

# Information Technology : The Change Agent For The Paradigm Of Education - With Reference To Indian Conditions

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## CHANGE IS HERE

Information technology has changed all processes and functions. Even areas and avenues which were known for their slow paced reforms and resistance to change are now adapting to the wave of IT enabled processes. Delhi University students experienced a host of e-learning technologies in the academic year 2011-2012. (Pushkarna, 2010). They have been given access e-lessons and e-lectures. E-quizzes help them to gauge their own learning. LCD panels are being installed in all major community areas of the University such as libraries, hostels etc. These will be used to stream audio visuals of the lectures, seminars, conferences etc. The ultimate aim is to facilitate information dissemination across all colleges of the University ( Jha, 2010).

Teachers' fear was dispelled by various workshops to help them realize about the replacement of "talk and chalk" regime by the "click and access" systems was to empower, and not to replace them. E-lessons gave them online textual matter, animations to explain concepts and relevant diagrams. Lectures of teachers from various DU colleges were put online for students across the board to increase the diversity of learning (Pushkarna, 2010).

The case in question could also be of Amity University, which has institutes all across the world and feels that the education of the students must be uniform regardless of location. They have mixed two different solutions (e-learning & IP cameras) to bring experts from different fields and locations to all students across the campuses. Minimum investment was required as existing IP cameras and e-learning suites were used. The video of the presenter was captured via webcam, and the surveillance cameras conveyed student images to the presenter. Dedicated high bandwidth was required to transmit audio, video and presentations simultaneously. There are several cost benefits as time and travel are saved of the guest lecturers. These lectures can also be used to benefit future students. A mobile phone version of the same is on the anvil (Sodhi, 2009).

All across the world, the scenario is the same - IT reforms were initiated in Korea to cope with the demands of emerging information society. The introduction of technology in schools was called "Educational Informatization" (Lee, 1998). Professors in Seoul, through videoconferencing, instructed distance learning students, in-service personnel, bridging tertiary and life-long education. Courseware, university information, even counseling and guidance are made available through Bulletin Board Services. Document transfer ensured availability of details of the educational institutes, faculty profiles, student records, etc. There were some basic requirements - that of connectivity to the internet, provision of hardware and software, teacher training, curriculum up-gradation and so on. Hardware was a major expenditure and hence, an impediment to the progress. Again, their maintenance and upgradation are an ongoing process.

In Singapore, the Ministry of Education introduced SAIL (Strategies For Active And Independent Learning) and concept of TLLM (Teach Less, Learn More) in the process of making students active learners rather than dependent on being fed information by the teachers. AI software was used to check student learning, take care of weak students, and fill their gaps of learning. CoP or Communities of Practice were formed where teachers pooled their teaching resources and collaborated with each other instead of competing. Of course, they faced initial resistance in moving teachers out of their comfort zones, but it was overcome by dispelling fears of being replaced by computers, training and establishment of help centers.

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Though in Singapore, it is widely believed in educational circles that there is scope for improvement in the online content. It was felt that any organization or people regardless of their credentials, proficiency and experience, can publish and circulate any material online in very little time and cost (Mokhtar, 2005).

## AREAS OF DISPARITY

✿ **Gender:** Gender has always been a factor of disparity, and more so when use of IT is studied. The paper (Croco, Cramer & Meier, 2008) urged decision-makers to treat disparate groups differently so that pre-existing conditions of inequality of resources are remedied and gender equity is attained. Unequal access, usage patterns and culture-related differences have always plagued technology use, and technology has always been viewed as a male domain.

Instead of viewing gender as a gap, it must be treated as a difference to be explored so that new standards and theories can be devised for the technology era. Females' collaboration skills and males' fascination to speed and power of computers can be suitably harnessed. For example, women have been found to be more adept in blogging, social-networking, etc. It has been found that overturning patterns of computer use, women are now dominating online communication. Web 2.0 is viewed as a catalyst to collaboration and networking and is attractive to the female gender. Women are increasingly being drawn to online courses.

✿ **The Differently-abled:** Several content providers are now delving into novel ways of designing content and delivering the same over cyber space to learners all over the world. The paper by Hoorebeek, Walker & Dermo, 2009 talked of suitably designing content so that it is accessible to all, including the challenged. The e-content should be designed such that it is compatible with all kinds of specialist software being used by the challenged, such as screen readers or magnification software.

