The Role of the Internet in Fostering University Education, Training, Research and Development in the 21st Century

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The following is an essay written by Mr. Chris Maharaj, who was then a Third-year Mechanical Engineering student in the Faculty of Engineering, UWI, St. Augustine Campus, Trinidad during the Academic year 2000/2001. Mr. Maharaj placed First in the EOG Resources Technical Essay Writing Competition held earlier this year.

1. Introduction

In today's world or rapidly expanding technology, universities are struggling to keep abreast. The major challenge that these tertiary educational systems face is how to optimise learning opportunities while maximising technology within the constraint of limited funding. Public fascination with online technologies has reached a fever pitch. The Internet, in particular, has literally taken the world by storm. University administrators have little alternative but to use this medium to resolve the dilemma of more students and limited government funding as they seek to automate the delivery of educational services. By the same token, efforts have to be made to improve the quality. Shrinking budgets also mean less resources are available to train lecturers in the theories and skills necessary to make them effective in the ever-changing electronic environment. Unfortunately, lack of teacher training is at the top of the list of reasons why technology is often misapplied. Undoubtedly, difficult decisions need to be made and will be made, hopefully more informed than the past.

Estimating the worldwide Internet population is, at this point in time, an inexact science. It was approximated that there were 259 million online users worldwide by the end of 1999. By the end of 2000, the number was expected to reach 349 million. By year-end 2002, there could be 490 million Internet users. At the end of 2005, over 765 million people may be logging on[1]. This exponentially growing market is an attration for many universities to go on-line. The driving forces of this trend are the new revenue streams and the panic of being left behind. Presently, 75% of two and four-year colleges in the United States of America offer some form of online education. By next year, that number may reach 90%. Interestingly, most online students are not typical undergraduates. In fact, only 16% are 18 to 22-year-olds[2]. The majority of the online learners are people who would have, in the past, been attending night school. Obviously, there are significant inroads that the Internet still has to make before it can sufficiently stimulate the functions of a university. However, the 1,000-year-old model of the 'village' college campus that produces the college graduate is definitely diminishing. Competing models are emerging that are incorporating new technologies, organisations and social goals. Yet, an Internet-stimulated university has its challenges, some of which unforeseen at the present time are destined to surface in the future.

2. Identifying the Pros and Cons

Developing an online course is far more complicated than simply posting a professor's notes on a website. Internet education must offer an array of additional student services online such as registration, academic advising, a library, financial aid, tutorials, and 24-hour technical support. Also, sales and marketing teams will be required just to attract students to these programmes. The economies of scale characteristics of e-commerce does not apply in the case of online learning, since more teaching assistants need to be added as the student population grows. Universities are not able to fully exploit the full potential that online video lectures can achieve since the vast majority of online interaction still occurs through words and pictures. It is clear that access to emerging technologies is a function of wealth, which itself is a function of the environment into which you happen to be born, that is, your country, class, race and gender. For instance, in the United States, the average age of an Internet user is 31 and there is a 70% chance that this person is a male[3]. Also, the estimated number of online users

in Africa is 3.11 million compared to 167.12 million in the United States and Canada[4]. Thus, the more resources at your disposal, the more likely you are to benefit from universities that use the Internet as a medium for information transfer. Indigenous cultures may fall prey to the dominant cultures of the Internet, namely the United States and Western Europe. The appeal of electronic networking operates in an inverse proportion to the disconnectedness of people from each other. We are learning to be alone together as is clearly evident in today's chat rooms and cyber-cafes. Traffic on the Internet has increased to the point that the flow of information reduces to a standstill on some occasions. This is a deterrent to institutionalising an Internet-fostered university programme. Without a regulatory body to monitor the transmission of data, the World Wide Web is emerging as a trash dump of misinformation and unwanted literature. The trend is that if you want access to certain information, you have to type in your credit card number. Thus, the Internet may not become a cost-saving strategy but a money-making business with courses being marketable commodities.

