

An Analysis of Role of the ICT in Education Quality Enhancement

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Abstract: *Though information technology was at its great speed still some steps and efforts needed at various levels for providing e-education. The global scenario shows the invading role of information and communication technologies into education sector so it was necessary to adopt technologies for education in India also. Researcher had also experimented with the generation of multimedia course contents, which can be streamed through Real server. The students need to have Real Player which was available for free. Researcher was currently developing our own open-source free software which can be used to hold live classroom sessions over internet. Overall experience indicates that an E-education system can complement the existing systems to make them more effective.*

Introduction

The evolution of internet and World Wide Web (WWW) has affected all part of life dramatically. Also, the area of education has not remained untouched. Previously, student used to spend their time in library searching for information in books and journals. Now a day, they use web search engines and figure out the web sites containing the required information. The information sharing has become very easy due to access to Internet.

Before delving further into the impact of internet on education, let us try to understand the terms teaching, education and learning. In order to understand these, one need to find how a person acquires the knowledge. An immediate observation was that teaching, education and learning all have a common purpose, i.e., to impart knowledge to their subjects to enable them to do certain tasks. Elaborating further, learning was done by subjects and the process involves cognitive abilities of subject, which leads to learning via experience via all the senses. Teaching was the effort done by teacher (instructor). The system where teaching and learning both happen in a harmonious fashion was education.

Consequently, education was a paradigm. Teaching in essence creates an environment which leads to learning experience for the student. The ability of teacher lies in the fact that he can create an environment which leads to a certain desired experience for the student. In the conventional scenario, the teacher takes the feedback by evaluating the students through examination or by the questions asked by the students. On the basis of this

feedback, the environment was modified to enable the student to learn. The mechanism by which teaching and learning take place constitutes education. In conventional scenario, the education system consists of teacher, black board, chalk, books, students, classroom and laboratory and interaction between them. The teacher uses this environment to create problems for student and then guides them through to experiences leading to desired learning.

Here one important point was that all the components except teacher and students of an education system were dependent on technology and has evolved over the development of civilization. With the evolution of internet and proliferation of computing devices all over with the progression of time, the tools were going to change. But their basic essence was going to remain same. One can classify the tools of an education system as follows

- Study material - can be in form of book, can be delivered on line, web pages etc...
- Interactivity tools - Black board, white board with writing tool (chalk etc.)
- Space - classroom and associated facility – Infrastructure for operation of educational system

Research Methodology

Research Methodology defines as a highly intellectual human activity used in the investigation of nature and matter and deals specifically with the manner in which data was collected, analyzed and interpreted. The

procedure of conducting the study requires a lot of attention to be paid, for it has a direct bearing on securing reliable and meaningful information. It was because of this reason that the research methodology adopted for a study needs to be elaborated upon. At the same time research methodology helps the researcher to give his reasons for adopting a certain course of action while ruling out the other. With this idea in mind, the methodology has been separately mentioned in this study.

The main objectives of the study are

- How can information technology be used to support learning in developing cities?
- How can information technology be used to improve communication for e-learning in developing cities?
- How can information technology be used to increase the possibilities and reduce the limitations for e-learning in developing cities?
- What campus organizations were most likely to support instructor's requirement with e-education with technology?

The present study was **exploratory** in nature, for it seeks to discover the ideas and insight and to bring out new relationship. The method of Interview will be used to get the responses of the respondents. The interview will contain question, which will be based on certain factors or dimensions. Now for each question, four alternatives will be given, out of which the respondent has to choose the alternative, which he finds most appropriate for that particular question. Scope of this study was limited to Delhi and Rohtak. Researcher had selected the target respondents randomly, had taken 200 as research sample to whom personally meet for interview. 180 were attended. Out of 180, only 120 respondents were providing the information, which was segregated by 20 (Teachers from Delhi), 20 (Teachers from Rohtak), 40 (Students from Delhi), 40 (Students from Rohtak), used for the research work.

