

Role of Information Technology (IT) And Information Communication & Technology (ICT) in Education, Research in Commerce & Management

¹Nimesh P Raval

S G M English Medium College of Commerce and Management (SEMCOM),
Vallabh Vidyanagar – 388 120, Gujarat.

Corresponding author e-mail: nimeshpriyakant@gmail.com

Abstract

Information Technologies (IT) and Information Communication Technologies (ICT) has played a significant role in worldwide changes that occurred in the last few decades. The World Wide Web provides a degree of information and learning resources unimaginable a few decades earlier. Most recently, Web applications, such as social networking, collaborative work and play spaces, blogs, and publication places for creative products, are being extensively used. These developments have resulted in a chasm between the world of information, knowledge production and dissemination, and learning as it exists outside of the schools, institutions and universities with what is happening within them. Adoption of Information and Communication Technologies in teaching, learning and research has come a long way and so is the use of various web tools. The researchers need to change with changing times and need to understand today's fast changing knowledge base and its peculiarities. The article is written with an objective of finding out how ICT helped for gathering knowledge and to enhance resource – development in commerce and management.

Keywords – Information Technologies (IT), Information Communication Technologies (ICT), Research, Commerce, Management.

Introduction

Use of Information Technology and Information and Communication Technology tools for making, gathering research data and information is more common nowadays, but the best use of ICT tools would be to improve cognitive skills to differentiate, evaluate and create wide information. As usually research process deals with large amount of complex information and requires a lot of skills to analyze and organize, any ICT tool which helps the researcher, gives meaning and precision along with adding value to the information generated, and would be rated above the ones which helps in just gathering information.

IT and ICT's are widely recognized for the contradictory twin roles they simultaneously play in society: the immense potential to meet development goals and to widen the gap between information rich and poor community overlapping with existing socio-economic divides. They also cover a broad range of meanings, approaches and practices from curing perennial poverty through capacity building to mushrooming back-end processing offices (BPO's) in urban sectors generating rapid employment. But, it is universally regarded as a 'good thing'.

ICT for development is the new mantra for initiatives to transform developing nations to superpowers or underdeveloped countries to clean and healthy ones. India is witness to rapid IT driven socio-economic boom with its GDP growth reaching all time high. Indian urban landscapes are dotted with IT parks, worldwide support centers and special economic zones. The government introduces pro-active policies to get faster the pace of economic upswing in the country. But this is barley a portion of the largely scenario. Despite a booming economy, the majority of suburban, peri-urban and rural India is yet to experience the fruits of opulence Seeking to gain momentum through India's mission of digital inclusion, many such ideologically driven processes (even those driven by government and private sector partnerships), find inconsistent adoption and sustainability in communities aspiring for entry into the larger information culture. Nevertheless, consumption of ICT value-oriented services is growing, with six million mobile phones added in the year

2006 in India to 25~30 million plus at the end of 2010. In this backdrop of increasing Indians interfacing with market driven ICT, we argue that the notional preponderance of development in challenging digital exclusion, evade or turn way from social processes, not in alignment with presumed development goals, where ICT's find better routes of immersion. To recollect a brief history of internet in India, the government introduced the first international telecom carrier in 1995. The Indian Government has been propelling towards "information age" and "convergence" by announcing enabling policies toward development and progress with an ultimate goal of "Internet for All". However, implementation of some of these policies has been beset with various operational, procedural, regulatory issues and supporting legal framework, which is inhibiting the reach and benefit of the Internet to masses in the country. A current survey by the Internet and Mobile association of India, IAMAI, puts India's Internet User Base at 37 Million touching 54 Million By March 2015

The Computer and Computer Technology

A computer, as the name indicates, is nothing but a device that computes. In this sense, any device, however crude or sophisticated, that enables one to carry out mathematical manipulations becomes a computer. But what has made this term conspicuous today and, what we normally imply when we speak of computers, are electronically operating machines which are used to carry out computations, editing the research work, has reduced human toil and added to the quality of research activity. To the researcher, the use of computer to analyze data has made complicated research designs practical. Electronic computers have by now become an indispensable part of research students in the physical and behavioral sciences as well as in the humanities. The research student, in this age of computer technology, must be exposed to the methods and use of computers. A basic understanding of the manner in which a computer works helps a person to appreciate the utility of this powerful tool. Computers can be used in education by three different ways such as "As a teacher", "As a learner", and "As an assistant". Broadly, one can consider the following roles of education where computer has been effectively used: Computer aided learning, Distance learning and Online examinations and Monitoring. Thus, Computer and its related technology viz. information technology have completely revolutionized our lives. It has great impact in our education system. Information technology makes our education system interested and effective. Students can learn better without getting bored and frustrated. Educators have now started using technology like smart classes, LCD projectors, EDUCOM, Laptops, memory sticks, digital drawing boards to make effective learning process. Haddad et al(2002) identify the five levels of technologies which are used in education such as presentation, demonstration, drill and practice, interaction and collaboration. And in during period of Covid-19 pandemic from 2019 to 2020, world over various universities, institutions, tutors and educators have adopted the use of tools of IT and ICT for imparting education, organizations of virtual seminars, conferences, workshops etc.