Online education's biggest attraction, however, is that it can be done on one's own time and from home. This type of model promises schools a potentially limitless market and eliminates the hassles of overcrowded lecture rooms. Easy scheduling and efficient delivery of classes to thousands or even millions of students can focus their training and development efforts on issues unique to their local communities. A 'virtual campus' renders the bricks-and-mortar facilities that make colleges so expensive simply irrelevant. This campus will not limit a student to pick courses from any one university. Instead, the individual will be unbounded in his choices. In the privacy of one's home, a hit of the 'Pause' button and a click of the 'Back' button is all that is needed if attention wanders. Through the Internet's higher speeds of information transfer and communication, a psychology student in South Africa can view through 'on-line conferencing' what transpired at a 'Serial Killer Behaviour' lecture two minutes ago at Harvard University. The ease of accessibility of information has made the web an attractive medium for research and development activities such as journal database searches. The Internet is also a phenomenal supplement to academic libraries. Recently, scientists have been studying the use of photons, instead of the traditional binary number sequences in digital communication, as a means of data transmission. These developments will lead to a dramatic increase in Internet speeds with a corresponding decrease in traffic. Little, if any, communication borders within the web greatly facilitate research and development activities such that a simultaneous

project can be done across countries. A global university village can even be created that is bereft of demographic boundaries.

3. A Tale of Two Futures

"There are many possible futures . . . Not all futures are equally probable. Not all futures are equally desirable. What is most desirable among the possibilities is not necessarily the most probable in the absence of some concerned effort to make it so."

Raymond S. Nickerson at the "2020 Panel" effort[5]

We will now look ahead to the latter half of the 21st Century by looking at the university life of a father, Heatcliff Williams and then his son, Kendall. Presented through the lives of these two people are pessimistic and optimistic views of the role of the Internet in fostering university education, training, research and development.

4. An Internet-fostered University Hell

The year is 2067. It is 5:00 a.m. and Heatcliff's alarm won't stop ringing. It is time for him to face a new day. On this little island of Grenada, everyone wakes up early. Sluggishly, 25-year-old Heatcliff rolls off his bed. After a breakfast of reengineered bacon with pancakes, he leaves for 'campus'. Heatcliff is studying to be a superconductor engineer. He arrives at the cyber-cafe four minutes later by means of a levitating taxi. He walks inside without being acknowledged by the other people there and sits down. As soon as he downloads his university programme from the Internet, he will officially be on 'campus'. For the majority of the next eight hours, he will be in front of the computer.

Not everyone has access to the 'campus' however. The skyrocketing cost of Internet access in Third World countries like Grenada leaves Heatcliff out of the comfort of his home and at the cyber cafe. It may not be the most conducive of places to learn but he has adjusted quickly. Through the Internet, courses are now marketable commodities and universities no longer have a genuine pedagogical interest. Instead, their objective is to maximise profits. Although internet speeds have drastically increased to one gigabyte per second, Heatcliff still only receives information at a rate of 10 megabytes a second. This is due to the high cost of new technology. Thus, the three dimensional holographic visual teaching aids can only be accessed by the wealthy few. Heatcliff is content with the 15-inch monitors at the cafe.

It is now 3pm and surprisingly, there was no significant buildup of Internet traffic today compared to most other days when the Web is inaccessible and Heatcliff would

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[4]   http://nua.ie/surveys
[5]   Technology in Education: Looking toward 2020. Edited by Raymond S. Nickerson & Philip P. Zodhiates

have to terminate his 'class'. It is amazing that Heatcliff has never seen his classmates. In fact, he will never know or see them. The university has unknowingly isolated Heatcliff from the rest of the world. Mandatory classes are finished for the day but Heatcliff has an assignment to research on 'superconductor applications in transportation'. He closes the university homepage and uses a search engine to get the required information for the assignment. The search engine brings up the titles of numerous articles and journals but they are at a cost that is so prohibitive that Heatcliff can only download one of them. In its programme, the university has specifically stated that it is not responsible for the training and development of their students. Thus, Heatcliff has to hope that when he graduates, some company will take him on a training programme to help him gain 'real world' experience and apply what he has learned.

Heatcliff is about to get up after 'logging off' when he feels someone's fingers massaging his shoulders. It's his wife Karen who is eight months' pregnant. The couple has not decided on a name for the baby boy but they have narrowed it down to either Kevin or Kendall. While receiving his massage, Heatcliff's mind drifts away. He is envisioning what wonders the future may bring for Kendall (he knows that he will convince Karen to choose this name) and hopes that it will be better than the present, especially with respect to university education. What Heatcliff does not know is that changes are on the rise and Kendall will be able to benefit from the full potential that an Internet-stimulated university can offer.

