Higher education facing the challenges of the information age

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“Opening the window of his cell, he pointed to the immense church of Norte Dame, which, with its twin towers, stone walls, and monstrous copula forming a black silhouette against the starry sky, resembled an enormous two-headed sphinx seated in the middle of the city.

The archdeacon pondered the giant edifice for a few moments in silence, then with a sigh he stretched his right hand toward the printed book that lay open on his table and his left hand toward Norte Dame and turned a sad eye from the book to the church.

“Alas”, he said, “this will destroy that”. (Victor Hugo, Notre Dame de Paris, 1482. 1967, p. 197)

Today we face a new challenge, perhaps reminiscent of the one Victor Hugo was describing. Higher education, we are told, is entering a new age. Its walled sanctuary, the physical location, is an anachronism dating back to the “Gutenberg Galaxy”; today, in the age of electronic information, the university is said to be obsolete (e.g., Hutchison, 1995)!
Will the computer, the modem and the internet destroy the university much like the flexible, perishable, open-to-interpretation book was expected, according to Hugo, to destroy the stable, timeless, stone-built intellectual stronghold of Notre Dame?

Higher education, as we have known it in the West for more than 2500 years, is and was, the place where knowledge-seeking people pilgrimage, and for which they take time off other activities to widen their intellectual horizons. In this sense, the university is a sanctuary, a unitary entity of space and time quite separate from the hustle-bustle of the world surrounding it. It is an island onto itself. This institution has traditionally three main missions: It is an institution of knowledge production, it is an institution of knowledge imparting, and it is an institution for knowledge preservation (Noam, 1995).

If we are to look back in history, this was the case of all institutions of higher learning, beginning perhaps with the well stocked library of Assurbanipal in Ninveh in the Seventh Century B.C. All ancient Greek temples are said to have had rich repositories of books where much studying and copying took place. The most famous of these was of course the Peripatetic school founded by Aristotle for the purpose of facilitating scientific research. That place came to replace the traveling Sophists. Higher education was no more a matter for Gypsy-scholars.

Other institutions continued the same pattern: In the Third and Second Century B.C we have the celebrated library of Alexandria with its 700,000 volumes. In the second Century B.C. we have the Jewish Yeshivah, the institute for academic Biblical and Talmudic learning and interpretation. This institution continues to exist to this very day. The tradition of creating, imparting and preserving knowledge continues later on in
Europe, with the universities of Paris, Padua, Prague, Heidelberg and of course the Catholic University of Leuven raising it to impressively high levels.

The fact that institutions of higher learning were places specifically dedicated to knowledge, citadels onto which one would ascend to study and do research, was no coincidence. Two factors may have contributed to this phenomenon. One such factor was the scarcity of knowledge and its sources, thus the need to go where the knowledge and the knowledgeable resided. Knowledge did not come to you; you had to go and get it. Moreover, the pursuit of that scarce knowledge required time, it was a single responsibility, not something that could be carried out while doing other things. The second factor was the desire to segregate the pursuit of knowledge from the lesser activities typical of regular life. Scarce resources can not be treated lightly, hence the cloister-like structure of traditional universities.

**Thesis**

Alas, things are changing. Suddenly one can study everything from anywhere, and one can obtain whatever stored information one needs in no time, with hardly any effort, and without leaving one’s home. Gone is the scarcity and with it - the segregation of the pursuit of knowledge. The three missions of higher education are now easily replaceable by electronic means. Or so at least, some enthusiastic prophets of the new, brave, virtual world tend to argue. Are their claims warranted or am I erecting a straw man, a non-existent threat? I am afraid the threat as already felt in the U.S.A, Israel and other Western countries is a real one. Universities such as the University of Oregon, UCLA, Berkeley, and Colorado have already launched aggressive electronic degree programs. Faculty and students at the University of York in Canada have declared a lengthy strike
against the university’s plans to go electronic, or as it was sarcastically labeled – “The transformation from the classroom to the boardroom”. Europe may only now begin to flirt with electronic higher education, but I don’t think it will take long for it to face the same challenges others are facing already.

