A Case Study of Cross Country Teaching Through Innovative Educational Programme

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Abstract: Education field is going through a period of rapid transformative change due to proliferation of new technologies and new form of communication. In the current information based networked society, the old methods of teaching and learning are no longer adequate and helpful for distant education. With the hardware and software innovations swarming into the education sector, innovative teaching and learning processes are unfolding. The concept of incubators for innovation in education is also gaining ground. 10 cool education technology incubators (namely, Imagine K12, 4.0 School, Startle, Stanford learning, etc.) aiming to change education forever are examples of such initiatives.

The paper discusses an initiative like that taken up at IIT Delhi which is an innovation in cross country education yet to be formalized as an incubator.

At the behest of the Ethiopian Government, a Memorandum of Understanding was signed between IIT Delhi and the Ministry of Education, Ethiopia for teachers training in technical education. A limited number of field of specializations were selected for training. The teachers are graduate engineers and are selected by the Government for Masters Degree in Engineering to be awarded by Addis Ababa University. Courses of study have been framed by IIT Delhi. The courses were offered through distant education mode with video teaching in virtual class environment in real time. Educational Technology Center at IIT Delhi provided the studio for teaching. The receiving end in Addis Ababa Institute of Technology, Ethiopia created the requisite studio facilities for attending the lectures and for real time interactions. Courses were offered in capsules with each lecture extending to 1.5 hrs duration. Lectures were delivered in mixed mode i.e. through slides and the use of Digital Intelli Pen. Interaction periods were slotted within the lecture hours. Illustration of the use of computer packages for problem solving formed a part of the curriculum. After the delivery of each capsule, a visit of the faculty from IIT Delhi was organized for personal interactions with the participants of the course and for conducting tests on the subject taught. The visit was also utilized for framing research topics for Masters level dissertation which cater to the need of the country. Experiences gained through this exercise are vast and can profitably be used for developing innovation incubators in education. Some of the important ones can be summarized as (i) creation of dedicated communication channel is a key to the success of such programme (ii) computer based online chat is an important facilitator within the video teaching (iii) creation of virtual laboratory should form an integral part of the programme (iv) use of e-book and e-library would be good facilitators (v) formation of effective tutorial classes in virtual mode is a challenge to be addressed.

Keywords: Open Education, Distance Education, e-learning, Innovation in Education, Ed Tech Incubators

Introduction

Education is no longer about curriculum and grades. It is about innovation, creativity and entrepreneurship. Education technology is one of the fastest growing markets in investment. It is perceived by many that education will be 21st centaury market. Education practitioners, technology geeks and web entrepreneurs will be determinant to change. They have the ability and willingness to invent tools, contents and devices that will benefit leaders and trainers, alongside students and teachers. Because of these reasons, educational technology incubators have sprung up in last few years. Part of this endeavor is an outgrowth of a mission to genuinely help education.

Closely associated with the new wave of changes in education is the upsurge in open education, distance education and innovation and creativity in education. Open education challenge is viewed as a big venture under European commission in which invitation to all innovators is extended to submit projects, receive mentoring and seed funding. The development of the concept takes a parallel path to that of educational technology incubator. Distance education has a long history but its popularity and use have grown exponentially as more advanced technology has become available. Creativity and innovation in education also have advanced significantly with rapid development of technology. New teaching methods and training have emerged with educational technology tools invented relentlessly. Thus, education of new era is surrounded and stimulated by a chain of new developments brought about by technology. They include open education, distance education, creativity

and innovation in education and educational technology incubator. In this paper, before presenting a case study of innovative educational method for cross country teaching and training, brief discussions of the chain of developments in education for the new era are put forward as a background of the method of cross country education adopted in the case study.

Open Education

Traditional education systems are no longer able to respond alone to great challenges of today. Performances of the system worldwide – and especially in most developed countries – are bad: there are a rising number of school dropouts, skyrocketing youth unemployment, and a mismatch of skills and companies' needs. Moreover, there is not enough money or space to build schools and universities and hire all the teachers that are needed. Major changes are required to the ways learning is delivered, students are motivated and teachers are trained. Education needs to open up to new contents, teaching practices, assessment tools. Technological advancements make these changes more possible and desirable than ever.

