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## The University of the Future

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Just visualize a digital university... - Whose stock in trade is a huge bin filled with storage disks, a dense network of fiber optic cable, a wide bandwidth connection to the Internet and maybe a satellite truck.

Thomas H. Thompson, 1998

### Introduction

Present-day universities face a major upheaval: on the one hand, a dearth of budgets together with an increase in the number of students require an organizational change which would adapt itself to the new needs; on the other hand, the sophisticated technology threatens to usurp the positions of some of the teachers, and transform the university into an institution whose main existence is virtual. The universities are the bodies most resistant to change; change usually evolves unwillingly and as a result of the emergence of a new reality rather than out of their own initiative. Even if we look back several centuries, to the 12<sup>th</sup> century, in which the large universities of Europe were established and operated, we will find the same teaching patterns practiced in the past, which testifies to the conservatively.

The computer mediated communications technology contains the ability to provide asynchronous learning, adapted to the time and abilities of the student, and tailored to his or her needs. This approach is revolutionary compared with the current teaching method, which ignores the requirements of the individual student and addresses the group at a given and fixed time and place. On the other hand, the computer mediated communications technology threatens to damage the current social fabric in educational institutions and turns physical meetings into a rarity.

### Technology and the University

Using technology for teaching in universities has as yet brought about no substantial changes. In the twenties, Thomas Edison predicted that use of the sophisticated technology known today as cinema will cause a revolution in all matters to do with the education system, and will replace the science reference literature. As early as the fifties, with the emergence of educational television, many promises were aired concerning the substantial change it would bring to learning methods in universities - reality today is that the great potential described in the fifties has remained no more than potential. Teaching methods in the universities have remained resolute.

Similarly, the audiovisual systems of the nineties, as teaching aids, have remained a matter of good will, and their use in day to day life are negligible.

The promise that the Internet and computer mediated communications environments bring with them remind us, therefore, of previous promises raised in other appearances of educational technologies which had then sunk into oblivion, so long as they were dependent on existing systems and their willingness to evolve.

The modern university that we know and love costs too much.

Higher education will lose market share if they are not proactive. Enlightened institutions and the private sector will partner to benefit from this new opportunity.

Life long learning will become a huge profit center for universities as they work with businesses by providing expanded learning opportunities to the work place.

Western Governors University, 1998b

## A Changing Reality

The forthcoming century brings with it a different economic reality, which contends that one must accomplish more with less. The growth of developing countries' populations causes the budgetary pie to be divided between more people. The population's demands also increase, and what follows is higher costs in the fields of medicine, internal security, transportation, *etc.*. The field of education gets waylaid in various places around the world. Despite the dramatic increase in the number of students, there is no parallel dramatic increase in the budgets transferred to the universities. The student population itself is also changing, and more students of the forty-plus age group enter the process. These students have different needs arising from family status, time flexibility and geographic distance, which influence the structure of teaching and the manner of conducting it. Many students, who in the past were prevented from being accepted into higher education institutions, are interested in broadening their horizons, and are also required to do so by their employers.

In the distant past, universities were established in order to train their students to function in society and to serve as better and more efficient citizens. In the previous and the last centuries, the concept changes somewhat, and a large number of universities, known as "research universities" were established, aimed at training "researchers" and not necessarily citizens whose direct contributions is to the productive force in the market. These universities consume expensive resources from the states in which they operate, and their direct contribution to the productive market is difficult to quantify. This occasionally conflicts with the direct needs of the market, which require a working force, better trained in specific subjects. This conflict causes pressure on the part of the productive entities in the market to change priorities in the allocation of resources, and direct it also toward training institutions or universities which would approach the target population with the aim of training it to function productively in the market. This also dictates an identification of new fields of knowledge, which are needed in the productive market, and developing training programs aimed at fulfilling these needs.

Another reason is based on the fact that universities, due to the rough competition between them, are getting more and more commercialized. The commercialization enables them to address new markets such as Life Long Learning or Corporate Training. These new and promising markets will enable universities to reach new target populations and survive. The way to commercialization is also paved by technology, which in many cases opens up the target market.

