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Original Article

Use of Advanced Technologies in Higher Education Vis-A-Vis Information Technology Law

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Abstract

We are passing through the transition period from the traditional teaching methods to adapt ourselves to the technological teaching methods during recent past especially in higher educational instructions. The increasing number of technological devices and as well as availability of technology supported information services more specifically the information and communication technologies (ICTs) such as web based internet services have paved the way for inspiring the teachers as well as students towards effective, efficient and fast teaching and learning activities. When it comes to technology in the classroom, phrases like "faculty resistance" and the importance of getting "faculty buy-in" are tossed around with great frequency. The days are gone to resist and sceptics about the use of ICTs in classroom teaching. This is supported by the results of the recent surveys that a full 73.67 per cent of readers who took the survey said they incorporated technology into their class during the past year. It was the third most popular activity, exceeded only by an impressive 85.81 per cent who attended a professional development workshop or conference and 83.92 per cent who used a rubric [1]. However, the use of technology must be rational and ethical otherwise it will become bane for both the teacher and learner as the technology is two faced sharp edges which will cut who misuse it by attracting the penal provisions of the Information Technology Act, 2000.

This paper attempts to evaluate the importance of the use of advanced technologies in higher educational teaching-learning activities and their ill effects if they are misused.

Keywords: Education; Higher Education; Technology; Information; Communication; Information Communication Technology; Efficient; Effective; Rational; Ethical Boon; Bane etc.

Introduction

The social structures have been dramatically changed due to dynamics of the technology especially the information technology (IT) in recent past. The societies of the world are highly close and social boundaries are clearly narrow though there remain political boundaries of the nations. Nation villages has been converted themselves into global village. Movement of goods less restricted and movement of people somehow more restricted from one country to another for political purposes. However, the movement and channels of information is globalised. This is possible due to innovations in technologies especially the information technology supported by hard and soft technologies. This has converted the traditional

society to technocrat society, the technocrat society to information society. The information society challenges the education system. In recent years, the speedy, effective and global communication of knowledge has created a new foundation for co-operation and team-work, both nationally and internationally. The increasing role played by information technology (IT) in the development of society calls for an active reaction to the challenges of the information society.

Information Technologies (ITs) are fast changing. During this period the educational system and for that matter any system has to be designed to be open to the changes both in IT and socio-economic processes. Development and progress of IT and its wider applications in all walks of life and work will be creating a society, in which every individual, group; community will be linked through internet with others. People will be using small hand-held and table-top devices to communicate access and send information, participate from a distance in talks, seminars, workshops and small/big group activities from a distance. In such a networked society, all communications and information could be stored somewhere, which could be accessed, sorted out, analyzed and useful information could be found out. Useful information or knowledge could be utilized for value addition or wealth generation. The persons who could find useful knowledge by using various IT tools and techniques, and could have related functionality to convert that knowledge into wealth will be successful in 21st Century. Education has therefore, to cultivate skills and competencies in using IT tools and techniques in the networked globalised context with a view to creating and nurturing innovativeness and entrepreneurship to convert knowledge into wealth. Education has to help in identifying and creating work and employment opportunities that would lead to new types of self-employment opportunities such as, knowledge workers, information service providers, tools/technique developers, process/system software designers, developers and implementers [1].

Already, new and greater demands are being made as to the core qualifications of individuals, as well as to their understanding and knowledge of the consequences of the introduction of information technology for the work and organisation of a company. Companies are no longer forced to gather all their functions in one place. The knowledge-intensive functions such as development and marketing can be sited in countries where the labor market can supply highly educated employees, whilst production itself can be moved to low wage countries. The result is the efficient handling, processing, co-ordination and administration of company resources, which is decisive for the competitiveness of the company. In a society which is becoming increasingly dependent on information and the processing of knowledge, great demands are therefore made that the individual should have a solid and broad educational foundation on which to build. Educational policy in the information society must ensure that: (1) IT qualifications are developed by means of their integration in all activities in the education sector and (2) The individual citizen must have an active and critical attitude to developments and not passively allow technological development to set the pace [3].

This requires that the education policy must be revamped so that we can develop the citizens to convert them into techno-citizens (netizens) by adopting information and communication technologies (ICTs) into our educational teaching and learning process to adapt ourselves to time and space for ushering the development process.

The ICTs can be used as educational technology as the study and ethical practice of facilitating learning and improving performance by creating, using and managing appropriate technological processes and resources, which denoted instructional technology as the theory and practice of design, development, utilization, management, and evaluation of processes and resources for learning.

Educational technology thus refers to the use of both physical hardware and educational theoretics. It encompasses several domains, including learning theory, computer-based training, online learning, and, where mobile technologies are used, m-learning. Accordingly, there are several discrete aspects to describing the intellectual and technical development of educational technology [4].

History

There are several shifts and changes in the civilization of the human kind. Since early history, mankind has devised means to help people learn in ways that are easier, faster, surer, or less expensive than previous means [5]. From this perspective, educational technology can be traced back to the emergence of very early tools, such as paintings on cave walls. However, the use of media for instructional purposes is generally traced back to the first decade of the 20th century [6] with the introduction of educational films (1900's) and Sidney Pressey's mechanical teaching machines (1920's). The first large scale use of technologies may be training of soldiers

in World War II by films and other mediated materials. The concept of hypertext is traced to Bush's description of memex in 1945.

