ISSN : 2394-2975 (Online)
ISSN : 2394-6814 (Print)

Transforming Teaching and Learning Process in India Through Smart Classrooms and Elabs

[I]Sandip Pal, [II]Sumit Das, [III]Sanjoy Kumar Pal
[I,II,III]Centre for Advanced Communication, Science & Technology Entrepreneur Park, Indian Institute of Technology (IIT), Kharagpur West Bengal, India

Abstract
With a population of over 1.2 billion and over 30% of school age, India boasts the second largest education system in the world. However, over 70% of the Indian population lives in rural areas where delivery of quality education is a real challenge. Information and Communication Technology (ICT) is now playing an important role to support teaching and dissemination of knowledge. ICT has virtually revolutionized the effective teaching and learning process. It has also given rise to the concept of smart classroom. Interactive Software Integrated Learning System (ISILS) is a modern educational approach to develop communication skills through interaction with the help of internet. Unlike the traditional classrooms smart classrooms offers a unique opportunity to receive and deliver education from remote locations. Apart from delivery of lectures, smart or tele-classroom, in sync with ISILS, encourages mock activities such as group discussions, role play, presentations and gives a real time experience for total personality development. Operating from Science & Technology Entrepreneur Park (STEP), Indian Institute of Technology (IIT), Kharagpur, India the Centre for Advanced Communication (CACM) have so far developed over 250 smart classrooms/elabs all over India. Over 10,000 students are receiving specialised/need based education through these interactive smart/tele classrooms. Some of the smart classrooms developed are in remote rural locations. CACM has also designed and developed the largest elab in eastern India. We believe that smart classrooms & elabs can radically transform the education scenario in India.

Keywords
Smart classroom, Skill Junction, CACM, ISILS, India

I. Introduction

Information and Communication Technology (ICT) is now playing an important role for the dissemination of sustainable quality education worldwide (Pal et al., 2015). ICT is defined as a diverse set of technological tools and resources used to communicate, create, disseminate, store, and manage information. These technologies include computers, the Internet, broadcasting technologies (radio and television), and telephone (Blurton). After the advent of ICT the teaching and learning process has virtually got revolutionized globally. The internet has given the education market a tremendous boost (Harper et al., 2004). With the wide spread use of ICT, especially the internet, the concept of smart classrooms evolved. A smart classroom is a classroom that is equipped with computer and audiovisual equipment, allowing the teacher to teach using a wide variety of media and with the help of internet real time teleconferencing is also possible. The goal of smart classroom is to eliminate the discrepancy of a teacher's experience in tele-education and that in the traditional classroom education, as well as enable the integration of these two currently separated education practices. So that in this classroom the teacher could interact with the remote students with multiple natural modalities just like interacting with the local students (Shi et al.). A review indicates that an appropriate use of ICT can raise educational quality and connect learning to real-life situations (Fu, 2013). ICT motivates not only students to study but also their parents to send their children to schools because computers are something new which seems attractive (Wims and Lawler, 2007). Through ICT, learning can occur anytime and anywhere. Online course materials, for example, can be accessible 24 hours a day, seven days a week. Smart classrooms allow both learner and teacher to interact simultaneously with ease and convenience (Fu, 2013). Based on ICT, learning and teaching no longer depend exclusively on printed materials. Multiple resources are abundant on the Internet, and knowledge can be acquired through video clips, audio sounds, visual presentation and so on. Current research has indicated that ICT assists in transforming a teaching environment into a learner-centred one (Castro-Sánchez and Alemán, 2011).

With a population of over 1.2 billion and over 30% of school age, India boasts the second largest education system in the world. By 2025, India is predicted to be home to the largest working-age population in the world with 25% of the world's workforce (Fatma, 2013). Annually, the demand for higher education is growing globally and India is no exception to it. In fact, in India, the number of applicants is three to five times as against the number of seats in any institution of higher education (Imran, 2012). Technology may well be the answer to all the ills that are currently plaguing the Indian education system. From dealing with inadequacies in India's infrastructure for delivery of education to lack of quality teachers – technology can help bridge the gap effectively (Chauhan, 2014). E-learning opens new vistas and personalised learning paths which are not possible in conventional classroom settings. Here, teachers can teach anytime, anywhere and students too are liberated from the confining classes. It is also cost-effective and provides access to people in remote locations as well (Chanania).

