ICT: Challenges for creative learning

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Abstract

Background: Information and communications technologies (ICT) are often characterized as offering new and exciting possibilities for changing and enhancing the way people work and play. Similarly, ICT-based learning environments offer opportunities for new types of learning and cognitive activity that have not been previously available in formal educational settings. Lessons from business reveal that technology can be a powerful accelerator of change, however it must be focused on productive applications.

Focus of discussion: In education, there have been calls to more closely examine some of the claims for ICT and to re-think the ways it has been used to date. This paper argues that at the school-level, the form ICT will take and the functions it will serve for teaching and learning are still yet to be determined.

Argument: It is clear from studies of highly successful organizations that that they think differently about technology and work hard to develop thoughtful and creative applications. The continuing challenge for Hong Kong schools is to demonstrate that ICT has a credible place in the development of collaborative learning environments that emphasize knowledge production over knowledge reproduction.

Conclusion: The educational leadership that is required for the new millennium is to look for smart uses of technology that are designed to foster knowledge creation and productive learning.

Keywords: information and communication technology (ICT), learning, design

Introduction

Everyday we are reminded by the media that information and communication technology (ICT) offers new and exciting possibilities for enhancing the way we work and play. For many people the gap between the hype and the actual experience has resulted in a level of skepticism and concern towards new technologies. There is considerable evidence that many people, regardless of skill level, experience a high level of stress associated with using technologies of all kinds (Weil & Rosen, 1998). Organizations that have adopted technical approaches to the use of technology are finding that their employees are more than a little “teched-off” with the technology over people approach. Take for example electronic mail. Once heralded as a tool for promoting dialogue and community building it is not uncommon for employees to...
report it is most often used to support one-way communication styles resulting in management-by-email approaches. The makers of communication and gaming products understand the importance of developing interesting and creative applications that fit people’s lifestyles. Some companies attempt to emphasize the importance of applications of their products in their corporate strategy (e.g. Nokia’s “Connecting People”).

ICT and schools
Schools face similar challenges to find creative uses of technology that engage young people and make a difference in learning. Young people actively engage in rich and complex technological contexts (Hancock, 1997) that contrast sharply with their school experience that they often find irrelevant and frustrating (Leone & Richards, 1989). For many teachers their experience of new technologies is limited and they often resist its use (Becker, 2000; Downes 2002). This situation is exasperated by the fact that educational systems all around the world now link educational reform with the creative and reflective applications of technology. Adopting more reflective approaches to technological use can help us ‘look behind’ the application to focus more on the educational benefits. Reflective approaches also require recognition of the inherent tension in the technological proposition. Sinikka (1995) identifies this well when she characterizes two opposing views about the use of technology. It can be used to strengthen communities and give voice to individuals and groups previously silenced, or it can become a tool of control serving the interests of governments and/or multinational capitalism. Both views are current and compete for expression just as alternate views for schooling - to free individuals or to prepare them for citizenship - compete in the development of the school curriculum. As educators engage with these different views, they will find themselves involved in the dialogue between these opposing schools of thought. For example, on the one hand, educational publishers and other commercial interests are looking seriously at ICT as a way of delivering goods and services into schools while on the other hand, communities (e.g. teachers, parents and professional associations) explore ways of using it as a means of collaboration and resource sharing. Facing the challenges of using ICT in educationally productive ways requires a rethinking of the place of ICT in education and a consideration of the ways to promote the development of creative contexts for thinking and learning.

