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Releasing the pedagogical power of information and communication technology for learners: A case study

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ABSTRACT

There is currently much debate around how best to incorporate Information and Communication Technologies (ICTs) into teacher education programs (Karsenti, 2001; Snider, 2002; Bain, 2004). Rapid advances in ICTs demand changes to our education systems. Computer technology has been absorbed into our schools but in many instances teachers simply deliver old lessons in a new format, and rarely fully capitalise on this technology in their practice. This article explores two issues, firstly, what are the barriers to educators embracing the new technologies, and secondly, what role do teacher education programs play in breaking down the barriers. In discussing these issues, initiatives being undertaken in Queensland are highlighted.

INTRODUCTION

Western societies are currently experiencing a transition from the industrial economy to the knowledge economy (Hargreaves, 2000), with obvious implications for education systems. Miller (2003, p.2) suggests that changes in the socio-economic landscape raises questions about the role of schools in the 21st century, and asks:

> *Under what conditions could today's schools play the same roles as in the past? Can the schools evolve along with the changing socio-economic context, and if so, how? Further, will the school serve as a brake or accelerator of desired changes?*

International research into the attitudes and skills of educators indicates that they have difficulties in embracing the rapid changes they are faced with (Albee, 2003; Bain, 2004; Christensen, 2002; Iding, Crosby, & Speitel, 2002; Plotnick, 2004; Rovai & Childress, 2003; Simpson, Payne, Munro & Hughes, 1999; Tsitouridou & Vryzas, 2003). While most educators appear to acknowledge the importance and relevance of Information and Communication Technologies within teaching, difficulties nevertheless continue to be experienced within the processes of adopting these technologies. Significantly, there is a gap between the valuing and relevance of 'new skills' and the extent to which they are practised in schools. For example, Simpson *et al* (1999, p.248) report that:

> *It appears that in tutors' delivery of the courses, the students seldom experienced demonstrations of the use of ICT as a teaching tool –i.e. the tutors seldom modelled its use through their own practices. The high level of importance and priority that tutors attach to ICT as an educational tool might be expected to be reflected in the extent to which they do not merely encourage, but also require its use by students.*

On anecdotal evidence, these difficulties appear to be similar to those currently experienced by Australian educators. We agree with Miller (2003) and suggest that, in relation to ICT, our schools have been operating as a brake more often than an accelerator**.**
As teacher educators, we need to take some responsibility for this and seek ways to address the issues. In the event, there is a need therefore to better prepare teachers to use the technology as a significant tool within teaching practices.

THE KNOWLEDGE ECONOMY

Gaining an understanding of our past helps us to understand the present and consider what is possible for the future. It is clear that society in the 21st century is different to that of the 20th century. The education systems of the welfare states, which prepared students for an industrial society, have given way to the new economy and globalisation (Hargreaves, 2000; Knight, 2000, 2002).

The industrial revolution has had a profound effect on education systems. Education systems were planned attempts to prepare people for a world of work increasingly dominated by manufacturing. The old economy demanded a vocational training mentality. We can observe many practices in our schools that are closely aligned to those used to regiment industry. For example, whistles in factories and bells in schools; clocking on and off at a regular time in the factory and 9-3 in schools; pay grades in factories and grades on report cards in schools; promotion through pleasing a boss and success through pleasing a teacher and meeting the requirements of standardised tests. All of these were designed to achieve 'normalisation' through uniformity, conformity and a mass production mentality. The result is standardised groups of children, and schools and education systems that are inherently conservative institutions.

However, research (eg Bentley, 2002; Hargreaves, 2000) reports that the knowledge/information economy demands an education system that responds to its requirements for a more flexible and adaptive workforce, as well as striving towards promoting socially just society. The arrival of the post-industrial society has brought a realisation that the new economy will be increasingly focused on the trade in knowledge through the medium of communication technology, which brings the educational systems into the debate about how to best adapt to an information society to provide the best educational opportunities for young people (White and Wyn, 2004, pp.122-4). Recent shifts in Queensland state education policy indicate recognition of the necessity for understanding this. Thus, *Queensland State Education-2010*, (2000, p.6) – the state government document outlining the vision for Queensland schools – observes that, "Information technology is the technical construct of the knowledge economy", which has enormous implications in respect to the challenges faced by education systems as they respond to the changing needs.