With the Indian e-learning market size expected to grow to around US$ 40 billion by 2017, both domestic and international players are entering the market with new and innovative products and services (Fatma, 2013). Many companies and firms like Educomp Solutions, NIIT, IIN, Hughes Global Education, 24/7 Learning, eAbyas Solutions, Edutech India, Azim Premji Foundation, Reliance Edge Academy are some of the e-education providers in India.

II. Centre for Advanced Communications & spread of tele-education

CACM is an anchor company at STEP, IIT-Kharagpur, and is presently the leading company in eastern India working in the

domain of multimedia content delivery and language application. CACM under the leadership of the first author started its journey way back in 1996 with a group of young & energetic professionals. In the year 2002 CACM got a chance to become an anchor incubated company at STEP. The space inside the business accelerator provided CACM access to uninterrupted power; internet and an ecosystem which helped the company to grow incrementally in the next 12 years. An engineering college based at Kolaghat, West Bengal was incidentally the first client to order CACM product and later many academic institutions followed with purchase request. Since the initiation of the company, CACM has progressed steadily. The company is now growing strong with its own dedicated office, satisfied client base and hard working team spread over eastern part of the country including Kolkata, Kharagpur and Bhubaneswar. The company employs over 20 people and another 15-20 people are associated with the company on a contractual basis regularly implementing, sourcing, providing orders for the company. It has its presence in 14 major states of India having implemented over 250 major projects in the last 13 years. More than 10,000 Students are benefitted by these smart classrooms. CACM has conducted more than 100 training program and has also designed and developed the largest lab in eastern India. The company has its own application and assessment centre at the Department of Humanities at IIT-Kharagpur.

A. Skill Junction developed by CACM

CACM primarily dealt with designing and marketing of digital educational resources to school & colleges. Initially, the educational material was supplied via floppies, CD, video cassettes etc. In post 2000s the school/institutes which were using the multimedia materials requested to provide more need based information in real time via internet. As after 2000 there was a wide spread expansion of broad band internet services throughout India. Hence, to meet this challenge the first author teamed up with his friends from Indian Institute of Technology, Kharagpur, to develop a cost-effective, user-friendly and efficient PC based Interactive Software Integrated Learning System (ISILS) that can be efficiently used by a large number of users. After some initial failures, his team could finally come up with a unique ISILS 'Skill Junction'. The salient features of this ISILS are: i.) Plurality of independent electronic interactive units at the respective work stations for communication to pupil; ii.) Each said electronic interactive unit adapted for independent interaction with the central instruction station; iii.) Interactive software comprises of a single screen software for user friendly interactive communication through various hardware means/gadgets; iv.) The electronic communication is adapted for the development of communication skill especially by ways of interactive education / presentation and the like. The system can fulfil diverse needs of interactive communication in particular environment, interactive conversation, interview, presentation and group discussion; v.) The system is especially useful for interactive language learning by way of a simple interactive and yet possible personalized two way communications between the instructor and the pupil. In 2005 the first author received an Indian patent for his PC based ISILS technology.

B. The constituents of Skill Junction

The comprehensive system consists of three parts; Core ISILS content, delivery system, the interior and the accessories. The room earmarked for the proposed lab/classroom is given a complete makeover and a healthy and pleasant ambience is developed to assist in enabling learning. The floor plan consists of the 'O' level Language drilling lab and the 'A' level Communication Lab/ Classrooms. The 'A' level is once again divided into Instructors area, the Activity area (here mock activities like presentation, interview, role plays, and group discussion are undertaken) and the student's area.

The core consists of wireless ISIL System, with digital switching unit and the user console unit. The interior consists of Instructor's & Student's area decking, storage at front wall, instructor's desk and lectern, storage cabinet, specially fabricated chairs and painting of the room etc. The accessories consists of laptop for ISIL system for content delivery; amplifier, speakers and headsets for students, multimedia projector and HDD camera.

C. Advantages with ISILS Technology

- Delivery of cost-effective high quality interactive education from any remote location
- Can provide guidance to decision-makers designing, implementing or investing in education initiatives
- Can also be implemented even in remote rural locations
- Help in capacity building
- Job on training
- Delivery of expert lectures

D. Cost of developing Lab/ Smart classrooms

In India the cost of making an interactive smart/tele classroom by CACM can vary from USD 25,000 to USD 50,000 depending on the type and requirement. A typical smart classroom developed by CACM is shown in figure 1.

