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Facilitating E-learning through National Knowledge Network

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ABSTRACT

Learning is very important in the current knowledge based society. The economy of a country depends on the education level attained by the population of that country. Traditional learning cannot satisfy the various demands of the people. Due to the rapid growth in Information and Communication Technology (ICT) more and more innovative methods for accessing and sharing knowledge develop as the days pass. Government is keen on the integration of technology in educational programmes which are cost effective as well as time saving. E-learning or electronic learning is one such idea which is gaining momentum at a very fast pace. The new digital technologies used in e-learning are capable of meeting the user requirements at a high level. For all these a high bandwidth Internet connection is required. The National Knowledge Network (NKN) established by the government of India is mainly for sharing knowledge between research institutions. The e-learning facility has been started in Technical Information Resource centre (TIRC) of Naval Physical and Oceanographic Laboratory (NPOL) in 2014. This paper presents the different e-learning platforms which have been used through National Knowledge Network (NKN) to access e-learning programmes in NPOL. It also points out the increasing user demands for e-learning facility and the importance of librarians in the e-learning environment.

Keywords: E-learning, virtual class, national knowledge network, knowledge sharing, online classes, digital technologies, VidyoDesktop, A-VIEW, NPTEL

1. INTRODUCTION

Education is a life long process. The tools and techniques of education also changed in the new scenario. digital technologies made it a 24x7 programme. Anybody from anywhere at any time can access his/her e-learning course according to his/her convenience. The advent of social networks helped people of same interest to form groups and share their knowledge. For all these, a strong internet backbone is necessary. National Knowledge Network (NKN) is a high speed nationwide network by government of india, with a high bandwidth of 1gbps which can be extended up to 10 gbps in near future. Its implementing agency is National Informatics Centre (NIC). There is provision in NKN to attend video conferencing and e-learning classes from distant virtual class rooms. People are more interested to do online certification/course for enhancing their skills, since these classes can be attended at any time. There a number of reputed institutes like Indian Institute of technology (IIT), Indian Institute of Science (IISC), Indian Institute of Science Education and Research (IISER) and foreign universities which offer e-learning courses to users through all possible means of communication[1]. The e-learning facility is started in tirc of npol in 2014 through NKN connection. Managing e-learning facility is a new challenge for library professionals. They should know the infrastructure required to access the facility. in addition to this, they should know the various e-learning platforms and their software to access these classes. here mainly three e-learning platforms have been used. Each having its own method to access.

2. LITERATURE REVIEW

Teddy kidd[2] in his book, a brief history of e-learning described the the various stages of evolution of e-learning. 'The origins of e-learning as currently practiced in higher education stem from the insightful work of Bitzer[3] and Suppes[4]. Both clearly stated the use of technology within a broader educational agenda. It is important to note that there is no single evolutionary point of which the e-learning originated nor is there a single agreed definition of e-learning. Since the 1960s, e-learning has evolved in different ways affecting Business, Education, the Training sector, and the Military in different ways[5]. E-learning means different things in different sectors. In the higher education sector, 'e-leaning' refers to the use of both software-based and online learning, whereas in Business, Higher-Education, the Military and Training sectors, it refers solely to a range of on-line practices[6].

Stephen Downes[7] described the use of Web 2.0 technologies for teaching and learning as 'e-Learning 2.0'. Emergence of cloud computing and availability of new technologies such as collaborative intelligent filtering, increased and reliable data storage capacity, higher screen resolutions, multi gesture devices and 3D touch user interface is leading us into the next generation of e-Learning. One of the big things of third generation of e-Learning will be the ubiquitous access to learning resources with the use of mobile devices to virtually access anything, anytime and anywhere. Web 1.0 is the read only web and Web 2.0 is the read/write web, then Web 3.0 is the read/write/collaborate web. It is believed

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that Web 1.0 is about providing information, Web 2.0 is about overload of information and the Web 3.0 is about control of information as studied by Hussain[8].

