INFORMATION AND COMMUNICATIVE TECHNOLOGY - COMPUTERS AS RESEARCH TOOLS

By

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ABSTRACT

The emergence of "the electronic age/electronic cottages/ the electronic world" has affected the whole world; particularly the emergence of computers has penetrated everyone's life to a remarkable degree. They are being used in various fields including education. Recent advances, especially in the area of computer technology has heralded the development and implementation of new and innovative teaching strategies. There is growing interest in the application of computer-based tools to support higher level thinking, improve teaching and learning processes and effect in the field of research. Computers can be used as research tools to carryout various tasks. The use of software and the Internet deserve special mention here. Internet is the newest in the world of educational computing, it is being promoted by many as the most powerful tool for learning ever invented. What makes it so powerful is that it allows the child or young person to freely search for educational material or useful information, as well as doing communication with all sorts of people in different parts of the planet.

INTRODUCTION

The world is changing in all spheres: scientific and technological, political, economic, social and cultural. Hence, educating the young to meet these challenges has become a primary objective for every society (*World Education Report'98 UNESCO, 1998, p.16*). Toffler (1981) was enthusiastic in studying the effects of the social and cultural changes on various psychological, sociological and educational aspects. He explained the rapidly changing world as a sequence of *"three waves"* of civilisation. The first wave related to the invention of *agriculture*. The second wave was the *Industrial revolution* and the third wave is the emergence of " the *electronic age, /electronic cottages/ the electronic world*". This third wave has attacked the whole world; particularly the emergence of computers has penetrated everyone's life to a remarkable degree.

There is growing interest in the application of computer-based tools to strengthen higher level thinking and meta-cognitive processes (Maddux, Johnson & Willis, 2001) to enable organisations and individuals to "learn faster" to cope with accelerating social and technological change (Fitzgerald and Findlay, 2004).

1. Knowledge and technology

As we enter the twenty- first century, children and teachers must be able to progress and succeed in their rapidly changing learning or working environment. They need to learn new techniques, skills and knowledge for adapting to the changing environment throughout their life to adopt to the new situations. Hence, greater attention has to be paid to the quality of education and to preparation for life in a rapidly changing and often technology dominated world (UNESCO, 1996, p.126).

As human brain knowledge grows ever more rapidly, it becomes increasingly difficult for any one person to remain on top of all the details of their field. Thus for any individual to be able to work out the consequences of low level changes, will essentially become impractical. Computers help in enabling us to simulate the emergent phenomena. But perhaps the mindquakes of the future will come from artificial minds (Bossomaien, T.R.J and Snyder, A.W)

In this view of the future, traditional responses to the demand for education that are essentially quantitative and knowledge-based are no longer appropriate. This is not enough to supply each child early in life with a store of knowledge to be drawn on from then on. Each individual must be equipped to seize learning opportunities

throughout life, both to broaden her or his knowledge, skills and attitudes, and to adapt to a changing, complex and inter-dependent world (UNESCO, 1996, p.85).

If it is to succeed in its tasks, education must be organised around four fundamental types of learning which, throughout a person's life, will be the pillars of knowledge: *learning to know,* that is acquiring the instruments of understanding; *learning to do*, so as to be able to act creatively on one's environment*; learning to live* together, so as to participate and co-operate with other people in all human activities; and *learning to be*, an essential progression which proceeds from the previous three. Of course, these four paths of knowledge all form a whole, because there are many points of contact, intersection and exchange among them (p.86).

Moreover, in the light of the '*knowledge explosion*' which is taking place, and the consequent need for the ever wider use of human scientific and technological ingenuity, it has become essential that each nation makes the best possible use of all its intellectual resources if it is even to maintain its position in the modern world (Cropley, 1967,p.19*)*.