Results and Interpretation of the Interviews

Question 1: How can information technology be used to support learning in developing cities?

Education was a process through which man, animal and machines acquire knowledge. Theoretical findings

have proved that technology can enhance learning. Different learning theories have defined different ways for the acquisition of knowledge. Learning pyramid also showed that learning process can be improved with the support of audio and video aid. Behaviorism has shown that teaching machine can provide information in small chunks and cognitive has claimed that a computer can become a partner in the learning process. Computer working memory interacts with the short term memory of learner; computer provides practices, tutorial and simulation activities which support to communicate information in a way that avoids reaching the limits of learner's short term memory. So, computer helps learner to incorporate new knowledge to previous knowledge. Further cognitive and constructionist analyzed that information technology helps in learning and knowledge construction, different websites which provide audios, videos and read/write webs can support in improving the learning capabilities.

Result Question 1:

Information technology can enhance learning, and it has been proved but how can IT support learning in developing cities were the basic question. Information technology can support learning in different ways in developing cities:

Knowledge construction: Almost all the developing cities have partially adopted the education systems with the support of information technology but they were not using its full facilities. One of the important facilities which can easily be used in the developing cities with the support of IT was *knowledge construction*. Constructionist in psychology for technology has also shown that computer and internet can help in knowledge construction. If courses design in a way that they compel students to construct their knowledge as the part of their education then this concept will improve the education level. If writing of blogs, creation of podcasts or e-portfolio, use of RSS feeds or social bookmarking, online photo galleries etc. become the part of education, then learning will enhance automatically. For the creation of these activities, the learner will consult different curricular or extracurricular resources, which will also improve learner knowledge and learner will encounter new technological advancements. The learners of developing cities were also facing the problem of

modern technological advancements. This thing will also improve the interaction of students of different cities.

Motivations: With the knowledge construction another important fact which was compulsory to adopt were motivation. IT can also support for the creation of motivational environments. If there were the environment of competition and reward for writing of blogs, creation of e-portfolios or podcasts then learners of the developing cities will also get the courage to compete with the international students, this process can also support in resolving the technological gaps between the developed and developing cities.

Checks and Balances: Cognitive learning model has shown that if information were in organized form, then new knowledge can easily become the part of previous knowledge. If teachers or course organizers keep an eye on learner's activities then they can get an idea of their knowledge and also they can check that they may not use the technology in the wrong way. This can be done by checking their blogs, wikis, Facebook or other IT related activities. With the perception of learner's knowledge they can design the course according to cognitive skills of the learners, through which new knowledge can incorporate previous knowledge easily.

Ease of technological use: The awareness of technology has become a big hurdle for the developing cities. In this context IT can support in a way that if the software were designed in native and international languages then they will become comfortable for their users. Most of the learners of the developing cities were not comfortable with English language. Signs, symbols, pictures were also another tool which can be used with the support of information technology to enhance technological awareness, but these signs, symbols and pictures should be used according to cultural context so that users feel comfortable and relax for using them. This can resolve the problem of deficiency of competent teachers because learners will have another teacher to whom they can consult any time anywhere. And the possibilities toward the use of computer-based trainings, web-based training and visual classrooms will increase.

Question 2: How can information technology be used to improve communication for E-education in developing cities?

Although information technology was already supporting the communications for E-education systems in developing cities but still there were deficiencies because of cultural constraints. In some of the developing cities the availability of resources was sufficient but still people were not using those resources. This factor was also claimed by the E-education teacher interviewee from Rohtak where all the facilities were available but still they were not allowing their female students to use synchronous communication mode for communication with male teachers. They were using asynchronous communication and partial synchronous communication mode within the cultural boundaries.

