Impact of Information and Communication Technology (ICT) On Education

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Abstract: - Education is one of the main keys to economic development and improvements in human welfare. As global economic competition grows sharper, education becomes an important source of competitive advantage, closely linked to economic growth, and a way for countries to attract jobs and investment. In addition, education appears to be one of the key determinants of lifetime earnings. Countries therefore frequently see raising educational attainment as a way of tackling poverty and deprivation. In developing countries, education is also linked to a whole batch of indicators of human development. Education of women influences the health of children and family size. The experience of Asian economies in particular in the past two decades has demonstrated the benefits that public investment in education can bring. In richer countries, education is seen as important not just in the early years, but also in later life. As the pace of technological change quickens and as the workforce in many rich countries grows older, education offers a way to improve and update the skills and capabilities of the workforce.

I. INTRODUCTION

There are, however, many constraints on delivering education to the right people at the right time. In developing countries, there is frequently a shortage of qualified school teachers. People may live in scattered communities in rural areas. Money for books and teaching materials may be scarce. In wealthier countries, money is also a problem: in particular, the cost of university education has risen sharply, and students are increasingly expected to meet all or part of the cost directly. But, at the level of higher education and training, the problem is often also one of time. Students who are already in full-time employment find it hard to take part in a university course offered at conventional times of day. Finally, employers, keen to train staff, are often acutely conscious of the costs of taking people away from their main job in order to attend training courses. They are therefore eager for more efficient and flexible ways to deliver information to employees.

All these factors have encouraged an interest in the use of information and communications technologies (ICT) to deliver education and training. Computers began to appear in school and university classrooms in the more advanced countries around the early 1980s. Broadband connections to schools and universities became common place in wealthier countries in the second half of the 1990s. In developing countries, experience is more limited. This is not necessarily a bad thing, as it should allow those countries to learn from the investments of richer countries.

Initially, educators saw the use of ICTs in the classroom mainly as a way to teach computer literacy. Most now see a broader role: that of delivering many kinds of learning at lower cost and with higher quality than traditional methods of teaching allow. In addition, schools and universities increasingly use ICTs, as do other large organizations, to reduce the costs and improve the efficiency of administration. By far the largest investments so far in ICTs have been in the United States. The United States' budget for the use of technology in schools is enormous: since 1989, the US Department of Education has invested almost US$1 billion in the use of technology in public education.1 Not surprisingly, most of the work developing educational ICTs and their most widespread applications are in the United States. And, as a result, many of the evaluations of ICTs have been carried out in the United States. Some lessons from American experience will be universal. Others will be peculiar to that country's education system, which at the higher level involves more private money and enterprise than higher education in most other countries.

In examining the development of ICTs in schools, universities and training, an important distinction should be made. In the case of schools, teachers primarily use ICTs in the school as an instructional device. "Distance" learning is rarely part of school teaching. In the case of higher education and training, students are more likely to use ICTs partly to learn at a distance from the instructor. Different teaching techniques are thus probably required in the two areas of education.

Also important to remember is the fact that most investment in education is publicly financed. Indeed, some has been driven more by politics than education policy. Computers and broadband connections have a high level of visibility; that makes them an attractive way for politicians to claim to be upgrading education with public money. 2 Even when politicians are not involved, the most measurable spending on ICTs in education is generally the result of public policy rather than private choice. However, private investment in ICTs also occurs. Some is by companies, using ICTs for training programs. In addition, many students acquire home computers partly for educational purposes; many, especially in richer countries, use their computers for study and homework. One important question is whether public investments in ICTs in education, made at the behest of administrators or politicians, have been less successful than private investments, made by students on their own account.