2. Globalisation and Information and Communicative Technology

Globalisation broadly refers to the expansion of global linkages, the organisation of social life on a global scale, and the growth of a global consciousness, hence to the consolidation of world society. 'Globalisation' is a multifaceted set of processes which include not only the changes which have flowed from the new information technologies and opening up of markets, but also new concepts which mean that 'shrinking space, shrinking time and disappearing borders are linking human lives more deeply, more intensely and more immediately than ever before' (UNDP, 1999).

Information and Communicative Technology (ICT) is to educate the trainees to lead quality life and to develop teaching aptitude and teaching competencies with accurate and up-to-date information. ICT enables assessment of students programmes, access to get online education / networking education. The recent innovation of the Internet has brought about a revolution in the world of information technology. The Internet is a source of information, like a vast library which holds bundles of information in the form of texts, graphics, sound, video etc. The Internet also provides searching facilities for exploring or seeking information from all over the world.

Undoubtedly, technology's offerings increased dramatically in recent years. These advances also introduced new educational nomenclature: "virtual education," "diploma mills," "virtual universities," "electronic universities," "virtual," and "cyberspace centres" Many educational institutions seem driven to use newly found access to global data communication that will increase enrolments and will award a vast range of degrees through massive investments in distance education programs (Noble, 1998, Hamza and Alhalabi, 1999).

Both globalisation and Information technology have caused and resulted in the growth of each other- they have emerged as two sides of the same coin and have impacted one another in complex and multiple ways. New trends in education have also come about, and new challenges have been thrown up to reckon! At the same time there is an indisputable need to maintain continuity, change and growth, all at once! (Madhumati, 2005, p.69).

Egbert, et al (2002) believed that using computer vision research results could provide a high level of motivation to students. It is also an excellent learning tool for educating students to integrate and use their acquired knowledge. The key scientific technologies inculcate the Internet and applications enabled by the network such as audio conference, videoconference, e-mail and collaborative software. Activities such as writing, literature searching, information management, idea management, and data analysis are the main functions of the computers.

Computer education, of course, is important because computerisation has become part and parcel of technologies contributing to development in every sphere (Review Committee of NPE'86, 1990, p.286).

Computer applications have an important role in maintaining interest, developing curiosity and fostering the desire to master problem situations (McLeod and Cropley, 1989). They also provide various possibilities for group learning, and self and peer evaluation. Computer networks, or teamwork at the terminal, open up prospects for communication, joint planning, mutual help and moral support.

3. The Computers and its functions

Computer is evolving into a tool to facilitate learning most of the educational properties of older technologies (books, radio, film strips, phonograph records, television) with at least equal if not greater convenience of use plus communication capabilities in addition (UNESCO, 1998, p.82). With the development of transistorised components, replacement of the vacuum tubes, miniaturisation, increased component reliability, elimination of heat dissipation problems, and other improvements, the computer has become a much more effective device for the storage, processing, and retrieval of information (Best and Kahn, 1992).

Computer is itself called as *tool, tutor and tutee.* The computer can ease the load of administrative duties, leaving the teacher more time to concentrate on teaching. For example, the computer can be used to assist in planning timetable; to monitor and manage teaching resources; to build up and maintain comprehensive student records in order to provide a complete student profile; and to accumulate information for assistance with career guidance (Hunt and Shelley, 1989). The UNESCO has identified 15 special properties of computers, which enhance student learning processes on a number of orthogonal dimensions (UNESCO, 1998,p.89).

A computer can do a variety of tasks easily, which works under a set of instructions, automatically accepts the supplied data, process and analyse the data and produce the information. It does any complex problems speedily and perfectly when proper instructions or programmes and data are fed. Such a kind of unimaginable functions is possible in this machine only because of its exceptional characteristics such as high speed, large memory and data storage capacity, accuracy, reliability, endurance, versatility, automation and diligence.

Computer technology includes four basic functions: input, storage, control and output.

