Economics of E-Learning in Higher Education : The Indian Case

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Abstract

Education is an important indicator of economic development and a key contributor to the Human Development Index. With the increase in global competition, countries attract human capital from across the world, and hence, education is imperative to gain competitive advantage. Also, education is a key indicator of lifetime earnings. In order to cope up with the technological changes, it is necessary for individuals to improve their skills and capabilities through education. Traditional methods of learning have become outdated and are being replaced by technology enabled education or 'e-learning'. The most important feature of e-learning is that it enables individuals to learn anytime, anywhere. Such flexibility makes learning faster, easier, and more attractive by creating a student-centred learning environment and by offering newer methods of teaching. This paper aimed to discuss the role of e-learning in the higher educational environment in this digital age, along with comparing the economic costs associated with traditional face-to-face and e-learning methods. I also reviewed several initiatives taken by the government and universities to promote e-learning in India.

Key words : **E-learning, higher education, internet, information and communication technology (ICT)**

JEL Classification : A22, A23, D83, H52, I21, I23

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Education has been considered as one of the most important aspects of nation building. Education is connected with a whole batch of human development indicators, especially in developing nations. For e.g., female education influences the family size and the health of children. The new era of globalization or integrated 'one world' has made it necessary to bring about a coordinated system in the teaching - learning environment for higher education. Technology enabled education or e-learning is now displacing the outdated traditional methods of learning. The Internet has become indispensable to make available resources for research and learning for both teachers and students in order to share and acquire information (Richard & Haya, 2009).

According to Gandhi (2011), e-learning refers to the :

> Intentional use of networked information and communications technology in teaching and learning. The term e-learning comprises a lot more than online learning, virtual learning, distributed learning, networked or web-based learning. As the letter 'e' in e-learning stands for the word 'electronic', e-learning would incorporate all educational activities that are carried out by individuals or groups working online or offline, and synchronously or asynchronously via networked or standalone computers and other electronic devices. (p.35)

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According to Bichsel (2013), e-learning is defined as a :

> learning that involves a web-based component, enabling collaboration and access to content that extends beyond the classroom. E-learning initiatives are ubiquitous in higher education. Their expansion has been driven largely by the increase in non-traditional learners who desire flexibility in scheduling, geographic location, and access to course resources. In addition to providing greater access for these students, e-learning initiatives can contribute to increased enrolments and revenue, enhance an institution's reputation, and enrich the teaching and learning experience. (p.5)

The major challenge faced by e-learning is that it cannot replace actual human beings and hence, while designing e-learning packages, it is of utmost importance to ensure that the students are not isolated with technology. Nelasco, Arputharaj, and Paul (2007) observed that :

> According to IDC, the revenue earned worldwide from eLearning was $6 billion in 2003. That's expected to rise to $21 billion by 2008. NASSCOM reports that Indian companies will get revenues of $7 million to $9 million by the end of 2005. E-learning in India has a very big potential and a bright future. (p. 16.6)

Current State of E-learning in Higher Education in India

In India, both the government and private players participate in the higher education market. Given the internal competition as well as the competition from the foreign institutions, the less effective educational institutions are forced to exit the market and the strategy of 'survival of the fittest' prevails. “The IT service sector export of India has grown up from US$ 754 million in 1995-95 to US$ 12,000 million in 2004-05” (Nelasco et al.,, 2007, p.16.3). Given this fast growth of the Indian IT sector, directed efforts should be made to replicate the same rate of growth in e-learning applications.

E-learning, though reached India late of course, is being fast accepted in a big way. Many institutions have started extending the teacher-led programmes to include more content-rich e-learning modules. Government initiatives are also picking up speed. E-learning is being strongly supported by the government and the Department of Electronics and Information Technology (DeitY) has been actively developing tools and technologies to promote it. DeitY has supported various R&D projects focused on e-learning at various academic institutes. These include technology initiatives, content development, HRD projects, and faculty training initiatives to impart education through e-learning (Imran, 2012).

> In order to increase the practical applicability of higher education, new applicants are increasingly seeking colleges which can offer flexibility and diversity in terms of course offerings. Students are seeking e-learning experiences. The proliferation of mobile devices has produced an anytime, anywhere expectation for access to information. Hence, it is important for institutions to look for ways to expand online course offerings to appeal to a wider section of learners. (Bichsel, 2013, p.7)

Complete modernization in areas of learning, research and innovations, improvement in coordination and flexibility in adapting to the needs of society is considered important for the development of higher education. Hence, the use of information and computer technology in the learning process should be one of the priorities of higher education institutions in order to focus on real problems of education. As Chadha, Rai, and Dugar (2016)

commented, India will fall back in reaping the benefits of its demographic dividend if the state of higher education remains the same as currently. Hence, educational institutions should recognize e-learning as an opportunity to transform the people, skills, and performance of the system, and should accordingly advance online learning capability in a speedy manner.

