Role of ICT in Secondary Education

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ABSTRACT

Information and communication Technology (ICT) is entering into almost all subjects. It is supposed to be used as a tool where and when considered useful. Actions are taken or planned to make sure that ICT will be the real part of the curriculum by supporting software development by integrating ICT into standard learning materials, by offering ICT module cases and by integrating the use of ICT in the different subjects areas. Further analysis reveals that a comparison of learner to teacher ratios at schools by the school type (primary, combined or secondary) shows that among schools that do not have computers, large class sizes and high learner to teacher ratios predominate in primary schools. In secondary schools, class size and learner to teacher ratios tend to be lower. By combining the information on the technology clusters and the learner to teacher ratio clusters an Index of Resources was constructed with three levels: low, medium and high. The survey, it was possible to create a (rough) index of technology resources (i.e. the level of technology resources which schools have). School had to indicate which of a number of 'technologies', such as TVs, VCRs, OHPs etc they had. Again, through cluster analysis, two 'technology clusters' were produced: high and low clusters. The vast majority of schools in the sample were classified as the low-tech cluster, ie. Where not more than one of thee items was available. The remaining 20% of schools were classified as the high-tech cluster. These schools on average have more than four of the items in the technology list. The next step was to look at the cross-tabulation of the ratio groups with the technology clusters. The use of ICTs can make substantial change in education and training mainly in two ways, Firstly, the rich representation of information changes the larger's perception and understanding of the context. Secondly, the vast distribution and easy access to information can change relationship between educators and student teachers. ICT can also provide powerful support for educational innovations.

Introduction:

The use of ICTs can make substantial change in education and training mainly in two ways, Firstly, the rich representation of information changes the larger's perception and understanding of the context. Secondly, the vast distribution and easy access to information can change relationship between educators and student teachers. ICT can also provide powerful support for educational innovations. It is important to examine the profile of schools without computers in some depth as it provides us with an important minimum benchmark against which to compare other stages in ICT provision and use. Among the schools with no computers, two groups were generated through cluster analysis: schools where learner to teacher ratios are relatively high (43:1) and those where the ratio is substantially lower (26:1).

Most of the sample (60%) were classified in the low ratio group; the remaining (40%) in the high ratio group. In making use of learner to teacher ratios, it is important to note that, ratios within and between provinces may differ considerably.

It is supposed to be used as a tool where and when considered useful. Actions are taken or planned to make sure that ICT will be the real part of the curriculum by supporting software development by integrating ICT into standard learning materials, by offering ICT module cases and by integrating the use of ICT in the different subjects areas. Further analysis reveals that a comparison of learner to teacher ratios at schools by the school type (primary, combined or secondary) shows that among schools that do not have computers, large class sizes and high learner to teacher

ratios predominate in primary schools. In secondary schools, class size and learner to teacher ratios tend to be lower. By combining the information on the technology clusters and the learner to teacher ratio clusters an Index of Resources was constructed with three levels: low, medium and high. When schools in the sample were organised into these three levels.

The Index of Resources was subsequently cross-tabulated with a two-level grouping of factors that inhibit the acquisition of computer facilities in the school. This grouping, divided into those schools that listed a few inhibiting factors and those that identified many inhibiting factors (more than 5). It is clear that schools which are classified as poorly resource identify a greater number of factors as inhibiting their acquisition of computer facilities. The opposite is also true: schools that are categorized as highly resources, on average identify a few factors inhibiting their capacity to acquire computer facilities.

This newly created variable was then cross-tabulated with the Pentium clusters. The results showed that there was a moderately strong correlation between the Pentium clusters and the ratio groupings. It was therefore decided to record the resultant categories into a new variable. A re-grouping of the variables produced a fourfold classification that we have termed ICT Sophistication Index with four categories: low, low/medium, medium/ high and high. The mean number of Pentiums and Laser Printers for these four categories.

This table shows that there is a clear relationship between level of ICT sophistication and the mean number of Pentiums in use in a school, but also between level of ICT sophistication and mean number of laser printers in use. When the ICT Sophistication Index was compared to other indicators of sophistication such as access to the Internet, a similar picture emerged.

A. Strong correlation between ICT sophistication and Internet access and there is a strong correlation between low ICT sophistication schools and the absence of Internet access. Furthermore, moderately strong correlations were obtained between ICT sophistication, the use of file servers and computer networks, as well as the proportion of teachers with e-mail facilities at home. It was decided to combine the two middle categories with a resultant 3-category index: low, medium and high levels of ICT sophistication.