An additional factor, which participates in this game, is the global communications giants such as the television companies, computer colossi, cable and telephone companies. In the competition raging these days in this field, these companies try to bite off an ever-increasing segment of the market, and control mankind's consumption habits. One of the most promising directions is the issue of education. Using the communications lines controlled by them in order to transform them into a high-demand product for essential needs will cause many of them, before too long, to make massive investments in the field of developing computer mediated communications courses. Major economic inducements and pressures will also accompany these investments on the universities to make intelligent use of the infrastructures for their target populations, including the regular students.

A fourth factor in this process is the directors of the universities. The directors of the universities are often responsible for the non-academic aspects of the body over which they are appointed, and their purpose is to maintain its economic balance and survivability. Using the information technology gives the body, which they head, a competitive edge over other universities, and they cannot let themselves lag behind. In addition, they can see the advantages arising from use of computer mediated communications media, such as: their increasing ability to maintain a follow-up of the teachers and their achievements, their ability to use courses developed elsewhere, and decrease the costs of teaching or developing courses.

This changing reality might be a stronger and sufficiently realistic cause, which will bring about a change in the university's attitude towards educational technologies, and in particular towards the information technology as it pertains to teaching. This will not take place by choice, but rather under compulsion and a dire need to withstand existing economic pressures.

## **The Digital Book and Its Impact on the Virtual University**

The printed media in the academic environment retains its place in the last century despite inventions such as film, television and computer games, but today, with the development of the information highway and the computer and other economic and other reasons to do with the environment (paper as an expensive product increasing deforestation) - a real threat has arisen against the continued use of print for publishing books and periodicals. The volume of printed information in the academic environment increases annually at an astonishing rate. An example is the magazine Chemical Abstract, which needed 30 years (1907-1937) to reach a million articles, 18 years for the second million articles, and in the last decade, a million articles are written every 1.75 years!!! At the same time, the number of new periodicals being published every year increases at the rate of 4-8 percent annually. The implications are huge in terms of printing and storage costs and purchase price for university libraries. In practice, many universities cut down the quantity of printed periodicals they purchase for their libraries, both for economic and for practical reasons, and shift to digital copies. As a result, the profitability of producing printed periodicals shrinks, and they start being published in digital media alone. A similar phenomenon occurs in the field of scientific reference literature. The cost of producing a reference book, due to the faster than ever developments in the fields of science, and the flooding of the market with reference books, causes many publishers and writers to realize that it is preferable to publish the book in digital media. Publishers also understand the capabilities inherent in this media, and prepare in advance computer-mediated communications courses based on the same

David Rashty, rashty@addwise.com

reference book. The outcome of this process is that the economic pressure on universities to shift to computer communications environments increases steadily. It is also coming from such a clear and known direction as the book, which more than anything else embodies the common concept of all higher education institutions.

## **Various Models of the University of the Future**

The economic reality, which will dictate the change in the structure of universities, might bring about several outcomes:

1) A virtual university - The University of the future will exist primarily in the virtual reality. In order to enable this, there will be a considerable improvement in all matters to do with computer associated technologies, including: speech recognition, screen information display, miniaturizing technology and transforming it into wearable technology, the Bandwidth intended for transfer of information, and the transferring speed of information. These technological means will make technology simple and available for anyone, and will remove obstacles which today bar extensive use of technology for teaching purposes.

2) The mixed model - In this model, the universities in which studying takes place physically will continue to exist, but they will be few and expensive. Only people of means will study in these institutions, which themselves will also make considerable use of information technologies. Most of the students will be studying in virtual universities, which will be cheaper and state-funded.