In 1960, the University of Illinois initiated a classroom system based in linked computer terminals where students could access informational resources on a particular course while listening to the lectures that were recorded via some form of remotely linked device like television or audio device [7]

In the early 1960s, Stanford University psychology professors Patrick Suppes and Richard C. Atkinson experimented with using computers to teach math and reading to young children in East Palo Alto, California. Stanford's Education Program for Gifted Youth is descended from those early experiments. In 1963, Bernard Luskin installed the first computer in a community college for instruction, working with Stanford and others, developed computer assisted instruction. Working with the Rand Corporation, Luskin's landmark UCLA dissertation in 1970 analyzed obstacles to computer assisted instruction.

The 1970s and 80s saw notable contributions in computer-based learning by Murray Turoff and Starr Roxanne Hiltz at the New Jersey Institute of Technology [8] as well as developments at the University of Guelph in Canada [9]. In 1976, Bernard Luskin launched Coastline Community College as a "college without walls" using television station KOCE-TV as a vehicle.

By the mid-1980s, accessing course content becomes possible at many college libraries. In Computer Based Training (CBT) or Computer-based learning (CBL), the learning interaction was between the student and computer drills or micro-world simulations.

Digitized communication and networking in education started in the mid 1980s. Educational institutions began to take advantage of the new medium by offering distance learning courses using computer networking for information. Early e-learning systems, based on Computer-Based Learning / Training often replicated autocratic teaching styles whereby the role of the e-learning system was assumed to be for transferring knowledge, as opposed to systems developed later based on Computer Supported Collaborative Learning (CSCL), which encouraged the shared development of knowledge.

The Open University in Britain [10] and the University of British Columbia (where Web CT, now incorporated into Blackboard Inc. was first developed) began a revolution of using the Internet to deliver learning, [11] making heavy use of web-based training and online distance learning and online discussion between students [12]. Practitioners such as Harasim [13] put heavy emphasis on the use of learning networks.

Cassandra B. Whyte researched about the ever increasing role that computers would play in higher education. This evolution, to include computer-supported collaborative learning, in addition to data management, has been realized [14].

With the advent of World Wide Web (www) in the 1990s, teachers embarked on the method using emerging technologies to employ multi-object oriented sites, which are text-based online virtual reality system, to create course websites along with simple sets instructions for its students. As the Internet becomes popularized, correspondence schools like University of Phoenix became highly interested with the virtual education, setting up a name for it in 1980.

In 1993, Graziadei described an online computer-delivered lecture, tutorial and assessment project using electronic mail. In 1997, Graziadei described criteria for evaluating products and developing technology-based courses include being portable, replicable, scalable, and affordable, and having a high probability of long-term cost-effectiveness [15].

By 1994, CAL Campus presented its first online curriculum as Internet becoming more accessible through major telecommunications networks. CAL Campus is where concepts of online-based education first originated, this allowed to progress real-time classroom instructions and Quantum Link classrooms. With the drastic shift of Internet functionality, multimedia began introducing new schemes of communication; through the invention of webcams, educators can simply record lessons live and upload them on the website page. There are currently wide varieties of online education that are reachable for colleges and universities students. This form of high learning allowed for greater flexibility by easing the communication between teacher and student, now teachers received quick lecture feedbacks from their students. The idea of Virtual Education soon became popular and many institutions began following the new norm in the education history.

Online education is rapidly increasing and becoming as a viable alternative for traditional classrooms. According to a 2008 study conducted by the U.S Department of Education, back in 2006-2007 academic years, about 66% of postsecondary public and private schools began participating in student

financial aid programs offered some distance learning courses, record shows only 77% of enrollment in for-credit courses being for those with an online component.[16] In 2008, the Council of Europe passed a statement endorsing e-learning's potential to drive equality and education improvements across the EU [17].

Today, the prevailing paradigm is Computer-mediated communication (CMC), where the primary form of interaction is between learners and instructors, mediated by the computer. CBT / CBL usually means individualized (self-study) learning, while CMC involves educator / tutor facilitation and requires scenarization of flexible learning activities. In addition, modern ICT provides education with tools for sustaining learning communities and associated knowledge management tasks. For these reasons the University Grants Commission (UGC) is mandating the use of modern and innovated gadgets in teaching and learning activities.

Use of Advanced Technologies in Higher Education

Students growing up in this digital age have constant exposure to a variety of media as well as technological devices. Major high-tech companies such as Google, Verizon, and Microsoft are funding schools to have the ability to teach their students through technology which may lead to improved student performance [18]. These are such media and technological devices through which teaching and learning can be softened and strengthened compared to the traditional methods of teaching and learning process.

Media

Educational media and tools can be used for:

- Task structuring support–help with how to do a task (procedures and processes),
- Access to knowledge bases (help user find information needed)
- Alternate forms of knowledge representation (multiple representations of knowledge, e.g., video, audio, text, image, data).

Numerous types of physical technology are currently used: [19] digital cameras, video cameras, interactive whiteboard tools, document cameras, and LCD projectors. Combinations of these techniques include blogs, collaborative software, ePortfolios, and virtual classrooms.

Audio and Video

Radio offers a synchronous educational vehicle, while streaming audio over the internet with webcasts and podcasts can be asynchronous. Classroom microphones often wireless can enable learners and educators to interact more clearly.

Video technology [20] has included VHS tapes and DVDs, as well as on demand and synchronous methods with digital video via server or web-based options such as streamed video from YouTube, Teacher Tube, Skype, Adobe Connect, and webcams. Telecommuting can connect with speakers and other experts.

Interactive digital video games are being used at higher education institutions [21]. Podcasting allows anybody to publish files to the Internet where individuals can subscribe and receive new files from people by a subscription [22].

Computers, Tablets and Mobile Devices

Computers and tablets enable learners and educators to access websites as well as programs such as Microsoft Word, PowerPoint, PDF files, and images. Many mobile devices support m-learning.