E-learning initiatives by University Grants Commission (UGC) and Ministry of Human Resource Development (MHRD) have been started after the formation of the National Task Force on Information Technology and Software Development in 1998. Mishra[9] suggests the establishment of a statutory body for e-learning. He also recommended to include the development of a learning objects repository, a consortia approach to e-learning programmes, and training of teachers[10].

3. OBJECTIVES

The objectives of the study are to:

i. Facilitate access to e-learning programmes

ii. Analyse the user demands

iii. Find out the new responsibilities emerged by the new service

4. METHODOLOGY

(a) Awareness about the latest Information Communication Technology (ICT) trends helped to start the e-learning facility in TIRC of NPOL. Access to e-learning programmes have been made available as per the instructions of NIC, QEEE and NPTEL e-learning programme team

(b) Based on the user data in the login register, demand for e-learning facility analysed

(c) Discussion with the users help to add more digital collection to the existing digital repository.

5. WHAT IS E-LEARNING

There are different terminologies for e-learning, such as 'online learning', 'internet learning', 'distributed learning', 'networked learning','tele-learning','virtual learning', 'computer-assisted learning','web-based learning', and 'distance learning'. In all these cases, the teacher and the student is sitting in separate places[10].

E-learning can occur in two ways, such as real-time learning (synchronous) or from recorded classes (asynchronous). For all these a high bandwidth connection is required for the streaming of the videos. Realising this, Government of India has set up the National Knowledge Network, connecting educational as well as research institutes to enhance knowledge sharing[10].

Digital technology has a great impact on learning system. Digital technologies are electronic tools, systems, devices and resources that generate, store or process data. These includes social media, online games and applications, multimedia, cloud computing, interoperable systems and mobile devices[11].

Social media such as Facebook, Twitter, LinkedIn, YouTube, Google Plus, Blog, RSS, etc., act as a platform to share knowledge. Online games are useful not only to pre-school children but also to adults for strengthening their memory. Wide range of multimedia tools helpto make the student participation more active. Cloud computing acts as a reservoir of information by storing the files of data and application of e-learning course and offers 24x7 access. To integrate multiple tools from different vendors, interoperable systems are required. Mobile devices can deliver course content across many platforms. The emergence of virtual classrooms revolutionised the classroom facilities of e-learning. It offers the real-time interactive classroom facility[12].

A virtual classroom is an online classroom where participants can attend the class in real time. They can view and share their resources. Usually there will be a username and password for each student to login to the portal of the service provider to access the virtual class[13].

5.1 Advantages of E-Learning

The advantages of e-learning are as follows:

(a) No geographical boundary for e-learning. Students can attend any course from anywhere

(b) Each student can study according to his/her convenience. Hence, it is self-paced

(c) Classes can be managed easily since digital technologies are involved in e-learning

(d) Interactive tools like whiteboard are available for teaching which makes students more active

(e) Students can ask questions in a variety of methods

(f) Synchronous learning or real-time learning is possible

(g) Instant messaging is possible here. It helps to communicate with others without disturbing the class.

(h) Live audio-video support is also available which enhance the quality of e-learning

(i) Sharing of learning resources is possible here due to the digital technologies

(j) Feedback Mechanism is faster and teacher can assess each student and pay more attention

(k) Technical skill can be enhanced by the learning community

5.2 Disadvantages of E-Learning

The disadvantages of e-learning are as follows:

(a) No physical contact. Hence, participant feel isolated

(b) Lack of knowledge of proper digital technology to access classes

(c) Bandwidth is not sufficient to access real-time classes

(d) Lack of self-motivation causes the failure of some students[14].

6. INFRASTRUCTURE FOR ACCESSING VIRTUAL CLASS ROOMS AT NPOL

NKN connection in NPOL was established in 2012 and in TIRC it was established in 2013. Power Grid Corporation of India Ltd. (PGCIL) is the service provider for NPOL. Power Grid has been entrusted to use its robust and widespread infrastructure to provide high speed connectivity through fiber optic network. The Fiber optic cable is routed through outdoor fiberoptic terminal box and then to the fiberoptic ethernet switch and router. Then it is connected to the firewall and from there it is connected to a switch and distributed to Transducer group, Information Technology group, Ocean Data Centre, Young Scientist Centre and Technical Information Resource Centre (TIRC). The connection is again distributed within the divisions. Bandwidth usage policies have been set up in the firewall so as to get the maximum utility of the service. The NKN connection drawn is distributed in TIRC through a 28-port switch. The bandwidth available for the connection is 100Mbps. This can be upgraded according to the requirements[15] (Fig.1).