Certainly, public-sector investors in ICTs in education need to be aware of the way corporate employers are approaching the use of ICTs in training, in case there are lessons to be learned. In making investments in ICTs in education, policy-makers have often had conflicting goals. Sometimes, the emphasis is on teaching computer skills and literacy; sometimes, on improving the quality of education, giving students access to a wider range of resources than they could otherwise enjoy, or teaching in a more effective way. Often, a subtext is that ICTs are a way to save money. That may mean reaching more people without a comparable increase in costs—and thus improving the productivity of the education system—or widening access, to reach students such as the housebound at a lower cost than would otherwise be entailed. In addition, ICTs are sometimes seen as a way to widen the times at which education is available. Obviously, it is impossible to meet all these goals simultaneously with a single tool. If ICTs can be used effectively to improve the delivery of education, they offer worthwhile prizes: in particular, lower costs and wider access. But policy-makers increasingly want to see value for money and clear evidence that educational investments will deliver commensurate benefits. And some of the early enthusiasts for ICTs in education have become more cautious, or even downright skeptical. This paper examines the conditions that need to be met if ICTs are to improve the delivery of education sufficiently to justify the investment involved. Where those conditions are not met, educators may do better to stick to the age-old recipe of "chalk and talk". The differing background The potential for using ICTs well in education and in building human capital depends on a number of factors that differ from one country

to another, and especially between developed and developing countries. It is important for countries to bear these differences in mind when making investments. What works in a country with high levels of computer access and low telephone costs will not necessarily transfer to somewhere with few computers and expensive connection charges. One of the most important differences between countries is the availability of hardware. A computer is essentially an individual device, most useful for one person at a time. Everywhere, youngsters tend to have better access at home than at school. In Sweden, for example, an OECD survey of 15-year-olds in 2000 found that 90 per cent had almost daily access to computers at home, but only 37 per cent at school. In nearby Latvia, by contrast, only 15 per cent of 15-year-olds had near-daily access at home, and a mere 5 per cent at school. At university level, computer ownership is almost universal in richer countries.

The followings are the aim and objectives of ICT implementation in education:
- ->To implement the principle of life-long learning / education.
- ->To increase a variety of educational services and medium / method.
- ->To promote equal opportunities to obtain education and information.
- ->To develop a system of collecting and disseminating educational information.
- To promote technology literacy of all citizens, especially for students.
- ->To develop distance education with national contents.
- ->To promote the culture of learning at school (development of learning skills, expansion of optional education, open source of education, etc.)
- ->To support schools in sharing experience and information with others.

The Effectiveness of ICTs in Education
ICTs stand for information and communication technologies and are defined, for the purposes, as a "diverse set of technological tools and resources used to communicate, and to create, disseminate, store, and manage information." These technologies include computers, the Internet, broad casting technologies (radio and television), and telephony.

ICTs are a potentially powerful tool for extending educational opportunities, both formal and non-for mal, to previously underserved constituencies—scattered and rural populations, groups traditionally excluded from education

due to cultural or social reasons such as ethnic minorities, girls and women, persons with disabilities, and the elderly, as well as all others who for reasons of cost or because of time constraints are unable to enroll on campus.

1) *Anytime, anywhere*. One defining feature of ICTs is their ability to transcend time and space. ICTs make possible asynchronous learning, or learning characterized by a time lag between the delivery of instruction and its reception by learners. Online course materials, for example, may be accessed 24 hours a day, 7 days a week. ICT-based educational delivery (e.g., educational programming broadcast over radio or television) also dispenses with the need for all learners and the instructor to be in one physical location. Additionally, certain types of ICTs, such as teleconferencing technologies, enable instruction to be received simultaneously by multiple, geographically dispersed learners (i.e., synchronous learning).

2) **Access** *to remote learning resources*. Teachers and learners no longer have to rely solely on printed books and other materials in physical media housed in libraries (and available in limited quantities) for their educational needs. With the Internet and the World Wide Web, a wealth of learning materials in almost every subject and in a variety of media can now be accessed from anywhere at anytime of the day and by an unlimited number of people. This is particularly significant for many schools in developing countries, and even some in developed countries, that have limited and outdated library resources. ICTs also facilitate access to resource persons, mentors, experts, researchers, professionals, business leaders, and peers—all over the world.

3) *ICTs help prepare individuals for the workplace.*
   One of the most commonly cited reasons for using ICTs in the classroom has been to better prepare the current generation of students for a workplace where ICTs, particularly computers, the Internet and related technologies, are becoming more and more ubiquitous. Technological literacy, or the ability to use ICTs effectively and efficiently, is thus seen as representing a competitive edge in an increasingly globalizing job market.

4) *Benefits/Advantages of ICT in Education*
   Here are some of the benefits which ICT brings to education according to recent research findings.

General benefits
- ❖ Greater efficiency throughout the school.
- ❖ Communication channels are increased through email, discussion groups and chat rooms
- ❖ Regular use of ICT across different curriculum subjects can have a beneficial motivational influence on students' learning.