ICT in schools
There is a growing band of commentators that present compelling cases for re-thinking how we have used technology in schools to date (Cuban, 2001; Healy, 1998; Oppenheimer, 1997; Postman, 1993; Stoll, 1999; Turkle, 1995). A common theme emerging from these views is the need to reconsider not just the how but also the why of ICT use. Cuban (2001) questions the claimed benefits of technology and has called for the proponents to examine their assumptions and work to develop a broader vision of the contribution of ICT to education. A proponent of technology, Becker (2000) in many ways agrees that technology has not transformed teaching and learning, however he argues that many of the problems arise from the narrow and technical focus of the educational applications. He concludes that in situations where teachers and students engage in authentic and deep learning there are more encouraging outcomes. Numerous critics argue that many uses of technology represent a failure to engage with students and their experience. Some go as far as to suggest that these effects are potentially damaging (e.g. Healy, 1998; Stoll, 1999). Even without needing
to accept the fundamental premises of these critics’ views, there is a strong imperative to re-consider the use of ICT. In today’s social and political climate, the focus on the economic costs of ICT is also important. In a recent review of ICT research, Angrist and Lavy (2002) conclude that “the costs are clear-cut the benefits are murky.” The challenges for research and evaluation in this area are highlighted by Rowe (1996) who suggests that ICT must be seen as more than a narrow technical experimental treatment or effect. Postman (1993) makes an important distinction between views of technology as ‘additive’ as opposed to ‘evolutionary’. He argues that technology transforms the social landscape and thus any evaluation or critique must acknowledge the changed social context. The creative application of ICT changes the context of teaching and learning and “alters the collaborative interaction and shared dialogue between students and teachers” (Rowe, 1996, p. 1). Research and evaluation must adopt more multidimensional approaches to monitor both the changes that take place in the cultures of classrooms/schools and the changes in students. At present, most measures of ICT learning seem to focus more on skills than knowledge creation.

Kevin Kelly (1997) argues that the term “information age” no longer adequately describes the era in which we live. Instead, the knowledge age or “network economy” means that the valued commodity is no longer routine and disembodied information, but rather the processes humans use to work together to create new knowledge and innovate. In this new era, views of human knowledge and development that do not acknowledge the interaction of context are inadequate. Increasingly, educational policy is also recognizing that an emphasis on mass knowledge and its transmission is only partially useful, and that there is also a need to understand the social and cultural base of knowledge development and human action. However, the extent to which educational practice has kept pace with these developments is still somewhat limited. In The Children's Machine: Rethinking School in the Age of the Computer, Seymour Papert (1993) posed a thought experiment in which a group of time travellers from the past, comprising a group of surgeons and a group of school teachers, visit their modern-day workplaces. The surgeons find the developments in medical knowledge and the application of new technologies have transformed practice while the teachers notice few changes.

In a recent review of the theories that underpin recent ICT applications, Merrill (2002) concluded that many of these theories share similar learning principles that are representative of what has been seen as the broader philosophical shift from instructionist to constructivist accounts of learning. While constructivism provides rich accounts of learning, there is limited discussion or reconciliation of the relationship between individual and social learning. Papert (1998) believes that constructivism offers us much but its emphasis has almost exclusively been on teaching:

There are many books and courses on the art of constructivist teaching, which talk about the art of setting up situations in which the learner will construct knowledge but I do not know any books on what I would assume to be the more difficult art of actually constructing the knowledge. The how-to-do-it literature in the constructivist subculture is almost as strongly biased to the teacher side as it is in the instructionist subculture. (p. 83)
There is evidence pointing to the benefits of adopting constructivist-type approaches to the integration of information technology into teaching and learning (Jonassen, Peck, & Wilson, 1999; Laurillard, 2002; Roblyer, Edwards, & Havriluk, 2002). There is also evidence that “instructionist” approaches often increase a teacher’s reluctance to adopt new technologies (Becker, 2000; Downes, 2002; Elliott, 1999). Roblyer, Edwards and Havriluk (2002) believe the role of teacher education is to develop both techno-savvy and child-centred teachers. Clearly there is a greater need to develop a more integrated focus on teaching and learning with ICT as both a context for learning and a set of practical skills (Au, Kong, Leung, Ng, & Pun, 1999; Lee, 2002). At the school level, effective technology integration also requires systemic institutional reform that must be supported by appropriate leadership (Brooks-Young, 2002).

In schools, the form ICT will take and the functions it will serve for teaching and learning will be determined largely by the framework and perspectives that school communities choose to adopt. Following Sinikka (1995), school communities must ask themselves: Does their use of ICT simply serve curriculum as another resource or does it transform what it means to be a learner in the knowledge age? Does it strengthen local communities or serve other interests? Does it position students as consumers of information or as creators of knowledge? Experience arising from working with teachers shows that answers to these and other important questions are most often realized when school communities engage with ICT on a more regular and confident basis. However, it is equally important that schools develop a critical view of what might be possible now and in the future. As learning organizations schools cannot ignore these questions. As dialogue is a key characteristic of any learning organization this must be enabled in such a way to allow all stakeholders, individually and collectively, to work to produce results that matter. Quite clearly, the use of ICT in education is no longer simply a teacher or student issue - it is a school development issue. In order to do this we need to develop a broader understanding of ICT and initiate a sustained dialogue grounded in pedagogical frameworks within which ICT is no longer seen as a technical issue but rather a whole school challenge that is focused on improving learning outcomes for children.