- Input- input entails entering information or data into the computer Eg. Keyboard, mouse, scanner, joy stick, touch screen, barcode readers, Optical/magnetic Character Recognisers (OCRs) etc.,
- Storage- once information is inputted, it is stored for eventual use on hard disks, floppy disks, Compact Disks (CDs) etc.,
- Control- control of stored information, as well as new input, is achieved through programmes written in one of several possible computer languages that are translated by the computer's controller to the computer's assembly languages.
- Output- the output or retrieval process transfers the processed information or data from the computer to the researcher, using number of devices to communicate the results. The output may be displayed on a Monitor, printed on paper, or recorded on disks.

To the researcher, the use of the computer to analyse complex data has made complicated research designs practical. Performing calculations almost at the speed of light, the computer has become one of the most useful research tools in the physical and behavioural science as well as in the humanities.

3.1 Applications of Computers

Computers have been entered in all walks of human life across the world. They are being used in various fields including education. Recent advances and especially in the area of computer technology has heralded the development and implementation of new and innovative teaching strategies. The computers are involved in a wide range of activities such as: scientific research, business applications, payroll and personnel records, office automation, word processing, desktop

publishing, electronic office, stock control and sales, banking, insurance and stock-exchanging, an aid to management, industrial applications, electricity, news paper printing and electronic media, engineering design, meteorology, space technology, communications (air travel, transportation, road traffic control) all types of bills (hotels, commercial and non commercial institutions, gas, telephone etc.,) telephone exchanges, medicine, law and order, libraries and museums, education, information systems and so on.

3.1.1 Computer as productivity tools

Now, more than ever, "computer proficiency" needs to become a top priority among our nation's parents, teachers, students, businesses and government agencies. Computer literacy -- a familiarity with the use and value that computers, software and related technologies can bring to our everyday lives -- can provide individuals of all ages with new opportunities and open new worlds to them. Just as learning to read prepares people to work and live in the "real world," learning to use a computer as a tool plays a similar role. Computers and software can also play a major role in improving the educational skills of our youth and in preparing them for the next century. Our work has just begun. With computers, software and people working together, the possibilities are infinite (Alden,).

With computers, productivity is always on the rise. Word processing and database management programs help students, young and old, organise their thoughts and information. For example, if a high school student uses a computer and a word processing program to prepare a term paper, there is no problem revising the first page. Before invention of computers, the student would have been forced to recopy the entire document, but with a computer, they simply key in the changes and reprint. By making written communications easier, computers can't help but boost our children's creativity and communications skills.

The study material and educational information is available on CDs and on Internet. Moreover, a computer literate is a person having a basic understanding of the computers and is able to use it for his own benefit. A person is said to have basic understanding of the computer when he is familiar with various parts of computer, MS-Office and with Internet. A teacher / researcher can use a computer to increase his efficiency level and become more informed professional. The paper work can be reduced to a great extent i.e., using of MS-Word for text processing, MS-Excel for statistical calculations, MS-Power Point for presentations and Internet Explorer for downloading the information he requires of teaching learning and e-mails services for communication with other.

3.1.2 Word Processors

Word processing is a tool system comprising of personal, procedures and equipment that is designed to handle business communications effectively and economically. In the narrower sense, it involves the manipulation by machine by machine of alphabetic and numeric characters to serve various communication purposes. MS-Word, Word Perfect, Page Maker are few word processors which are run on windows and Word Star is single user and it can run only on DOS. These word processors can be used to store, manipulate and print text. Normally such software comes with facilities such as spell check, editing facility, drawing facility.

3.1.3 Power-point Presentations

Microsoft PowerPoint is a presentation programme that allows to create overhead slide modules, speaker notes, audience handouts, and outlines all in a single presentation file. PowerPoint offers powerful tools to help to create and organise a preparation step by step. For example, one can create presentations for training, brainstorming, business planning, progress reports, project management and marketing.

3.1.4 Adobe PhotoShop

The Adobe PhotoShop and Adobe ImageReady are useful to create original artwork or import images into the programme from any source, such as: Digital Camera, CDs, Scanners, negatives, video images and artworks created in drawing programmes.