6.1 Hardware and Software Requirements For Accessing Virtual Classes

For Desktop videoconference/virtual class rooms, the devices required are as follows:

(a) PC with Windows XP or above or Linux with video conferencing software

(b) Webcam

(c) Microphone

(d) Speakers

Some of the Video conferencing softwares are VidyoDesktop, Aview, TeamViewer, AnyMeeting, WebEx Meetings Basic, Google+ Hangout, Skype Free, Mikogo Free, GoToMeeting Free, join.me, MeetingBurner, etc.

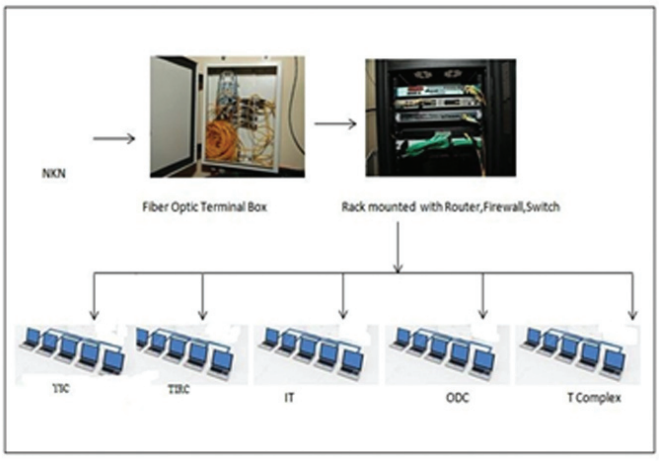

Figure 1. NKN Infrastructure @ NPOL.

Accessing virtual class rooms using VidyoDesktop has been started in TIRC in 2014. The main subjects of NPOL are Digital Signal Processing, Signal processing Algorithms, Transducers, Oceanography, Material science, etc. There are a number of online e-learning platforms such as Moodle (modular object-oriented dynamic learning environment), Claroline, Udemy, RCampus, Learnopia, P2PU (Peer 2 Peer University), etc.

National Informatics Centre (NIC) have offered the videoconferencing facility and virtual class room facility for the researchers. In addition to this, TIRC has facilitated the access of Amrita Virtual Interactive e-Learning World (A-VIEW) and National Programme on Technology Enhanced Learning (NPTEL) through national knowledge network (Fig. 2).

Figure 2. Virtual class room @ TIRC.

7. VIRTUAL CLASSES OFFERED THROUGH THE DIGITAL NETWORK OF NIC

Virtual Classroom (Fig. 3) is a wonderful application of e-learning using digital network of national informatics centre, ministry of communication & IT, Govt. of India. It supports educational institution in better mentoring for the remote learning. The infrastructure facilitates quality Education and Research at national level interconnecting premier institutions and removed the barriers of state and district boundaries. The faculty can do an interactive lecture. Students can attend live classes from remote sites[1].

Figure 3. Virtual class time table from NIC.

The schedule of classes are displayed in the NIC portal (Fig. 4). In addition to this the new announcements related to seminars, workshops, etc., are also displayed. Interested students can contact the nodal person of the courses or seminars. With the help of NIC person,

