An E-learning System for Quality Education

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Abstract

E-learning can be defined as the use of available information and communication technologies to facilitate learning process. E-learning is the combination of learning and the Internet technology. In the modern world, education has become more global, and people are looking for learning with ease and interest. Students are looking for more interactive and interesting learning style rather than tedious. Using e-learning, we can provide the quality education to remote and rural regions with the help of modern technologies like satellite, internet, and mobiles. Satellites can play a very crucial role to establish the connectivity among all educational institutions with a sufficient infrastructure to provide quality education with interest to the large number of populations. In this paper, we propose an e-learning model to deliver better lectures and contents to the students studying in the remote areas, and hence to improve the quality of education and interest.

Keywords: *E-learning; e-learning system; quality education.*

1. Introduction

According to Merriam-Webster dictionary, "Learning is knowledge or skill acquired by instruction or study [1]". In another words we can explain the above line as: A process of acquiring of knowledge and improving skills either by experience, practice, study or by being taught by someone. It requires concentration to learn anything.

E-learning can be defined as the use of technology to facilitate people to gain knowledge anytime and anywhere. E-learning includes training, the delivery of just-in-time contents and guidance from the subject experts [2]. The term e-learning involves a very wide range of applications: it includes computer based learning, mobile based learning, web based learning, virtual classrooms, and digital association. E-learning can be very well defined as the content delivery using electronic mediums including the Internet, extranets, intranets, satellite communications, audio & video tape, interactive Television and CD-ROM [3]. Any e-learning system includes minimum three elements e.g. technology, services and the contents. Electronic learning or e-learning is also referred as

learning through distances. By the advancement of technologies like Internet boom, satellite communications and other technologies there is a very good chances to spread the education and improve the level of education. By providing some quality educations along with the quizzes and some other interesting activities, we can provoke the students to learn.

In India, EDUSAT designed by Indian Space research Organization (ISRO), which is fully developed for the education sector. EDUSAT is the first satellite of its kind which is helping to India's educational institutions. IGNOU and other institutions are very much involved in the e-learning education system.

Many gulf countries have very low population in the wide geographical areas. There are few countries that are growing with good development growth. Large countries like Saudi Arabia, Egypt, UAE, Algeria etc. have to take initiatives to improve their educational level from basic up to advance and higher technical education. They should provide the education to each and every people.

E-learning has lots of benefits over the traditional classroom teachings and learning. The most important benefits are the flexibility and the reduced cost which comes from travel free education. There are many benefits of e-learning like cost effectiveness, modified learning, flexible and knowledge development. Some other important benefits can be given below [4]:

- E-learning is less expensive to produce as compared to traditional learning. It is a self paced. Most of the e-learning programs can be joined and studied when they are needed.

- The speed of learning and completion is faster. According to an article by Jennifer Salopek in "Training and Development Magazine," e-learning courses progress up to 50 percent faster as compared to traditional courses.

- There is no communication gap. E-learning provides a consistent messaging. It minimizes the

problems related with different instructors teaching style. Because everyone has their own teaching style and knowledge material on the same subject.

- E-learning can be joined from any location and at any time. Knowledge updating is very easy and quick.

By e-learning we can have stronger grip on the subject. Management is very easy for large number of students. By using web enabled e-learning system we can build a community of students, where they can join together for knowledge sharing, group discussions, forums etc. This approach can provide tremendous output.

To establish the e-learning system, we should also be aware of the internet facilities in the Gulf region. The usage of internet in the Middle East region can be given as follows:

Table 1: Internet users in the Middle East and in the world

Middle East	Population (2011)	% of world	Internet users, 31-dec-11	% population (penetration)	Users % world
Total Mid East	216,258,843	3.1	77,020,995	35.6	3.4
Rest of world	6,713,796,311	96.9	2,190,212,747	32.6	96.6
World Total	6,930,055,154	100.0	2,267,233,742	32.7	100.0

(Table data source: www.internetworldstats.com accessed on 28-May-2012)

Based on the table I, we can expect very good chances of success for our e-learning model. As there are good numbers of internet users available in the Middle East region, we can easily apply and spread the system model.