3.1.5 Spread Sheets

Spreadsheets are general-purpose tools that can be used for tasks, which arise in a variety of different applications involving calculations on rows and columns of numbers. Major tasks which spreadsheets may be applied are: analysing statistics,; creating business plans, budgets, estimating business cost, calculating profit or losses, sales forecasting and financial analysis. Two very popular spreadsheet packages in widespread use today are Microsoft Excel and Lotus1-2-3, which are highly sophisticated and integrated software packages. It combines the largest, most advanced electronic spreadsheet, state-of-the art graphics and a complete information management system.

3.1.6 Database

A database can be defined as a body of information stored in an organised fashion. In computer systems, data is organised in the form of files. A file is nothing but a collection of logically related records, and each record is a collection of logically related fields.

3.1.7 Statistical Analysis and Packages

The computers can perform many statistical calculations easily and quickly. Computation of means, standard deviations, correlation coefficients, t-tests, analysis variance, multiple regression, factor analysis, and various non-parametric analysis are few of the programmes and sub-programmes that are available in the market for data analysis.

Statistical Package for the Social Sciences (SPSS), Statistical Analysis System (SAS), etc., programmes are similar in their capabilities and the variety of statistical analyses that can be performed. The 'Multilevel Modelling' package was developed in UK for the analysis of huge amount of data from schools.

- S P S S - SPSS is a software package used for conducting statistical analyses, manipulating data, and generating tables and graphs that summarise data. Statistical analyses range from basic descriptive statistics, such as averages and frequencies, to advanced inferential statistics, such as regression models, analysis of variance, and factor analysis. SPSS also contains several tools for manipulating data, including functions for re-coding data and computing new variables as well as merging and aggregating datasets. SPSS also has a number of ways to summarise and display data in the form of tables and graphs.
- S A S: SAS is driven by SAS programmes that define a sequence of operations to be performed on data stored as tables. An SAS program is composed of three major parts, the DATA step, procedure steps (effectively, everything that is not enclosed in a DATA step), and a macro language. SAS Library Engines and Remote Library Services allow access to data stored in external data structures and on remote computer platforms. In addition, the SAS System integrates with many SAS business solutions that enable large-scale software solutions for areas such as human resource management, financial management, business intelligence, customer relationship management and more.
- Multilevel Modeling:Multilevel modeling is a generalisation of regression methods, and as such can be used for a variety of purposes, including prediction, data reduction, and causal inference from experiments and observational studies.

Compared to classical regression, multilevel modeling is almost always an improvement, but to different degrees: for prediction, multilevel modeling can be essential, for data reduction it can be useful, and for causal inference it can be helpful (Gelman, 2005).

Statistical software packages such as MLWin, SAS PROC MIXED, LISREL 8.7 and HLM are used to fit linear and non-linear models appropriately to hierarchical data sets. The LISREL 8.7 is also used to analyse air traffic control data and multivariate education data.

3.1.8 Internet and WWW

Internet is a giant network of computers located all over the world to communicate with each other. This facility connects various computers around the globe. The Internet is the physical aspect of computers, networks and services. It is an international network connecting a

large number of smaller networks that link computers at academic, scientific, government and commercial institutions.

The best known part of Internet is the WWW (World Wide Web) which stores information in multimedia form sounds, photos, videos, as well as text. Internet sites offer entertainment, knowledge, advice, great shopping and a whole social world! (Ivens, 2003). The web serves to access sites all over the world simply by 'clicking' on a selection or by entering a specific address. The Internet Explorer, Netscape etc., are some of the Web-browsers available to access, send or download many different types of information across the world.

The resources on the net are so large that even a well-established traditional library cannot offer. The latest books or information are also available on Internet and this can be accessed from anywhere in the world. Trainees, teacher educators, researchers and anybody can use it for their references. "Knowledge webs" give people distributed access to experts, archival resources, authentic environments and shared investigations. Via information infrastructures, educators and students can join distributed conferences that provide an instant network of contacts with useful skills (Sheela, 2005).