✿ **Culture:** Cultural differences are very important to understand and bridge to make the collaboration effective (Zhu, Valcke & Schellens, 2009), for example, the Americans are free and open, while the Chinese are passive, content oriented and formal in their discussions. Behaviorist approach is important to use to counter lower levels of computer literacy, internet use and limitations, such as online environments are unable to provide instantaneous help to learners as it is in a face to face environment. Ignoring the above may lead to frustrating learning results.

## TOOLS OF IT IMPLEMENTATION

In a study done by Jones et al. (2007), all the stakeholders were studied in focus groups to find out a blended/hybrid learning model. Majority of the institutes of Higher Learning operate in a VLE (Virtual - Learning Environment). E-learning offers ease of access and flexibility of time and space. A pure e-learning pedagogy has a communication and a content area. The communication area allows e-mail, discussion boards and virtual classrooms, while the content area includes modules of study supported by case studies and graphical content. The study describes "*blended learning*" - a pedagogical solution that combines traditional, face-to-face and e-learning. Scheme makers have to integrate the two strategies into a seamless package and devise a balance of classroom instruction, self paced study, virtual classrooms, interactive web based training, email communication, collaborative software, online discussions, and online testing. While online interactions may encourage a direct exchange of ideas, and a greater degree of collaboration, face to face meetings with the teacher are used to reassure, and remove confusions and anxiety. Sometimes, the students require the emotional "*crutch*" of the tutor. Both forms of learning should complement and support each other.

The use of novel e-learning solutions are on the rise in the present-day academia. The experience of using web 2.0 tools such as blogs, social bookmarks have been discussed and studied at various forums. An impact has been observed by the incorporation of such tools on teaching and learning processes because of their ease of use, portability and contributions to collaboration, etc. Various blogs such as Weblogs at Harvard Law were observed, though it is felt that blogs are not so successful because of fear of writing publicly, and lack of motivation. Podcasts are digital media (audio and video) files that are distributed over the internet using syndication feeds for playback on portable media players and personal computers (Wikipedia, 2000). These are used as course content dissemination tools to make classroom lectures available for students round the clock and on the move. These are powerful supplements to classroom lectures, though there are the initial hurdles of slow downloads. It may also impact classroom attendance if the lectures are just content heavy and lack interaction (Saeed and Yuang, 2008). Blogging can also be a powerful tool

to post research results and daily reports. Many technologies were not originally meant to be used in the educational fields and can be referred to as “*edutainment devices*” such as ipods, smartphones etc. (Taylor & Clark, 2010). A podcast is a combination of a multimedia file, a subscription device and a downloadable digital device. Incorporation of technology does not automatically reap benefits because all depends on how the technology is used. Podcasts could be used to replace handouts, as supportive content - to emphasize main discussion points and as a supplement, such as FAQs or required readings. They be used for students with language difficulties and to grant flexibility of time and place of learning. Podcasting can serve as a back-up and a reinforcement tool for what is being taught. Several renowned universities have used it for their courses, while websites have extensively utilized it for learning of languages. In-fact, it has also been used for delivering of sermons calling it “*God-casting*” (Beilke & Matthew, 2009). It is also known to increase literacy skills. In a case study of Faculty of Health at Birmingham City University (BCU), UK, by MacKenzie & Walsh (2009), creation of shareable multimedia teaching learning aids has been discussed. At BCU, media students worked in collaboration with faculty to create advanced multimedia content, which the lecturing staff does not have the time, expertise and equipment to create. It was a win-win situation, the students gained a portfolio of work and work ex., while the teachers gained relevant content. Again, this content was reusable, sharable and was kept in central repositories so that the expense incurred was justified.

Learning-ware is an expression used to denote groupware used for collaborative learning (Fuks & Assis, 2004). The authors proposed a relationship between the three major attributes of groupware - communication, coordination and cooperation and integrated them with perception of other participants. This helps them to plan their work and avoid duplication of work and hence, wastage of time. This “*information awareness*” has a direct impact on the knowledge being collaborated. With the new pedagogies and technologies emerging, a new teaching ecological system has emerged, which ensures ubiquitous educational awareness. Technology has almost become a learning partner. Portable digital learning tools are decreasing in size and increasing in their processing power. U- Learning is e-learning with mobility, whose characteristics include: using wireless wide-band technology and application, creating an environment in which learners can get access to knowledge and make personalized, conceptualized, and interactive learning with the help of any device such as a hand-held computer anytime and anywhere synchronically or non-synchronically developing participatory environments (Ding, 2010).