Role of Information Technology and ICT in Education

As per World communications and Information reports (UNESCO 1999-2000) ICTs swathe Internet service provision, telecommunications equipment and services, information technology equipment and services, media and broadcasting, libraries and documentation centers, commercial information providers, network-based information services, and other related information and communication activities. As claimed by UNESCO (2002) information and communication technology (ICT) may be regarded as the amalgamation of 'Informatics technology' with other related technology, especially communication technology. The various kinds of ICT products available and having relevance to education, such as teleconferencing, email, audio conferencing, television lessons, radio broadcasts, interactive radio counseling, interactive voice response system, audiocassettes and CD ROMs etc have been used in education for different purposes (Sharma, 2003; Sanyal, 2001; Bhattacharya and Sharma, 2007). The field of education has been affected by ICTs, which have undoubtedly affected teaching, learning, and research. A great deal of research has proven the benefits to the quality of education. ICTs have the potential to innovate, accelerate, enrich, and deepen skills, to motivate and engage students, to help relate school experience to work practices, create economic viability for tomorrow's workers, as well as strengthening teaching and helping schools change states, much has been said and reported about the impact of technology, especially computers, in education. Initially computers were used to teach computer programming but the development of the microprocessor in the early 1970s saw the introduction of affordable microcomputers into schools at a rapid rate. Computers and applications of technology became more pervasive in society which led to a concern about the need for computing skills in everyday life. Hepp et al (2004) claim in their paper "Technology in Schools: Education, ICT and the

Knowledge Society” that ICTs have been utilized in education ever since their inception, but they have not always been massively present. Although at that time computers have not been fully integrated in the learning of traditional subject matter, the commonly accepted rhetoric that education systems would need to prepare citizens for lifelong learning in an information society boosted interest in ICTs (**Pelgrum et al, 2003**). The 1990s was the decade of computer communications and information access, particularly with the popularity and accessibility of internet-based services such as electronic mail and the World Wide Web (WWW). At the same time the CD-ROM became the standard for distributing packaged software (replacing the floppy disk). As a result educators became more focused on the use of the technology to improve student learning as a rationale for investment. Any discussion about the use of computer systems in schools is built upon an understanding of the link between schools, learning and computer technology. When the potential use of computers in schools was first mooted, the predominant conception was that students would be ‘taught’ by computers (**Thakral P., 2015**). In a sense it was considered that the computer would ‘take over’ the teacher’s job in much the same way as a robot computer may take over a welder’s job. **Collis (1989)** refers to this as “a rather grim image” where “a small child sits alone with a computer”. However, the use of information and communication technologies in the educative process has been divided into two broad categories: ICTs for Education and ICTs in Education. ICTs for education refers to the development of information and communications technology specifically for teaching/learning purposes, while the ICTs in education involves the adoption of general components of information and communication technologies in the teaching learning process. A Computer, as the name indicates, is nothing but a device that computes. Performing calculations almost at the speed of light, the computer has become one of the most useful research tools in modern times. Computers are ideally suited for data analysis concerning large research projects. Researchers are essentially concerned with huge storage of data, their faster retrieval when required and processing of data with aid of various techniques. In all these operations, computers are of great help. Their use, apart expediting the research work, has reduced human drudgery and added to the quality of research activity. Electronic computers have by now become an indispensable part of research students in the physical and behavioral sciences as well as in the humanities. The research student, in this age of computer technology, must be exposed to the methods and use of computers. A basic understanding of the manner in which a computer works helps a person to appreciate the utility of this powerful tool. Keeping all this in view, the present chapter introduces the basics of computers, especially it. answers questions like: What is a computer? How does it function? How does one communicate with it? How does it help in analysing data?

Role of Information Technology and ICT in Research

Information technology – the set of computer and telecommunications technologies that makes possible computation, communication, and the storage and retrieval of information—has changed the conduct of scientific, engineering, and clinical research. The linkage of computer technology with telecommunications technology has removed the constraints of speed, cost, and distance from the researcher (**Stéphan Vincent-Lancrin.,2006**). On the whole, IT and ICT has led to improvements in research. Novel dimension for scientific discovery have opened. Researchers can collaborate more widely and efficiently. Much more data are available for analysis. Logical capabilities have enhanced significantly, along with the capability to present results as visual images (**Aitken, Wendy.,2007**). New information technologies offer further opportunity to advance research. But extensive use of computers in research has not come about without problems. Some of these difficulties are technological, some financial. Many of them are complex institutional and behavioral impediments., such as.