In the survey of Sarsani (2006), the responses given by the trainees towards the purpose of access to the Internet are presented that mostly the B,Ed trainees used Internet for

(i) down loading model lesson plans or gather information for planning lessons (50%), (ii) multimedia presentations for the classroom (32%) and (iii) searching for computer project information or other project records for their B.Ed course (32%).

The trainees also used Internet to (i) download exams results and hall tickets (21%), (ii) attended online counselling (18%), (iii) chatting (18%), (iv) downloaded instructional materials (ie-handouts, tests, etc) (14%), (v) communicate with classmates, other students and teachers via e-mail (14%), and (vi) download music or songs (11%). Very few of trainees (7% each) were downloaded application of admissions or jobs; computer games and educational and other free software. Only 4% of each were able to create or maintain own web-site, access research and best practice for teaching, to explore new knowledge or to know the latest developments on the globe and download news and information.

3.1.9 WWW Browsers and Search engines

A browser is a software programme that lets to view, and interact with, the information available on the web. Technically, a browser is software that can use the Hyper Text Transport Protocol (HTTP), which is the protocol driving most web pages. HTTP proves a lot of the useful features on the web, such as the ability to create links to other pages and sites, and the ability to format information in a manner that makes it easier (and more fun) to use web sites (Ivens, 2003, p.87). Browsers allow a user to download information in various forms (i.e., Text file, HTML file, PDF file). The user can later use the downloaded information. One important convention on the web, that is a standardised method of locating information is called URL (Uniform Resource Locators).

e.g. http://www.mircosoft.com, http://www.ioe.ac.uk, http://www.ug.ac.in

Search engines are special software programmes that help to locate information about a specific topic. While entering a word or phrase for what a person is looking for finds lots of websites containing the search word or phrase.

3.1.10 Different uses of Internet

Online information / instruction: Online instruction is the most recent form. It is commonly termed as distant education that incorporates satellite courses, computer programmes, video instruction, educational television, and correspondence or home study courses. These methods attempt to move educational opportunities out from a traditional centralised classroom.

Another area that student can explore with the help of a computer is a database program. Now, pulling together background information on a topic takes on new meaning. Besides the traditional resource materials like encyclopedias, books, etc., there are software and computer tools that provide students with access to

online database information and research reports. In addition, there are a number of research analysis and organisational tools available.

Today, computer users can access information through hundreds of online information and database services. With the increased storage capabilities offered by CD-ROM technology, the computer is able to take on even more critical roles as "information grabbers" and organisers for individuals, schools and businesses. It is clear that students who become computer literate today will be better prepared to take on future academic and professional challenges with the aid of computers and software (Alden).

Electronic Mail (E-mail): e-mail is a facility by which a computer can send or receive messages electronically at any time and from anywhere in the globe thorough any computer, which is connected through the network. It has made the geographical boundaries of nations shrink, as one can send mail to anyone connected to Internet wherever he/she is almost instantaneously. E-mail is mostly used for sending and receiving messages, scanned letters, text, audio and video, and image files; mails with attachments of these can be downloaded easily, and reduces the postal delays and save time. As compared to paper mail, telephone, and fax, e-mail is preferred by many because of its following advantages:

- It is faster than paper mail
- Unlike the telephone, the persons communicating need not be available at the same time.
- Unlike fax documents, e-mail documents can be stored in a computer, and can be easily edited using editing programmes.
- File transfers and Attachments of files

At various stops on the highway, there are "sights"- similarly, at various places on the Internet, there are repositories of software and other information that you can download for free. This is called *file transfer* (Fisher, 1993).

Telnet and Usenet News: the telnet service allows an Internet user to log in to another computer somewhere on the Internet. One of the most important uses of telnet for the research purpose is accessing remote computer's database or archive. The information archive, such as the public database or library resources may be available on the remote computer. The Usenet service allows a group of Internet users to exchange their views, ideas and information on some common topic, which is of interest to all the members belonging to the group, such groups are called *newsgroups*.