The result reveal that in Secondary schools that have a low index of ICT sophistication, fund raising played a more significant role as a source of funding for ICTs. However, schools within this category were also dependent to varying degrees on funds obtained from parental contributions. In schools that have a medium to high index of ICT sophistication, financial contributions from parents constituted the more important source of funding for new ICT resources at the school.

- Overall, funds that were obtained from both parents and fund raising were evenly spread across schools irrespective of their start-up date.
- Schools that started before 1994 were more reliant on contributions from parents for financing new ICT resources.
- Schools that started from 1995 onwards depended to a greater degree on fund raising activities.
- Funding obtained through fund raising activities was generally prevalent in primary schools. However, in primary schools a large part of the funds that were used for new ICT resources were obtained from both parental and fund raising contributions.

There is a growing tendency within schools for parents to share a greater burden of education expenditure. It was also pointed out that such expenditure is largely directed towards non-personnel expenditure where cuts in real terms have been most significant over the past three years. The recognition that the situation places poorer families at a disadvantage and reinforces a growing division between schools which are able to supplement their income from parent's contributions and those where parents cannot afford to contribute has been recognised and noted by the government. The sources of funding for ICTs and the link between parent contributions and higher levels of resources suggest that the provision of ICTs follows the same pattern as other non-personnel expenditure items.

There is no doubt then that while the provision, maintenance and teaching of computers remains an area of expenditure which is largely dependent on parent contributions, existing inequalities in the provision of ICTs will not only deepen but will also serve as a mechanism for increasing the divide between schools. The implications of this are enormous, particularly as ICTs develop as a means of accessing

information and as a vital support mechanism for both educators and learners. These concerns were expressed openly by some of the more disadvantaged schools interviewed in the survey. They argued that even if they were able to raise money or receive a donation for new ICT resources, parents would be unable to pay for any maintenance that may be required and their teachers lacked the skills to be able to use the computers effectively.

As instructional partners, the classroom teacher and library media specialist are actively involved in identifying the learning needs of the students developing teaching units that facilitate activities which offer meaningful practice in using a variety of information resources, and guiding student progress. Based on a recent study, the following factors seemed to result in successful integration of information skills into the academic curriculum:

● The institution has a strong commitment to excellent educational outcomes for the students in the area of critical thinking, problem solving, and information skills.

● Library administrators have long-term commitments to integrate library instruction into the curriculum; and

● Faculty and librarians work together in curriculum development.

Many changes are occurring in the workplace today. Employees are expected to keep up with rapid technological advances, to streamline operations and to possess the ability to be proactive problem solvers. Information literacy skills, which carry over from educational to occupational settings, are the keys to helping employees keep up with change in their jobs and careers, and in self-improvement and upgrading of skills. Awareness of market trends, the business climate, and policies affecting business involves the active pursuit of information upon which decisions will be made. Such information has to be considered for its bias, source, and accuracy. Indeed, information technology appears to be broadening the gap between the haves and the have notes.

Information and communication technology (ICT) is a force that has changed many aspects of the way we live. If one was to compare such fields as medicine, tourism, travel, business, law, banking, engineering and architecture, the impact of ICT across the past two or three decades has been enormous. The way these fields operate today is vastly different

from the ways they operated in the past. But when one looks at education, there seems to have been an uncanny lack of influence and far less change than other fields have experienced. A number of people have attempted to explore this lack of activity and influence. As we move into the 21st century, these factors and many others are bringing strong forces to bear on the adoption of ICTs in education and contemporary trends suggest we will soon see large scale changes in the way education is planned and delivered as a consequence of the opportunities and affordances of ICT. This work seeks to explore the likely changes we will see in education as ICT acts as a powerful agent to change many of the educational practices to which we have become accustomed. In particular, the work will explore the impact both current and emerging information and communication technologies will be likely to have in coming years on what is learned, when and where learning will take place and how the learning will occur.