3) The WGU model - Western Governors University is one of the leading examples of a virtual university. It was established in 1995 by the Governors of the 18 western states of the United States, and started operating in 1998. The university enables virtual study through the Internet and also grants credits to students for courses and professional training they have taken in the past, and for the student's current knowledge. The university has entered into international strategic alliances with similar bodies in England and China, and with distance-learning institutions such as England's Open University, in order to increase the variety of offered courses. The universities' offices are spread out over several states in the United States and several continents worldwide, and there is not solid physical delineation of the university's campus. The university set itself the goal of turning to the large plants' population and offering them professional training for their employees. The access to sources of information such as libraries is provided, to the extent possible, through on-line sources, or alternatively through traditional libraries located near the student's residence. The economic model on which the university is based states: less self-investments in expensive infrastructures and more collaborations and purchases of external services, in order to lower the costs of the infrastructure and its replacement, which are necessary for traditional universities and which cause them ever greater outputs of resources.

## **Top-Down against Bottom-Up Approaches**

The shift to the virtual university age is perceived as something dependent in practice only upon the will of the university managers and the economic pressures placed on them. This attitude believes in the Top-Down Approach, while occasionally ignoring the part lecturers and even students play in the process. The lecturers may not cooperate with this process because of the threat on their status and position in

David Rashty, rashty@addwise.com

the virtual university. To the degree that the knowledge possessed by the lecturer can be translated into a computer communications course, which can even be pooled by several universities, it would be possible to make do with fewer lecturers. Utilization of the computer communications environment would also enhance the ability of the university managers to maintain a close follow up over the lecturers' achievements, which would of course cause great anxiety on their side. The students, on their part, would fear for the future of teaching at the university, and the demand from them for more involvement and responsibility over the learning process. The traditional learning requires less involvement and responsibility, and sometimes makes the students passive participants of the learning process, which is convenient for some.

A contrasting approach is that of Bottom-Up, which contends that the process will succeed only by cooperating with the lecturers and rewarding them appropriately. Without proper rewards, it will be impossible to find lecturers to effect the shift from traditional teaching to computer communications teaching. The lecturers also argue against those who abide by the Top-Down Approach, that the time required for learning and interacting in the computer communications environment is far greater than that needed for traditional learning, and hence many economic advantages, which seem attached to this technology, are still far from being reached.

What is missing is a common set of guidelines for the delivery of education via technology. The entertainment market and electronic commerce may eventually drive the emergence of technology standards which education will adopt in.

Western Governors University, 1998b

## **Technological Emphases on the Way to the University of the Future**

In order to advance and realize the reality in which the virtual university will operate, several technological difficulties and concepts must be overcome. Today, these technological difficulties prevent a simple support and implementation of educational technology.

Among the major emphases:

1) Solutions that are not unique and not dependent on the working environment - open solutions are essential for the success of the process and for the students' and teachers' work. In addition, the desire to enable pooling of assets among different institutions demands a lack of uniqueness of solutions and formats. In order to achieve this situation, there must be a striving towards cooperation with the hardware and software producers and causing their participation in the process, identifying the leading standards and supporting them, as well as collaborating in determining the standards and defining the users' needs. The standards to be determined must be as open as possible, independent of any particular media or working environment, and enable as wide a compatibility with any other solution as possible.

2) Securing and confidentiality of information - since the idea behind the virtual university is to provide as simple and as free an access to information rather than blocking it, there is great importance attached to developing means of protecting the

David Rashty, rashty@addwise.com

confidentiality of the information and securing it, while at the same time enabling as free an access as possible, and even encouraging the use of the information. Another important point is the ability to enable purchasing of services from third parties, through secured and user-friendly protocols.

3) User-friendliness and easy-accessibility - one of the difficult problems of using the computer is the support the user needs to utilize the media. The support arises from incompatibility of platforms and software, from the fantastic speed in which technology develops and from the unfriendliness of the technology. In addition, the interface between the user and the computer will determine the level and volume of the interaction, which will be one of the bases of working in the virtual university.

4) Capabilities of two-way synchronous and asynchronous communication - the technology, which will enable two-way and multi-user, synchronized and a-synchronized communication still needs considerable research and agreement over standards. Problems that must be overcome include Bandwidth, information compression, ability to multiplex the number of users, and transmitting body mimics as part of the two-way communication.