Benefits for teachers
- ❖ ICT facilitates sharing of resources, expertise and advice
- ❖ Greater flexibility in when and where tasks are carried out
- ❖ Gains in ICT literacy skills, confidence and enthusiasm.
- ❖ Easier planning and preparation of lessons and designing materials
- ❖ Access to up-to-date pupil and school data, anytime and anywhere.
- ❖ Enhancement of professional image projected to colleagues.
- ❖ Students are generally more 'on task' and express more positive feelings when they use computers than when they are given other tasks to do.
- ❖ Computer use during lessons motivated students to continue using learning outside school hours.

Benefits for students
- ❖ Higher quality lessons through greater collaboration between teachers in planning and preparing resources.
- ❖ More focused teaching, tailored to students' strengths and weaknesses, through better analysis of attainment data
- ❖ Improved pastoral care and behavior management through better tracking of students
- ❖ ☐ Gains in understanding and analytical skills, including improvements in reading Comprehension.
- ❖ Development of writing skills (including spelling, grammar, punctuation, editing and re-drafting), also fluency, originality and elaboration.
- ❖ Encouragement of independent and active learning, and self-responsibility for learning.
- ❖ Flexibility of 'anytime, anywhere' access (Jacobsen and Kremer, 2000)
- ❖ Development of higher level learning styles.
- ❖ Students who used educational technology in school felt more successful in school, were more motivated to learn and have increased self-confidence and self-esteem

- Students found learning in a technology-enhanced setting more stimulating and student-centered than in a traditional classroom
- Broadband technology supports the reliable and uninterrupted downloading of web-hosted educational multimedia resources
- Opportunities to address their work to an external audience
- Opportunities to collaborate on assignments with people outside or inside school

ICT and Raising Standards

Recent research also points to ICT as a significant contributory factor in the raising of standards of achievement in schools. Schools judged by the school inspectors to have very good ICT resources achieved better results than schools with poor ICT. Schools that made good use of ICT within a subject tended to have better achievement in that subject than other schools.

Socio-economic circumstances and prior performance of pupils were not found to be critical.

Secondary schools with very good ICT resources achieved, on average, better results in English, Mathematics and Science than those with poor ICT resources. A range of research indicates the potential of ICT to support improvements in aspects of literacy, numeracy and science. Improved writing skills: grammar, presentation, spelling, word recognition and volume of work. Age-gains in mental calculations and enhanced number skills, for example the use of decimals. Better data handling skills and increased ability to read, interpret and sketch graphs Improvements in conceptual understanding of Mathematics (particularly problem solving) and Science (particularly through use of simulations)

The use of ICTs helps improve the quality of education

ICTs can enhance the quality of education in several ways: by increasing learner motivation and engagement by facilitating the acquisition of basic skills, and by enhancing teacher training. ICTs are also transformational tools which, when used appropriately, can promote the shift to a learner-centered environment.

Motivating to learn

ICTs such as videos, television and multimedia computer software that combine text, sound, and colorful, moving images can be used to provide challenging and authentic content that will engage the student in the learning process. Interactive radio likewise makes use of sound effects, songs, dramatizations, comic skits, and other performance conventions to compel the students to listen and become involved in the lessons being delivered. More so than any other type of ICT, networked computers with Internet connectivity can increase learner motivation as it combines the media richness and interactivity of other ICTs with the opportunity to connect with real people and to participate in real world events.

Facilitating the acquisition of basic skills.

The transmission of basic skills and concepts that are the foundation of higher order thinking skills and creativity can be facilitated by ICTs through drill and practice. Educational television programs such as Sesame Street use repetition and reinforcement to teach the alphabet, numbers, colors, shapes and other basic concepts. Most of the early uses of computers were for computer-based learning (also called computer-assisted instruction) that focused on mastery of skills and content through repetition and reinforcement.

Enhancing teacher training.

ICTs have also been used to improve access to and the quality of teacher training. For example, At Indira Gandhi National Open University, satellite-based one-way video- and two-way audio-conferencing was held in 1996, supplemented by print-materials and recorded video, to train 910 primary school teachers and facilitators from 20 district training institutes in Karnataka State. The teachers interacted with remote lecturers by telephone and fax

Examples of ICT-based activities

What kind of classroom activities are suited to the use of ICT? The following is a brief guide to some of the most common uses of ICT in teaching and learning.