E-learning: it is a combination of learning and technologies to provide high value based integrated learning, anytime, any place to any one. It is a flexible, quick and high quality learning method, which uses various learning tools of Internet.

On-line journals and magazines: the internet now has literally thousands of electronic subscriptions, which can be found both for free and low cost. There are many WWW sites on the Internet, which deal with electronic versions of many journals and magazines.

World-wide video conferencing: World wide video conferencing is an emerging services on the Internet, which allows a group of users located around the globe to talk and interact with each other as if they were sitting and discussing in a single room. The parties interacting can see each other talking on their computer screens and can hear each other's voice through a special audio-device fixed in their computers.

Online shopping / product promotion/ feedback about products: Internet has also facilitated the introduction of a new market concept, which consists of virtual shops. These shops remain open 24 hours all the year round, and are accessible to purchasers all around the world (eg. Amazon.com). Several commercial organisations are effectively using Internet services for promoting their products, to gather information about user satisfaction of existing products, market opportunities of new products, and ideas for potential new products. E-commerce is a facility mainly used for business interaction. It promotes shopping through Internet.

Online Software sharing / Customer Support Service: Internet provides access to a large number of shareware software development tools and utilities. A few examples

of such available shareware tools are compilers, code libraries, mail servers, and operating systems. Many organisations are also using the Internet to provide timely customer support. The combined electronic mail, ftp, and other services on the Internet provide all of the enabling tools necessary to provide such first-rate customer support.

Conclusion

The explosion of new knowledge, emergence of electronic age and expansion of global linkages, it has become essential to learn new techniques, skills and knowledge in a rapidly changing and often technology dominated world. The computers and Internet have brought about a revolution in the world of information technology by providing searching facilities for exploring or seeking information from all over the world. In the age of information and communicative technology, computers are being used by people of all ages and in every profession, in their work as well as in their leisure. Computers can also be used as a research tool to carryout various tasks such as writing, literature search, information management, idea management and data analysis.

The computer doesn't think; it can only execute the direction of a thinking person. If poor data of faulty programmes are introduced into the computer, the data analysis will be meaningless. The expression *"garbage in, garbage out"* describes the problem quite well. It is critical when using canned programmes to carefully follow the appropriate programme syntax. If a comma or slash is missing, the programme may stop processing the data, or worse yet, process the data incorrectly (Best and Kahn, 1992). Rather than knowing how to programme a computer, most computer users simply need to understand how a computer functions, and what all it can do. Even those who need to programme a computer, can do their job more effectively, with better understanding of how computer functions, and their capabilities and limitations.

References

[1]. Adobe (2004). Adobe PhotoShop CS: Classroom in a book. New Delhi: Techmedia.

[2]. **Agarwal, A, K and Pershad, D (1993).** Mastering PC Software. Hyderabad: Universities Press, pp. 45, 233, 287

[3]. **Alden, S. B** .The role technology can play in preparing our children for the 21st century. (WWW document) URL: www// Role of Technology in Preparing Children for the 21st Century.htm

[4]. **Bossomaien, T.R.J and Snyder, A.W.** Complexity, creativity and computers. WWW document

[5]. **Best, J.W. and Kahn, J.V. (1992).** Research in Education (6th ed.). New Delhi: Prentice-Hall of India Private Limited.

[6]. **Cropley, A. J. (1967).** Creativity. London: Longmans, p.19.

[7]. **Egbert, D., et al (2002).** Computer vision research as a teaching tool in cs1. Paper submitted in 32nd ASEE/IEEE Frontiers in Education Conference November 6 - 9, 2002, Boston, MA,

[8]. **Fisher, S (1993).** Riding the Internet Highway: complete guide to 21st Century Comminations. Indianapolis, Indiana: New Riders Publishing. Pp.8

[9]. **Fitzgerald, R. and Findlay, J (2004).** A computer-based research tool for rapid knowledge-creation: A retro-viral agent of change. EdMedia 2004 conference, Switzerland, 21-26 June, 2004.