The Open Education Challenge, launched in partnership with the European Commission, is an invitation to all innovators to submit projects, receive mentoring and seed funding through the European Incubator for Innovation in Education, and get direct access to investors. The Open Education Challenge is targeting innovators, passionate about education, and is convinced that technology will deeply transform the way we learn, teach and train. Applicants may be aspiring entrepreneurs or existing startups in the first stage of development. Their projects must contribute to transforming education in one of the following fields:

- Learning contents
- Devices, tools and connectivity
- Learning assessment and analytics
- School management and organization
- Learning communities

The European Incubator for Innovation in Education is promising startups in Education who will undertake the following tasks throughout the incubation process:

- Design their prototypes
- Test them in real classrooms or corporate learning environments
- Develop a sustainable business strategy
- Benefit from a unique learning experience:

- Connecting with researchers, practitioners and users
- Continuous interaction with peers
- Complete immersion in the European market

Distance Education

The widespread use of computers and the internet have made distance learning easier and faster, and today virtual schools and virtual universities deliver full curricula online. Many private, public, non-profit and for-profit institutions worldwide now offer distance education courses from the most basic instruction through the highest levels of degree and doctoral programs. Distance education has a long history, but its popularity and use has grown exponentially as more advanced technology has become available. By 2008, online learning programs were available in the United States in 44 states at the K-12 level. Although the expansion of the internet blurs the boundaries, distance education technologies are divided into two modes of delivery: synchronous learning and asynchronous learning.

In synchronous learning, all participants are "present" at the same time. In this regard, it resembles traditional classroom teaching methods despite the participants being located remotely. It requires a timetable to be organized. Web conferencing, videoconferencing, educational television, instructional television are examples of synchronous technology, as are direct-broadcast satellite (DBS), internet radio, live streaming, telephone, and web-based VoIP. Online meeting software such as Adobe Connect has helped to facilitate meetings in distance learning courses.

In asynchronous learning, participants access course materials flexibly on their own schedules. Students are not required to be together at the same time. Mail correspondence, which is the oldest form of distance education, is an asynchronous delivery technology, as are message board forums, e-mail, video and audio recordings, print materials, voicemail, and fax.

The two methods can be combined. Many courses offered by The Open University use periodic sessions of residential or day teaching to supplement the remote teaching. The Open University uses a blend of technologies and a blend of learning modalities (face-to-face, distance, and hybrid) all under the rubric of "distance learning."

Distance learning can expand access to education and training for both general populace and businesses since its flexible scheduling structure lessens the effects of

the many time-constraints imposed by personal responsibilities and commitments. Furthermore, there is the potential for increased access to more experts in the field and to other students from diverse geographical, social, cultural, economic, and experiential backgrounds. Distance education can also provide a broader method of communication within the realm of education. With the many tools and programs that technological advancements have to offer, communication appears to increase in distance education amongst students and their professors, as well as students and their classmates. The distance educational increase in communication, particularly communication amongst students and their classmates is an improvement that has been made to provide distance education students with as many of the opportunities as possible as they would receive in in-person education. The high cost of education affects students in higher education, to which distance education may be an alternative in order to provide some relief. Distance education has been a more cost-effective form of learning, and can sometimes save students a significant amount of money as opposed to traditional education. Distance education may be able to help to save students a considerable amount financially by removing the cost of transportation and residential stay. In addition, distance education may be able to save students from the economic burden of high-priced course textbooks. Many textbooks are now available as electronic textbooks, known as e-textbooks, which can offer digital textbooks for a reduced price in comparison to traditional textbooks. Within the class, students are able to learn in ways that traditional classrooms would not be able to provide. It is able to promote good learning experiences and therefore, allow students to obtain higher satisfaction with their online learning. Distance learning may enable students who are unable to attend a traditional school setting, due to disability or illness such as decreased mobility and immune system suppression, to get a good education. Distance education may provide equal access regardless of socioeconomic status or income, area of residence, gender, race, age, or cost per student. Distance Learning may also offer a final opportunity for adolescences that are no longer permitted in the General Education population due to behavior disorders. Instead of these students having no other academic opportunities, they may continue their education from their homes and earn their diplomas, offering them another chance to be an integral part of society.

Barriers to effective distance education include obstacles such as domestic distractions and unreliable technology, as well as students' program costs, adequate contact with teachers and support services, and a need for more experience.

Some students attempt to participate in distance education without proper training of the tools needed to be successful in the program. Students must be provided with training on each tool that is used throughout the program. The lack of advanced technology skills can lead to an unsuccessful experience. Schools have a responsibility to adopt a proactive policy for managing technology barriers. Distance Learning benefits may outweigh the disadvantages for students in such a technology driven society.

Distance e-Learning or DeL

It is the combination of Distance Education and e-Learning which is characterized by the extensive use of Information and Communications Technology (ICT) in the delivery of education and instruction and the use of synchronous and asynchronous online communication in an interactive learning environment or virtual communities, in lieu of a physical classroom, to bridge the gap in temporal or spatial constraints. Distance e-Learning combines the strengths and advantages of Distance Education and e-Learning. "The focus is shifted to the education transaction in the form of virtual community of learners sustainable across time."

The Distance Education model has its traditional focus on content delivery or correspondence, and emphasis on independent learning. Distance e-Learning has its roots on computer conferencing and collaborative constructivist learning approach; it encourages collaboration in an interactive learning environment. Distance e-Learning is also different from e-Learning. Distance e-Learning goes beyond the use of ICT as tools to access information which primarily characterizes e-Learning use in classroom teaching or in the residential setting.