Finding out

Students can use ICT to find out information and to gain new knowledge in several ways. They may find information on the Internet or by using an ICT-based encyclopedia such as Microsoft Encarta. They may find information by extracting it from a document prepared by the teacher and made available to them via ICT, such as document created using Microsoft Word or a Microsoft PowerPoint slideshow. They may find out information by communicating with people elsewhere using email, such as students in a different school or even in a different country.

Processing knowledge

Students can use ICT as part of a creative process where they have to consider more carefully the information which they have about a given subject. They may need to carry out calculations (e.g. by using Microsoft Excel), or to check grammar and spelling in a piece of writing (perhaps using

Microsoft Word), or they may need to re-sequence a series of events (for example by re-ordering a series of Microsoft PowerPoint slides).

Sharing knowledge
Students can use ICT to present their work in a highly professional format. They can create documents and slideshows to demonstrate what they have learned, and then share this with other students, with their teacher, and even via email with people all around the world.

Computers and the Internet use for teaching and learning
There are three general approaches to the instructional use of computers and the Internet, namely:
1) Learning about computers and the Internet, in which technological literacy is the end goal;
2) Learning with computers and the Internet, in which the technology facilitates learning across the curriculum; and
3) Learning through computers and the Internet, integrating technological skills development with curriculum applications.

Learn about computers and the Internet
Learning about computers and the Internet focuses on developing technological literacy. It typically includes:
- Fundamentals: basic terms, concepts and operations
- Use of the keyboard and mouse
- Use of productivity tools such as word processing, spreadsheets, database and graphics programs
- Use of research and collaboration tools such as search engines and email
- Basic skills in using programming and authoring applications such as Logo or Hyper Studio
- Developing an awareness of the social impact of technological change.

Learning with computers and the Internet
Learning with the technology means focusing on how the technology can be the means to learning ends across the curriculum. It includes:

- Presentation, demonstration, and the manipulation of data using productivity tools
- Use of curriculum-specific applications types such as educational games, drill and practice, simulations, tutorials, virtual laboratories, visualizations and graphical representations of abstract concepts, musical composition, and expert systems
- Use of information and resources on CD-ROM or online such as encyclopedia, interactive map sand atlases, electronic journals and other references.

- Technological literacy is required for learning with technologies to be possible, implying a two-step process in which students learn about the technologies before they can actually use them to learn.

Learning through computers and the Internet mean
Learning through computers and the Internet combines learning about them with learning with them. It involves learning the technological skills "just-in-time" or when the learner needs to learn them as he or she engages in a curriculum-related activity.

Computers and the Internet used in distance education
Many higher educational institutions offering distance education courses have started to leverage the Internet to improve their program's reach and quality.

Disadvantages of ICT
One of the major barriers for the cause of ICT not reaching its full potential in the foundation stage is teacher's attitude. According to Hara (2004), within the early years education attitudes towards ICT can vary considerably. Some see it as a potential tool to aid learning whereas others seem to disagree with the use of technology in early year settings. Blatchford and White bread (2003:16), suggests that the use of ICT in the foundation stage is "unhealthy and hinders learning". Other early years educators who are opposed to offering ICT experiences within the educational settings take a less extreme view than this and suggest that ICT is fine, but there are other more vital experiences that young children will benefit from, (Blatchford and White bread, 2003). In theory some people may have the opinion that the teachers who had not experienced ICT throughout their learning tend to have a negative attitude towards it, as they may lack the training in that area of the curriculum.
Another important drawback to using ICT in schools is the fact that computers are expensive. According to the IT learning exchange (2001), in most schools ICT will be the single largest curriculum budget cost. This may be seen as a good thing but on the other hand there will be little money left over for other significant costs. There is widespread research interest in information and communication technologies (ICTs). According to Crede & Mansell (1998), ICTs are crucially important for sustainable development in developing countries. Thioune (2003) notes that for the past two decades most developed countries have witnessed significant changes that can be traced to ICTs. These multi-dimensional changes have been observed in almost all aspects of life: economics, education, communication, and travel. In a technology driven society, getting information

quickly is important for both sender and receiver. ICTs have made it possible to quickly find and distribute information.

Work Cited:

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