Consider the accumulation and preservation of knowledge. Noam (1995) offers some startling statistics: If the accumulation of the first million abstracts in chemistry took 30 years (1907 to 1937), the most recent one required only one and a half years. More papers in chemistry were published in the last two years than ever before! Libraries cannot possibly handle this tremendous volume of new publications in all fields of knowledge. There is no space for this, space is exceedingly costly, and there is no money for this either. The first million abstracts in chemistry cost in 1940 the equivalent of BFR 408, while today the most recent collection costs close to BFR 600,000. Who can pay for this? The same applies to space. Ten years ago the whole of the Encyclopedia Britannica cost me about BFR 51,000 and required space for 37 volumes. Recently I bought it on a CD-ROM for BFR 7,500 and it requires no space at all (However, you can not show off with a CD-ROM; 37 volumes on your shelves look much more impressive). That much for the preservation of knowledge.

Turning to the production of knowledge, the processes undermining the traditional university are similarly strong and compelling. Knowledge, as we know, increases these days in leaps and bounds. The case of chemistry cited earlier is but one of many. When I was a doctoral student at Stanford in the late 60’s it was clear that a researcher in my field, educational psychology, would need to read the five most important journals. Today, you’d have to browse through at least 50 journals! Little wonder that all kinds of
abstracting services—PsychLit, ERIC, Sociofiles, MEDLINE, GEOBASE and the like are doing a brisk business. Who has got the time to read full articles?

Some say that all our knowledge multiplies now every 5 to 10 years. This proliferation of knowledge has yet another concomitant: Increased specialization on the one hand, and a growing tendency for the development of new, interdisciplinary fields, on the other. New communities of expertise spring up but they are not necessarily located in one place any more. Once, at Harvard, you had the Mecca of behaviorism with Skinner as its high priest on one floor, and the Delphi of cognitivism with Bruner as its Oracle, on another. Today, the action is not any more in the hallways of this or that department but rather on e-mail, on the Web, and through teleconferencing. The same applies to scholarly publication. This is the first year that the American Psychological Association sells electronic access to all its journal articles. It seems to be the end of the hard copy journals arriving each month by mail and piling up on our desks.

And finally, teaching. Here the case is the most compelling. Face to face instruction is costly, often not very effective, and too often even alienating. On the other hand, electronic instruction from ready-made courses like the already existing selection of hundreds of certified courses from all over the world, is far less expensive; it can be individually tailored, it affords intensive interaction among students residing in different countries, and most importantly—it is accessible all the time and from anywhere. All you need is a computer, a modem, a phone line and a credit card. Students now have to take full responsibility for their own education, logging on and self-regulating their learning process.
The economic and practical attraction of this way of electronically mediated learning seems to be irresistible. The rapid spread of the electronic version of Socrates/Erasmus in the European Community attests to this, and thus, to the development of the virtual university. It is quite interesting to note that it is mainly the universities themselves that encourage these developments, although, as it becomes quite clear, this may lead to their own demise (Casper, 1996)!

One can of course accept the new developments as a technological blessing: Stuffy, elitist, and self-contained universities are finally opening up for everybody to have equal, democratic, and easy access to higher education. Information becomes something that seeps out from the once privileged citadel into the homes of every one who seeks knowledge. Knowledge becomes a fluid, available thing, no more a commodity to own and store but something to be accessed.

**Antithesis**

But things are not that simple. In the past, technology was always supposed to be the *means*, not the raison d’etre of the way education was conducted. But now, the technocentric approach starts to dictate the essence of higher education. The argument is that if the possibility exists for the development of universities without walls then this possibility should be pursued to its fullest. Yet, as it has been so eloquently put by Seymour Sarason (1984): *Not everything possible, wondrous as it might be, is necessarily also desirable!*

Thus, we should ask, how desirable is the replacement of face to face higher education by electronically mediated learning? How desirable is it to weaken the physical citadel of higher education for the sake of less expensive electronic alternatives? To
answer such questions we would need some superordinate perspectives: Economic perspectives, social perspectives, learning perspectives.

