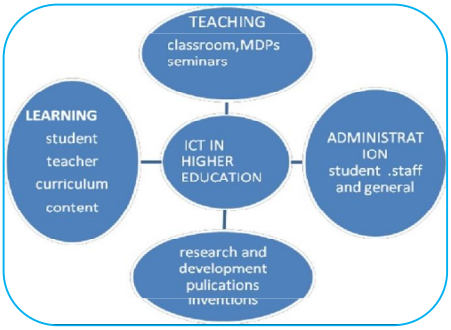
REVIEW OF RESEARCH
ISSN: 2249-894X
IMPACT FACTOR : 5.7631(UIF)
VOLUME - 12 | ISSUE - 5 | FEBRUARY - 2023

THE ROLE OF ICT IN HIGHER EDUCATION FOR THE 21ST CENTURY: ICT ASA CHANGE AGENT FOR EDUCATION

Dr. Shivpal Singh[1] and Mr. Rakesh Kumar Keshari[2]
[1]Principal, Dewan Institute of Management Studies (College of Education)
Affiliated to CCS University,Meerut ,Uttar Pradesh, India.
[2]Assistant Professor, Dewan Institute of Management Studies (College of Education)
Affiliated to CCS University,Meerut, Uttar Pradesh, India.

ABSTRACT:



Information and communication technologies (ICT) have becomecommonplace entities in all aspects of life. Across the past twenty years the use ofICT has fundamentally changed the practices and procedures of nearly all forms ofEndeavour within business and governance. Within education, ICT has begun to havea presence but the impact has not been as extensive as in other fields. Education is avery socially oriented activity and quality education has traditionally been associatedwith strong teachers having high degrees of personal contact with learners. The useof ICT in education lends itself to more student-centred learning settings and oftenthis creates some tensions for some teachers and students. But with the world movingrapidly into digital media and information, the role of ICT in education is becomingmore and more important and this importance will continue to grow and develop inthe 21st century. This paper highlights the various impacts of ICT on contemporaryhigher education and explores potential future developments. The paper argues therole of ICT in transforming teaching and learning and seeks to explore how this willimpact on the way programs will be offered and delivered in the universities andcolleges of the future.

KEYWORDS: *Online Learning, Constructivism, Higher Education.*

INTRODUCTION:

Information and communication technology (ICT) is a force that has changed many aspects of theway 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 hasbeen enormous. The way these fields operate today is vastly different from the ways theyoperated in the past. But when one looks at education, there seems to have been an uncanny lackof influence and far less change than other fields have experienced. A number of people haveattempted to explore this lack of activity and influence (eg.Soloway and Prior, 1996; Collis, 2002)There have been a number of factors impeding the wholesale uptake of ICT in education acrossall sectors. These have included such factors as a lack of funding to support the purchase of thetechnology, a lack of training among established teaching practitioners, a lack of motivation andneed among teachers to adopt ICT as teaching tools (Starr, 2001). But in recent times, factorshave emerged which have strengthened and encouraged

moves to adopt ICTs into classrooms andlearning settings. These have included a growing need to explore efficiencies in terms ofprogram delivery, the opportunities for flexible delivery provided by ICTs (eg. Oliver & Short,1997); the capacity of technology to provide support for customized educational programs tomeet the needs of individual learners (eg. Kennedy & McNaught, 1997); and the growing use ofthe Internet and WWW as tools for information access and communication (eg. Oliver & Towers,1999).As we move into the 21st century, these factors and many others are bringing strong forces to bearon the adoption of ICTs in education and contemporary trends suggest we will soon see largescale changes in the way education is planned and delivered as a consequence of theopportunities and affordances of ICT. This paper seeks to explore the likely changes we will seein education as ICT acts as a powerful agent to change many of the educational practices towhich we have become accustomed. In particular, the paper will explore the impact both currentand emerging information and communication technologies will be likely to have in comingyears on what is learned, when and where learning will take place and how the learning willoccur.