Mobile devices such as clickers and smart-phones can be used for interactive feedback [23]. Mobile learning can also provide performance support for checking the time, setting reminders, retrieving worksheets, and instruction manuals [24].

Open Course-Ware (OCW) gives free public access to information used in under-graduate and graduate programs at institutions of higher education [25].

Social Networks

Group webpages, blogs, and wikis allow learners and educators to post thoughts, ideas, and comments on a website in an interactive learning environment [26]. Social networking sites are virtual communities for people interested in a particular subject or just to "hang out" together. Members communicate by voice, chat, instant message, video conference, and blogs, and the service typically provides a way for members to contact friends of other members [27]. The statistics support the likelihood of being able to bring these technologies into our classrooms and find successful teaching methods to employ their use in an educational setting. Social networking inherently encourages collaboration and engagement [28] Social networking can also be used as a motivational tool to promote self-efficacy amongst students. In a study by Bowers-Campbell Facebook was used as an

academic motivation tool for students in a developmental reading course [29]. Group members may respond and interact with other members [30]. Student interaction is at the core of constructivist learning environments and Social Net-working Sites provide a platform for building collaborative learning communities. Every student has his or her own learning requirements, and a Web 2.0 educational framework provides enough resources, learning styles, communication tools and flexibility to accommodate this diversity [31].

The popularity of social media and its rapid ascension into our daily lives is nothing short of astounding. Sites that weren't even around 10 years ago are now visited every day. What's more, 56 per cent of the faculty surveyed said they expect their use of social media to increase rapidly. The survey provides amazing facts about use of social media by raising the following questions.

1. Do you friend your students on Facebook?
2. Do you tweet, or use Twitter in the classroom?
3. Do you network on LinkedIn, and participate in its groups?
4. Does your college or university have a social media policy?

For the past two years, *Faculty Focus* conducted a survey on Twitter usage in higher education. This year they expanded the survey to include Facebook and LinkedIn, while adding a number of new questions as well.

Twitter, Facebook and LinkedIn all have their strengths and weaknesses, and they are better used for some things than others. But how are the three being used in higher education today? It's their hope that these survey results provide at least some of the answers while lending new data to the discussion.

Here are just some of the findings from Social Media Usage Trends among Higher Education Faculty, a 2011 *Faculty Focus* survey of nearly 900 higher education professionals:

1. Facebook is the most popular social media site for the people who took this survey. Nearly 85% have a Facebook account, following by LinkedIn at approximately 67% and Twitter at around 50%.
2. 32% have "friended" an under-graduate student on Facebook; 55% said they wait until after the student graduates.
3. 83% allow students to use laptops in the classroom; 52% allow smart phones.
4. 30% said their institution doesn't have a social media policy. About 40% weren't sure.
5. 68% have talked to their students about managing their online reputation [32].

Transcription Technologies

Tools and Techniques for Improving Course Accessibility At-risk learners those who have learning disabilities or who are not native English speakers can benefit from multi-modal access to lectures and presentations. It has become increasingly clear that one mode of delivering course material often is not enough for the varied learning styles, needs, and challenges of today's college students. Research has shown that one of the simplest ways to improve access to course content is to capture, caption, and transcribe your lectures and presentations [33]. A more intermediate approach could include using audio recording software like Audacity, Power-Point narration, or tools such as mp3 Direct Cut or Power Sound Editor. If the institution has invested in lecture capture systems such as Camtasia Relay, Mediasite, Tegrity Campus, Echo 360 or Panopto, there are even more options and much less work since the recording and synchronization are all automated.

Once the presentation is digitized, the next step is to transcribe it, Bain said, noting that this is often the most difficult aspect of offering students truly accessible course media. Some of the tools Bain recommends for converting speech to text include Dragon Naturally Speaking, Media Access Generator (MAGpie), CapScribe, and InqScribe. YouTube also offers a captioning feature that Bain called "promising" and there are a few research prototypes with speech recognition based transcription, including an IBM Research's Hosted Transcription Service and Synote [34].

Webcams

Webcams and webcasting have enabled creation of virtual classrooms and virtual learning environment [35].

Whiteboards

Interactive whiteboards and smart-boards allow learners and instructors to write on the touch screen. The screen mark-up can be on either a blank whiteboard or any computer screen content. Depending on permission settings, this visual learning can be interactive and participatory, including writing and manipulating images on the interactive whiteboard.

Screen-casting

Screen-casting allows users to share their screens directly from their browser and make the video available online so that other viewers can stream the video directly [36]. The presenter thus has the ability to show their ideas and flow of thoughts rather than simply explain them as simple text content. In combination with audio and video, the educator can mimic the one-on-one experience of the classroom and deliver clear, complete instructions. Learners also have an ability to pause and rewind, to review at their own pace, something a classroom cannot always offer.

Virtual Classroom

A Virtual Learning Environment (VLE), also known as a learning platform, simulates a virtual classroom or meetings by simultaneously mixing several communication technologies. For example, web conferencing software such as GoToTraining, WebEx Training or Adobe Connect enables students and instructors to communicate with each other via webcam, microphone, and real-time chatting in a group setting. Participants can raise hands, answer polls or take tests. Students are able to whiteboard and screencast when given rights by the instructor, who sets permission levels for text notes, microphone rights and mouse control.