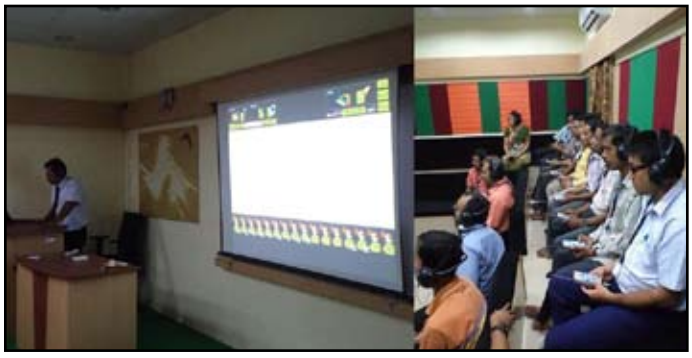

Fig. 1 : Teacher and students in a typical ISILS classroom developed by CACM

III. Discussion

Digital information has become a social infrastructure and with the expansion of the Internet, network infrastructure has become an indispensable part of social life and industrial activities for mankind. Every day, new Internet applications and more efficient ways of doing existing tasks are being discovered. Although most Internet applications are concentrated on a more efficient or cheaper way of performing existing tasks, the applications in education are mostly concerned with the sharing of scarce resources, available in one location, with many other locations (Pishva and Nishantha, 2008). As society moves further into the 'Knowledge Age,' everyday workplace practices are being increasingly changed and shaped by new and advancing technologies (Zurita and M. Nussbaum, 2004). In this fast changing information age even DVD player after 5-10 years of market life has now become history and YouTube and MTvU has taken its place (Berk, 2009). Globally students now tend to spend considerable amount of time on social media tools

such as Facebook, WhatsApp, YouTube, Twitter, blogging, Wikis, Ebay etc. (Dubose, 2011). Today's '*Net Generation*' students are so sophisticated with technology that they have been branded as digital natives (Prensky, 2001). 'Digital' is their native language. They are 'native speakers' of the language of computers, video games, and the Internet. To match with this fast changing world scenario the classrooms of the '*Net Generatio*n' students should also be upgrade to tap their multiple intelligences and learning styles. Smart/tele classrooms will be playing an important role in the future in dissemination of education. The advantages with such classrooms are many wiz: a.) Grab students' attention; b.) Focus students' concentration; c.) Generate interest in class; d.) Create a sense of anticipation; e.) Energize or relax students for learning exercise; f.) Draw on students' imagination; g.) Improve attitudes toward content and learning; h.) Build a connection with other students and instructor; i.) Increase memory of content; j.) Increase understanding of subject; k.) Foster creativity; l.) Stimulate the flow of ideas; m.) Foster deeper learning; n.) Provide an opportunity for freedom of expression; o.) Serve as a vehicle for collaboration; p.) Inspire and motivate students; q.) Make learning a fun; r.) Set an appropriate mood or tone; s.) Decrease anxiety and tension on scary topics; and t.) Create memorable visual images.

Education and training is the cornerstone of social and economic development. As per the 2011 census, over 70% of the Indian population lives in rural areas. Though, the Government has established many primary as well as secondary schools in every village but due to the lack of facilities and durable geographical conditions the teachers and staffs do not prefer taking postings in those areas, which results in failure of government polices and widespread illiteracy (Shah and Dafouti, 2013). There are many problems faced in rural education in India viz: i.) Teachers of rural schools in villages and small towns receive low income and facilities so there is a possibility that teachers give less attention to children; ii.) Teacher don't prefer rural schools because, rural area don't meet the need and luxurious requirement of their family; iii.) Residential facilities are not as good. Water and Electricity supply is not consistent; iv.) Most of the schools do not have proper infrastructure. So they do not get most of the facilities such as computer education, sports education and extra-curricular activities; v.) There are no proper transport facilities and thus children don't like to travel miles to come to school etc. Recently, a new ambitious initiative 'Digital India' is launched by the Indian government. Digital education could be one of the segments that can be best benefited from the initiative (Bhushan). As higher bandwidth becoming more common throughout the country day-by-day it is now possible to reach the remotest areas of the country via internet. CACM has constructed many smart classrooms which are placed in remote locations. After some initial problems these classrooms are now running well with the support and cooperation of the local people.

IV. Conclusion

Impactful eLearning interventions can transform Indian education systems and make education for all a living reality. Widening access to reliable information technology is a key to how we can help our future generation develop educationally (Angwin, 2012). Creative and innovative applications of ICTs like smart/tele classrooms is as important potential tools to enable educational reform processes improving both access to education, and the quality of that education in India. With the constant encouragement from the Government and other agencies CACM is firmly committed for the spreading of the eLearning process to the remotest corners of the country.