Creative contexts for learning

Cultural-historical activity theory (Engeström, 1999; Leontiev, 1978; Luria, 1971) sees the development of thinking processes and human activity as intimately related. This more systemic view argues that successful technological innovation requires a deep understanding of its social and cultural setting (Nardi, 1996). One implication arising from this view is that many educational innovations are often stifled by contextual factors. With respect to ICT innovation these factors can take the many forms such as exam-oriented pedagogy, unsupportive leadership, resistant teachers, irrelevant learning tasks all the way through to problems of fragmented timetabling and classroom layout. Experienced educators understand the powerful influence of these factors. In the area of psychology, Quartz & Sejnowski (2002) argue that traditional views of intelligence (based around IQ predominately) have been the biggest obstacle to creating smart cultures. In education, teacher-centred and exam-oriented approaches to education and schooling often stifle individual creatively and hinder educational innovation. There is also evidence from brain science that this can impact on brain development. The brain’s capacity to change its structure and function is known as plasticity. The brain has evolved with a capacity for life-long
learning developed in response to being immersed in a complex and changing world. Animal studies reveal that the most significant brain changes occur when the animal’s environment is regularly changed. The key implication is that our brains need stimulation and novelty. Routine and highly structured environments do not offer these opportunities. There is promising work that is showing how teaching programs can be developed to build and strengthen an individual brain function (Quartz & Sejnowski, 2002). Psychology (and education) used to hold individual differences up as the main source of variation in performance. It is quite likely that the availability and use of technological tools in creative contexts will be a new source of variance offering a very real opportunity to leverage individual differences in highly productive ways.

A focus on the use of ICT as knowledge creation is also dependent on the design of contexts or spaces for thinking and learning. Vygotsky (1978) and Luria (1971) argued that tool-use shapes and re-shapes thinking processes. As context changes, those thinking processes also change. They are not fixed and unchanging but rather plastic and formed by practical activity. Many current uses of ICT in schools are skills-based and characterized by set routines and fixed instructional sequences and activities. Many of these uses require little creativity on the part of students and thus have limited impact on thinking processes. Though these are an important form of thinking, it is quite clear that the next generation of thinkers must develop more relational and reflective forms of thinking. It follows that our goal should be about designing activities and contexts for learning that both generates new knowledge and provides contexts that shape more creative and reflective forms of thinking.

The concepts of multiliteracies (The New London Group, 1996) and technoliteracies (Lankshear, Snyder, & Green, 2000) work against a view of technology from a technical perspective. In these views, integrating ICT into school curriculum without examining the pedagogical implications of practice fails to engage with the realities of today’s changing world - a world of rapid technological and economic change that requires flexible and strong problem-solvers. In this regard ICT is seen both as a form of information literacy dealing with the effective use of technologies, and the basis for the development of higher-order thinking and problem-solving. Information literacy is a dialogic process that is fundamentally active and communicative rather than passive and informational. The main point to take from these views is the importance of seeing the design of ICT-based activities as an open-ended and collaborative process. While there are useful examples of using ICT to promote higher-level thinking (Moersch, 2002), for project-based learning (Moursund, 2003) and Webquests (Dodge, 1997), all of these approaches still draw largely on instructionist models and there is still a need for broader collaborative knowledge creation approaches.

The Hong Kong context
The Hong Kong Special Administrative Region (HKSAR) government requires all new teachers to demonstrate their proficiency in using and applying ICT (Education and Manpower Bureau, 1998). Their five-year strategy (1998-2003) was designed to promote the use of ICT specifically for the enhancement of teaching and learning. A key aim of this strategy was to ensure that ICT supported at least 25% of the curriculum by 2003 and was used comprehensively within ten years. The key message from various reports such as Information Technology Learning Targets for HK Schools (Curriculum Development Council, 2001) is that ICT comprises an
important set of skills to be learned so that it can be applied effectively as a tool for teaching and learning.