[10]. **French, CS (1997).** Data processing and Information technology (10th edition). New Delhi: BPB Publications

[11]. **Gelman, A (2005).** Multilevel (hierarchical) Modeling: What it can and can't do. Http://www.stat. Columbia. Edu/_gelman/

[12]. **Goldstein, H. (1995).** Multilevel Statistical Models. URL -http://www.arnoldpublishers.com/support/goldstein.ht

[13]. Government of India, Ministry of Human Resource Development (1990). Report of the committee for Review of National Policy on Education-1986 (headed by Acharya Ramamurti). New Delhi: Government of India Press.

[14]. **Hamza, M.K and Alhalabi, B (1999).** Technology and Education, First Monday, Volume 4, number 3, (WWW document)URL:http://www.firstmonday.Org/issues/

issue4_3/hamza/index.html.

[15]. Hunt, R and Shelley, J (1989). Computers and Common Sense. New Delhi: Prentice-Hall of India Private Limited, pp 7-9, 108, 129-130

[16]. Information Technology Services (2000). SPSS for windows: Getting Started, the University of Texas at Austin (WWW document).URL: http://www.utexas.edu/its/re/tutorials/sat/spss/spssl/

[17]. Ivens, K. (2003). Faster Smarter Internet. New Delhi: Prentice-Hall of India, pp.xiii., 118

[18]. Maddux, C., Johnson, D., & Willis, J. (2001). Educational computer: Learning with tomorrow's technologies. Boston: Allyn and Bacon.

[19]. Madhumati, B. P. (2005). Challenges and strengths of e-learning in schools. In M. S. Talawar (ed.). Teacher education and globalisation. Bangalore: Cauvery Prakashana, pp.69-71.

[20]. McLeod, J., and Cropley, A. (1989). Fostering Academic Excellence. Oxford: Pergamon Press.

[21]. Microsoft (2001). Microsoft ® PowerPoint ® version 2002 by step by step. New Delhi: Prentice-Hall of India.

[22]. Mitchell, E. (1993, cited in Fryer, 1996, pp. 5-8). Paradigms for transformation to a meaningful global future. Address to the 1993 Presidents' Convocation, Creative Education Foundation, Buffalo, NY.

[23]. Noble, D.F (1998). "Digital diploma mills: The automation of higher education, First Monday, volume 3, number 1,

[24]. Raina, M. K. (1989). Social Change & Changes in Creative Functioning. New Delhi: National Council of Educational Research and Training, pp. 43

[25]. Sarasni, M.R and Anuradha, R.K (2006). The use of computers in education. In Mahender Reddy Sarsani (ed.). Quality Improvement in Teacher Education. New Delhi: Sarup & Sons., Pp134-141.

[26]. Sarsani, M.R. (2006). The attitude of teacher trainees towards the teaching of computer education at B.Ed Level. Paper presented in the International Conference on 'Preparing Teachers for a changing context', 3-6 May 2006, organised by the IOE, University of London, UK and Beijing Normal University, China.

[27]. Sheela, G (2005). Internet Learning in teacher education A learning resource in the knowledge era. In M. S. Talwar (Ed) Teacher Education and Globalisation. Bangalore: Cauvery Prakasana Pp 133.

[28]. Sinha, P.K and Sinha, P (2003). Computer Fundamentals (3rd ed.). New Delhi: BPB Publishers, pp. 341-347.

[29]. Toffler, A. (1981). The third wave. London: PanBooks in association with Collins.

[30]. UNDP(1999).World Development Report. NY: UNDP

[31]. UNESCO. (1996). Learning: The treasure within Report to UNESCO of the International commission on education for the twenty-first century. Paris: UNESCO Publishing.pp.85-96., 126

[32]. UNESCO. (1998). World education report: Teachers and teaching in a changing world. Paris: UNESCO Publishing , Pp. 16-22, 48-49, 54-56, 63-67, 71-94.

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