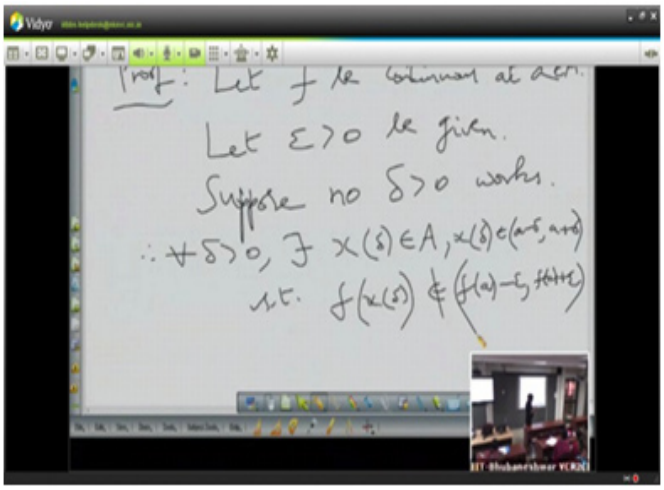

Figure 4. Virtual class from NIC.

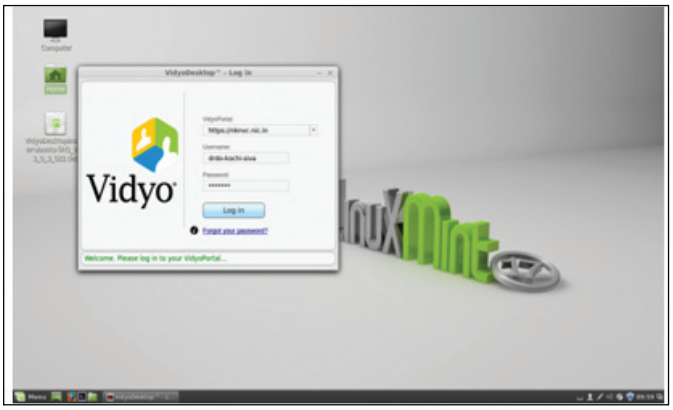

Figure 5. Vidyodesktop login.

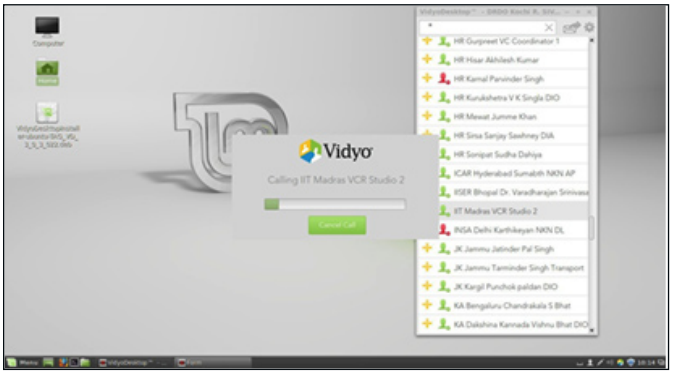

Figure 6. Vidyodesktop.

students can connect to the classes. Here in NPOL, the classes have been accessed usingVidyoDesktop Software. Some of the screenshots of VidyoDesktop are given (Fig. 5 & 6).

8. VIRTUAL CLASSES OFFERED BY QUALITY ENHANCEMENT IN ENGINEERING EDUCATION (QEEE)

The interactive virtual classes by the IIT faculty have been established in 2015 through NKN using AView software. Quality Enhancement in Engineering Education (QEEE): (sponsored by MHRD, Govt. of India through IIT Madras) is a direct to student interactive program[16].

The topics selected are Designing with Combinational modules & Iterative Circuits, Maxwell's Equations, Computer Organisation & Architecture, Digital Communication Systems, Stress and Strain Tensors, Diffusion in Materials, Basic Construction Planning Techniques, Circuit Analysis Techniques, Convective Heat Transfer, Wireless Medium Access, Shear strength of sands and clays, Computer Networks, Analysis by Slope-Deflection Method, MOS Transistor, Skin Effect in Wires & Cables, Pure Substances, Design of Shallow Foundations, Frequency domain analysis, Integral Flow Analysis, Fourier Transforms, High performance communication networks and ARM Architecture.

The time-table is displayed in TIRC portal to inform the users. Many researchers attended the course. They could raise their question by typing in the chat box or raising their hand. QEEE courses has been accessed using Amrita Virtual Interactive e-Learning World (A-VIEW) software.