A virtual classroom also provides the opportunity for students to receive direct instruction from a qualified teacher in an interactive environment. Learners can have direct and immediate access to their instructor for instant feedback and direction. The virtual classroom also provides a structured schedule of classes, which can be helpful for students who may find the freedom of asynchronous learning to be overwhelming. In addition, the virtual classroom provides a social learning environment that replicates the traditional "brick and mortar" classroom. Most virtual classroom applications provide a recording feature. Each class is recorded and stored on a server, which allows for instant playback of any class over the course of the college year. This can be extremely useful for students to review material and concepts for an upcoming exam. This also provides students with the opportunity to watch any class that they may have missed, so that they do not fall behind. It also gives parents and auditors the conceptual ability to monitor any classroom to ensure that they are satisfied with the education the learner is receiving.

Learning Management System

A learning management system (LMS) is software used for delivering, tracking and managing training and education. For example, an LMS tracks attendance, time on task, and student progress. Educators can post announcements, grade assignments, check on course activity, and participate in class discussions. Students can submit their work, read and respond to discussion questions, and take quizzes [37] An LMS may allow teachers, administrators, students, and permitted additional parties (such as parents if appropriate) to track various metrics. LMSs range from systems for managing training / educational records to software for distributing courses over the Internet and offering features for online collaboration. The creation and maintenance of comprehensive learning content requires substantial initial and ongoing investments of human labor. Effective translation into other languages and cultural contexts requires even more investment by knowledgeable personnel [38].

Learning Content Management System

A learning content management system (LCMS) is software for author content (courses, reusable content objects). An LCMS may be solely dedicated to producing and publishing content that is hosted on an LMS, or it can host the content itself. The Aviation Industry Computer-Based Training Committee (AICC) specification provides support for content that is hosted separately from the LMS. A recent trend in LCMSs is to address this issue through crowd-sourcing [39].

Computer-aided Assessment

Computer-aided assessment, also but less commonly referred to as e-assessment, ranges from automated multiple-choice tests to more sophisticated systems. With some systems, feedback can be geared towards a student's specific mistakes or the computer can navigate the student through a series of questions adapting to what the student appears to have learned or not learned.

The best examples follow a formative assessment structure and are called "Online Formative Assessment". This involves making an initial formative assessment by sifting out the incorrect answers. The author of the assessment / teacher will then explain what the pupil should have done with each question. It will then give the pupil at least one practice at each slight variation of sifted out questions. This is the formative learning stage. The

next stage is to make a summative assessment by a new set of questions only covering the topics previously taught.

Learning design is the type of activity enabled by software that supports sequences of activities that can be both adaptive and collaborative. The IMS Learning Design specification is intended as a standard format for learning designs, and IMS LD Level A is supported in LAMS V2.elearning and has been replacing the traditional settings due to its cost effectiveness.

Electronic Performance Support Systems (EPSS)

An Electronic Performance Support System is, according to Barry Raybould, "a computer-based system that improves worker productivity by providing on-the-job access to integrated information, advice, and learning experiences" [40]. Gloria Gery defines it as "an integrated electronic environment that is available to and easily accessible by each employee and is structured to provide immediate, individualized on-line access to the full range of information, software, guidance, advice and assistance, data, images, tools, and assessment and monitoring systems to permit job performance with minimal support and intervention by others" [41].

Data system Student data systems have a significant impact on education and students [42]. Over-the-counter data (OTCD) refers to a design approach which involves embedding labels, supplemental documentation, and a help system and making key package / display and content decision [43].

Advantages of Technologies

Advantages of incorporating technology into the classroom are many in number and may include defray travel costs and the following:

1. *Easy-to-access Course Materials.* Course material on a website allows learners to study at a time and location they prefer and to obtain the study material very quickly [44].
2. *Student Motivation.* According to James Kulik, who studies the effectiveness of computers used for instruction, students usually learn more in less time when receiving computer-based instruction and they like classes more and develop more positive attitudes toward computers in computer-based classes [45]. Teachers must be aware of their students' motivators in order to successfully implement technology into the classroom [46]. Students are more motivated to learn when they are interested in the subject matter, which can be enhanced by using technologies in the classroom and targeting the need for screens and digital material [47] that they have been stimulated by outside of the classroom.
3. *More Opportunities for Extended Learning.* According to study completed in 2010, 70.3% of American family households have access to the internet [48]. According to Canadian Radio Television and Telecommunications Commission Canada, 79% of homes have access to the internet [49]. This allows students to access course material at home and engage with the numerous online resources available to them. Students can use their home computers and internet to conduct research, participate in social media, email, play educational games and stream videos.
4. *Wide Participation.* Learning material can be used for long distance learning and are accessible to a wider audience [50].
5. *Improved Student Writing.* It is convenient for students to edit their written work on word processors, which can, in turn, improve the quality of their writing. According to some studies, the students are better at critiquing and editing written work that is exchanged over a computer network with students they know [51].
6. *Differentiated Instruction.* Educational technology provides the means to focus on active student participation and to present differentiated questioning strategies. It broadens individualized instruction and promotes the development of personalized learning plans in some computer programs available to teachers. Students are encouraged to use multimedia components and to incorporate the knowledge they gained in creative ways [52]. This allows some students to individually progress from using low ordered skills gained from drill and practice activities, to higher level thinking through applying concepts creatively and creating simulations [53]. In some cases, the ability to make educational technology individualized may aid in targeting and accommodating different learning styles and levels [54].

