E-Learning and ICT in Engineering Education: A Case of GNDEC, Ludhiana

Amanjot Kaur Gill and Sandeep Singh Gill
Guru Nanak Dev Engineering College
Ludhiana
amanjot@gndec.ac.in; ssg@gndec.ac.in

ABSTRACT

E-learning and usage of Information and Communication Technology (ICT) has started impacting Engineering education in India in a big way. Usage of multimedia tools, virtual learning environments, simulation software's, lecturing through online mode, video and CD ROM recorded lectures, video conferencing, access to e-resources like books, journals, conference proceedings as well as access to the finest brains in the field are some of the key areas in which ICT and E-learning has shown its impact.

Teaching highly technical subjects using the common E-learning tools is a challenging task. The general rules that may apply to the arts and social sciences fail miserably as learning in engineering occurs in discrete quanta and the failure of a student to grasp certain basic fundamentals will not foster further learning in a given subject area or topic. Therefore, support structures for E-learning in Engineering Education are very important for successful delivery.

An important initiative in this regard was the National Broadband Policy initiated in 2004 in India which paved the way for adoption of broadband technology in the country. The National Knowledge Commission (NKC) was established by the Government in 2005 to focus on India’s competitive advantage in Knowledge-intensive Service Sector (Sharma, 2013). The National Knowledge Network (NKN) which was established on the recommendation of NKC “is a state-of the-art multi-gigabit pan-India network for providing a unified high speed network backbone for all knowledge related institutions in the country”. The network is envisaged to create a pool of qualified professionals while establishing quality institutions with excellent research facilities. The UGC-Infonet 2.0 (University Grants Commission, India, 2012) launched on April, 2010, paved the way for strengthening the NKN which has plans to provide 1GB Internet connectivity to the universities in the

KEYWORDS

Education, E-learning, E-resources, Faculty, ICT, Internet, Students.

1 INTRODUCTION

With India becoming a signatory of Washington Accord and adoption of outcome based education (OBE), E-learning and usage of Information and Communication Technology (ICT) has started impacting Engineering education in India in a big way. Usage of multimedia tools, virtual learning environments, simulation software's, lecturing through online mode, video and CD ROM recorded lectures, video conferencing, access to
country. Government of India has initiated the National Mission on Education through ICT (NMEICT) where the focus is on creation of infrastructure and generation of re-usable digital content.

1.1 Review of Literature

A number of researchers have worked in this field over the years. The previous research is studied in this section to analyze work done and find areas in which research is required in future.

A study chaired by Rao [1] in the Indian Institutes of Technology (IIT) brings out that there are many areas in which ICT can be used in IIT. This includes access to IIT faculty and students to information available on cyberspace, help to faculty and students of other Engineering colleges by creating course material, and making it available through E-learning and ICT modes and collaborative work with other global institutions.

A few suggestions have been made to use E-learning for informal and vocational training, which is highly effective for a developing country like India, where a majority of population is living in rural/remote areas and has received almost negligible formal education [2].

Another paper addresses the ways in which India is trying to improve the quality of engineering education in the country and provide wide access to such education through technology mediated learning. Appropriate training of teachers is the other area of focus that will help achieve this goal and lead to a virtual university in future [3].

Nath et al. [4] in their paper examine a number of issues including technology, teaching, learning, organizational issues, and makes general recommendations for the successful use of ICT. They also look into E-learning limitation in particular related with technologies, personal issues, comparison with traditional campus learning, design and other issues. At the end paper suggests that synchronous tools should be integrated into asynchronous environments to allow for “any-time” learning model [5].

Imran [6] presents future perspective in relation to E-learning in India, where demand within higher education is no different from that seen in developed countries. E-learning is the most innovative application of the Internet and it has done wonders globally and currently is disseminating education in classrooms as well. The findings by Pulist [7] indicate that the implementation of E-Learning in Commonwealth Asian countries is moving forward. Though institutions are facing different challenges, the enthusiasm among the faculty and staff is high and need sustenance. Institutions are integrating ICTs and online technologies in their programmes. E-Learning programmes are largely offered in blended mode, thus making a strong case for offering completely online programmes.

In another paper the applications of E-learning, and its current practice in engineering education in engineering institutions of the state of Jammu and Kashmir is examined. The results are discussed in light of relevant research and recommendations for improving E-learning implementations in engineering education are given [8].

Kaware and Sain [9] say that today virtual classrooms are functioning in a system of virtual reality in the Indian educational scenario, where the teacher and students converse in real time, simulating the conventional classroom. In this paper they focus on virtual learning and propose that it is capable of replacing partially or totally the conventional educational, evaluative and administrative functioning of a regular classroom by adopting the advanced computer and ICT technologies.

Another paper suggests that synchronous tools should be integrated into asynchronous environments to allow for “any-time” learning model and also suggests that E-Learning needs to improve from various barriers and training of users should also be done [10].
1.2 Profile of institution

The present paper studies the effect of E-learning and ICT on teaching learning process and upgradation of faculty skills in Guru Nanak Dev Engineering College (GNDEC), Ludhiana. The college, established in 1956, is one of the oldest in North India. It is an autonomous institution and is accredited by National Assessment and Accreditation Council with ‘A’ grade. Its UG programmes in Engineering have been accredited by National Board of Accreditation thrice since 2004. The institution is also ISO 9001-2008 certified since last 13 years. It is running 7 UG and 13 PG courses in Engineering besides MBA, MCA and doctorate programmes. A comprehensive study of ICT infrastructure and resources is made and view of faculty and students regarding its adequacy and usefulness analyzed. Based on the study recommendations for future are made.