Result Question 2:

Mostly the communication problems were because of cultural hindrances and lack of awareness of the E-education system. Information technology can provide solutions for communication associated problems. For changing the mindset of people there should be trainings of information technology at each level within the developing cities but start should be taken from the trainings of school teachers and company managers because these two levels were in the middle and can communicate the benefits of E-education on each level. Further these people can impart trainings to others. For making these trainings easy the use of semiotics and multilingual software can help well. Because semiotics builds up the structure of experiences via signs, symbols and pictures but these should be used within the cultural context of the cities which were closely associated with language. The description of semiotics in native to international language can also reduce many communication problems and also the learning of international language will improve automatically. Semiotics within cultural context can improve the conceptual and cognitive understanding of the subject matter. Semiotics can help in knowledge construction by relating new knowledge to previous knowledge, they can also guide for technological familiarization by providing small chunks of information. Since whole E-education system build on computer mediated

communication so it was compulsory to consider technical and human communication aspect for the success of E-education systems. Selection of content were also discussed but if semiotics within the cultural context becomes a compulsory part of message content, then the interpretation of message at the receiver end can enhance. So the communication through E-education system can augment if the use of semiotics for technology and instruction designs were within cultural and international boundaries.

Question 3: How can information technology be used to increase the possibilities and reduce the limitations for E-education in developing cities?

In the theoretical part of research different factors which could be the possibilities or limitation of the implementation of E-education in the developing cities have been found. The limitations and possibilities which were found in the theoretical studies were validated in empirical survey by three interviewees. Mostly the limitations in selected developing cities were the same because of similarities in the culture people have almost the same mind set. But Rohtak were a rich country so there were no problems of resources and finances, which Delhi were facing badly. The common obstacles which were found in both the cities were lack of information technology awareness, mind set, language barriers and employer attitude. If these problems can be blown away then possibilities of E-education can ameliorate.

Result question 3:

For increasing the possibilities of E-education systems in developing cities with the support of IT, work on every level were required.

The use of different E-education categories:

Advancement of IT has enabled E-education to introduce different categories like informal learning, blended learning, community learning, learning networks, work-based learning and fully online learning. Developing cities normally use blended and informal learning. They were not using other forms of learning like community learning or fully online learning as found in empirical survey. For increasing the possibilities of E-learning it was compulsory to use

all the categories of E-education. This can only be done by increasing the awareness about these categories and by increasing the interaction of human with the computer. Awareness about the benefits of E-education can be improved with the support of different Media with proper strategies. Magazines, newspapers, TV, radio, internet and mobile can be used to introduce the eminences of E-education.

Use of CBT/WBT: Information technology has introduced different form of computer-based learning such as CBT, WBT, virtual learning environments and virtual classroom. With computer-based trainings the availability of internet was not required, learners can learn with the help of CDs or DVDs. In developing cities like Rohtak internet were not properly available so use of computer-based training can resolve this problem. Learning materials from quality teachers could be available on CDs and DVDs, but these CDs and DVDs should be updated at regular intervals so that learners may not get the old and outdated material. Web based training which have resolved the threats of old and outdated material can be used because in urban areas of Delhi internet were available and students have an urge toward E-education education.

Virtual Class Rooms: Developing cities were also facing the problem of competent teachers as explored in theoretical findings and empirical survey. In that concern virtual classrooms can help best because the cities like Rohtak have internet at good speed all over the country. So, deficiency of female teachers can be resolved with the help of virtual classrooms. Students from Rohtak can get an education from any part of the world from quality teachers.

Use of Open Source: New emerging concept of E-education was the use of open-source software. Adaptability and innovations according to the university portal were available with this software. Above all this software's provide low cost of ownership, integration with campus infrastructure and security. So, the cities like Delhi who were facing the problem of finances can adopt these software's easily. Also, these software's were trying to provide support for mobile devices such as, PDAs, Pocket PC, WAP2

phone and handheld devices so the learners of Rohtak can also use these within cultural boundaries to improve their education level.