The strength and weaknesses or assets and liabilities of the use of technologies in teaching and learning processes are seen in the following table:

Strenghth/Assets	Weaknesses/Liabilities
Just-in-time information Learn how to use technology (individually & in a small group)	Divided attention so some are missing the work of the group or having private study
Tools to make group more efficient & interdependent	Distraction and/or diversion of group work
Can be used to create "shared experience"	Time sink for searches
Instant tool to look up definitions quickly for group	Source reliability and validity
Projection of scribe work on screen	Computer operation and presenter control
Ability to save scribe work as .doc or .pdf files	File organization
Projection of notes, diagrams, pictures on screen	File sharing
Ability to save any notes, diagrams, pictures on screen	Not using the technology wisely
Instant question submission to weekly Synthesis & Integration Panel	Leaning on technology rather than learning
Emails to and from experts in group	Instant Evidence Based Medicine work (discourages preparation?)
Paperless educating/learning	Slows the group down
Easier to administer progressive disclosure	Greater preparation required on the part of the facilitators and the block case writers
Will eliminate paper copies	Technology training required
	Physical barrier to group participation

Suggested "ground rules" for heading off potential misuses of technology:

1. Discussion is still supreme (as opposed to reading off a screen).
2. Laptop work must be related to the groups tasks (no personal email, chat or other surfing/ playing).
3. System should be used for sharing information (send to Blackboard and bring up in class as favorite resources).
4. Scribe should control the technology for the session.
5. Wrap up should include evaluation of how the technology is being used.
6. Group agrees on what they believe is appropriate use.
7. Give immediate feedback if technology is being used inappropriately.
8. Agree that it is not appropriate to look up work that should have been prepared in advance.
9. Purpose of technology is to enhance group effectiveness.
10. Quick look-ups allowed (less than 60 seconds)
11. Single, group-only computer. No individual users.

Note that the identified ground rules are simply suggestions for the group to negotiate. We encourage the facilitators to lead the group in a discussion so the group has ownership. Our experience with this has consistently shown a more cohesive and unified group in terms of use of technology.

We feel this method helped us document some of the issues and moved us from victims to victors by allowing us to proactively begin to capitalize on emerging technologies as they become the new tools of the trade [55].

Criticism

Use of technology in education needs large scale spending of money. However, it is not sure that achieving improved students performances, outcomes and results from new technology based teaching [56].

New technologies are frequently accompanied by unrealistic hype and promise regarding their transformative power to change education for the better or in allowing better educational opportunities to reach the masses. Examples include silent film, broadcast radio, and television, none of which have maintained much of a foothold in the daily practices of mainstream, formal education [57]. There is a growing awareness that technology, in and of itself, does not necessarily result in fundamental improvements to educational practice [58]. Rather than having blind faith that technology will lead to improvements, it is becoming increasingly recognized that focus needs to be on the learner's interaction with

technology—not the technology itself. With that being said, technology should not be seen as a quick fix. It needs to be recognized as "ecological" rather than "additive" or "subtractive". In this ecological change, one significant change will create total change [59]. Unless and until that happens, it is likely that expectations in learning outcomes will continue to exceed those observed in reality.

Electronic devices such as cell-phones and computers facilitate rapid access to a constant stream of sources, each of which may receive cursory attention. Michel Rich, an associate professor at Harvard Medical School and executive director of the Center on Media and Child Health in Boston, said of the digital generation, "Their brains are rewarded not for staying on task, but for jumping to the next thing. The worry is we're raising a generation of kids in front of screens whose brains are going to be wired differently" [60]. Students have always faced distractions and time-wasters but computers and cell-phones are a constant stream of stimuli that poses challenge to focusing and learning. Although these technologies affect adults too, young people are more influenced by it as their developing brains can easily become habituated to constantly switching tasks and becoming unable to sustain attention [61].

As part of educational reform, new instructional materials and tests are being developed which are online and adaptive. This means that a computer will tailor questions to each student's ability and calculate their scores. This initiative is pushed more by for-profit companies to increase the use of their products which is now a multi-billion dollar market. Online educational resources like Khan Academy is used as learning materials, but it is criticized for not looking into process and content but only the end result. Computer-based instructional model also encourages students to work individually rather than socially or collaboratively. Social relationships are important but high-tech environments may compromise the balance of trust, care and respect between teacher and student [62].

Massively Open Online Courses (MOOCs), although quite popular in discussions of technology and education in developed countries (more so in US), are not a major concern in most developing or low-income countries like India. One of the stated goals of existing MOOCs is to provide less fortunate populations (i.e., in developing countries) an opportunity to experience courses with US-style content and structure. However, research shows only 3% of the registrants are from low-income countries and although many courses have thousands of registered students only 5-10% of them complete the course [63]. MOOCs also implies that certain curriculum and teaching methods are superior and this could eventually wash over (or possibly washing out) local educational institutions, cultural norms and educational traditions leads to digital divide [64].

Use of Technologies Must Comply with Information Technology Law

The use of technology in teaching and learning process rapidly is being used which is having advantages in effective learning activities. However, at the same time the technology is being misused and wrongly applied leading towards numerous problems such as corrupting the young minds due to pornography and affecting the privacy of the individuals. So, the use of the technology in an appropriate manner ensured in the Information technology laws which are needed to be observed and followed for maintaining culturally rich techno-society. The laws which provide for the better use of the technology for many purposes especially the educational activities are as follows:

The Information Technology Act, 2000

The United Nations General Assembly by resolution A/RES/51/162, dated the 30 January 1997 has adopted the Model Law on Electronic Commerce adopted by the United Nations Commission on International Trade Law. This is referred to as the UNCITRAL Model Law on E-Commerce. Following the UN Resolution India passed the Information Technology Act 2000 in May 2000 and notified it for effectiveness on October 17, 2000. The Information technology Act 2000 has been substantially amended through the Information Technology (Amendment) Act 2008 which was passed by the two houses of the Indian Parliament on December 23, and 24, 2008. It got the Presidential assent on February 5, 2009 and was notified for effectiveness on October 27, 2009. Information Technology Act 2000 addressed the following issues:

1. Legal Recognition of Electronic Documents
2. Legal Recognition of Electronic (Digital) Signatures
3. Offenses and Contraventions
4. Justice Dispensation Systems for Cybercrimes

The Information Technology (Amendment) Act, 2008 as the new version of Information Technology Act, 2000 is often referred has provided additional focus on Information Security. It has added several new sections on offences including Cyber Terrorism

and Data Protection. A set of Rules relating to Sensitive Personal Information and Reasonable Security Practices (mentioned in section 43A of the ITAA, 2008) was released in April 2011 [65]. Some of the cyber law observers have criticized the amendments on the ground of lack of legal and procedural safeguards to prevent violation of civil liberties of Indians. There are also been appreciation about the amendments from many observers because it addresses the issue of Cyber Security.

Salient Features of the Information Technology Act, 2000

- Authentication of electronic records (Section 3)
- Legal Framework for affixing Digital signature by use of asymmetric crypto system and hash function (Section 3)
- Legal recognition of electronic records (Section 4)
- Legal recognition of digital signatures (Section 5)
- Retention of electronic record (Section 7)
- Security procedure for electronic records and digital signature (Sections 14, 15, 16)
- Licensing and Regulation of Certifying authorities for issuing digital signature certificates (Sections 17-42)
- Data Protection (Sections 43 & 66).
- Various types of computer crimes defined and stringent penalties provided under the Act (Sections 43, 66, 67, 72).
- Establishment of Cyber Appellate Tribunal under the Act (Sections 48-56)
- Appeal from order of Adjudicating Officer to Cyber Appellate Tribunal and not to any Civil Court (Section 57)
- Appeal from order of Cyber Appellate Tribunal to High Court (Section 62)
- Interception of information from computer to computer (Section 69)
- Act to apply for offences or contraventions committed outside India (Section 75)
- Investigation of computer crimes to be investigated by officer at the DSP (Deputy Superintendent of Police) level.
- Power of police officers and other officers to enter into any public place and search and arrest without warrant (Section 80)
- Offences by the Companies and firms (Section 85)
- Constitution of Cyber Regulations Advisory Committee (CRAC) who will advice the Central Government and Controller (Section 88).

New Provisions added through Amendments in 2008

- New Section to address technology neutrality from its present "technology specific" form i.e., Digital Signature to Electronic Signature (Section 3A).
- New Section to address promotion of e-Governance and other IT application:
  a) Delivery of Service
  b) Outsourcing – Public Private Partnership (Section 6A)
  c) New Section to address electronic contract (Section 10A)
- New Section to address data protection and privacy (Section 43)
- Body corporate to implement best security practices (Sections 43A &72A)
- Multimember Appellate Tribunal-Sections (49-52)
- Offensive messages and Spam (Section 66A)
- Pornography (Section 67A)
- Preservation and Retention of Data / Information (Section 67C)
- Blocking of Information for public access (Section 69A)
- Monitoring of Traffic Data and Information for Cyber Security (Section 69B)
- New section for designating agency for protection of Critical Information Infrastructure (Section 70A)
- New Section for power to CERT-In to call and analyse information relating to breach in cyber space and cyber security (Section 70B).
- Revision of existing Section 79 for prescribing liabilities of service providers in certain cases and to Empower Central Government to prescribe guidelines to be observed by the service providers for providing services. It also regulates cyber cafes (Section 79).
- New Section for Examiner of Digital Evidence (Section 79A).
- New Section for power to prescribe modes of Encryption (Section 84A)
- Punishment for most of offences was reduced from three years to two years.

- Mumbai Cyber lab is a joint initiative of Mumbai police and NASSCOM. There should be a definite forum to redress the grievances under the Cyber Space.
- More Public awareness campaigns
- Training of police officers to effectively combat cyber crimes
- More Cyber crime police cells set up across the country
- Effective E-surveillance
- Websites aid in creating awareness and encouraging reporting of cyber crime cases.
- Specialized Training of forensic investigators and experts
- Active coordination between police and other law enforcement agencies is required.
- Cyber security forum-Joint collaboration between India and U.S.

Major provisions of the IT Act, 2000 ensures the use of the information and technology in right manner by prescribing punishments in the following manner:

Cyber Crime	Brief Description	Relevant Section in IT Act	Punishments
Cyber Stalking	Stealthily following a person, tracking his internet chats.	43, 65, 66	3 years, or with fine up to 2 lakh
Cyber Pornography including child pornography	Publishing Obscene in Electronic Form involving children	67, 67 (2)	10 years and with fine may extends to 10 lakh
Intellectual Property Crimes	Source Code Tampering, piracy, copyright infringement etc.	65	3 years, or with fine up to 2 lakh
Cyber Terrorism	Protection against cyber terrorism	69	Imprisonment for a term, may extend to 7 years
Cyber Hacking	Destruction, deletion, alteration, etc in a computer resources	66	3 years, or with fine up to 2 lakh
Phishing	Bank Financial Frauds in Elec- tronic Banking	43, 65, 66	3 years, or with fine up to 2 lakh
Privacy	Unauthorized access to computer	43, 66, 67, 69, 72	

Section 66A of the Information Technology Act provides for punishment for "Sending Offensive Messages". The Section can be read: *66(A) Punishment for sending offensive messages through communication service, etc.: Any person who sends, by means of a computer resource or a communication device, - any information that is grossly offensive or has menacing character; or*

(b) any information which he knows to be false, but for the purpose of causing annoyance, inconvenience, danger, obstruction, insult, injury, criminal intimidation, enmity, hatred or ill will, persistently by making use of such computer resource or a communication device,

(c) any electronic mail or electronic mail message for the purpose of causing annoyance or inconvenience or to deceive or to mislead the addressee or recipient about the origin of such messages, shall be punishable with imprisonment for a term which may extend to three years and with fine.