The environment and culture of the current generation are essentially participatory. With the threshold of knowledge increasing by the day, everyone has something to say and contribute to a kind of collective intelligence in the making. Web 2.0 has ensured that knowledge is continuously being created, and it is not an individual possession. A fourth dimension is in the making. The computer gives access to distant experts, and increased collaboration amongst peers and mentors. The new age of wireless has encouraged ubiquitous computing. Thus, learning is not confined to space, context and time.

<b>Table 1 : Education 3.0</b>			
<b>Characteristics</b>	<b>Education 1.0</b>	<b>Education 2.0</b>	<b>Education 3.0</b>
Primary role of a Professor	Source of knowledge.	Guide and source of knowledge.	Orchestrator of collaborative knowledge creation.
Learning activities	Traditional essays, assignments, tests, some group work within the classroom.	Traditional approaches transferred to more open technologies, increasing collaboration in learning activities.	Open, flexible learning activities focused on creating room for student creativity, social networking outside traditional boundaries.
Institutional arrangements	Campus-based with fixed boundaries between institutions.	Increasing collaboration between universities.	Loose institutional affiliation and relations: regional and institutional boundaries breakdown.
Student behavior	Largely passive and absorptive.	Passive to active, emerging sense of ownership of the educational process.	Strong sense of ownership of education, co-creation of resources.
Source : Brown, 2008			



All the above comes with the a forewarning, The expertise of students in terms of technology may be shallow; it may be erroneous to assume that students know computer applications, and of course, it is imperative to understand that though the internet brings knowledge and data to your screen, the students must be encouraged to think critically. Classrooms must transform themselves to learning complexes. Technology alone cannot impress the present generation, they need to be convinced of its function/activity (Oblinger, 2008).

Wikis are collaborative writing tools. Web 2.0 has enabled users to create, publish and share content leading to peer based learning (Judd, Kennedy & Cropper, 2010).

IT can serve dual purposes of complementing lectures and increasing communication amongst peers and seniors. An alternate learning model called constructivism is supported where knowledge emerges from peer interaction and collaboration. Knowledge can be broadly classified into two types - conceptual and pragmatic. While conceptual knowledge is best imparted through traditional classroom lectures, pragmatic knowledge is best gained through discussion and problem solving. Time and place independent communication can greatly increase the latter. Again, a self-directed and self paced learning may be more successful in some categories of learners. A web page can act as a repository of course materials such as syllabus, assignments, class notes, announcements, etc. Students in remote locations can access class lectures through videoconferencing and even participate in real time. Hyper-cases are interactive web-based cases, in which students explore and discover problems in a fictional company.

*"A GSS - group support system is a simultaneous communication system for group meetings in real time. It usually consists of networked computer workstations in a decision room, a large public screen to display the discussion to everyone, and software to support group processes such as brainstorming to generate ideas and voting and ranking to rate the quality of the ideas. Participants use various software modules and contribute to the discussion by typing their ideas into their personal workstations. These ideas are displayed in the large public screen. The GSS allows everyone to participate in the discussion by providing a forum that cannot be monopolized and is free of the typical factors constraining participation in a face-to-face environment. Using an ALN (Asynchronous Learning Network - which features a combination of database, email, and threaded discussion capabilities), groups can solve case studies, interact anytime/anywhere using the system as the only means of communication. Each team is placed in a different computer conference, which is seeded with the questions of case or the main discussion topics. Participants post their opinions or ideas as a reply to the main comments, and their discussions are structured or threaded according to the initial root comments. Agreements and disagreements are also posted as replies to the appropriate comments. The system organizes the contributions and maintains a written transcript of the interaction that can be revised, stored, and retrieved later for the compilation of the final report. In addition, the need to verbalize all aspects of interaction by writing can enhance meta-cognitive skills such as self-reflection and revision in learning. Another advantage of this approach is that everyone is perceived on a similar basis, regardless of physical handicaps, regional and national accents, usual assertiveness in face-to-face discussions, and other characteristics that would tend to put students on unequal footing in the usual classroom setting. However, in ALN-mediated discussions, participants may not participate regularly at all, or may experience anxiety and frustration due to delays and different participation rates of other members."* (Benbunan-Fich, 2002)