- 1) Funding sources required to build local network infrastructures.
- 2) Development of standards not only improves efficiency but also reduces costs.
- 3) Right to confidentiality of personal information is held strongly in our society. Concerns about the conflict between researchers' needs and citizens' rights have been extensively explored nowadays.
- 4) Gaps in Training and Education: The development of information technology has brought computing into the researcher's laboratory and office. As a result, the level of computing competence expected of researchers, their support staff, and their students has increased manifold.
- 5) Risks of Organizational Change: Changing an organization to make way for advanced information technology and its attendant benefits entails real risks. Administrators and research managers are often reluctant to incur the costs – financial, organizational, behavioral of new technology.
- 6) Absence of Infrastructure for the use of information technology.

ICT refers to technologies that provide access to information through telecommunications. It is similar to IT but primarily focuses on communication technologies. This includes internet, wireless networks, cell phones, and other communications mediums. It has provided society with vast arrays of new communication capabilities. For example, researchers can communicate through face book, instant messaging services, linkedin, google scholar, scopus, web of science, etc.

Generally, ICT helps research student in following ways: 1) Identify the appropriate information sources, literature search etc. 2) Analyzing information. 3) Research effectively, 4) Manage, store and gather information. 5) Extend and communicate information across subjects 6) More search of relevant databases, dissertation, thesis 7) Depicting results in common formats 8) Select favorite resource, journals, records, alerts, notifications for publications etc.

Applications of ICT in “**pre-data analysis**” includes, Literature search viz e-resources available on shodganga - India, Google scholar, Microsoft academic search, Mendeley, Linkdin SSRN – multidisciplinary online repository for online scholarly search and related material on subject, common search, literature tracking, data collection, thesis or dissertation tracking etc. Similarly, Application of ICT for “**In-data analysis**” viz. Quantitative data analysis and Qualitative data analysis. Lastly, application of ICT for “**post-data analysis**” Also references and bibliographic compilation, designing dissertation or thesis, plagiarism detection and research article writing and submission in journals.

Researchers interested in developing skills in computer data analysis, while consulting the computer centers and reading literature, must be aware of the following steps:

- I. Data organization and coding.
- II. Storing the data in the computer.
- III. Selection of appropriate statistical measures/techniques.
- IV. Selection of appropriate software package.
- V. Execution of the computer program.

Role of Information Technology and ICT in Management

Information Technology and Information Communication Technology (ICT) as described by **Chaffey and Wood** is “Technology resources used for business information management”. These resources include software, hardware and telecommunication networks used for managing information. IT helps the manager to improve the efficiency and effectiveness of their business processes, managerial decision making, and workgroup collaboration, thus helping the managers to strengthen the positions of their company in a rapidly changing environment. IT has become a necessary ingredient for Managers to succeed in today’s dynamic global environment.

According to **Benemati et al(2000)**., IT is changing rapidly and considering the increasing strategic impact of IT on business operations, its successful management is of utmost importance. **Irani and Love(2004)** suggested that for IT management to be successful, it must be perceived as an iterative business process capable of providing organizational learning throughout the lifecycle of the technology. However, even when IT is managed successfully, the question arises, as to what role IT plays in the achievement of organizational strategic goals and objectives. In response to this question, **Venkatraman et al(1993) and Franz and Klepper(1995)** postulated that the proper role of IT in an organization is usually epitomized as a fit or alignment with the strategic goals of the organization. Therefore, IT can only be appropriately aligned when infrastructure put in place to implement the IT strategy is adequate; the strategy supports the organization’s strategy and business processes. Today every organization has already started use of ICT. ICT facilitates storing and regaining gigantic information quickly with the help of hardware/software networks and workstations at minor costs. Technology enables combination and configuration of data to create distinctly new information which helps in speedy decisions. The global expansion of trade and commerce has facilitated the companies to go global needing a communicating network to fulfill their needs. ICT network enables to communicate with persons in any part of the world. In this way it helps to have an access to any information for making quick decisions. Human resources can be utilized in the best possible manner with the help of information technology to have the competitive edge by increasing operational efficiency of human resources and speedily increasing the productivity. The next century will be dominated by the use of information technology. The advanced knowledge is made accessible today itself. IT will be a boon for human resource management. It can also determine the need for training in future for the employees and executives. It