'Explanation.- For the purpose of this Section, terms "electronic mail" and "electronic mail message" means a message or information created or transmitted or received on a computer, computer system, computer resource or communication device including attachments in text, images, audio, video and any other electronic record, which may be transmitted with the message.

Section 66A has been criticized and challenged in Lucknow and Madras High Courts for its constitutional validity [66]. Recently the Supreme Court of India has struck down Section 66A as being violative of Article 19(1) (a) of Constitution of India [67]. Section 67 provides for the punishment for publishing or transmitting obscene material in electronic form. Section 67A provides for the punishment for publishing or transmitting of material containing sexually explicit act, etc., in electronic form. Section 67B provides for the punishment for

publishing or transmitting of material depicting children in sexually explicit act, etc, in electronic form. Section 69 empowers the Central Government / State Government / its authorized agency to intercept, monitor or decrypt any information generated, transmitted, received or stored in any computer resource if it is necessary or expedient so to do in the interest of the sovereignty or integrity of India, defence of India, security of the State, friendly relations with foreign States or public order or for preventing incitement to the commission of any cognizable offence or for investigation of any offence. They can also secure assistance from computer personnel in decrypting data, under penalty of imprisonment.

Information Technology (Reasonable Security Practices and Procedures and Sensitive Personal Information) Rules, 2011 [68]

The protection of personal information lies at the heart of the right to privacy; and, for this reason, it is an imperative legislative and policy concern in liberal democracies around the world. In India, although remedies for invasions of privacy exist in tort law and despite the Supreme Court of India according limited constitutional recognition to the right to privacy, there have never been codified provisions protecting the privacy of individuals and their personal information [69]. These rules can be regarded as the first law on the right to privacy which is narrated in the following manner.

Rule 2(i) defines the personal information: *"Personal information" means any information that relates to a natural person, which, either directly or indirectly, in combination with other information available or likely to be available with a body corporate, is capable of identifying such person.*

Rule 3 of the Sensitive Personal Data Rules provides an aggregated definition of sensitive personal data as follows:

Sensitive personal data or information of a person means such personal information which consists of information relating to:

- Password
- Financial information such as Bank account or credit card or debit card or other payment instrument details,
- Physical, physiological and mental health condition,
- Sexual Orientation,
- Medical records and history,
- Biometric Information,
- Any detail relating to the above clauses as provided to body corporate for providing service, and
- Any of the information received under above clauses by body corporate for processing, stored or processed under lawful contract or otherwise.

Provided that, any information that is freely available or accessible in public domain or furnished under the Right to Information Act, 2005 or any other law for the time being in force shall not be regarded as sensitive personal data or information for the purposes of these rules.

In accordance with the principle that certain kinds of personal information are particularly sensitive, due to the intimate nature of their content in relation to the right to privacy, to invite privileged protective measures regarding the collection, handling, processing, use and storage of such sensitive personal data, it is surprising that rule 3 does not protect electronic communication records of individuals. Emails and chat logs as well as records of internet activity such as online search histories are particularly vulnerable to abuse and misuse and should be accorded privileged protection.

Rule 8 provides for the Reasonable Security Practices and Procedures in the following manner: *A body corporate or a person on its behalf shall be considered to have complied with reasonable security practices and procedures, if they have implemented such security practices and standards and have a comprehensive documented information security programme and information security policies that contain managerial, technical, operational and physical security control measures that are commensurate with the information assets being protected with the nature of business. In the event of an information security breach, the body corporate or a person on its behalf should be required to demonstrate, as and when called upon to do so by the agency mandated under the law, that they have implemented security control measures as per their documented information security programme and information security policies.*

The Sensitive Personal Data Rules represent India's first legislative attempt to recognise that all persons have a right to protect the privacy of their personal information. However, the Rules suffer from numerous conceptual, substantive and procedural weaknesses, including drafting defects, which demand scrutiny and rectification [70].

Information Technology (Intermediaries Guidelines) Rules, 2011 [71]

Rule 3 Provides for observance of due diligence by intermediary [72] while discharging their duties which are as follows:

1. The intermediary should publish the rules and regulations, privacy policy and user agreement for access-or usage of the intermediary's computer resource by any person.
2. Such rules and regulations, terms and conditions or user agreement should inform the users of computer resource not to host, display, upload, modify, publish, transmit, update or share any information that:

(a) Belongs to another person and to which the user does not have any right to;

(b) Grossly harmful, harassing, blasphemous, defamatory, obscene, pornographic, paedophilic, libellous, invasive of another's privacy, hateful, or racially, ethnically objectionable, disparaging, relating or encouraging money laundering or gambling, or otherwise unlawful in any manner,

(c) Harm minors in any way,

(d) Infringes any patent, trademark, copyright or other proprietary rights,

(e) Violates any law for the time being in force,

(f) Deceives or misleads the addressee about the origin of such messages or communicates any information which is grossly offensive or menacing in nature

(g) Impersonate another person,

(h) Contains software viruses or any other computer code, files or programs designed to interrupt, destroy or limit the functionality of any computer resource,

(i) Threatens the unity, integrity, defence, security or sovereignty of India, friendly relations with foreign states, or public order or causes incitement to the commission of any cognisable offence or prevents investigation of any offence or is insulting any other nation.