Creativity and Innovation in Education

The debate on the role of ICT for creativity and innovation in education has become an important one over the past decade. The rapid development of technology, mainly as a result of the internet, has brought about an upsurge of technological tools which young people are appropriating for use in their everyday lives. As explored by the domestication theory, the arrival of ICTs in homes has brought the mobilization of material resources, skills, cultural values and social competences and capabilities (Silverstone, 2006). The recent rise of social media is also having an impact on education. Evolution in

communication practices suggests that developments for pedagogy need to address what it means to be educated in our times (Loveless, 2007), so as to avoid yesterday's education for tomorrow's students (Prensky, 2005). Social computing applications which vary from social networking sites (like Facebook; MySpace); sharing of bookmarks (del.icio.us; Citeulike);sharing of multimedia (Flickr; YouTube), online gaming (Second Life) and blogging, to offer new opportunities for people to express their creativity, make it available to a large audience and get feedback and recognition (Cachia, Compano, & Da Costa, 2007).

Continuous technological change means that learners today need to develop positive attitudes towards change and also, adaptability (Hinkley, 2001). As Hinkley argues, students in the future will endorse 'portfolio careers', moving through several careers and different jobs, including jobs that today still do not exist. Technology is one of the major components for fostering future creative communities, together with talent and tolerance.

There are different ways in which users interact with technology in learning processes (Loveless, 2008). Interaction with technology is primarily based on how users understand the capacity of technology. Interaction with technology in learning process, also known as 'active learning process' provides users with new ways of doing things: 'extend or enhance ability; novel ways of dealing with a task which might change the nature of the activity itself, or provide limitations and structure which influence the nature and boundaries of the activity'.

Basic technology skills are prerequisites for creative learning. It is also important to mention that the open innovation culture is changing the way users deal with technology today. A recent example is Facebook's Application Programming Interface (API), which allows third parties to integrate foreign applications.

Literature and research suggest that technology is endowed with a potential to innovate education (Blandow & Dyrenfurth, 1994; Ruiz i Tarrago, 1993). However, teachers need to modify their teaching methods to accommodate the changed interaction patterns. The effective use of new technologies requires innovative teaching skills. Teachers' proficiency in using technology is another issue covered in literature (Shaffer, 2006). Teachers, who are not conversant with the technologies they use in their teaching, may not feel comfortable with showing their lack of expertise in front of their students.

EdTech Incubators

While there are more than 7,000 business incubators around the world, very few focus specifically on education technology. In fact, only in the past few years has there been major growth in the number of these highly-focused incubators. Part of this increased attention is an outgrowth of a mission to genuinely help education. Yet these kinds of incubators are also thriving simply because edtech is a solid investment, as the education technology market is poised to grow by leaps and bounds in the coming years. A handful of successful startups have already come out of these edtech incubators. Some of them are (Blog Post, 2012):

i) *Imagine K12*: One of the biggest and most notable incubators for edtech has to be Imagine K12. Founded in 2011 by three big names in Silicon Valley (Geoff Ralston, Alan Louie, and Tim Brady), the incubator has since helped dozens of startups specializing in educational technology get off the ground. The ultimate aim of the incubator is to invigorate education through innovation and many of its fledgling companies do just that, including recent successes.

ii) *SIIA Innovation Incubator Program*: The Software & Information Industry Association is also trying to give startups a leg up by sponsoring a yearly incubator program focused on edtech. The program is designed to connect developers of new technologies with potential investors, industry leaders, and established businesses that may be seeking partnerships and offers many a way to get exposure and get financial support for their ideas.

iii) *4.0 Schools*: Based in Louisiana, this incubator isn't dedicated solely to edtech, but many tech-focused education businesses have come out of it, nonetheless. 4.0 Schools provide resources and training to help individuals launch schools and education-related businesses in Louisiana and the wider Southeastern U.S., and have been an incredible asset for many who feel they have great ideas but not the funding and resources to turn them into a serious business.

iv) *Center for Educational Technology Incubator*: The U.S. isn't the only place where edtech-focused incubators are sprouting up. In May of 2012, it was announced that the Center for Educational Technology, an Israeli nonprofit, would be establishing an edtech incubator to help advance the educational system in Israel. The CET's incubation labs consist of three areas: the Garage, where entrepreneurs can look for solutions to challenges in education; the Aquarium, a space

devoted to research on education and technology; and the lab, which helps to identify the needs of Israel's education system and will pilot programs developed through the incubator.

v) *Learning Technologies*: While NASA does have a number of popular educational resources online, it's unlikely that most who use them are aware that the space-focused organization actually supports its own edtech incubator to develop them. The program provides funding, tech tools and technology services to those who have great ideas for building educational resources that help learning, focus on STEM, and will engage students.

vi) *Stanford Learning, Design and Technology*: Stanford's School of Education isn't an incubator in the strictest sense of the word, but the resources and support offered to students in its edtech programs has made it a fertile breeding ground for the next generation of edtech startups, entrepreneurs, and ideas. Masters students in its Learning, Design, and Technology program are required to complete research or to build their own applications that can help facilitate learning which are then showcased at a yearly expo.