Commonly used E-learning Tools

With this rapid expansion of e-learning has come a rapid expansion of different forms of e-learning. Regular classroom teachers have started to incorporate the Internet into their modules in a variety of forms. For e.g., web pages may be used as illustrations in face-to-face classes, online discussion forums can be used to continue discussion after class, and students may be asked to do web searches as part of their studies, either in class, or outside class (Bates, 2008). This section highlights some of the e-learning tools used in higher education, namely:

(1) Internet Forums : An internet forum is an online platform where individuals can communicate in the form of posted messages. A user can post a topic for others to review, and other users can view this topic and post their own comments one below the other. These have been modelled after the real-world prototype of bulletin boards, which were extensively used before the Internet was born.

(2) Weblog (or Blog) : A blog allows users to discuss and exchange information on the Internet with the help of discrete text entries known as 'posts'. Users can generate their own website and the discussions are presented in reverse chronological order. Blogs provide comments or news on a particular subject, which can be a great source of e-learning (Pande, Wadhai, & Thakare, 2016).

(3) Social Bookmarking : Social bookmarking helps in referencing resources by linking then to bookmarked pages. It is a centralized online service which is very different from file sharing. It allows users to add, annotate, modify, and share bookmarks of web documents. Users can store useful lists of Internet resources in a social bookmarking system.

(4) Instant Messaging : Instant messaging allows users to communicate over the Internet on a real-time basis. It offers privacy to the users to chat more openly as compared to a blog or an Internet forum. Over the past few years, there has been a considerable increase in instant messaging services and platforms. Some of the applications which provide instant messaging facility are GTalk, Skype, ICQ, Yahoo! Messenger, MSN Messenger, etc.

(5) Text Chat : Text chat or Internet Relay Chat (IRC) is an online chat technology that allows users to communicate in a chat room. People from around the world can join a chat room and exchange information in a group discussion forum. In addition, it can also be used for one-on-one private communication as well as data transfer. Some of the examples of IRC clients are mIRC, XChat, ChatZila, etc.

(6) Rich Site Summary (RSS) : RSS is a type of web feed that publishes frequently updated content like news, blog entries, etc. It is presented in the form of a news aggregator on which users can track different websites. It automatically checks the RSS feed for new content, allowing the content to be passed from website to website or from website to users.

> Users of RSS content use software programs called 'feed readers' or 'feed aggregators'. The user subscribes to a feed by entering a link to the feed into the reader program. The reader can then check the user's subscribed feeds to see if any of

> those feeds have new content since the last time it checked and if so, retrieve that content and present it to the user. (Pande et al., 2016, p.277)

(7) Virtual Classroom : A virtual classroom is an online learning environment and is perhaps the most suited application of an e-learning system. It is an audio-video interaction, text-chat, and interactive whiteboard enabled classroom, which makes learning more interesting and attractive for the students. It allows students to communicate with one another, view presentations or videos, and engage with resources in work groups.

Economic Framework to Study Costs

There are numerous models that can be applied to study the costs and benefits of training and education systems. The cost function approach is of great value for policy research in higher education. Institutions can use the cost function to compare their different modes of education. Cost functions also provide an opportunity to evaluate the cost of providing higher education to domestic and international students for both traditional and online learning methods.

According to Bramble and Panda (2008) :

> The total cost of education can be classified into fixed capital and variable operating costs. Thus, a basic model for cost analysis is that the total cost of a system is equal to the fixed costs of the system plus the variable costs multiplied by the number of students the system serves. Fixed costs are capital costs of equipment and content development, while variable costs are the costs associated with the students and the instructors as the courses are offered. (p.277)

Table 1. Cost Elements of Traditional vs. E-Learning

Cost Elements	Traditional Learning	E-Learning
Fixed Costs	**Costs to the Institution:**	**Costs to the Institution:**
	• Construction/rent of building	• Learning platform (servers, software etc.)
	• Administration system	• PCs/laptops
	• Equipment (furniture, boards etc.)	• Administration system
	• Utilities	
	Costs to the Student:	**Costs to the Student:**
	• Learning Fees	• Learning Fees
	• Books and related materials	• PCs/Laptop and related technologies,
	• Travel and accommodation costs	high speed internet
Variable Costs	**Costs to the Institution:**	**Costs to the Institution:**
	• Supplies (workbooks, pens etc.)	• Supplies (knowledge management sites)
	• Course development experts	• Web development designers
	• Course delivery instructors	• Support (coaches, help desk etc.)
	Costs to the Student:	**Costs to the Student:**
	• Education Loan	• Education Loan
	• Opportunity cost during period of education	• Health related issues due to excessive use of computers (eyesight etc.)