The relevant concern, then, is how well teacher educators perceive and address the challenges for education. Hargreaves (2000, p.2) suggests there are three fundamental building blocks to resource the knowledge economy, requiring three interdependent capacities: "the capacity to be creative; the capacity to turn a creative idea into an innovation; and the capacity to market innovations successfully". This also gives some indication as to the kinds of expertise, pedagogy and curricula which teachers need to access within educational systems in order to be enabled to effectively contribute to, and participate in, a knowledge-based society. Hargreaves (2000) suggests that an overall strategy of knowledge management can facilitate this, and is critically tied to the future success of education systems in the OECD countries. The challenge is to ensure the building blocks are utilised to harness the full potential of the explosion of the growth in information and communication technologies.

IMPLICATIONS FOR EDUCATORS

How then can education systems mirror these changes and help prepare students for life in a knowledge economy? We propose that the answer has two parts: the first assesses the notion of professional knowledge, while the second promotes a new way of operationalising ICT's within educational contexts.

New Professional Knowledge

There is a need for new professional knowledge for teachers: education systems need to draw on the collective intellectual capital of educators. This stands in contrast to the old model of teacher education, which involves university–based researchers disseminating information to teachers within the context of formal teacher education programs. Rather, we argue that the old system needs to be replaced by approaches that facilitate and nurture flexible learning communities, which requires a change in both the knowledge and behaviours of teachers.

Within this approach, teachers become involved in the creation of professional knowledge that is relevant and context-specific. The Bachelor of Learning Management provides an example of this approach – a relatively new and innovative undergraduate education degree developed by Professor Richard Smith and delivered at Central Queensland University, Australia. Within this program, the notion of the teacher as expert is replaced by that of the teacher as the manager of learning – their own learning and the learning of the students they work with. The learning community of this teacher education program includes the university, schools and other learning sites, and the wider community in partnership. A mindset is established that values the input of a variety of learners and ways to learn. Consideration is given to where 'education' ranks in the list of powerful influences in the teachers' as well as in students' lives. Multiple images of learning are acknowledged and the challenges for 'teachers' or 'learning managers' associated with these images of learning are considered and critically evaluated.

To illuminate this approach from a conceptual perspective, we refer briefly to two different kinds of knowledge creation, which have been labelled as 'Mode 1' and 'Mode 2' types of knowledge (Gibbons, Limoges, Nowotny, Schwartzman, Scott and Trow, 1994). Mode 1 knowledge is more academically created, usually in universities and is generally individually created. Mode 2 knowledge is interdisciplinary and team generated. The latter type of knowledge, rather than being created by researchers in a university and applied in the real world, is circuitous in that it evolves from its application in solving problems in the real world.

The knowledge that is required by students in the knowledge economy and by students in teacher education programs in relation to information and communication technologies is Mode 2 knowledge. However, an additional factor in this is that in the interdisciplinary- and team-generated knowledge is that much of the technical expertise often rests with the younger generation. For example, as Tapscott (1998, p.2) has found that,

> *For the first time in history, children are more comfortable, knowledgeable, and literate than their parents about an innovation central to society…There is no issue more important to parents, teachers, policymakers, marketers, business leaders, and social activists than understanding what this younger generation intends to do with its digital expertise.*

We should also be aware that although the Information Age has existed for about 30 years, a significant part of our information still moves in paper form. In many instances we are still not fully realising the potential that the technology offers, and that the tools and connectivity of the digital age offers exciting ways to obtain, share and act on information (Tapscott, 1998; Teghe, Knight, and Knight, 2004).