Construction of error-free examinations, faster and more accurate grading, instant feedback were some of the "instant" advantages of the incorporation of the IT project at the State University of New York (SUNY) college at Oneonta (Ozkul, 2007). Question sets for several "sets of papers" need to be error free and have the same level of difficulty. Again, the post exam review of the instructors with their students may be a time-consuming task, along with the pressures of providing faster grading. With the number of students increasing by the day, this task becomes even more arduous. An automation of the question banks and solution sets can save a considerable amount of instructor time and effort and lead to consistent and prompt grading.

The current form of scholarship is information and intensive, collaborative and hence distributed, and multidisciplinary. Finding books, articles, notes, etc. is no longer difficult and thus not enough. Scholars want to mine documents and text. No longer do students want to study linearly, they want to read all possible abstracts, conclusions, bibliographies. They are also interested in tables, figures and diagrams.

Again, sharing and collaborating on projects has become an intrinsic part of projects. Online chat (with or without accompanying video) and video conferencing can be used to bring distant experts as guest lecturers right up to the scholar's computers. VLE (Virtual Learning Environments are powerful mediums for collaboration projects and interdisciplinary projects. Interesting teaching-learning pedagogies stimulate student participation and thus,

academic achievement (Ruiz-Molina & Cuadrado-Garcia, 2008).

## THE FLIP SIDE

Several studies have pointed out that as many as fifty percent adults have computer related phobia, which impacts computer usage. A study by Saade & Kira (2009) done with 645 university students in Canada points out expected productivity gains and benefits to various student, teacher and researcher groups cannot be realized unless there is large-scale acceptance, adoption and satisfaction related to computer use amongst these communities. TAM or technology acceptance model provides various determinants that explain user behaviors. PEU (Perceived Ease of Use) and PU (Perceived Usefulness) are also considered important factors of user behaviors. Again, individual differences, situational constraints, organizational dynamics and system characteristics are the external factors influencing computer usage. Frustration, anger, and confusion can affect even the overall well-being of the user. User friendly interfaces, and maneuverability of websites can go a long way in increasing user comfort. Zemsky & Massy (2004) in their final Report for Weatherstation Project, University of Pennsylvania, where they worked in six campuses interviewing faculty, administrators, and students to find out if e-learning was an institutional priority and budgetary priority, state that despite notions that students will take to technology and its tools like ducks to water, was not quite so true since, though the students want to be connected, they do to one another; for entertainment, games, music, movies, etc. and not for knowledge acquisition and dissemination.

Again, many faculty members are still engaged in one-way transmission of basic knowledge, leading to the success of course management systems and PowerPoint software that aid distribution of teaching material. There have been enhancements to traditional pedagogies without tampering with the basic mode of instruction. Examples include e-mail, student access to information on the Internet, the use of multimedia and simple simulations. The typical application of, off-the-shelf software, such as PowerPoint, to enhance classroom presentations and homework assignments and Course Management Systems, are acting as pedagogical crutches, and though they provide better communication with and among students and quick access to course materials, they are often poorly integrated into a course, skewing the balance of content and technology.

E-learning initiatives have been termed as a "revolution" by Slater (2005), but the creation of innovative and relevant resources is sometimes an uphill task for the faculty due to the constraints of time, finances and technical barriers. Lack of necessary technical expertise to create e-learning resources is a major impediment to production of e-resources. "Death by PowerPoint" has been coined by Winn (2003) to indicate futile overuse of technology. Teacher education programs face an impediment of individual differences, dynamic needs and digital constraints. A vast digital divide exists in poor, Government aided schools and schools in remote areas. Digital equity is extremely difficult to attain. There are several challenges faced by the educators, that of creating quality content, and then using it effectively.