THE IMPACT OF ICT ON WHAT IS LEARNED

Content has always dominated conventional education. Courses have been designed around textbooks for a long time. Lectures and presentations have been used to teach, along with tutorials and learning activities to reinforce and practice the material. Curricula that emphasize competence and performance are increasingly popular in today's classrooms. Curriculums are beginning to emphasize skills and to focus more on how students will use the information than on what it is.

A. COMPETENCY AND PERFORMANCE-BASED CURRICULA

Emerging instructional technologies (e.g., e-learning) strongly support and encourage the shift to competency- and performance-based curricula. 2001, Stephenson) These courses typically require:

- having access to numerous information sources;
- access to many different kinds and formats of information;
- learning environments centered on students and based on information access and inquiry;
- learning environments that emphasize inquiry-based and problem-centered activities;
- real-world scenarios and examples; and teachers' roles as coaches and mentors as opposed to content specialists.

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, and contemporary ICTs are able to provide strong support for all of these requirements (e.g. 2000, Oliver) Teachers who have wanted to implement such curricula for a long time have been constrained by the tools and resources they have at their disposal. However, with the proliferation and widespread availability of modern ICTs, many of the previous restrictions and obstacles have vanished. What's more, new innovations willcontinue to drive these types of learning further. The capacity to support these high-quality learning environments will continue to expand as teachers and students gain access to resources that can be shared, more direct forms of communication, and faster internet connections.

B. INFORMATION LITERACY

The ways in which ICTs now dominate so much of contemporary life and work are another factor influencing the content of education curricula. “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” (McCausland, Wache, & Berk, 1999, p.2), has already emerged as a need for educational institutions to ensure that graduates exhibit appropriate levels of information literacy. The drive to encourage such advancements stems from institutional efforts to ensure that graduates possess not only subject-specific skills and knowledge but also general characteristics and generic skills. In the past, abilities like formal reasoning, problem-solving, effective communication, negotiation of outcomes, time management, project management, and collaboration and teamwork skills were considered generic

skills. In recent years, the pool of generic skills has expanded to include informationliteracy as a result of the growing use of ICTs as everyday tools, and it is highly likely that this set of skills will expand even further in the future with technological advancements and applications.

THE IMPACT OF ICT ON HOW STUDENTS LEARN

The way students learn is also being influenced and supported by technology, just as it is influencing and supporting what is taught in schools and universities. Changes in delivery methods from teacher-centered to student-centered are associated with shifts from content-centered to competency-based curricula. Students are now encouraged to take responsibility for their own learning in modern learning environments thanks to technology-facilitated approaches. In the past, students were very used to learning through transmissive modes. Students have been taught to let other people present the curriculum's information to them. Many of the methods that teachers and students use to help them learn are changing as a result of the increasing use of ICT as an instructional tool. The following sections talk about specific types of learning that are becoming more common in schools and universities around the world.

A. STUDENT-CENTRED LEARNING

The shift from a teacher-centered to a more student-centered model of education can be supported and facilitated by technology. Today, these are examples of this: The use of ICT in educational settings is itself a catalyst for change in this domain. The proliferation of curricula focused on capability, competency, and outcomes moves toward problem-based learning. Internet users are able to choose the experts from whom they will learn. Increased use of the Web as an information source. By their very nature, ICTs are instruments that support and encourage independent learning. As more and more students use computers as information sources and cognitive tools (e.g., ICTs), they become immersed in the learning process. According to Reeves & Jonassen (1996), technology will continue to have a greater impact on how students learn.

B. SUPPORTING KNOWLEDGE CONSTRUCTION

A growing awareness of alternative learning theories has coincided with the emergence of ICTs as learning technologies. Based on constructivist principles, the most effective learning theories of today are 1996, Duffy and Cunningham). According to these tenets, learning can be accomplished through the active construction of knowledge supported by a variety of perspectives and meaningful contexts. Social interactions are seen as having a significant impact on learning and cognition in constructivist theories (e.g. Vygotsky, 1978). Traditionally, teachers have planned and guided students through a series of instructional sequences in order to achieve a desired learning outcome. As a means of consolidating the knowledge acquired, these types of teaching have typically revolved around the planned transmission of a body of knowledge followed by some forms of interaction with the content. Constructivism's strengths lie in its emphasis on learning as a process of personal understanding and the development of meaning in ways that are active and interpretative. Contemporary learning theory is based on the idea 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 (Duffy & Cunningham, 1996). In this field, learning is viewed as meaning-making rather than fact-memorization (e.g. Lebow, 1993; (Reeves & Jonassen, 1996) By enabling learning to be related to context and practice and by providing support for resource-based, student-centered settings, contemporary ICT-based learning approaches provide numerous opportunities for constructivist learning (e.g. Berge, 1998; 1998, Barron). As was mentioned earlier, any use of information and communication technology (ICT) in a learning environment can help with a variety of aspects of knowledge construction. The impact of this will grow as more students use ICTs in their learning processes.