Figure 7 shows the login screen of A-View class room. When the classes are going to start, the Start button (Fig. 8) will be highlighted. We can adjust the

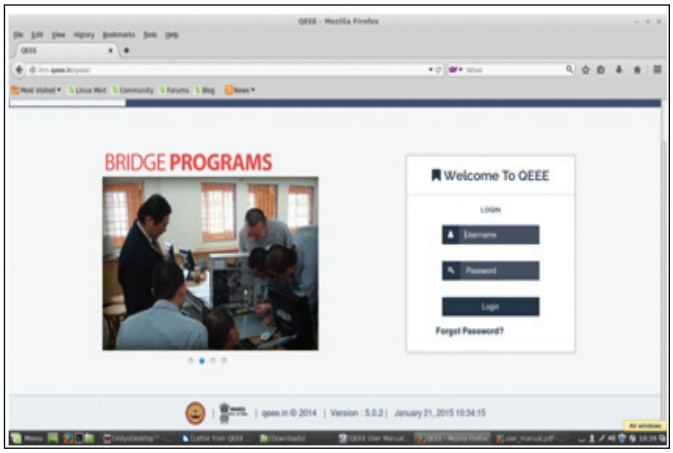

Figure 7. A-VIEW login.

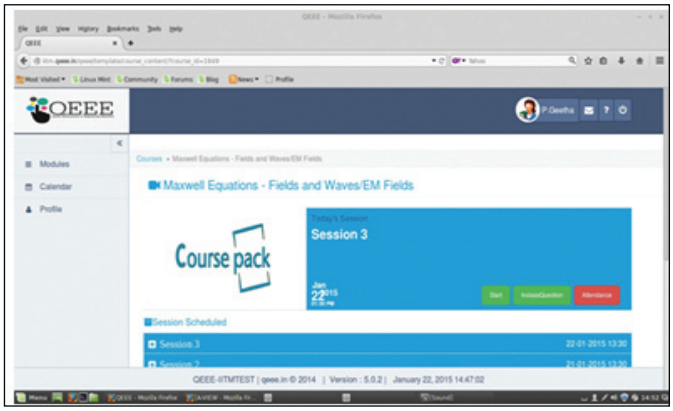

Figure 8. Virtual class from QEEE.

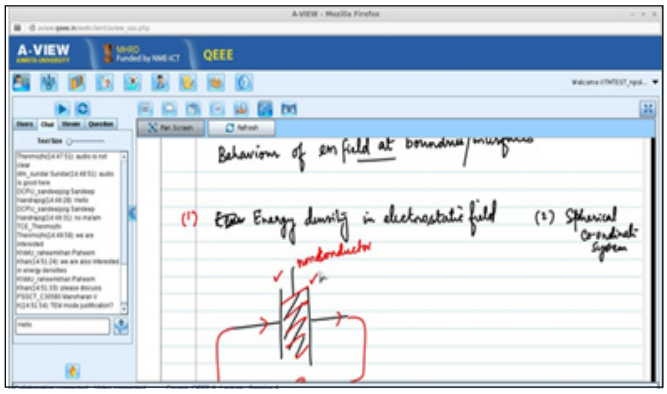

Figure 9. Virtual class from QEEE.

settings like, video, sound, etc. After login to the class, our login name will be displayed in top right corner (Fig. 9). Students have to submit assignments within time. Most of the classes were meant for B.Tech students. For accessing the classes, user has to install A-View software. Prior permission is required to access the classes.

A-VIEW is an award winning indigenously built multi-modal, multimedia e-learning platform that provides an immersive e-learning experience that is almost as good as a real classroom experience developed by Amrita e-Learning Research Lab. It is a part of Amrita Vishwa Vidhyapeetham, one of the fastest growing institutions of higher learning in India. It addresses the most pressing issue of higher education in India-the shortage of highly qualified teachers. A-VIEW is part of Talk to a Teacher program coordinated by IIT Bombay and is funded by the Ministry of Human Resource Development (MHRD) under the Indian Government's National Mission for Education using Information and Communication Technology (NME-ICT) along with various other projects in Virtual Labs, Haptics and Natural Language Processing. A-VIEW is now deployed at several IITs, NITs and other leading educational institutions across the nation[16].