Therefore, in the context of seeking a new professional knowledge, a thorough understanding of the communication media alternatives is essential for the professional communicator. However, every communication medium has its strengths and weaknesses. What is important is the ability to choose the appropriate medium for each communication event. It is also important to acknowledge that there will be great variation among pre-service teachers regarding knowledge of and competence with, information technology. It cannot be taken for granted that all pre-service teachers will enter a teacher education program with computer literacy, but it should be

expected that the program will provide them with the skills and knowledge to use ICT as an empowering tool for learners.

Another aspect of the learning management approach is its focus on the active role of reflection on the impact of ICT on the society as a whole, and thus on the future of young people. Participants in the Bachelor of Learning Management, including teachers and students, examine the nature of change that ICTs bring in society and implications for the children of the future, and seek practical ways in which learners and learning managers can embrace the technology. The importance of such change and its impact on educational contexts is being increasingly underlined in the literature, with an emphasis on catering for such change within educational systems. For example, Tapscott (1998, p3) observes that,

> *The digital media is increasingly a reflection of our world – every view, every discipline, every commercial interest, every repository of knowledge. Because it is distrusted, interactive, malleable, and lacking central control, it is a vehicle for revolutionary change in every discipline, attitude and social structure. Never has there been a time of greater promise or peril. The challenge of achieving that promise, and in so doing save our fragile planet, will rest with the Net Generation. Our responsibilities are to them - to give them the tools and opportunities to fulfill their destinies.*

Writers such as Tapscott (1998), Veen (2002) and Teghe and Knight (2004) bring to our attention the tremendous intergenerational differences existing between the established educational systems and those that are required by, and will make sense to, what Tapscott (1998) calls the "Net-generation" (born 1977-present) and Veen (2002) calls "homo zappiens" (presently the 3-16 years olds). The professional educators of the future would benefit from a reflexive approach to their practice as it stands in the context of change that is brought about by generational interaction with technology, and the meaning and purpose it is imbued with by users within their own historical contexts. As an example, Tapscott (1998) discusses the role of television in shaping the baby boom generation and their world (those born between 1946 and 1964). By contrast, the next generation, which is referred to as the baby bust generation (born 1965-1976) because 15% fewer babies were born, are "aggressive communicators who are extremely media-centered", while the last generation (born 1977-present) is known as the "Net-generation" for the way that they have embraced the Internet as a primary means for communication and access to information (Tapscott, 1998).

As learners, young people are increasingly taking responsibility for and are increasingly in charge of information flows, creating virtual communities as a means of imbuing their learning experiences with meaning (Teghe and Knight, 2004). Learning for the younger generation '…is enhanced by confrontation with complex interactive experiences, [and is] a non-linear process of adaptation using associative and creative thinking' (Veen, 2002: online).

In light of this, education professionals need to reflect on how young people – what Tapscott (1998) calls the N-Gen – might not see the technology as technology. They see, instead, the people, friends, and information at the other end rather than the computer screen. As an analogy, parents do not talk about pencils – they talk, instead, about writing. It is like assimilation for the N-Gen and accommodation for adults who haven't grown up with computers as part of their environment. Thus, there are implications for educators in the communication aspects of the culture. Tapscott's (1998) research shows that N-Gens are dissatisfied with the broadcast paradigm TV offers and favour a model of increased interactivity. N-Gens are a generation of critical thinkers because they have the tools to question and challenge, debate, and so on. We assert that educational providers who are trying to transform themselves for relevance should heed this type of research.

Leadership has an important role in formulating educational programs that promote new professional knowledge, although it is also important to understand the kind of leadership that is required. Miller (2003) discusses two types of leadership: strategic leadership and everyday leadership. He describes strategic leadership as being about setting goals and everyday leadership as being about the choices that make the vision a reality. Society has some brilliant strategic leaders, but there is also a need for practical measure that will translate the ideas into reality – which requires everyday leadership. For example, one of the ways in which strategic and practical leadership can link to facilitate a more effective understanding of ICTs by educators is by engaging the N-Generation in planning teacher education programs. As it is, many 'experts' are consulted when designing such programs for relevance, while generally overlooking the possibility of formulating a key partnership with young people.