THE IMPACT OF ICT ON WHEN AND WHERE STUDENTS LEARN

In the past, educational establishments have limited students' options for how programs are delivered and how they are delivered. In most cases, students have been made to accept what has been given to them, and educational establishments have tended to be rather rigid and conventional when it comes to how their programs are delivered. Applications for information and communication technology (ICT) offer a plethora of options, and many educational establishments are now gaining an advantage over rivals by offering students more options. These options range from when and where students can choose to learn.

A. ANY PLACE LEARNING

It is not a novel idea to allow educational programs to be delivered anywhere (e.g. 1996 (Moore & Kearsley). Programs have been offered at a distance by educational institutions for a long time, and there has been a lot of research and development done on effective off-campus teaching and learning methods. The application of technology, on the other hand, has broadened the scope of this activity. Previously, students who were unable to attend campuses had the option of receiving their education off-campus; however, today, a significant number of students are able to do so through technology-facilitated learning environments. Some of the examples below demonstrate the scope and extent of this activity.

- Learning in work-based settings, where students can access courses and programs from their workplace, has increasingly replaced traditional classroom instruction. Not only is it easier to get education and training when it's needed, but it also saves money on travel and time away from work. It also makes it easier to apply what you learn in real-world situations that matter.
- Many learners can enroll in courses offered by outside institutions rather than those located locally thanks to the communications capabilities of modern technologies. The advantages of these opportunities include extensive course offerings and diverse class cohorts made up of students from a variety of cultures, backgrounds, and perspectives.
- The freedoms of choice provided by programs that can be accessed from anywhere also support the delivery of programs with units and courses from a variety of institutions. For instance, undergraduate students now have a plethora of options for studying units for a single degree through a number of different institutions, which gives students a lot of variety and choice in the programs they take.

B. ANYTIME LEARNING

Technology-facilitated educational programs remove many of the temporal constraints that students with special needs face, in addition to geographical flexibility (e.g. Moore and Kearsley, Students are beginning to appreciate their ability to learn from any location, at any time. Just-in-time learning is now more readily available thanks to this adaptability, and many more students who were previously constrained by other commitments (e.g. Young, 2002).

- The use of online technologies has made learning an activity that is no longer constrained by predetermined times and places. When time permits, students are free to participate in learning activities, greatly expanding the opportunities for many students to participate in formal programs.
- The many different learning technologies can provide asynchronous learning support, preserving the advantages of communication and collaboration with other students while avoiding the requirement for real-time participation.
- Teachers are also discovering that the advantages of teaching at any time outweigh the disadvantages of learning at any time. Teaching and learning are supported round-the-clock by mobile technologies and seamless communications technologies. The educators of the future will face challenges in deciding how much time will be used within the 24-hour-a-day envelope and during what periods of time (e.g. Young, 2002).

In the years to come, the increased use of information and communication technologies (ICTs) in education will serve to expand the temporal and geographical opportunities that are currently available. The ICT capabilities of the lowest common denominator, or the students with the least access to ICT, frequently impede advancements in learning opportunities. These opportunities will also increase as public access to ICT increases.

EMERGING ISSUES

The adoption of technology has resulted in a number of additional issues whose effects have not yet been fully investigated. These include alterations to the composition of the teacher pool, to the profile of our courses' students, and, most importantly, to the costing and economics of course delivery.