The Impact of ICT in Secondary Education:

Conventional teaching has emphasised content. For many years course have been written around textbooks. Teachers have taught through lectures and presentations interspersed with tutorials and learning activities designed to consolidate and rehearse the content. Contemporary settings are now favoring curricula that promote competency and performance. Curricula are starting to emphasis capabilities and to be concerned more with *how* the information will be used than with *what* the information is:

A. Competency and performance-based curricula:

The moves to competency and performance-based curricula are well supported and encouraged by emerging instructional technologies (eg. Stephenson, 2001). Such curricula tend to require:

● access to a variety of information sources;

● access to a variety of information forms and types;

● student-centered learning settings based on information access and inquiry;

● learning environments centered on problem-centered and inquiry-based activities;

● Teachers as coaches and mentors rather than content experts.

Contemporary ICTs are able to provide strong support for all these requirements and there are now many outstanding examples of world class settings for competency and performance-based

curricula that make sound use of the affordances of these technologies. For many years, teachers wishing to adopt such curricula have been limited by their resources and tools but with the proliferation and widespread availability of contemporary ICTs, many restrictions and impediments of the past have been removed. And new technologies will continue to drive these forms of learning further. As students and teachers gain access to higher bandwidths, more direct forms of communication and access to sharable resources, the capability to support these quality learning settings will continue to grow.

B. Information literacy :

Another way in which emerging ICTs are impacting on the content of education curricula stems from the ways in which ICTs are dominating so much of contemporary life and work. Already there has emerged a need for educational institutions to ensure that graduates are able to display appropriate levels of information literacy, "the capacity to identify and issue and then to identify, locate and evaluate relevant information in order to engage with it or to solve a problem arising from it". The drive to promote such developments stems from general moves among institutions to ensure their graduates demonstrate not only skills and knowledge in their subject domains but also general attributes and generic skills.

Traditionally generic skills have involved such capabilities as an ability to reason formally, to solve problems, to communicate effectively, to be able to negotiate outcomes, to manage time, project management, and collaboration and teamwork skills. The growing use of ICTs as tools of every day life have seen the pool of generic skills expanded in recent years to include information literacy and it is highly probable that future developments and technology applications will see this set of skills growing even more.

The impact of ICT on *how* students learn:

Just as technology is influencing and supporting what is being learned in schools and universities, so too is it supporting changes to the way students are learning. Moves from content-centered curricula to competency-based curricula are associated with moves away from teacher-centered forms of delivery to student-centered forms. Through technology-facilitated approaches, contemporary learning settings now encourage students to take responsibility for their own learning .In the past students have become very comfortable to learning through transmissive modes. Students have been trained to let others present to them the information that forms the curriculum. The growing use of ICT as an instructional medium is changing and will likely continue to change many of the strategies employed by both teachers and students in the learning process. The following sections describe particular forms of learning that are gaining prominence in universities and schools worldwide.

A. Student-centered learning :

Technology has the capacity to promote and encourage the transformation of education from a very teacher directed enterprise to one which supports more student-centered models. Evidence of this today is manifested in:

● The proliferation of capability, competency and outcomes focused curricula
● Moves towards problem-based learning
● Increased use of the Web as an information source, Internet users are able to choose the experts from whom they will learn

The use of ICT in educational settings, by itself acts as a catalyst for change in this domain. ICTs by their very nature are tools that encourage and support independent learning. Students using ICTs for learning purposes become immersed in the process of learning and as more and more students use computers as information sources and cognitive tools the influence of the technology on supporting how students learn will continue to increase.

B. Supporting knowledge construction

The emergence of ICTs as learning technologies has coincided with a growing awareness and recognition of alternative theories for learning. The theories of learning that hold the greatest sway today are those based on constructivist principles (eg. Duffy & Cunningham, 1996). These principles posit that learning is achieved by the active construction of knowledge supported by various perspectives within meaningful contexts. In constructivist theories, social interactions are seen to play a critical role in the processes of learning and cognition. In the past, the conventional process of teaching has revolved around teachers planning and leading students through a series of instructional sequences to achieve a desired learning outcome. Typically these forms of teaching have revolved around the planned transmission of a body of knowledge followed by some forms of interaction with the content as a means to consolidate the

knowledge acquisition. Contemporary learning theory is based on the notion that learning is an active process of constructing knowledge rather than acquiring knowledge and that instruction is the process by which this knowledge construction is supported rather than a process of knowledge transmission.