LMS and PLE: IT has introduced learning management systems through which learner and instructors can interact, the learner can get learning material and can perform different tasks. But now the trend was shifting toward personal learning environments through which learners can get maximum control of learning activities. If learners of developing cities use the personal learning environments, then, they will know the ideas of other learners and improve their knowledge. This will also resolve many problems like lack of IT awareness, lack of teachers, international collaboration and digital divide.

□ **YouTube:** YouTube can be the best partner of the learners of developing cities because it provides support for learner centric education. It offers audio/video clips with the facility of pause, play, replay, rewind, forward, cut, collaborate and post to blog or Facebook etc. If the learners of developing cities use YouTube for educational purposes, then many educational problems will be resolved because they will have audio/video demonstration. Audio/video demonstrations were better than simple readings and lectures as proved by learning pyramid. But all the above defined facilities can be adopted if the interaction of learner with a computer were maximum.

Interaction design: As stated in the theoretical part E-education was the combination of many systems so it was compulsory to edit all its subsystems for enhancing the possibilities of E-education. Information technology in this context can play a positive role. Advancement in human computer interaction can imply affirmative impact. If the systems design according to the interaction design principals with the consideration of design values, conceptual, behavioral and interface design principals then the interaction of learner with the computer will automatically increase, which in turn increase the possibilities of E-education.

Use of Semiotics: Instruction designs according to learning theories, which talk about the human

cognition, can play a promising role. The use of semiotics within a cultural context for instructional design and technology can make the system more communicative which can be another step towards the possibilities of E-education. The language of signs, symbols and pictures can also enhance the technological awareness and reduce international language barrier.

Modern IT Tools: Another limitation which developing cities were also facing were the lack of resources and practicing environment and competent teachers. The limitation of the lack of practicing environments can be reduced with the support of virtual reality-based software, in which the learner can get expertise virtually before applying to the real world. Artificial intelligence with the support of information technology has introduced many intelligent tutors with the reasoning of master teachers. This can resolve the problem of quality teachers in developing cities and can attract learners toward education.

Question 4: What campus organizations were most likely to support instructor's requirement with e-education with technology?

This question explained the option for the requirement of the instructor for getting the e-education system these options were assisting with hardware, networking and technology infrastructure, trouble shooting network outage, managing network availability and capacity, managing intellectual property issues, creating new e-education programs and researching online material and copyright issues.

In this researcher wanted to know about the training methods used by the respondents. Firstly, Group Training, as recent trends, mostly institutes were charged a flat rate per hour and not per student, so it was always more cost effective to train a group of two or more rather than an individual whenever possible. Secondly Individual (one-on-one) Instructor-Led Training, while one-on-one instructor-led training was more expensive than attending a group class, it was a good investment when people have a specific issue to solve or people need to get started in the right direction with your software/hardware needs. Thirdly On-Site Training, Institutes were provided on-site training,

especially for individual training, demonstration classes, or hands-on classes where people already have a training lab or can set up equipment for training. Fourthly, Hands-On Instructor-Led Classes: Hands-on instructor-led training was preferred over lecture/demonstrations, when possible, especially for introductory level applications classes such as "Intro to Windows" or "Intro to Excel". Students get to actually try out what they were learning, and they were given class files to practice with during and after class. Fifthly, Instructor-Led Lecture/Demonstrations: A lecture/demonstration class can be given in any classroom, conference room or auditorium to any size group from just a few to up to several hundred. This makes it much easier to arrange for on-site training for companies that don't have their own training facility. Lastly, Web-Based Vs. Instructor-Led Training: Web-Based hands-on training was a truly excellent alternative or supplement to instructor-led training. It solves almost all of the problems faced by classroom training. Students can take a "Pre-Test" to determine what areas they need to study.

And Suggested Classroom Hours, the number of hours people need for training depends on several factors, including how in-depth people need to learn the material, whether people need hands-on training and whether it was for a group or individual. Depending on how many people want to give hands-on training to, people might be able to set up 2 to 6 of your own workstations in a conference room, and then have two people share a workstation. There were some inexpensive training labs that can be rented from the community college (availability becomes the issue), and still others for quite a bit more. Projection System, institutes strongly recommended using a projection system for both hands-on and/or lecture/demonstration classes.