facilitates interaction between the employees of different departments and interdepartmental helping in to build teamwork. The use of information technology will change the work style of traditional nature because the decision support system will help in making quick decisions by the front line supervisors which were taken by higher ups in the managerial hierarchy. This will lessen the bureaucratic tendencies. IT will initiate customer oriented approach. The personnel's working in the field will be able to make more contacts with the customers and clients. Laptop computers aid them enormously in this respect. The corporate bodies are expanding their business area globally having human resources spread over in different countries of the world. The information technology through its systems like computer networking, electronic mail (E-mail) and videoconferencing bring them closer sitting (though at a large distance) together as a team discussing business, vital issues, planning, taking decisions ignoring the distance and time completely. Various tools of ICT are

1. Use of internet
2. Use of E-mails
3. Use of USENET
4. Talk facility through net
5. Internet Relay chat

Conclusion

Inspite of all this sophistication we should not forget that basically computers are machines that only compute, they do not think. The human brain remains supreme and will continue to be so for all times. As such researchers should be fully aware about following limitations of computer based analysis:

1. Computerized analysis requires setting up of an elaborate system of monitoring, collection and feeding of data. All these require time, effort and money. Hence, computer based analysis may not prove economical in case of small projects.
2. Various items of detail which are not being specifically fed to the computer may get lost sight of.
3. The computer does not think; it can only execute the instructions of a thinking person. If poor data or faulty programs are introduced into the computer, the data analysis would not be worthwhile. The expression "garbage in, garbage out" describes this limitation very well.
4. At last, user should not forget environment where he /she is performing.

References

1. UNESCO, 1999 – 2000., World communication and information report, 1999-2000
2. UNESCO, 2002., Information and Communication Technology in Education–A Curriculum for Schools and Programme for Teacher Development. Paris: UNESCO., UNESCO, 2002., Open and Distance Learning Trends, Policy and Strategy Considerations., Haddad W. and Drexler A. UNESCO, 2002. Technologies for Education: Potentials, Parameters and Prospect, Washington D.C, AED, Paris
3. Sharma, R., 2003. Barriers in Using Technology for Education in Developing Countries, IEEE0 – 7803 – 7724 – 9103. Singapore schools, Computers and Educ. 41(1): 49 – 63.
4. Sanyal, B. C., 2001, New functions of higher education and ICT to achieve education for all, UNESCO, Paris.
5. Bhattacharya, I., Sharma, K., 2007, India in the knowledge economy – an electronic paradigm, Int. J. Educ. Manage. 21(6): 543-568.
6. Hepp, K. P., Hinostroza, S.E., Laval, M.E., Rehbein, L. F., 2004. Technology in Schools: Education, ICT and the Knowledge Society, OECD, www1.worldbank.org/education/pdf/ICT_report_oct04a.pdf.
7. Pelgrum, W. J., & Law, N. 2003. ICT in education around the world: trends, problems and prospects. In. Fundamentals of educational planning; No. 77. UNESCO – IIEP.
8. Thakral P., 2015. Role of ICT in Professional Development of Teachers. Learning Community: 6(1): 127-133.
9. Collis, B. 1989. Using information technology to create new educational situations. "International Congress on Education Informatics" UNESCO, Paris.

10. Stéphan Vincent – Lancrin, 2006. What is Changing in Academic Research? – Trends and Futures Scenarios”, *European Journal of Education*, Volume 41(2): 169 – 202.
11. Aitken, Wendy, 2007. Use of Web in Tertiary Research and Education., *Webology*, 4(2), Article-42.
12. Benemati J, Lederer Albert L., 2000. Rapid Change: Nine Information Technology Management Challenges, *Information Systems and Operational Research* 38(4):336 – 357.
13. Irani Z. Love Peter E.D., 2004. An exploratory study of information technology evaluation and benefits management practices of SMEs in the construction industry, *Information & Management* 42: 227–242.
14. Venkatraman, N., Henderson, J.C., and Oldach, S.H., 1993. Continuous strategic alignment: exploiting IT capabilities for competitive success. *European Management Journal*, Vol. 11(2):139–149.
15. Franz, C.R., and R. Klepper., 1995. Information Technology and Business Strategy in Romania. *International Journal of Information Management*, Vol. 15, 451-461.

Web reference

1. <https://unesdoc.unesco.org/ark:/48223/pf0000119077>.
2. <http://www.webology.ir/2007/v4n2/a42.html>
3. <http://www.weblens.org/scholar.html>
4. <https://www.scholarify.in/application-of-ict-in-research/>
5. www1.worldbank.org/education/pdf/ICT_report_oct04a.pdf