2. Our Contribution

The main aim of this research is to present a system model for the improvement of education level as well as interest in education. The priority is to provide academic freedom, interest and high quality in education. Most of the students in gulf countries are not having much interest in learning the new things like programming, web development, designing etc. The reason behind is the lack of proper basic education, guidance and interest of students. We propose a real e-learning system with some interactive learning like forums; quizzes etc. to make the education

interesting to help students for improving their knowledge level and interest. Students can get proper guidance with the faculties not limited to their college or universities only. They can get benefits from the special lectures on specific topics by the subject experts.

This paper presents an interactive system for e-learning. This system includes a dedicated educational satellite. The satellite is responsible to distribute the e-learning contents to the universities connected to it. To improve the performance proposed system is using satellite that is working on spot beam technology [5] supported with VSAT terminals. There is a relay centre which consists of main centre along with sub centers capable to broadcast the data (live and recorded). Contents can be in text, audio, video and other multimedia format. It should be properly connected to the satellite. The satellite is specially configured for relaying through audio-visual medium, employing multi-media multi-centric system and to create interactional classrooms. It should have multiple regional beams which may cover dissimilar geographical pieces of gulf regions.

The main centre relays the content to satellite, and the satellite is responsible for distributing all the content to the registered universities. Universities are then having a web based application to consume the contents and from the websites the colleges can access the contents. The communication channel is responsible to broadcast the data, receive the data and it can interact with client side applications. By using this communication and broadcasting we can serve the nation by e-education as IGNOU is serving in India and abroad.

This system is designed to improve the quality of education and interest of scholars in Gulf countries particularly at the higher level of studies. The students can get benefits from the system to develop their learning ability and to visualize the things. The system contains an interactive web based system which can also be used via mobiles to ensure the benefits to the maximum number of students. In the suggested e-learning system, significant elements are the World Wide Web and mobile phone application, communication channels and the distributing centre.

Through World Wide Web and mobile phone application we can approach to all the enrolled and registered students as well as educators. Web application includes a login area for administrator, professors and scholars. There is a dashboard which contains information about the current and future activities and other events. After authentication, any educator can logged in and check the assignment, make remarks on students report, attendance and all the

interrelated work. Whereas the scholars can finish their assignments, submit their reports to the concern educator, they can take part in the quizzes available. They can post doubts to the assembly as well as to the concern educator. Students can also get information about their attendance and other reports. They can also download the lecture and other e-contents. The system also has provision of sending progress reports via emails and SMS's to the students as well as their guardians.

Students can download the lectures in the form of e-content at their computer or laptop for further learning and exercise. For the quizzes there is provision of mandatory quizzes related to various educational fields and general studies. Some percentage of the score gained by the scholar is to be added to the subjective performance. This type of activity will raise the interest in study as well as general ability.

3. Review of Previous Works

In this section we discuss some e-learning systems. Here we explain the experience of Indian satellite education systems and IGNOU, the largest university of India; NIOS is the largest schooling body.

3.1 Edusat

EDUSAT was launched on September 20, 2004. It is the first Indian satellite which was built exclusively for serving into the educational areas. It is essentially intended to meet the requirement for an interactive satellite based e-learning and distance based education system for the country. It strongly displays commitment of India to use space technology for the development of nation, especially in the field of education by educating the maximum possible population residing in the remote and rural geographical locations. EDUSAT is configured to cope with the demand of interactive e-learning system through audio and video mode broadcast throughout the country. Some important features of EDUSAT can be summarized as [6]:

Orbit: Geostationary (74 degree E longitude)

- Lift-off Mass: 1,950 kg
- Physical : 2.400 m X 1.650 m X 1.1530 m cuboids (10.9 m long with solar panels deployed)
- Power : Solar array providing 2040 W End Of Life
- Mission Life : 7 years

- **Five lower Ku-band transponders** for spot beam coverage with 55 dBW Edge of Coverage-Effective Isotropic Radiated Power (EOC-EIRP)
- **One lower Ku-band transponder** for national coverage with 50 dBW EOC-EIRP
- **Six upper extended** C-band transponders for national coverage with 37 dBW EOC-EIRP
- **One Ku-band beacon** to help ground users for accurate antenna pointing and uplink power control.