New ways of operationalising ICTs

There is no doubt that ICTs are seen as central to education in the 21st century. The Queensland Government has made a huge commitment to promoting the use of new communication technologies through its *ICTs for Learning* initiatives. These initiatives are part of the Queensland Government's (2002) policy, *Education & Training Reforms for the Future*. A commitment to fund the area of ICTs with a large monetary support package indicates a commitment to delivering the education and hardware needed to service the needs of the information economy. This policy has practical effects, reflected in the example of the new Queensland Technology Syllabus for Years 1-10. This syllabus uses a learner-centered framework where "through the experiences and challenges of 'working technologically', students develop a range of associated knowledge, practices and dispositions" (Queensland Schools Curriculum Council, 2002, p.2). Thus ICTs are seen in government policy to very much be just one of the tools for learning.

Education reform in Queensland is reflected in teacher education programs. It is reported, however, that teachers often feel that they are not provided with adequate support to use technology effectively in the classroom (Brush, Glazewski, Rutnowski and Berg, 2003). This is an example of how policy attempts to address change, but in practical terms educational systems undergoing transformation fail to deal with significant factors that influence how transitions take place.

In light of this, the Bachelor of Learning Management (BLM) degree has seen a radical redesigning of the model of teacher education. Policymakers and stakeholders have worked together to design a program that focuses on collaborative learning and exploring ways to manage learning throughout the lifespan. The design is multi-disciplinary and multi-sectoral. Rather than the focal point being 'knowledge' or 'information' as the important components, the focus is on the ability to access information, create solutions, analyse and apply knowledge. New partnerships have been established between the university and schools/learning sites. Practising classroom teachers also work as teacher educators and mentor student teachers. University-based teacher educators network with schools in a variety of ways. Universities, schools and community partners together facilitate learning in this teacher education model.

An example of how this is done is in the way information literacy is explored. One of the first courses of the BLM, 'Networks and Partnerships', teaches some of the skills needed to access information literacy. Subsequent courses in the program have information literacy skills embedded in the courses, such as when students are required to use various databases, websites and other e.resources. In this way, as the 'information' changes, students will have the skills to access, analyse and apply 'knowledge' that is relevant to the situation. Computer literacy is managed in the same way. The ability and skills (basic competencies) required to negotiate the hardware are taught but students are encouraged to see the potential of the 'tool' and the autonomy it gives learners rather than be focused on specific 'computer knowledge' as the final

point. The ability to learn new skills and adapt to new hardware and software will be essential as in the knowledge economy, technology and pedagogy are quickly outdated. After the initial 'skilling', computer literacy is also embedded in subsequent courses.

A crucial aspect of this model is that it incorporates a 'futures perspective'. It is a model that is amenable to the notion of continuous change and reform. Change is accepted as the constant rather than the variable. Learners (whether teachers or students) are prepared for the present and for the future. Learning is dynamic, flexible and responsive to the needs of particular contexts. ICTs are simply one of the change agents as tools for learning.

The BLM with its emphasis on a futures orientation has the potential to be a successful model of teacher education for the 21st century. Students positionthemselves to enact change, collaborate successfully with students and other stakeholders and release the power of ICTs for learners.

CONCLUSION

For students facing the challenges of the twenty-first century, there is a need to replace current traditional models of education with a model that reflects the knowledge economy and the need for lifelong learning. Our teachers are experiencing reform fatigue with all of the major developments that have occurred in the last decade. Educators need to recognize the need to constantly update skills and knowledge, not only of their students but their own skills as well. In the knowledge economy, there is a new role for teachers. While teachers have the 'reform' mindset (the brake), they are not seeing themselves as lifelong learners (the accelerator) who are constantly updating their knowledge, skills and pedagogy. Governments are spending large amounts of money on technology and infrastructure so that powerful ICTs are available for use in schools. These ICTs have the potential to significantly influence teaching practice, students' learning and engagement in the learning process.

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