2 CASE STUDY

The study has been conducted in GNDEC amongst Faculty and UG Engineering students. Research instruments in form of questionnaires were designed separately for both faculty and UG Engineering students. A sample of 50 teachers from different departments was surveyed. Similarly 100 students spread over all departments and admission batches were administered the questionnaire. Initially the questionnaire was pilot tested and necessary changes incorporated based upon the response by test sample. The UG curriculum in GNDEC comprises of four components namely theory courses, practical courses, industrial training, and project work. The teaching and learning process is a blend of traditional classroom teaching as well, modern E-learning and ICT interventions. Experiments of practical courses are conducted in the laboratory where traditional equipment as well as simulation tools and software’s are used. Outcome based education has been implemented wherein vision, mission of institute as well as departments are defined and well integrated with each other. Programme educational objectives, program outcomes, and course outcomes are defined and evaluated using direct and indirect tools, with use of ICT for evaluation of attainment. Rubrics are used for evaluating laboratory classes, major project, industrial training etc. A majority of classrooms are equipped with LCD projectors and internet. There are around 1200 computers and laptops in the college which are available for both faculty and students. The 80 acre campus, which includes academic areas, hostels, and staff quarters, is connected with internet of bandwidth 50 mbps either through wired or Wi-Fi mode. Online access is available to various e-resources like e-journals, e-books, databases, proceedings, and theses etc. There are seminar rooms equipped with smart boards and video conferencing facilities which are also used for online lectures from other prestigious institutes like Indian Institute of Technology (IIT), Madras, under the quality enhancement in engineering education (QEEE). Video conferencing has also been used for faculty skill upgradation programmes in collaboration with National Institute of Technical Teachers Training and Research (NITTTR), Chandigarh. Student’s performance is assessed separately on the basis of score obtained by them in written and practical tests as well as continuous evaluation in classroom and laboratory using devised tools like rubrics.

2.1 Results and discussion

Faculty respondent profile included 10 percent Professors, 20 percent Associate Professors, and 70 percent Assistant Professors. Amongst them 25 percent were doctorate holders and remaining Masters Degree holders. The professional experience in engineering education was more than five years for 40 percent of respondents and less than five years
for the remaining 60 percent. Average age profile for 75 percent of faculty was less than 40 years. Amongst the respondents 65 percent were male faculty members and remaining were female members. E-learning and ICT was introduced in the college around 15 years ago in some or the other form. This included video classes which were transmitted from the Edusat satellite. Attendance of students, examination process including result declaration, feedback from students, alumni, employers etc. are all taken online using in-house software. The college has its own web server. Recently it has started a community FM radio station through which dissemination of information is being done both within the college and in the local community.

Table 1 summarizes component-wise current practice of ICT by faculty members in engineering education at GNDEC. The data is presented as percentage of use (varying from never used to extensively used) of each component. ICT is extensively used in course planning, scheduling and coverage. It is also used for student feedback, evaluation and assessment besides keeping record of student attendance, examination, and conduct. E-books, journals and other components of an E-library are put into use by a majority of the teachers. Power point presentations, online assignments and projects, as well as course material design are done using ICT. A blend of traditional and E-learning/ICT based teaching learning pedagogy is being practiced. A small percentage of courses are being supplemented through video conferencing classes under QEEE programme being conducted by IIT, Madras. Some initiatives have been taken to train teachers through ICT as well have collaborative programs with other institutions. Internet availability is their throughout the campus with wired/ Wi-Fi access and is used by a substantial number of users for additional help in search of Engineering solutions. Library is well equipped to facilitate E-learning through online Journal/ conference proceedings, video lectures like NPETL, digitized theses at PG/ Ph.D. level and facilities for video conferencing and 20 computers/ laptops. ICT is yet to pick up in a big way in the laboratories as shown through responses to lab demos/simulations and virtual laboratory. However, a large number of application software’s are being taught to students and are also available for research. ICT based research collaboration is around 10% which needs to be enhanced. Curriculum E-content is being taught to students and are also available for research. 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Some of the major challenges to the implementation of E-learning and ICT include work overload on the teachers, resistance/sluggishness against change, lack of proper training to some of the teachers as well as limited computing skills. Continuous upgradation and removal of obsolescence in E-infrastructure is another big challenge facing the college.

3 CONCLUSIONS

ICT and E-learning are being implemented in engineering institutions all over India. However, the level and quality of this implementation differs across institutions depending upon the quality of faculty and available infrastructure.

Pitchian and Churchil [11] and Sarangi [12] in their research have postulated that the required competencies for engineers as identified by ABET (http://www.abet.org/) are enhanced by the use of E-learning. At GNDEC, it is seen that with the institute offering itself for peer review through various agencies like National Board of Accreditation (NBA) and National Assessment and Accreditation Council (NAAC), from time to time, its level of adoption of E-learning and ICT has been increasing over time. The college, being one of the oldest in Northern India, presents a fascinating case on the subject being studied. It presents a situation wherein massive infrastructure is available in all areas including computing hardware and software but level of adoption is slow and steady due to old faculty not being ready to adopt newer techniques by moving out of their comfort zone. However, younger faculty is driving the winds of change and slowly but inexorably leading the institute towards adoption of ICT/ E-learning and use of E-Technology. It is expected that within the next five years the college shall reach a right blend of traditional and ICT based learning and be a driver in bringing change in other institutes in the region.

REFERENCES