I won’t deal here with the economic aspects of the question, although I will admit to my bias: I would beware of pursuing questions of education, indeed, questions that pertain to the future of whole generations and to that of science, through the prism of the check book. Not that economy is irrelevant, but higher education is much too important to leave it to the office accountant.

First, a social perspective. Higher education is neither just a matter of pumping knowledge into young heads nor is it just a place for secluded scholars doing their science in monk-like solitude. Higher education is a meeting place of generations, of cultures and of social classes. This may be one of the few societal institutions where rich and poor, adolescent and mature, knowledgeable professor and naive student meet and pursue an intellectual life together. This is where a culture of literacy and intellect becomes germinated, formulated and shared; this is where one learns first hand, of other cultures, social classes, and new perspectives. The Herasmus program is justifiably based on this very idea. Electronically mediated experiences can provide information about another culture, but it can not replace the social function afforded by the university of becoming embedded in a culture and participating in its construction.

Next let me turn to a learning perspective. Learning, after all – that of the students and of the scholars – is what higher education is all about. Taking this perspective, I would like to begin with a basic tenet: Information transmitted – in whatever way – is not yet knowledge! Information is characterized by being discrete and raw; knowledge, on the other hand, is characterized by being part of meaning networks whereby elements are
interrelated in personally meaningful ways. Information can be acquired outside any particular cultural and social context, whereas knowledge is negotiated and constructed within a cultural and social context (Bruner, 1990). The test of information acquisition is its availability for storage, recitation and simple manipulation; the test of knowledge construction is in the wide and creative performances one can carry out with it (Perkins, 1993). Being able to say that the European Community has now a new currency, the Euro, the value of which is $1.17 – attests to information acquired; being able to derive implications, consider the pros and cons of this, and formulate educated predictions is evidence of having meaningful knowledge of the issue.

*Information needs to be converted into knowledge by the students sitting in a course much like it is to be converted by the researcher with new raw data in his or her hands. And this is not an automatic process!* It takes place neither on its own nor does it takes place in the absence of direct human contact. To paraphrase Stephen Acker (1995), “Seduced by the effortless access to information we are discounting the need and the cost of turning information into knowledge and knowledge into wisdom” (p. 4).

In what concerns *knowledge*, we are talking not only of basic information-rich knowledge but about *skill* – the knowledge of how to do things, how to design a bridge, how to design an information system, to teach, to diagnose, to write a novel. And this is not all. There is in addition another element of knowledge which is the true backbone of higher education: That which we call *higher order knowledge*, or *meta-knowledge*. This is knowledge of strategies and ways to solve novel scientific problems, this is knowledge of rules of admission and proof, of validity and warrant, in short, knowledge of the scientific ways of thinking - learning to think like an historian, a biologist, a
psychologist, or a mathematician. Meta-knowledge entails also certain intellectual dispositions towards the disciplines and their ways of inquiry, dispositions of curiosity, skepticism, and adventurousness. Without these kinds of knowledge one cannot really progress in higher education. But this is not knowledge that emerges all by itself, and it does not pop up on its own. One needs to be in a particular kind of environment that nourishes and cultivates development of advanced skills and academic meta-knowledge. It is an environment that not only teaches but it also socializes into particular and non-trivial ways of thinking and relating to the sciences and to society.

It is evident that there are certain functions within higher education, and I am not talking about the trivial ones of bridging time and space, that electronically mediated learning can accomplish quite well. One of these is the transmission of basic information, rich with facts to be memorized, entailing basic concepts and formulae. But there are other functions that are quite alien to electronically mediated learning: The cultivation of advanced skills and what I have just called meta-knowledge, dispositions, and deep disciplinary understanding. These are not based on simple factual knowledge that can be transmitted electronically or in print. And it does not matter whether the electronic transmission is more or is less interactive, whether it is more or less embellished with colorful graphics. The cultivation of skills, the construction of meaningful knowledge and of meta-knowledge requires a human environment that at the least provides (a) a live community of learners and scholars, and (b) mentoring and tutelage. This is what makes graduate education so valuable. It may be a mistake to avoid using electronic technology to transmit basic information, but it is a wrong-headed pretension to claim that one can
provide a genuine community of scholarship and tutelage through electronically mediated learning.