The architecture of EDUSAT can be seen in the figure given below:
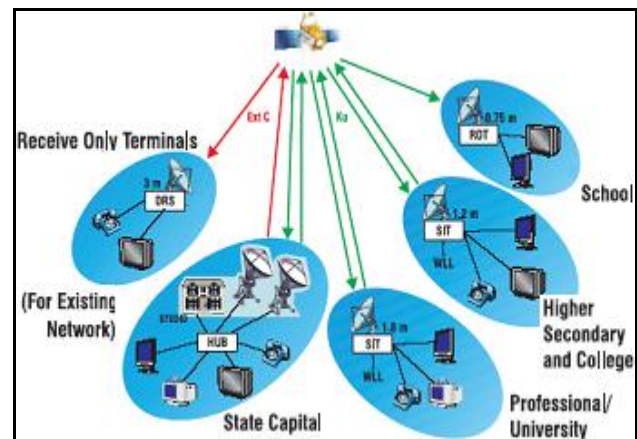

Fig.1 - Architecture of EDUSAT (Image source: ISRO) [7]

After getting freedom, India has got revolution in the educational sector. It can be seen that there is substantial increase in the number of educational institutions/organizations at primary level, secondary level and higher levels. The numbers of students are also increased in the same proportion. But one thing is lacked i.e. lack of enough infrastructure in the rural areas and also unavailability of qualified and trained teachers.

EDUSAT network is responsible to provide satellite based education and learning facilities to the students and faculties of the engineering colleges around the country. ISRO is providing the space division for EDUSAT System and demonstrate the effectiveness of the satellite system for interactive learning and education.

Syllabus based education is being communicated via satellite by University Grants Commission (UGC) through the CEC (Consortium for Educational Communication).

The launch of EDUSAT has helped a lot in providing quality education and learning through audio and video programs to students studying in the remote areas. The

students have improved from the programs delivered through the Satellite. They are getting more and more quality learning and education. They are getting better understanding of the course content, better understanding of the subject, and improvement in attendance and getting attention with interest in viewing programs. The teacher's involvement is also very important during the broadcast as a facilitator and conduct of Pre and Post broadcast activity.

The table given below summarizes few pioneered institutions of India which are using EDUSAT an e-learning approach for the benefit of the students. The table shows that IGNOU is on top of the list using more than 100 terminals followed by IIT (Indian Institute of Technology) Kharagpur with 70 terminals and others.

Table 2: Institutions using Edusat in India

Institution Name	Terminals
IGNOU (Indira Gandhi National Open University)	120
IIT Kharagpur	70
IIT Chennai	05
Institute of Electronics and Tele-communication Engineers	18
DST/National Council of Science Museums	25
Centre for Environmental Education	05
National Council for Educational Research and Training	100

(Table data source: ISRO Brochure [8])

3.2 INSAT (Indian National Satellite System)

INSAT is a multipurpose Geo-Stationary Orbit satellite launched by ISRO. The main aim of this satellite was to facilitate the country in the field of telecommunication, education, broadcasting etc. INSAT is a series of satellites which is jointly developed by Department of Telecommunication (DoT), Department of Science (DoS) and Indian Radio and Doordarshan. It is among the largest satellite system in the Asia pacific region. The satellites of INSAT series which are in service of the country today are INSAT-2E, INSAT-3A, INSAT-3B, INSAT-3C, INSAT-3E, KALPANA-1, GSAT-2, EDUSAT, INSAT-4A, GSAT-8 and GSAT-12. GSAT-12 was launched recently. The system provides a total of about 175 transponders in the C, Extended C and Ku-bands. Being a multipurpose satellite system, INSAT provides services to telecommunications, television broadcasting, weather forecasting, disaster warning and Search and Rescue fields. Primarily amongst the service sector is the Telecommunications sector wherein INSAT is providing Mobile Satellite Service besides providing VSAT services. These days, more than 25,000 VSATs (Very Small Aperture Terminals) are in function. Due to the INSAT more than 900 million people are able to watch TV rebroadcast transmitters. In case of Telemedicine network it covers around 152 hospitals, out of which 120 remote or rural hospitals and 32 super specialty hospitals in major Indian cities [9].