The Case Study

Preamble

A Memorandum of Understanding between IIT Delhi and Ministry of Education, Ethiopia was signed for teacher's training programme in distance education mode. The concept behind the programme was to offer Master's Degree to selected graduate engineering students and train them to teach engineering students at Under Graduate level. The conventional system of sponsoring selected candidates to different institutes of repute was abandoned in view of the available educational technology and innovation in education. This was further promoted by the need of establishing distance education capability in Ethiopia. A part of the training was aimed to equip and train the participants for distance education. Modern technology in this regard available in India was profitably used. The synchronous method of distance education was adopted and a number of pedagogy was employed. Innovations in education consisted of (i) structuring of courses most suited to distance education, (ii) delivery of lectures in interactive mode, (iii) thematic continuity, (iv) simultaneous video recording and online teaching, (v) real time contact in laboratory courses.

Participants and selection procedure

All the participants of the course were Ethiopian nationals. They were chosen from the nation-wide engineering universities based upon performance at their undergraduate level examination in the area of higher study being undertaken. They were supposed to become teachers to the undergraduate students of various universities in Ethiopia after completing the course through distance learning mode. Some of the participants were already teaching at various universities whereas some of them were serving other organizations. Many participants joined this programme after returning back to Ethiopia from foreign countries where they had gone for jobs, etc. The selection was also based upon their aptitude to become a teacher.

Courses offered and their details

The programme on Construction Technology and Management (CTM), Chemical Engineering, Electronics and Computer Engineering, Manufacturing Engineering were started. The courses offered in the programme on CTM were similar to those being taught to any master's level programme in India. The following courses were offered in CTM leading to 33 credits. The student had to register for 8 core courses and 2 elective courses:

Core

- Construction and Contract Management
- Project Planning and Control
- Computer Lab for Construction Management
- Civil Engineering Materials
- Quantitative Methods in Construction
- Construction Engineering Practices
- Construction Methods and Equipments
- Construction Economics and Finance

Elective (any 2 courses)

- Recent Advances in Construction Materials
- Management of Quality and Safety in Construction
- Building Services and Maintenance Management
- Environmental Management in Construction Projects

Faculty teaching the courses

Faculty teaching these courses was all experienced faculty members at IIT Delhi with vast experience in

teaching and research in the area of specialization being offered. The same group of teachers, offer the courses to IIT Delhi programme on CTM and Construction Engineering and Management. Faculty from Environmental Engineering and Computational Methods were also involved.

Different types of sessions conducted

The main sessions were classroom sessions as the main mode of teaching. Sessions on tutorials, problem solving, case study discussions and seminar presentations were also conducted. It was possible due to two way video link. The laboratory courses were offered through video links as well as in person consultations during mid-term visits of the faculty to Addis Ababa, Ethiopia.

Mode, nature of interactions and Technology used

Video link leased through under sea cabled link were used, hired from service provider through different countries. Classrooms were equipped with all the facilities of TV, LCD, display boards, intelli pen writing boards, etc.

Evaluation procedure

Evaluation was done at mid-term and final exam after completion of course and personal interactions. The procedure was similar to what is adopted in Addis Ababa since degrees were being awarded by Addis Ababa University. Major project in the second year was carried out by the participants based upon the requirements of construction industry in Ethiopia.

Limitations

Except the physical presence of teacher and the participants as envisaged in usual teaching environment, everything went well. The level of education of the participants was more or less at par with average students back in India. Frequent disturbances were caused due to power failure at Addis Ababa.

Conclusions

A state-of-the-art in innovation on education consisting of distance education, open education, creativity in education and educational technology incubators is briefly presented. Future scope and promise in innovations on education are also outlined. In particular, the benefits and disadvantages of distance learning are pointed out. A case study of distance education in providing higher degree and teachers training is described to emphasize how developing countries like India and an under developed country like Ethiopia can carry out the task of world wide acceptance of innovation in education and furthering Educational Technology. The spirit underlying such efforts is a mark for the making of Educational Technology as the 21st centaury's economic market. The case study conducted here lead to the following conclusions:

i) Creation of dedicated communication channel is a key to the success of such programme

ii) Computer based online chat is an important facilitator within the video teaching

iii) Creation of virtual laboratory should form an integral part of the programme

iv) Use of e-book and e-library would be good facilitators

v) Formation of effective tutorial classes in virtual mode is a challenge to be addressed

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