## PREREQUISITES

The paper by Oikonomidou (2009) talks about how critical reflection and analysis of student blogs can provide important information to the teachers to help them redesign and better their teaching pedagogies. One can identify student resistance and acceptability so that one can refrain from "one method fits all" kind of pedagogies. In a multicultural and diverse kind of mix of students, societal, interpersonal and individual differences can hamper learning. Knowledge of cultural diversity and characteristics can translate into better teaching-learning opportunities. Quality of a system can be considered to comprise of the educational, economical and technical aspects. E-learning software must have the following considerations:

- ✿ Pedagogical and psychological;
- ✿ Technical and functional;
- ✿ Organizational and economical;
- ✿ Social and Cultural

Software need not only be technologically sound, but also acceptable to the target audience. For example, English speaking population will fare better in English medium web sites. The administrators of higher education must take a

global perspective and inculcate values, which encourage political and intercultural bridges and tolerance to cultural and ethnic diversity. A networked learning environment, with its synchronous and asynchronous modes is ideal for the above. Imbalances of literacy, pedagogies, quality of learning processes can thus be slowly eradicated (Sorensen, 2007).

Moradi & Khalkhali (2008) point out that teachers require training not only for computer skills, but also how to integrate ICT (Information and Communication Technologies) into the curriculum. It has also been studied that slowly, gender equity is being achieved in terms of computer use, and the “private use” of computers has a little impact on integration by teachers in their professional life. Hardware inaccessibility, poor internet connections, lack of audiovisual materials are prime barriers to integration of technology in educational pedagogy. Lack of time, funding and interest, both in terms of administrators and teachers impede the progress further. The training of teachers should be a mix of self-discovery and structured training. TAM (Technology Acceptance Model) has been successfully used to study ATCU - Attitudes Towards Computer Use, which is influenced by PU (Perceived Usefulness) and PEU (Perceived Ease of Use). ATCU of the teachers is one of the most important factors to take into account when implementing computerization. Strong correlation is observed between attitudes and behavioral intentions. PU, PEU are considered to be fundamental indicators of user acceptance (Teo & Noyes, 2010).

Pittman (2007) in his paper advocates converging of instructional technology and intercultural education so that teachers can best handle diverse complex classrooms of today. The needs of teacher education are changing because of the Web-based learning technologies. Electron research has come to include books, e-articles, online journals, websites and so on. Modern day teachers need to adapt to the changing classroom environments because of the existence of ubiquitous computing with handheld devices, pocket PCs, “smart” technologies being embedded in modern-day learning. In a collaborative learning environment, the learners show an efficacy of learning if the tools and modes available to them are adapted to their personal and cultural background.

## THE INDIAN SCENARIO

Knowledge capital and management are concerns, which need to be addressed on the priority in any academic institution. Digital repositories are being created to collect, store, preserve and store scholarly publications and teaching material to aid the process of intellectual pursuits. An institutional repository helps create a knowledge sharing and collaborative culture. It also gives the institution visibility and helps in brand building if the repository has a public interface. Infrastructure, funding and manpower can be initial roadblocks. Initiating and encouraging faculty to contribute, Staff training, system maintenance were some of the initial challenges faced by the Business Schools of Gujarat (Doctor, 2008).

Enterprise wide video networking to facilitate data capture and dissemination, video archiving, transmitting and conferencing, and E-podiums are being extensively used for communication and collaboration in real time. IP based conferencing removes all barriers of time, distance and resources, leading to a global community with multi participant and multi country presence. Document sharing and other forms of collaboration such as chats can be used to share views, schedules and resources, including diagrams, slides, etc. amongst the conference participants. These are being extensively used in premier research institutes (Misra et al., 2005).

Penetration and acceptance of e-learning tools is rather slow because of misinformation and negative perceptions. Perceptions and computer skills can be differentiators when implementing E learning technologies and can be extremely useful parameters to take into consideration by educational planners. Attitudes and perceptions largely affect Internet use as an enabler of education delivery and evaluation mechanism. Education that is “any time, any place” breaks classroom silos, facilitating B-School learning (Dhume, 2009).

ICT mediums, including radio, the internet, VSAT, ipTV can address issues of access, reach, content and pedagogies effectiveness. Simulation, visualizations and modeling can enhance the pedagogies of teaching, e-learning and virtual-learning environments, which can ensure wider reach and group tasks can facilitate collaboration. Teacher skills, and IT infrastructure upgradation are another focus area. A central repository of technology enabled, and other teaching resources can also be set up. “Democratization of classrooms” due to IT enabled teaching- learning is a crucial achievement in a country like India.

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