The recently released *Information Technology in Education: Way Forward* (Education and Manpower Bureau, 2004) acknowledges the significant challenges and barriers to realizing the goals of the original five-year strategy. While a formal evaluation of the strategy is still under way, it appears clear that Hong Kong schools have achieved a sound level of access and connectivity. Most teachers have received (or achieved) basic IT skills, however the percentage of teachers who have reached the “creative” level is still small (about 6%). To what extent the use of technology in Hong Kong schools has impacted on educational practice, resulting in a shift from teacher-directed to student-centred approaches, is yet to be determined (Pearson, 2001). While the results of the recent Second Information Technology in Education Study Module 2 (SITES M2 – http://www.sitesm2.org) do provide examples of innovative uses of technology both in Hong Kong and internationally, the overall numbers of teachers adopting these approaches is still small (Kozma, 2003). Both in Hong Kong and elsewhere, there is a clear imperative for ICT integration across the curriculum based on constructivist approaches.

The continuing challenge to integrating ICT effectively is that of moving away from narrow and technical views of technology in teaching and learning. The idea of smart and more integrated uses of technologies is supported by studies of successful business organizations. In his book *Good-to-Great*, Jim Collins (2001) shows how effective businesses work hard to create a will or momentum for growth and then choose appropriate technologies to accelerate that growth. The impetus for change and growth is based around the core business goals and not solely the desire for change or technology-use per se. Successful organizations think differently about technology and respond to the pressure of change with thoughtfulness, creativity and design. It is timely for Hong Kong schools to reflect on the thoughtfulness, creativity and design of their uses of ICT in education. Is ICT used as a ‘lever for change’ focused on the development of productive learning communities or is it a ‘blunt instrument’ used to reinforce skills agendas and old ways of teaching and learning? Is it used as an accelerator or inhibitor of educational change? Is it used to promote new educational dialogues or maintain the status quo? There is strong anecdotal evidence suggesting that the creative use of ICT is struggling for a foothold in Hong Kong schools.

**Tools to support knowledge creation**

An example of a collaborative approach to knowledge creation can be seen in recent work that is promoting a new model of design through the development of collaborative knowledge creation tools (Findley, 2003). Based on software known as group decision support systems (GDSS), these tools were originally developed in Australia to support decision making in business settings and in recent years have been adapted to facilitate collaborative learning. The team learning systems (TLS) in its most recent implementation has features that record and document the expertise of people skilled in human interaction and knowledge formation. In many implementations, this expertise is presented as pre-structured open-ended questions to a group in either a face-to-face or distributed setting. In its room-based form, twelve keyboards are connected via a multiplexer to a computer, allowing everyone to “talk” at the same time and view the ideas as they are being created or further manipulated (a
web-based version allows teams to collaborate on a problem over the Internet). A real context or question is posed and the participants follow different design-etiquettes (e.g. Talk-Type-Read-Synthesize) to solve problems and produce knowledge outcomes. The system allows participants to operate both as individuals and as part of a team in a variety of contexts. Concept development takes place more intuitively, in a manner more like the way “private thoughts” evolve, as opposed to the more formal and structured way of taking turns to present opinions and positions. The TLS also has voting tools that allow participants to respond simultaneously in public or private to propositions, either as a single question or sequence of questions, and then tabulate and chart the group inputs. The tools comprise a Yes-No vote, Multiple Choice, Weight, Rank, XY, Scale, and Team Questionnaire. The success of these types of tools appears to be due largely to the way that students are given access to high level cognitive expertise allowing them to co-create new knowledge. The knowledge creation process is highly collaborative and open-ended but still involves design and facilitation.

**Conclusion**

Improving learning with ICT requires the careful design and facilitation of activities that connect with young people’s interest. The success of such innovations will be highly dependent on the local social and political context. Our perceptions and theoretical frameworks simultaneously limit and liberate particular learning possibilities. While constructivism has significantly advanced our understanding of how learning occurs, we need to better understand how ICT-based settings can promote higher-order thinking and learning. Ten years ago, Charles Crooke (1994) wrote, “if we do not wish to see new technology transform the experience of learning into something solitary and dislocated-then we must demonstrate that it has a credible place in a more collaborative framework” (p. 223). The continuing challenge for school communities is to demonstrate that their use of ICT is not restricted to technical applications but has a credible place in the development of productive collaborative learning environments. The way forward for ICT in Hong Kong, and elsewhere for that matter, is to sustain a “practical” dialogue that engages with ICT-based learning as a complex educational phenomenon while promoting strong pedagogical frameworks within which ICT is no longer seen as a technical issue (e.g. teacher development of computer skills) but rather a broader philosophical issue (e.g. school development) that must be linked to improving learning outcomes for students.

**References**


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