Result question 4:

A. Training Methods which were used by the instructors during e-education provided:

Group Training: Although most of institutions were charged a flat rate per hour and not per student, so it was always more cost effective to train a group of two or more rather than an individual whenever possible. But teachers were more willing to take group classes

same as students of developing cities were too willing in group classes but many students of metro city were less interested in group training.

Individual (one-on-one) Instructor-Led Training: While one-on-one instructor-led training was more expensive than attending a group class, it was a good investment when people have a specific issue to solve or people need to get started in the right direction with your software/hardware needs. Many students of metro city were willing to take training alone. They felt that they only grasp the new thing when the alone and they said their concentration was also increased.

On-Site Training: Institutes can provide on-site training, especially for individual training, demonstration classes, or hands-on classes where people already have a training lab or can set up equipment for training. If people need to be trained off site, researcher was very flexible and can arrange for training facilities as needed. Now most of the students were willing to join on site as well as off site training but the teachers were willing to on-site training. But very few were also willing off-site too.

Hands-On Instructor-Led Classes: Advantages: Hands-on instructor-led training was preferred over lecture/demonstrations, when possible, especially for introductory level applications classes such as "Intro to Windows" or "Intro to Excel". Students get to actually try out what they were learning, and they were given class files to practice with during and after class. Hands-on instructor-led training was most effective when used with a projection system so the whole class can follow what the instructor demonstrates on screen. While ideally, it's best if each student can have their own workstation, it can be equally effective when two partners share a workstation, which allows for more people to take a hands-on class with less equipment. Having a partner also helps keep the class moving smoothly, since one person can usually help their partner when they get stuck.

Disadvantages: Hands-on Instructor-Led training requires more time than a lecture/demonstration class, so people may have to limit how much in-depth content was covered. If there were some real beginners who have trouble keeping up, this can slow down the whole class. It also requires a training facility or workstations to be setup, which was added time/expense. Hands-on

classes were usually limited to 8-10 students/class, so if people have a large number of people to train, this requires a larger number of classes and can be difficult to arrange and schedule around everyone's work. It's also consequently more expensive. In some situations, hands-on training might be too difficult to setup, such as for an Outlook class where people would want to be using the company's own server and email accounts.

Instructor-Led Lecture/Demonstrations:

Advantages: A lecture/demonstration class can be given in any classroom, conference room or auditorium to any size group from just a few to up to several hundred. This makes it much easier to arrange for on-site training for companies that don't have their own training facility. Lecture/demonstrations can also move much more quickly and thus cover a lot more content. They were especially effective for overview sessions and for seminars on advanced topics, and very popular for conference presentations.

Disadvantages: For beginners, lecture/demonstrations were a less effective way to learn and retain information than hands-on training. People learn best by getting hands-on experience, particularly for introductory level content. This was less of an issue for more experienced users. People also have to be sure to have a working projection system (if it breaks, the class was over without a backup) as well as a room with an adequate setup, sound system and lighting for screen projection. So, the quality of a lecture/demonstration can depend a great deal on the facilities and equipment.

Web-Based Vs. Instructor-Led Training:

Advantages: Web-Based hands-on training was a truly excellent alternative or supplement to instructor-led training. It solves almost all of the problems faced by classroom training. Students can take a "Pre-Test" to determine what areas they need to study. Students can train anytime, anywhere there was a computer on the Internet, work at their own pace, review as much as they like, and experience a consistently excellent training methodology and comprehensive content over a period of up to a year instead of for only a day or two. Students (and an Administrator) can monitor their progress at all times, and they can Test themselves after training or whenever they wish, as often as they want. It was also the most cost-effective training available.