Source: Adapted from Chakrabarty et al. (2014)

A basic model for cost of education is as follows:

$$TC = FC + VC$$

where,
TC = Total cost of education,
FC = Fixed cost of education,
VC = Variable cost of education.

Thus, *TC = FC + (VC per student*Number of students)*
The average cost *(AC)* per student is then given by:

$$AC = TC/\text{Number of students}$$
$$= (FC + VC)/\text{Number of students}$$
$$= FC/\text{Number of students} + VC/\text{Number of students}$$
$$= FC/\text{Number of students} + VC \text{ per student}$$

In strategic decision making, average cost is used to evaluate economic viability of education methods, where economic viability refers to the ability of all participants to finance an e-learning environment over a period of time. Economies of scale are said to exist if there is an inverse relation between the long-run average cost and the output produced, that is, when each additional unit of output can be produced for less additional cost than the previous unit. Economies of scale in higher education sector help increase the welfare for all participants (Chakrabarty, Rahman, & Khanam, 2014).

According to Rumble (2004) :

> The use of media and the problems of managing online students mean that the overhead costs of the institution, the costs of developing a course, and the course related costs of presenting courses are in general higher in distance teaching institutions than in traditional institutions with comparable student numbers. However, cost per student is lower. This is because the relatively limited amount of support given to students means that the direct cost per student is lower, but overhead cost is higher because much of the managerial and academic effort of the institution is being put into the development and maintenance of educational materials and administrative systems for the control of distance students. (as cited in Chakrabarty et al., 2014, p.9)

The Table 1 summarizes the cost elements of e-learning as compared to traditional face-to-face learning.

Advantages of E-learning

The inclusion of e-learning in higher education institutions has several benefits, such as:

(1) Increased Flexibility : E-learning is very flexible with respect to time and place. E-learning empowers the learner to access online library resources, and since it is possible to replay recorded sessions, absentees can learn the lessons as and when it is convenient. Also, slow and fast learners can take their own time to learn, which helps reduce the overall stress in the classroom environment.

(2) Integration : E-learning can help integrate all students, teachers, researchers, universities, and regulatory bodies at a regional, state, national, and international level. This will facilitate efficient utilization of available resources through sharing of knowledge, experience, infrastructure, and technology.

(3) Access to Best Resources : Availability of faculty is not restricted by geography or time and hence a few good teachers can be scaled up with the introduction of e-learning. In addition, a larger group of students can benefit from the same quality study material across geographies.

(4) Enhanced Learning Experience : E-learning increases opportunities for collaboration among students, since discussion of study material is no longer limited to the physical classroom. Students participate in discussions in online forums, blog about their learning experiences, and share online information with their classmates that supplements course materials.

(5) Wider Reach : Another advantage of e-learning is that people living in smaller towns and cities can get access to the best possible learning resources from across the world, at a very affordable price. This helps create a level-playing field for all.

(6) Learning By Doing : E-learning is an active experience with the emphasis on interactivity and 'learning by doing'. Difficult or dull subjects can be made more interesting, easier, and more appealing through e-learning as compared to traditional learning.

(7) Cost Effectiveness : E-learning reduces the overall cost for both the institutions and the students as the best knowledge products are available on the web without any additional travel or lodging expenses.

Challenges Faced by E-learning

Even though e-learning has several benefits, it is not, however, the be all and end all to every educational need because computers cannot replace human beings. Below are some of the limitations of e-learning:

(1) Lack of Personal Touch : According to Nelasco et al (2007) :

> personal touch, face-to-face interaction and eye contact are some of the stimulating and motivating factors in the learning process. The impersonality, suppression of communication mechanisms, elimination of peer-to-peer learning and reduced social and cultural interactions are the major drawbacks associated with e-learning mechanism. (p.16.5)

(2) Reduced Effectiveness : The e-learning method may be less effective than the traditional method of learning with respect to clarifications, way of explanations, as well as interpretations. In some cases, the learning process is much easier with the use of the face to face encounter with the instructors or teachers.

(3) Poor Social Skills : E-learning may deteriorate the role that institutions play in socialization amongst teachers and students. It may also have a negative impact on development of effective communication skills due to limited human interaction.

(4) Limited Applicability : E-learning may have limited applicability since it is not possible for all fields or disciplines to employ e-learning techniques in education. For instance, in purely scientific fields, practical work sessions in the laboratories cannot be substituted by web based methods.

(5) Technological Barriers : Severe limitations of technology infrastructure may also hamper enthusiasm and the widespread use of e-learning technologies. These may range from insufficient network speed and bandwidth capacity to incompatibility across different platforms and between different content materials (Imran, 2012).