A. EXPANDING THE POOL OF TEACHERS

In the past, only highly qualified individuals held the position of teacher in an educational establishment. With technology-facilitated learning, the teaching pool can now include a lot more people than just this specialist group. Opportunities for other people, such as workplace trainers, mentors, specialists from the workplace, and others, to participate in the process have increased as the teacher's role has changed. We now have a much larger pool of teachers who are able to support students in a variety of flexible settings thanks to the advantages and capabilities of technology. With new ICT innovations and applications, this trend appears to be set to continue and expand. In addition, new responsibilities and skill sets will be required for future teaching, which will require more facilitative rather than didactic teaching roles (e.g. Littlejohn and other, 2002).

B. EXPANDING THE POOL OF STUDENTS

Education has historically been a privilege and an opportunity that many students whose circumstances did not fit the norm often lacked. Many students who were previously unable to participate in educational activities are now able to do so thanks to the flexibility provided by technology. As more and more people who have a need for education and training are able to take advantage of the increased opportunities, the pool of students is changing and will continue to change. For example, school students taking university courses to get around limitations in their programs and employees taking courses from their desktops are both seeing interesting opportunities.

C. THE COST OF EDUCATION

The conventional way of thinking has always been that technology-enhanced education would result in savings and efficiencies that would significantly lower the costs of providing educational programs. The ability to create courses with fixed establishment costs, such as technology-based courses, would result in savings in delivery due to widespread enrollment. A number of virtual universities have already been constructed solely around technology delivery (e.g. (http://www.jiu.edu/) Jones International University In reality, not many institutions have been able to achieve these economic goals. In areas like course development and delivery, it appears that many costs were underestimated.

The production of high-quality learning materials that make use of technology is very expensive. It has been discovered that it is more than just a matter of repackaging existing materials; large-scale reengineering is required at a large cost. In a similar vein, it was discovered that delivery-related costs did not decrease as anticipated. The expectation that students will have access to teachers in their courses and programs and the need to maintain a relatively stable student-to-staff ratio have been the primary drivers of this. In terms of infrastructure, course development, and delivery, technology-facilitated learning has proven to be quite costly in comparison to traditional off-campus learning methods. It's possible that we'll have to prepare ourselves for the advantages and savings that will soon raise some of the costs while also raising the quality of education.

STAKEHOLDERS AND INFLUENCES

Although ICTs may not have had a significant impact to date, their use will grow to play a significant role in many aspects of the design, development, and delivery of educational programs in the coming years, according to the ideas presented in this paper. Examples of an agent that can influence education at all levels and thus support and encourage significant change are provided by the various influences that have been discussed. It is fascinating to speculate among stakeholders as to which stakeholders will experience the greatest change when the future of education is considered in this manner. The primary stakeholders are listed in Table 1, which provides an idea of how the various issues discussed in the paper might affect each of them. Clearly, students are the stakeholders for whom technology appears to have the greatest influence and change. Therefore, regardless of the outcomes, the students will be the beneficiaries of the activity and change while institutions consider how they will be influenced in the future. It would appear that everyone would prefer this outcome.

Table 1: The influence of ICT on education and its stakeholders

	What is learned and how much	How it is learned	When it is learned	From whom it is learned	Who is learning	What it costs
Students	x	x	x	x	x	x
Employers	x		x	x		
Teachers	x	x	x	x		
Institutions	x		x	x		x
Government	x	x	x	x	x	x

SUMMARY AND CONCLUSIONS

This paper has sought to explore the role of ICT in education as we progress into the 21st century.In particular the paper has argued that ICTs have impacted on educational practice in education todate in quite small ways but that the impact will grow considerably in years to come and that ICTwill become a strong agent for change among many educational practices. Extrapolating currentactivities and practices, the continued use and development of ICTs within education will have astrong impact on:

- What is learned;
- How it is learned;
- When and where learning takes place;
- Who is learning and who is teaching.

The upshot of all this activity is that we should see marked improvements in many areas ofeducational endeavour. Learning should become more relevant to stakeholders' needs, learningoutcomes should become more deliberate and targeted, and learning opportunities shoulddiversity in what is learned and who is learning. At the same time, quality of programs asmeasured by fitness for purpose should continue to grow as stakeholder groups find the offerings matched to their needs and expectations.