3. The intermediary should not knowingly host or publish any information or should not initiate the transmission, select the receiver of transmission, and select or modify the information contained in the transmission as specified in sub-rule (2): provided that the following actions by an intermediary should not amount to hosting, publishing, editing or storing of any such information as specified in sub-rule: 2.(a) temporary or transient or intermediate storage of information automatically within the computer resource as an intrinsic feature of such computer resource, involving no exercise of any human editorial control, for onward transmission or communication to another computer resource; (b) removal of access to any information, data or communication link by an intermediary after such information, data or communication link comes to the actual knowledge of a person authorised by the intermediary pursuant to the provisions of the Act.
4. The intermediary, on whose computer system the information is stored or hosted or published, upon obtaining knowledge by itself or been brought to actual knowledge by an affected person in writing or through email signed with electronic signature about any such information as mentioned in sub-rule (2) above, should act within thirty six hours and where applicable, work with user or owner of such information to disable such information that is in contravention of sub-rule (2). Further the intermediary should preserve such information and associated records for at least ninety days for investigation purposes.
5. The Intermediary should inform its users that in case of non-compliance with rules and regulations, user agreement and privacy policy for access or usage of intermediary computer resource, the Intermediary has the right to immediately terminate the access or usage lights of the users to the computer resource of Intermediary and remove non-compliant information.
6. The intermediary should strictly follow the provisions of the Act or any other laws for the time being in force etc.

Conclusion

Globalization and ICT (Information and Communication Technology) revolution in India has changed the form of information drastically. It made information more accessible portable and handy. However, there are threats of the same at the alarming level which can be understood by going through the statistics provided here. Today Cyber crime is a bigger threat to India in comparison to physical crime. In a survey conducted by National Crime Records Bureau (NCRB), Ministry of Home Affairs shows that cyber crime is increasing everyday in various forms. Cyber Crimes increased by 22.7% in 2007 as compared to previous year. Cyber Forgery 64.0% (217 out of total 339) and Cyber Fraud 21.5% (73 out of 339) were the main cases under IPC category for Cyber Crimes. 63.05% of the offenders under IT Act were in the age group 18-30 years (97 out of 154) and 55.2% of the offenders under IPC Sections were in the age group

30-45 years (237 out of 429). According to analysts at the Indian Institute of Science, Tax evasion, cheating on the Internet, identity theft, child pornography and other cyber crimes cause a loss of $50 billion annually.

Recent trend shows that there has been a 100% increase in cases of publication or transmission of obscene material, including child pornography, using electronic means in just one year – 2012 to 2013. Statistics shows that 1,203 cases were reported last year as against 589 in 2012. The maximum number of 234 cases was reported from Andhra Pradesh, a nearly 74 per cent jump from 2012.

In a written reply to the Lok Sabha to a specific question by BJP MP Varun Gandhi, the Ministry of Home Affairs shared statistics according to which Kerala stood second with 177 cases. A total of 159 cases were registered in Uttar Pradesh as against only 26 in 2012. While no such cases were reported from Assam in 2012, the State recorded over 100 per cent increase with registration of 111 cases in 2013.

Cases went up from 48 to 81 in Rajasthan and in Maharashtra, there was 60 per cent increase in reported offences that are punishable under the Indian Penal Code and Sections 67, 67A and 67B of the Information Technology Act. Of the total 737 arrests, the maximum (167) were made in Uttar Pradesh and 130 in Maharashtra.

The reasons for this are lack of empirical data on child pornography is proving to be a hurdle to the allocation of resources for training, law enforcement and understanding of how to conduct investigations into such cases. "The National Crime Records Bureau (NCRB) statistics do not provide any information on child pornography cases. As a result, the gravity of the issue is not being appreciated. The entire system of data collation should be overhauled," said Vidya Reddy of Tulir–Centre for the Prevention and Healing of Child Sexual Abuse, a non-government organization [73].

Suggestions

1. Regulating Firms of Service Providers and Cyber Cafes: In India, Firms of Service providers and Cyber cafes have emerged as base for cyber crime including cyber terrorism. Various offences relating to cyber crime suggest that local cyber cafes have been used for sending threatening mails to any individual or to any high officials. Earlier, cyber cafes were required to create detailed records about their customer's browsing habits, but the same is not being abided by the Cafes.
2. Dispute Settlement: The IT Act provides various modes of dispute settlements. However, citizens are not aware of various kinds of commonly committed cyber offences, procedure for filing a case, resolving a dispute. There is also a lacuna of trained judges and skilled investigators.
3. Contractual Aspect: This unprecedented growth of internet, calls for a legal framework for e-commerce in India. IT act deals with some contractual aspect in E-commerce. However, several practical problems still exist when we form a contract.
4. Training for Judges and Skilled Investigators: We need to promote and facilitate the fair use of cyber space among general masses and also there is an immediate requirement of skilled investigators and trained judges for fair and effective dispute resolution.
5. India needs to address various questions; issues relating to cyberspace and the most appropriate way to start are the creation of a comprehensive legislation which should address broad area of cyberspace taking into consideration sectoral, institutional and individual requirements by introducing appropriate legal framework.
6. The amendments in several laws by the IT Act are a good beginning but several changes are still needed for the act to ensure both functional equivalence and technological neutrality.
7. International agreements by way of convention and cooperation are required for various dispute resolutions in International arena.

Laws are not the solutions themselves they need to be observed and implemented effectively by the concerned such as public at large and implementing agencies then only desired goals can be achieved to expected level.

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