Recent Government Initiatives to Promote E-learning

Given the advantages of e-learning as pointed above, coupled with the growing number of Internet users and improvements in Internet connectivity, a large number of institutions and government organizations are developing an interest in the e-learning industry. This fact is substantiated by the Docebo report issued in 2014, according to which, the e-learning industry in India was valued at ₹ 18.41 trillion in 2010-2011, with estimates that the market should grow at a CAGR of 17.4% over the period from 2013-2018 (Docebo, 2014).

The Central government has taken up a lot of initiatives in the e-learning sector and has launched new services and campaigns in the past few years. One of the most important is the Digital India Campaign, which aims at digitalization of all important government services. It will also facilitate education through its innovative plans about e-learning. The campaign initiatives include providing broadband connectivity, wifi services, etc. to various schools all over the country. Enhancement of digital literacy is one of the important aims of this programme (Biswas & Hazra, 2016). In February 2009, India launched the National Mission on Education through Information and Communication Technology, which is expected to provide Internet connectivity to about 20K higher educational institutions in the country.

The E-Gyankosh project was started in 2006 by Indira Gandhi National Open University (IGNOU). It is a National Digital Repository of learning resources, aimed at storing, indexing, and distributing the digital learning resources of open and distance learning institutions of the country. One of the latest initiatives of IGNOU is Inter University Consortium for Technology-Enabled Flexible Education and Development (IUC-TEFED), which works as a nodal point to undertake various collaborative activities involving new knowledge creation, e-learning, open and distance learning, etc. Some of the expected benefits of the consortium are to facilitate convergence and sharing of knowledge through the judicious mix of media and technology (Imran, 2012).

Another flagship project to provide web based training is the National Programme on Technology Enhanced Learning (NPTEL), which is being funded by the Ministry of Human Resource Development (MHRD). It is an initiative by seven IITs (Indian Institute of Technology) and Indian Institute of Science for creating course contents in engineering and science. This was first conceived in 1996 to enhance learning of basic science and engineering concepts by introducing multimedia and web technology. It was launched in September 2006. The course content trains teachers and through them improves the quality of students. In addition, these course materials (both web and video) can be accessed freely by everyone independent of their geographic location. As in February 2016, NPTEL had 994+ courses with more than 19K online video lectures, becoming the most viewed education channel (Department of Higher Education, Ministry of Human Resource Development, 2016).

Research Implications, Limitations of the Study, and Scope for Further Research

The above analysis concerning the current state of e-learning in the higher-education systems in India, along with its advantages and limitations, makes it apparent that this is an important subject for a better future of the country.

As Pradeepkumar and Panchanatham (2011) suggested, the core purpose of education and learning is to ensure that individuals possess the necessary skills which enable them to actively participate in a democratic society.

The concept of e-learning is that of a technologically enhanced learning mechanism through the Internet. Because of its benefits, the demand for e-learning is on a continuous rise and hence, it is becoming necessary to improve the overall quality of the e-learning system in India. However, there are numerous challenges which the governments face in their attempts to develop new e-learning mechanisms, some of which are:

- Poor availability of e-systems in rural areas.
- Lack of training amongst individuals to use ICT.
- High economic cost of data and broadband services in India.
- Insufficient laws for a strong security system to protect online data.

As already discussed, human interaction is crucial for successful learning. Hence, while designing e-learning packages, it is necessary to ensure that the learners are not secluded with technology. Faculty-to-student as well as student-to-student interactions should be encouraged through audio or video-based web conferencing programs and online discussion forums. The usage of e-boards, chats, e-mail, and tele-conferencing may also help remove potential drawbacks to some extent (Nelasco et al., 2007).

Our current study is limited in terms of the official estimates for the actual size of impact of e-learning on higher education in India. Owing to the limited scope of the study and time constraints, the analysis was restricted only to the level presented above. However, it would be interesting to conduct studies which can estimate the effectiveness of e-learning methods more accurately by using some quantitative techniques. It could also be of interest to discover new e-learning tools and techniques, especially in the context of a developing nation like India.

Conclusion

This paper attempts to study the role of e-learning in the higher-education system, its benefits and drawbacks, and the various tools and techniques which can be used for e-learning. A generic economic model is presented to understand the cost-effectiveness of different methods of learning. In addition, some of the recent measures taken by the government in order to promote the use of new online methods in higher education in India have also been discussed.

Internet connectivity and the rapid increase in its use has been an important catalyst for the growth of e-learning. The development of new information technologies is widening the range of services and is facilitating the creation of a global informational and cultural space in the higher education system. Information and communication technologies provide numerous opportunities for capturing and representing real-world scenarios. This study underlines that improvements in efficiency cannot be achieved in the learning and education process without integrating new information and communication technologies in the education system.

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