5. An Internet-fostered University Heaven

Kendall laughed away with Karen and Heatcliff on the 620th floor of his 'Grenadian Moonscrapers' apartment. They reminisced on 20 years that flew by so fast. Kendall especially loves to hear stories of the dreaded university days of the past told by his Dad. Significant changes were made since his Dad's days. There were no longer any demographical, geographical or socio-cultural borders that surrounded tertiary education. Through the Internet, university education is free and full of all the promises that the technology can offer.

Kendall would have loved his parents to stay a little while longer but lectures were about to begin. He sees his parents out and tells his computer 'Ernie' that he is ready for class. Immediately, Kendall's room turns into the lecture hall where he is able to see his fellow classmates. Through the advanced technology of the Internet, his friends are able to see him too. Kendall sits down next to his best friend, Steve. Steve almost looks real as the computer has an on-line, real time, three-dimensional holographic image of him. After both saying hello to one another, they quickly review the notes of the previous class. They both are particularly interested in the course titled, "Gene Transfer Processes in Plants". This is a compulsory course in their four-year degree programme of 'Genetic Modification Science'. It is astounding that even though Steve is currently residing in Germany, he is sitting next to Kendall. What is even more profound is that, through the Internet and in real-time, Steve's language is being translated to Kendall's and vice-versa.

Kendall's university is really a combination of many. He is actually registered at Harvard University, Oxford and The University of the West Indies, each of these institutions specialising in courses he has picked. This makes Kendall's degree a unique and customised one. Yet, he must set aside his final year specifically to develop his mental skills and to train for the world of work. Also, he must attend 'traditional' lecture classes where he is able to physically interact with some of his other classmates in Grenada. This is to ensure that he is not a victim of the 'Isolation Phenomenon'. Through the Internet, Kendall is able to peruse millions of articles relevant to his research projects. Within a microsecond, he has downloaded 10 of them free of charge.

6. A Personal Forecast: Neither Heaven nor Hell

The Internet will have a positive impact in fostering university education, training, development and research in the 21st Century. It will be a medium to reach more people and to also break down most prejudicial borders that still exist in today's universities. There will be less of a need to increase physical infrastructure. Also, as the innovations of new computer-related products increase, the cost of the technology is decreasing. The Internet will exploit this advantage to reduce the cost of tertiary education significantly. More and more lectures will be through on-line video conferencing. The 'physical library' that exists today will become a figment of the past. Research material will be available from encyclopaedias, books, articles and journals on-line. University students will be able to train and develop themselves for the world of work with three-dimensional, holographic, real-time images (downloaded from the net) as industry simulation aids. For example, through the net, a simulation of a problem on a process plant can be created and the Undergraduate Process Engineering student has to find the solution. In a way, the student is getting experience in the real world environment.

Conclusion

The role that the Internet will play in assisting university functions of the future will largely depend on the careful consideration that we place at present. While most institutions are rushing into the arms of this new

technological medium, they should also incorporate continuous appraisals of the system. In doing this, the medium's full potential can be achieved.

Although the goal of the Internet-assisting tertiary education to become free, non-prejudicial, and beneficial for all may not be realised at the end of the 21st Century, significant strides would have been made that would at least pave the way for more progress in the 22nd Century and beyond.

Other References

[1]   This campus is being simulated. New York Times Magazine, New York, Nov. 19, 2000.

[2]   Instructional and Cognitive Impacts of Web-based Education. Beverly Abbey. Hershey, PA: Idea Group Publishing, 2000.

[3]   Social Dimensions of Information Technology: Issues for the New Millennium. G. David Garson. Hershey, PA, and London: Idea Group Publishing, 2000.

[4]   Alternate Visions for the Future University. The Futurist; Washington; Jan/Feb 2001.

[5]   The Classroom goes Global. Training; Minneapolis: Jan. 2001.

[6]   New Information Technology in Education. David Hawkridge.

[7]   Literacy Theory in the Age of the Internet. Edited by Todd Taylor and Irene Ward. Columbia University Press. New York. ISBN 0 231 11330 7.

[8]   Using Technology in Teaching and Learning. Pat Maier, Liz Barnett, Adam Warren, David Brunner. ISBN 0 7494 2516 4.