4. Case Studies: IGNOU & NIOS

4.1 IGNOU (Indira Gandhi National Open University)

The IGNOU (Indira Gandhi National Open University) in its more than 25 years of existence has established itself as the single largest University in the world of democratic. IGNOU is serving around 2.0 million students only in India and apart from India in more than 30 other countries with more than 20 Study Schools and a vast network of around 70 regional centers, more than 1800 study centers and tele learning centers and more than 45 centers in other countries. The University offers around 140 Certificate, Diploma, Degree and Doctoral programs comprising around 1350 courses. IGNOU combines conventional teaching and learning methods very effectively with Information and Communication Technology and Satellite based teaching and learning systems.

IGNOU has taken few major initiatives towards developing e-learning environment for distance learners. eGyanKosh: a national digital repository, PAN- African E-Network and Sakshat a one stop education portal of the Ministry of Human Resource Development (MHRD) and e-Learning platform for LIVE (Library and Information Virtual Education) are some important initiatives of the Indira Gandhi National Open University.

4.2 NIOS (National Institute of Open Schooling) [11]

The NIOS (National Institute of Open Schooling), formerly known as National Open School (NOS), with approximate figure of 1.5 million students are enrolled, has emerged as the largest open schooling organization in the world. This was initiated as a project in 1979 by the CBSE (Central Board of Secondary Education) the Open Schooling program has now taken shape as an independent education system in India.

NIOS is now globally recognized for its sustainable learner centric school education, skills up-gradation and training through open and distance learning. NIOS is also known for ensuring convergence of open schooling organizations. By this approach it is getting closer to an inclusive learning society, human resource development, global understanding and national integration.
Facts About NIOS:

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379

- It is the largest Open Schooling system in the world. It involves more than 22,35,000 learners have taken admissions since year of 1990.

- More than 20,000 learners are take admission every year in Vocational Education Courses and more than 2,50,000 in all available courses.

- Around 64,000 learners have been certified in different Vocational Courses since 1995.

- NIOS reaches out to students through a network of more than 900 vocational centers across the country and abroad.

- NIOS has more than 2,800 centers for all the available programs.

- NIOS imparts education through distance mode using a media mix of self-instructional print materials, audio visual and CD-ROM supported by Personal Contact Programs (PCP) and Practical Training Sessions. These are further supported by Radio Broadcasts and Television programs.

5. Proposed E-learning System Architecture

Satellites communication can establish the connectivity and create balance between urban educational institutions and organizations with sufficient infrastructure to provide quality education and the large number of backward rural and semi-urban area's institutions that are lacking with the basic facilities and infrastructure.

In our proposed e-learning system, there are three important components. They are the web and mobile application, communication channels and the broadcasting centre.

- **Web and Mobile Application:** In web and mobile application we can have a centralized educational application accessible to all the enrolled students and teachers. After authentication, any teacher can logged in and check the assignment, make comments on students report, attendance and all the related work. Whereas the students can complete their assignments, submit reports to the concern teacher, can participate in the quizzes available, can post questions to the forum as well as to the concern teacher, can check their attendance and other reports etc.

  There is also provision of sending progress reports through emails and SMS's to the students as well as their parents.

Students can download the e-content at their computer or laptop for further study and practice. For the quizzes there should be provision of compulsory quizzes related to various educational fields and general studies and some percentage of the score gained by the student should be added to the educational performance. This type of activity will increase the interest in studies as well as general ability.
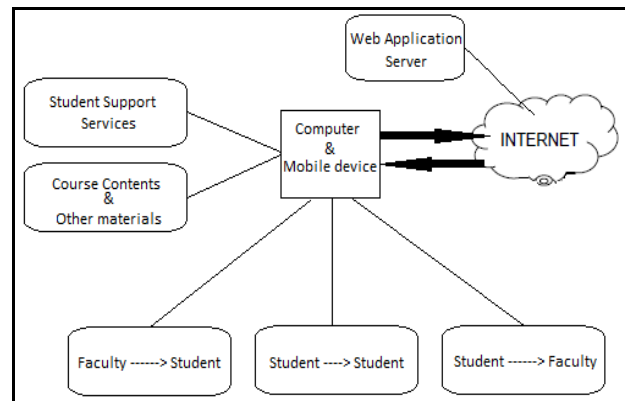

Fig.2 – Web & Mobile Application Architecture

In the architecture given above (Fig. 2), web application is hosted at server and computer & mobile devices are connected to the internet for services. It contains few important modules viz. Student support services, course contents and other materials, faculty to student & student to faculty communication etc. The student and faculty can communicate through web application via computer and mobile devices.