9. VIRTUAL CLASSES OFFERED BY NATIONAL PROGRAMME ON TECHNOLOGY ENHANCED LEARNING

'NPTEL is an acronym for National Programme on Technology Enhanced Learning which is an initiative by seven Indian Institutes of Technology (IIT Bombay, Delhi, Guwahati, Kanpur, Kharagpur, Madras and Roorkee) and Indian Institute of Science (IISc) for creating course contents in engineering and science. NPTEL as a project originated from many deliberations between IITs, Indian Institutes of Management (IIMs) and Carnegie Mellon University (CMU) during the years 1999-2003. A proposal was jointly put forward by five IITs (Bombay, Delhi, Kanpur, Kharagpur and Madras) and IISc for creating contents for 100 courses as web based supplements and 100 complete video courses, for forty hours of duration per course in Fig. 10. Web supplements were expected to cover materials that could be delivered in approximately forty hours. Five engineering branches (Civil, Computer Science, Electrical, Electronics & Communication and Mechanical) and core science programmes that all engineering students are required to take in their undergraduate engineering programme in India were chosen initially. Contents for the above courses were based on the model curriculum suggested by All India Council for Technical Education (AICTE) and the syllabi of major affiliating Universities in India'[17]. NPTEL uses google account for user authentication (Fig. 11). It uses

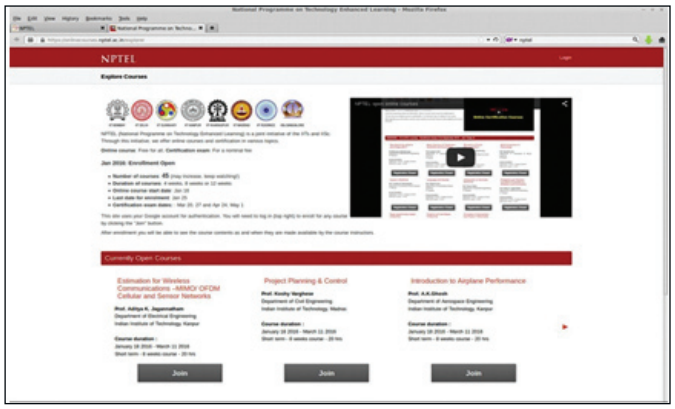

Figure 10. NPTEL online certification course-web site.

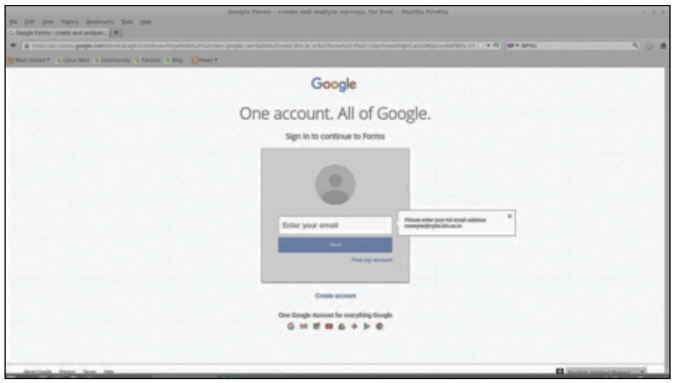

Figure 11. NPTEL–User authentication.

Google Hangouts as communication platform. Google Hangouts is developed by Google which lets instant messaging, video chat, SMS and VOIP features.