To ensure that the opportunities and advantages are realized, it will be important as it is in everyother walk of life to ensure that the educational research and development dollar is sustained sothat education at large can learn from within and that experiences and activities in differentinstitutions and sectors can inform and guide others without the continual need for re-invention ofthe wheel. Once again ICTs serve to provide the means for much of this activity to realize the potential it holds.

REFERENCES

- Barron, A. (1998). Designing Web-based training. British Journal of Educational Technology, 29(4), 355-371.
- Berge, Z. (1998). Guiding principles in Web-based instructional design. Education Media International, 35(2), 72-76.
- Collis, B. (2002). Information technologies for education and training. In Adelsberger, H., Collis, B, &Pawlowski,J. (Eds.) Handbook on Technologies for Information and Training. Berlin: Springer Verlag.
- Duffy, T., & Cunningham, D. (1996). Constructivism: Implications for the design and delivery ofinstruction, Handbook of research for educational telecommunications and technology (pp. 170-198).New York: MacMillan.
- Freeman, M. (1997). Flexibility in access, interactions and assessment: The case for web-based teaching programs.Australian Journal of Educational Technology, 13(1), 23-39.
- Jonassen, D. & Reeves, T. (1996). Learning with technology: Using computers as cognitive tools. In D. Jonassen(Ed.), Handbook of Research Educational on Educational Communications and Technology (pp 693-719). NewYork: Macmillan.
- Kennedy, D. & McNaught, C.(1997). Design elements for interactive multimedia. Australian Journal of EducationalTechnology, 13(1), 1-22.
- Laffey J., Tupper, T. & Musser, D. (1998) A computer-mediated support system for project-based learning.Educational Technology Research and Development, 46(1), 73-86.
- Lebow, D. (1993). Constructivist values for instructional systems design: Five principles toward a newmindset. Educational Technology, Research and Development, 41(3), 4-16.
- Littlejohn, A., Suckling, C., Campbell, L. & McNicol, D. (2002). The amazingly patient tutor: students' interactionswith an online carbohydrate chemistry course. British Journal of Educational Technology, 33(3), 313-321.
- McCausland, H.,Wache, D. & Berk, M. (1999). Computer literacy; its implications and outcomes. A case study fromthe Flexible Learning Centre. University of South Australia.
- Moore, M. & Kearsley, G. (1996). Distance Education: A Systems View. Belmont, CA: Wadsworth.Oliver, R. & Short, G. (1996). The Western Australian Telecentres Network: A model for enhancing access toeducation and training in rural areas. International Journal of Educational Telecommunications, 2(4), 311-328.
- Oliver, R. (2000). Creating Meaningful Contexts for Learning in Web-based Settings. Proceedings of Open Learning2000. (pp 53-62). Brisbane: Learning Network, Queensland.
- Oliver, R. & Towers, S. (2000). Benchmarking ICT literacy in tertiary learning settings. In R. Sims, M. O'Reilly &S. Sawkins (Eds). Learning to choose: Choosing to learn. Proceedings of the 17th Annual ASCILITE Conference(pp 381-390). Lismore, NSW: Southern Cross University Press.
- Soloway, E. & Pryor, A. (1996). The next generation in human-computer interaction. Communications of theACM, 39(4), 16-18.
- Starr, L. (2001). Same time this year. [on-line]. Available at http://www.education-world.com/a_tech/tech075.shtml[Accessed July 2002].
- Stephenson, J., Ed. (2001). Learner-managed learning- an emerging pedagogy for online learning. Teaching andLearning Online: Pedagogies for New Technologies. London, Kogan Page.
- Young, J. (2002). The 24-hour professor. The Chronicle of Higher Education, 48(38), 31-33.
- Copyright ã 2002 (R. Oliver)The authors assign to the organisers of the HE21 Conference a non-exclusivelicense to use this document for personal use and in courses of instruction, provided that this article is used in full andthis copyright statement is reproduced. The authors also grant a non-exclusive license to the organisers of the HE21
- Conference to publish this document on CD-ROM within the HE 21 conference proceedings. Any other usage isprohibited without the express permission of the authors.