_The community of learners:_ It is gradually becoming clear that good learning, the kind that helps the individual turn information into meaningful knowledge, requires interpersonal processes no less than _intra_-individual, solo, ones. We are not only social creatures, _we are social learners_ (Salomon & Perkins, 1998). For one thing, the construction of knowledge, as already pointed out, is a process that takes place within a cultural and social contexts. Knowledge is situated in these contexts and is socially distributed. To learn, we need to exchange ideas, stimulate each other, argue, offer feedback and _jointly_ construct new ideas and meanings. Research in social psychology and in education repeatedly and consistently shows that the physical social context facilitates the construction of knowledge while in its absence learning lacks the multiplicity of perspectives and it lacks depth. Also, recent findings about the wellbeing of internet users shows quite reliably that much communication through the internet results in increased depression, loneliness, stress, and isolation (Kraut, et. al., 1998).

_People need more than a modem!_

The fact that learning is to a large measure a social process is not just an abstract principle, but a necessity. Indeed, a _solo_ adventure into the unknown, becomes a nostalgic feature of the past. People work in teams, study in teams and break new scientific grounds in teams. Moreover, working with others is something people _desire_. Not many people like to stay home in jeans and with the dishes to be done and study in the solitude of their home. Indeed, are we witnessing the promised great exodus of desk workers from their offices to their private homes to work from there? No, not really!
Mentoring and tutelage: Learning is not a simple matter of absorbing, internalizing, or acquiring bodies of ready-made knowledge; learning requires face to face mediation between the material and the learner. When it comes to the transformation of information into deeper knowledge, it requires mediated tutelage. It has been argued that such face to face tutelage is particularly crucial in the humanities and the social sciences, but we know today that the construction of arguments, the generation of hypotheses, and of formulation of interpretations are of no lesser importance in the natural sciences. The system of mentoring so well developed for advanced students may perhaps be too much to ask for for beginning students, but it is indispensable for advanced students. Electronically mediated learning can offer very little that even comes close to the tutelage required.

There is a second side to this: Most people, most of the time, cannot really learn well when on their own as they lack sustained motivation and the kind of necessary self-regulation that higher education desires to cultivate but cannot assume to exist right away. This is not just a matter of motivation but of sustained motivation in the face of competing attractions. How can calculus compete with the European football cup? My mother called this self-discipline, which according to her wise observations, I, like most others, did not have. And sustaining motivation, as we well know, is possible when some tutor is around to guide you across stumbling blocks that would otherwise discourage you (Sharan, 1990). Close examination of the Israeli Open University yields a surprising fact: Although it has thousands of students, only 5% actually graduate its programs with a degree! And I don’t believe that Israeli students have less self-discipline than those in the European Community.
And then you have the politically charged issue of nurturing and setting standard of excellence. It sounds elitist, but in fact it is more like providing a locomotive for the growing train of higher education. Higher education needs to have a Harvard, an Oxford, or a Leuven, to set the standards because otherwise mediocrity will be the norm. No society can afford that. As Casper, the former president of Stanford University, has so succinctly pointed out: “A society that itself wants to be at the frontiers of discovery and intellectual vibrancy will not easily get there, or remain there, if it abandons the institutions dedicated to the recognition and challenging and, thereby, the nurturing of excellence” (1996, p. 80). And you don’t nurture excellence by remote control. In short, when it comes to the development of higher order knowledge and to the nurturing of excellence, virtual higher education can produce no more than virtual results.