Impact of ICT on *when* and *where* students learn:

In the past educational institutions have provided little choice for students in terms of the method and manner in which programs have been delivered. Students have typically been forced to accept what has been delivered and institutions have tended to be quite staid and traditional in terms of the delivery of their programs. ICT applications provide many options and choices and many institutions are now creating competitive edges for themselves through the choices they are offering students. These choices extend from when students can choose to learn to where they learn.

A. Any place learning:

The concept of flexibility in the delivery place of educational programs is not new. Educational institutions have been offering programs at a distance for many years and there has been a vast amount of research and development associated with establishing effective practices and procedures in off-campus teaching and learning. Use of the technology, however, has extended the scope of this activity and whereas previously off-campus delivery was an option for students who were unable to attend campuses, today, many more students are able to make this choice through technology-facilitated learning settings. The communications capabilities of modern technologies provide opportunities for many learners to enroll in courses offered by external institutions rather than those situated locally. These opportunities provide such advantages as extended course offerings and eclectic class cohorts comprised of students of differing backgrounds, cultures and perspectives.

B. Anytime learning

In concert with geographical flexibility, technology-facilitated educational programs also remove many of the temporal constraints that face learners with special needs . Students are starting to appreciate the capability to undertake education anywhere, anytime and any place. This flexibility has heightened the availability of just-in-time learning and provided learning opportunities for many more learners who previously were constrained by other

commitments. Through on-line technologies learning has become an activity that is no longer set within programmed schedules and slots. Learners are free to participate in learning activities when time permits and these freedoms have greatly increased the opportunities for many students to participate in formal programs. The wide variety of technologies that support learning are able to provide asynchronous supports for learning so that the need for real-time participation can be avoided while the advantages of communication and collaboration with other learners is retained.

A. Expanding the pool of teachers

In the past, the role of teacher in an educational institution was a role given to only highly qualified people. With technology-facilitated learning, there are now opportunities to extend the teaching pool beyond this specialist set to include many more people. The changing role of the teacher has seen increased opportunities for others to participate in the process including workplace trainers, mentors, specialists from the workplace and others. Through the affordances and capabilities of technology, today we have a much expanded pool of teachers with varying roles able to provide support for learners in a variety of flexible settings. This trend seems set to continue and to grow with new ICT developments and applications. And within this changed pool of teachers will come changed responsibilities and skill sets for future teaching involving high levels of ICT and the need for more facilitative than didactic teaching roles.

B. Expanding the pool of students:

In the past, education has been a privilege and an opportunity that often was unavailable to many students whose situation did not fit the mainstream. Through the flexibility provided by technology, many students who previously were unable to participate in educational activities are now finding opportunities to do so. The pool of students is changing and will continue to change as more and more people who have a need for education and training are able to take advantage of the increased opportunities. Interesting opportunities are now being observed among.

C. The cost of education:

Traditional thinking has always been that technology-facilitated learning would provide economies and efficiencies that would see significant reductions in the costs associated with the delivery of

educational programs. The costs would come from the ability to create courses with fixed establishment costs, for example technology-based courses and for which there would be savings in delivery through large scale uptake. We have already seen a number of virtual Universities built around technology delivery alone. The reality is that few institutions have been able to realize these aims for economy. There appear to have been many underestimated costs in such areas as course development and course delivery.

Conclusion:

The costs associated with the development of high quality technology-facilitated learning materials are quite high. It has found to be more than a matter of repackaging existing materials and large scale engineering has been found to be necessary with large scale costs. Likewise costs associated with delivery have not been found to diminish as expected. The main reason for this has been the need to maintain a relatively stable student to staff ratio and the expectation of students that they will have access to teachers in their courses and programs. Compared to traditional forms of off-campus learning, technology-facilitated learning has proven to be quite expensive in all areas of consideration, infrastructure, course development and course delivery. We may have to brace ourselves for the advantages and affordances which will improve the quality of education in the near future to also increase components of the cost. The use of ICTs can make substantial change in education and training mainly in two ways, Firstly, the rich representation of information changes the larger's perception and understanding of the context. Secondly, the vast distribution and easy access to information can change relationship between educators and student teachers. ICT can also provide powerful support for educational innovations. Information and communication Technology is entering into almost all subjects. It is supposed to be used as a tool where and when considered useful. Actions are taken or planned to make sure that ICT will be the real part of the curriculum by supporting software development by integrating ICT into standard learning materials by offering ICT module cases and by integrating the use of ICT in the secondary education.

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