Disadvantages: For students who have a great deal of difficulty doing any kind of independent work, Web-Based Training may be less effective if it was the only training provided. However, the best way to use Web-Based Training was to combine it with an Instructor-Led class and/or with ongoing technical support where students can get one-on-one assistance and help be motivated to learn. Since a manager or administrator can track all student activity in Web-Based Training, they can often provide the needed motivation and personal attention to help less independent students.

B. Suggested Classroom Hours

Recommended number of hours for Instructor-Led Training: The number of hours people need for training depends on several factors, including how in-depth people need to learn the material, whether people need hands-on training and whether it was for a group or individual.

2 Hours: This amount of time was the *minimum* that would be adequate for a lecture/demonstration overview of an application or a specific topic, with 3 or 4 hours being recommended. For example, an overview of Outlook features, a conference seminar on "Introduction to the Internet", or a workshop on "Merging Form Letters in Word". Two hours was ok for a one-on-one needs-assessment or session on a specific issue. It was not enough time for effective hands-on training, but can be adequate as the block of time for one part of a multi-part demonstration class (for example two, three or four 2hr sessions).

3 Hours: Best for lecture/demonstrations, same as the 2 hours above but with more breathing room and time for a break, questions, and addressing individual issues. It was the minimum block adequate for an "Intro to Outlook", "Intro to GroupWise", or "Intro to PowerPoint" demonstration class. It was the *minimum* block of time adequate for a hands-on session, but usually best as one part of a multi-part session (such as two 3hr sessions, or three 3hr sessions).

4 Hours: This was the recommended block of time for hands-on training, or when there was in-depth coverage in a lecture/demonstration format. It gives enough time to answer questions, take a 15 minutes break, and "put out fires" that can happen during any hands-on class. It

was the recommended time for an "Intro to Windows" or an "Intro to PowerPoint" class. Typically, researchers recommend 8 hours classes for hands-on in-depth applications training (such as Intro to Word or Excel, Advanced Excel), broken up into two 4-hour sessions.

6 Hours: This was the *minimum* amount of time adequate for an in-depth hands-on applications class such as Intro to Word or Intro to Excel. Typically, it would be split into two 3-hour sessions, either morning/afternoon, or a few days or a week apart. For in-depth classes, 8 hours was recommended.

8 Hours: This was the recommended amount of time for an in-depth hands-on applications class such as Intro to Word or Excel. It was usually split into two 4-hour blocks, taught either in one day, or a couple days or a week apart. It allows for more questions, individual time, and inclusion of intermediate/advanced topics as dictated by the needs/level of the attendees.

C. Training Facilities

Training Facilities: If people don't already have access to a training facility, researchers can arrange that for people, or help people design and set up their own. Depending on how many people people want to give hands-on training to, people might be able to set up 2 to 6 of your own workstations in a conference room, and then have two people share a workstation (sharing a workstation need not be a disadvantage--partners can help each other out).

Institutes had access to several training facilities in the Eugene/Springfield area, and can arrange for facilities at any other location in Oregon or out of state. There were some inexpensive training labs that can be rented from the community college (availability becomes the issue), and still others for quite a bit more. If people were from a department at a university or college, people almost certainly would be given access (at no or little cost) to a training facility on campus, and frequently K-12 and Higher Ed institutions will rent facilities to the public as well.

Projection System: Institutes strongly recommend using a projection system for both hands-on and/or lecture/demonstration classes. Many training facilities already have them installed. The projector can be effective in either a small or large room; it's easiest if there was a large blank wall to project onto, although a

stand-alone screen will work fine depending on the size of the group. If people don't have your own projector, they can be rented typically as per day depending on the type of projector needed.

Institutes charged a flat hourly rate for all services at competitive pricing. Researchers can also provide discounted bids for larger contracts. Training for classes and groups were charged by the hour, not by the number of students attending. Additional Expenses may include: such as Projection system, Training lab/facility, Computer training materials, books, Course outlines/handouts, Travel by car, Travel by plane and Meals & lodging.

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