**Differentiation**

So, where do we go from here? Liking it or not, the avalanche of the information age is a real and compelling one. We may have reasons not to embrace it stock, lock and barrel, but we cannot dismiss it either. It may come in small and innocent ripples, beginning with extension studies, but as we see it at places such as UCLA, Berkeley, and the University of Colorado, it starts touching the core of the degree programs which are gradually turned over to electro-commercial vendors (Noble, 1998). However, the other forces, those pertaining to deeper learning, skill development, human nature, and the need for institutions dedicated to the promotion of excellence, serve to counter balance the electronic forces. Who is going to win? Assuming we have a say in the changes that higher education faces, where would we want it to go come the new millenium?
Universities, for a variety of social, national and institutional reasons are not going to disappear; they are still and continue to be a source of national and professional pride; they are still the gatekeepers of credible knowledge (Noam, 1995), and they are the places where excellence is nurtured.

But universities will have to change. The change, I believe, will take on three forms of differentiation. One form will be differentiation between institutions. Not all learners are alike, and not all kinds of institutions excel in the same things. Functions that electronically mediated learning and cooperation can accomplish are very different from those best accomplished by the university as we know it, and vise versa. Basic, mass education for beginning students in their first years, for students with special family, geographic or job requirements, and for older students needing to quickly update their knowledge, can be served quite well by electronically mediated instruction. Indeed, one can already see the growing numbers of students who for reasons of work, age or geography use the opportunity that electronically mediated learning offers them. Much of the undergraduate education will wonder out of the ivory tower into cyberspace. But this does not mean that there will be no more undergraduate teaching at the universities. It will continue on a smaller scale, but one will have alternatives to choose from, something that has not existed on a large scale until now.

On the other hand, the university will have to strengthen that which is its unique quality and raison d’etre: Being a community of scholars and learners where close contact, exchange of ideas, role modeling, and skill development play a supreme role. As Noam (1995) says, “The strength of the future physical university lies less in pure information and more in college as a community; less in wholesale lecture, and more in
tutorial, less in Cyber-U and more in Goodbye-Mr.-Chips college.” (p. 9). And this pertains to both teaching and research and development.

The second kind of differentiation will be within the university. Our methods of instructions are indeed pretty antiquated and would greatly benefit from some electronic refreshment. More importantly, the new technology affords the design of whole new learning environments with more self-guided exploration, more collaborative work across distances, more intellectual interactivity, real life-like simulation, testing of unlikely hypotheses, and the ability to arrive at rare sources of information. Much of the busy work of information transmission can be left to the electronically mediated processes while the more intellectually challenging aspects of higher education, the real socialization into academia, the cultivation of skill and values, can be done in the ways that universities are so good at. This would allow the blossoming of small high power colleges, communities of excellence whose existence requires physical closeness.

I am fully aware that the description of today’s university as an intellectually exciting community of learners is more an ideal than a reality, given the overflow of students, the overcrowded seminar rooms, and the overworked professors. But once the differentiation I describe takes place, with more of the beginning students turning to the electronic alternative, and more of the purely informative instruction within the university creatively done via electronic means, the seminar will return to be what it is supposed to be and the university - to what it is truly good at.

Let me end with one more argument based on a little parable. It is taken from a speech by the president of a well known technical university who aired his greatest fears. Students in engineering, he tells us, were given a project to plan: A pipeline to transport
blood from one place to another some 500 km. away. Superb projects were turned in, the best engineering has seen, clever, cost efficient, with up to date technology. However, notices the president, not ONE student came up and asked “A pipeline for WHAT?”

Economically driven cyber universities cannot promote human value systems. This requires physical contact, for values are learned by absorption, by the emulation of a live model, by osmosis from the atmosphere in a live intellectual community. And thus, it would be a tragedy indeed if we’d allow a university such as the Catholic University of Leuven, founded on, and dedicated to the promotion of humanistic values, to be replaced by electronic ersatz, so highly efficient but so totally innocent-of-values.
References


Noble, D. F. (1998). Digital diploma mills, Part II: The coming battle over online instruction. Listserv@batch.3.csd.umn.edu