V. Acknowledgement

The financial assistance from the State Bank of India, IIT branch and logistics support received from STEP, IIT Kharagpur is duly acknowledged.

Reference

[1] S. Pal, S. Punit, S. Das, and S. K. Pal. (2015). The role of Centre for Advanced Communication (CACM) in spreading e-Learning in India, International Journal of Applied Research, Vol. 1(8), 190-193.

[2] C. Blurton. New direction of ICT use in education, Available online: http://www.unesco.org

[3] K. C. Harper, K. Chen, and D. C. Yen. (2004). Distance learning, virtual classrooms, and teaching pedagogy in the Internet environment, Technology in Society, Vol. 26, 585 -598.

[4] Y. Shi, W Xie, G. Xu, E. Chen, Y. Mao, and F. Liu. Providing natural means for teacher in Smart Classroom for Tele-education. [Accessed from: minnow.cc.gatech.edu/hci-seminar/uploads/3/PC112%20Shi.pdf].

[5] J. S. Fu. (2013). ICT in Education: A critical literature review and its implications, International Journal of Education and Development using Information and Communication Technology, Vol. 9, 112-125.

[6] P. Wims and M. Lawler. (2007). 'Investing in ICTs in educational institutions in developing countries: An evaluation of their impact in Kenya', International Journal of Education and Development using Information and Communication Technology, Vol. 3, 5 – 22.

[7] J. J. Castro Sánchez and E. C. Alemán. (2011). Teachers' opinion survey on the use of ICT tools to support attendance-based teaching, Journal of Computers and Education, Vol. 56, 911- 915.

[8] S. F. Fatma. (2013). E-learning trends issues and challenges, IJECR, Vol. 3, 1-10.

[9] S. M. Imran. (2012). Trends and issues of e-learning in lis-education in India: a pragmatic perspective, Brazilian J Info Sci Marília (Sp), Vol. 6, 26-45.

[10] P. Chauhan. (2014). How e-learning practices are shaping a new face of the Indian education system. [Accessed on 01.04.2015] http://www.iamwire.com/2014/01/e-learning-practices-face- shapingindian-education-system/24090

[11] P. Chanania, Crossing classroom boundaries with e-learning. The Hindu. [Accessed on 01.04.2015] http://www.thehindu.com/todays-paper/tp-features/tp-opportunities/ crossing-classroom-boundaries-with-elearning/article2651357.ece

[12] D. Pishva and G. G. D. Nishantha. (2008). Smart classrooms for distance education and their adoption to multiple classroom architecture, Journal of Networks, Vol. 3, 54 – 64.

[13] G. Zurita and M. Nussbaum. (2004). Computer supported collaborative learning using wirelessly interconnected handheld computers, Computers & Education, Vol. 42, 289 - 314.

[14] R. A. Berk. (2009) Multimedia teaching with video clips: TV, movies, YouTube, and mtvU in the college classroom, International Journal of Technology in Teaching and

Learning, Vol. 5, 1–21.

[15] C. Dubose. (2011). The social media revolution, Radiol Technology, Vol. 83(2),112-119.

[16] M. Prensky. (2001). Digital natives, digital immigrants, part II: Do they really think differently? On the Horizon, vol. 9, [Available from: http://www.marcprensky.com/writing/]

[17] S. Shah and B. Dafouti. (2013). A Study of Open and Distance Education (ODE) for rural India, International Journal of Advanced Research on Computer Science & Software Engineering, Vol. 3, 1115-1118.

[18] K. Bhushan. (2014). How digital India initiative can revive the education sector, [Accessed on 01.04.2015] http://www.digit.in/telecom/how-digital-india-initiative-can-revive-the-education-sector-24721.html.

[19] D. Angwin. (2012). Appropriate and sustainable technology solutions for education in Africa, The eLearning Africa 2012 Report, ICWE: Germany, 17.

Authors Profile

Mr. Sandip Pal is the CEO of CACM. He has over 20 years research experience in education technology especially PC based Interactive Software Integrated Learning System (ISILS). More about CACM and his ISILS can be known from: skilljunction.in.

Mr. Sumit Das is Manager R&D in CACM. He has done his Master of Computer Applications from Mithibai College, Mumbai. He has over 5 years research experience in software industry and has developed few social networking apps.

Dr. Sanjoy Kumar Pal is a Senior Scientist in CACM, he has over 20 years experience in research and teaching in India and abroad. More about him can be found from his website: sanjoypal.com.