete and may even be a distorted and misleading picture (see Meadows, 1993, for an overview of Vygotsky’s model of cognitive development). It has been demonstrated that students similarly construct their own learning which is strongly influenced by the range of existing beliefs and attitudes held by the learner. Most important for any educator is to recognise that students hold a range
of attitudes, perceptions, and abilities that relate both to what and how they are taught. Teaching needs to be seen as building on and reconstructing existing ideas with the students.

Collaborative learning puts students together to work on focused but open-ended tasks (Bruffee, 1993:1). It gives the students the chance to work together in a relatively safe group environment where the individual stakes are low and students are given the opportunity to construct knowledge interdependently with the teacher. As a basic model for classroom collaboration Bruffee (1993: 28-51) suggests the use of consensus groups, the key elements of which are:

1. Divide the class into small groups.
2. Provide an open-ended task for the students to work on.
3. Collate the results in a complete class discussion session.
4. Evaluate the quality of the work.

This approach is not difficult. It is ideal for the cross-curriculum use of computers because it does not rely on all students having a computer in front of them. It works best outside of traditional computer laboratories in ordinary classrooms, where computers are set up as resources for learning. Students work in teams allowing them to build their own understanding of the subject area and to build communication skills. Naturally this approach does not suit all situations or address all learning outcomes, but situations where students can work collaboratively on computers effectively builds "the zone of proximal development", referred to by Vygotsky, into the classroom where they can extend their knowledge and abilities in a social context.

Conclusion

One of the emerging goals of school education is to prepare people to deal with the new information society. To cope with the increasing volume of information, we will need to develop students' capacity for flexible thinking that sees strength in diversity and takes advantage of opportunities. The new information technologies have succeeded in bringing the world
closer together; now we need to ask what we are going to do with the computer once it has been brought into our schools.

Purchases of computers are often made as a response to the cry for computer literacy. When we look more closely at what is being requested, it becomes apparent that not all people share the same meaning for this term. If taken literally, we can say that it is being suggested that large sums of money need to be spent so that people can learn to read and write using a computer. In fact, people tend to become quickly competent at the simple mechanics of using a computer, but this does not mean that they should be considered to be computer literate. If being literate is an extension of our primary skills of reading and writing, then literacy in the information age is being able to deal with, collect, analyse and represent information.

We need to look at the ways in which people will be using computers in their everyday lives. It is very unlikely that all of us want to directly belong to the computer community, programming software or building or repairing our computers ourselves. Just like the motor car, most people will want to just jump in and drive them, after acquiring some basic proficiency. To achieve this we must go beyond focusing on the tool (Stavely 1993:2) to concentrating on the work that can be done with it, utilising its capacity for constructing knowledge.

Using technology in education will provide opportunities otherwise unavailable to our students. Through simulations, case studies and other resources, we will be bringing the wider community into the classroom. Over the past couple of years there has been a subtle but persistent change in the perception of computing. It is no longer a machine that merely sifts, analyses and correlates data, an improvement on the programmable calculator. The computer is evolving into a communications tool that allows the information worker to mine the information quarry. The challenge for us as educators is to build a curriculum that is sensitive to the cultural diversity that will confront our students as they encounter the technologically shrinking world.
References