- Communication channels: Communication channel means the medium by which we can share or transfer the desired information from one place to another place. In our proposed model, communication channel contains satellite terminal. It is a totally dedicated educational satellite which can function like EDUSAT. It should contain spot beam technology [12] supported with VSAT terminals. The communication channel should be able to broadcast the data, receive the data and it can interact with client side applications. By using this communication and broadcasting we can serve the nation by e-education as IGNOU is serving in India and abroad.

- Broadcasting Centre: Broadcasting can be explained as the distribution of audio and video material to a group of audience via any audio visual medium. Broadcasting centre consists of main centre along with many sub centers which are able to broadcast the data (live and recorded). It should be properly connected to the satellite. The

satellite should be specially configured for relaying through audio-visual medium, employing multi-media multi-centric system and to create interactive classrooms. It should have multiple regional beams which may cover different geographical parts of gulf regions. Like EDUSAT in India having five Ku-band transponders with spot beams covering northern, north-eastern, eastern, southern and western regions of the country. The satellite should provide an enormous range of educational delivery system like one-way TV broadcast, interactive TV, video conferencing system, computer conferencing, and web based instructions etc [13].
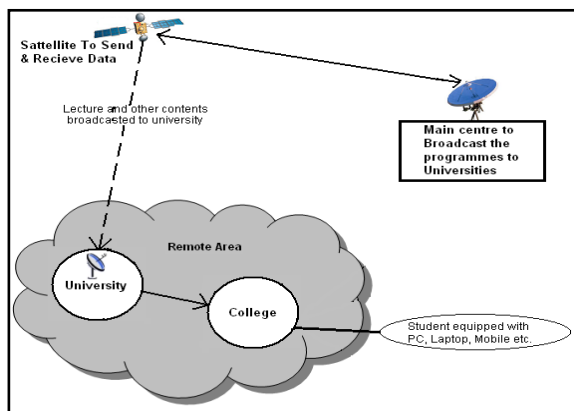
The Proposed Model:

Fig.3 – Proposed E-learning System Model

In our model, there is a main broadcast centre to broadcast the lectures and other contents in text, audio, video and other multimedia format. The main centre broadcasts the content to satellite and satellite is responsible for sending all the content to the registered universities. Universities are then having a web based application to consume the contents and from the websites the colleges can access the contents.

The live lectures are received at classrooms of the colleges. Two types of classrooms are there: interactive classrooms and non-interactive classrooms. The 1.2-meter wide antenna has been installed on top of each college. In the interactive sessions, the students can interact with the concern professor/lecturer or subject expert through a voice link by means of satellite. The students can hear the question and the reply of subject expert for the question live in all classrooms. They can also experience video conferencing with the experts.

In our proposed system, web application includes a login area for administrator, professors and students. There is a dashboard which involves the current and future activities and events. After login, professor can view the activities of students registered under him/her and mark the student as present or absent and perform other tasks. Students can submit the assignments and other tasks assigned and ask the questions or doubts to the concern professors. They can also download the lecture and other e-contents. Web application also has a open forum for students as well as faculty members. It can be used for the purpose of knowledge sharing. There is also service of email and SMS alerts for the new assignments, results and other events. Our system also involves the quiz, forum and other activities to generate the interest of students in education.

6. Conclusions

In this paper, we have presented an interactive system for e-learning which involves dedicated educational satellite to improve the education level and interest of students in Gulf countries especially at the higher educational level. The system develops the ability of the students to visualize and enhancement of quality learning. In this system, the satellite is using spot beam technology for better performance. We have also explored Indian educational satellite EDUSAT and INSAT and success of Indian institutions like IGNOU and NIOS. The system contains an interactive web application for the more student benefits. Web application can also be used via mobiles to ensure the benefits to the maximum possible students.

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