9.1 Course Categories

Biological Sciences and Bioengineering, Civil and Aerospace Engineering, Computer Science & Engineering, Electrical, Electronics & Communications Engineering, Humanities & Social Sciences, Management Studies, Mathematics & Basic Sciences, Mechanical, Chemical & Metallurgical Engineering, Multidisciplinary courses. The courses will be displayed in the NPTEL site (Fig. 10) so that students can join in time. There are 10hrs, 20hrs and 30hrs, 40hrs courses. TIRC has displayed NPTEL course announcement in its Portal and researchers have started enrolling the course of their interest. Time schedule for classes have been informed through e-mail. Screenshot of NPTEL class is shown in Fig. 12. There will be time period within which students have to post questions on classes. There is a discussion group where student can

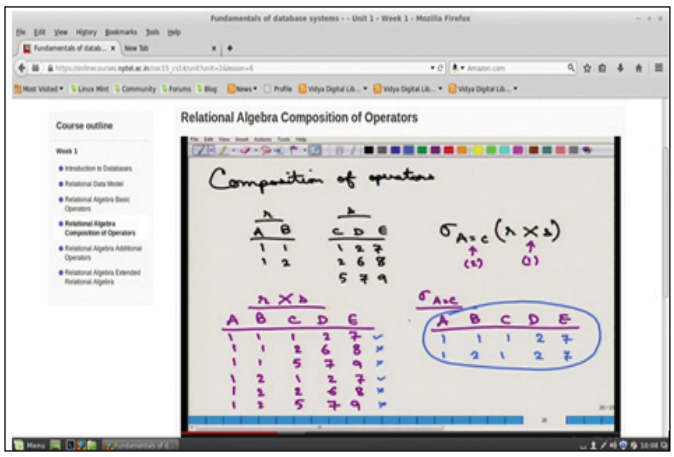

Figure 12. Virtual class from NPTEL.

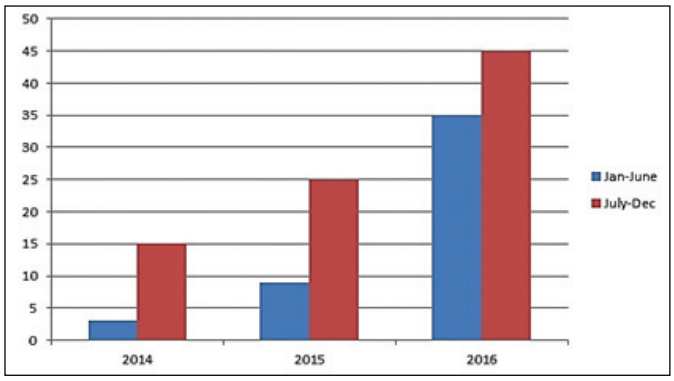

Figure 13. Chart showing the e-learning classes accessed during 2014 to 2016.

share his/her opinions, doubts, etc. Assignment will be there after each lecture. Assignment marks will be informed in time. Students can choose nearby centres for online examination.

10. FINDINGS

A chart has been prepared based on the user login details entered in the register kept for accessing e-learning classes from 2014 to 2016. The following chart (Fig. 13) shows the ascending nature of the user demand for e-learning in each year. The increase of accessing e-learning sites are due to two major factors:

(a) Awareness of the e-learning facility

(b) Availability of advanced tools and techniques to access the facility

It is observed that, in NPOL, NPTEL is the most accessed platform for e-learning. Since the digital classes offered by QEEE and NIC are available only in a fixed time, employees in NPOL are unable to attend the classes regularly.

11. CONCLUSIONS

It is found that the demand for e-learning is increasing in each year. Researchers find e-learning more convenient. It saves time, money and manpower. They can access the classes whenever they want. They can choose the topic according to their interest from desired e-learning platform. In the e-learning context, the users require more digital resources and the suitable technology to access these resources. The digital library can play a pivotal role in an e-learning environment.

A library website can function as an information gateway to its digital resources. It should include the subject gateway to the topics of the online courses materials interested to its users. It can add the purchased or subscribed databases, e-books, e-journals relevant to the course[18]. This will help the learner to access the documents of his/her topic very fast. At each phase namely extending NKN connection to TIRC, purchasing required hardware, software, identifying digital documents, digital collection development, etc., library professional should have thorough knowledge on latest technologies. The workplace learning[19], attending courses, hands on training helped very much to keep in tune with the rapid changes in ICT and in turn implementing the new service in NPOL library.

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