New Challenges Facing Universities in the Internet-Driven Global Environment

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Abstract

This paper explores some new challenges facing universities in a global multimediated Internet-based environment, as they seek alternative paradigms and options to remain true to their core business. At a time of rapid technological change, and contested, complex concepts associated with globalisation, knowledge is becoming a primary factor of production in a global economy. Universities face macro challenges of responding to the exponential demand for higher education, decreasing government funding, and the changing nature of knowledge, student expectations and global competition. While advances in the Internet can support constructivist, self-directed interactive learning, its implications for higher education remains complex and problematic. The paper examines potential challenges of new educational approaches within the framework of more traditional open learning and e-learning environments. The main challenge is to develop a university that shifts the paradigm from the conventional national university to a sustainable global learning system that maintains quality in teaching, learning, processing and applying knowledge to real-life problems in diverse cultural contexts.

Keywords

global curricula and local learning; teaching/learning/knowledge; the Internet; artificial intelligence (AI) systems

List of topics

Introduction

The core functions of universities are the storage, processing, dissemination and application of knowledge to address the great issues of our time. Correspondingly, challenges are to define the great issues of our time which are increasingly global, and to manage universities so they can successfully respond to changing demands in rapidly changing technological environments.

Developments in the Internet, virtual reality (VR), artificial intelligence (AI), digitalisation, and mobile telephony are revolutionising how we communicate in all enterprises. Higher education is no exception. Concurrently with new technological developments, society's needs and paradigms of knowledge are changing, and government education budgets are shrinking just when the demand for lifelong education is expanding (Tiffin and Rajasingham, 1995). University education is seen as the key to escape from poverty, dependency and exclusion, and as the gateway to survival in an increasingly competitive, globalised economy. According to John Daniel, merely to maintain the present proportion of the world population that benefits from a university education a sizeable new university would now be needed every week (Daniel, 1996). That is unlikely to happen.

Technological innovation is changing the way in which universities teach and students learn, and the way information is processed into knowledge that is applied to real-life problems. Since the 1990s, a number of seminal texts on the future of universities has been published; texts which argue the need for new university paradigms in an era of rapid technological change (Grocock, 2002; Bates, 2004; Hanna, 2000;

Tiffin and Rajasingham, 1995, 2003). A Google search shows 4,790,000 academic texts on the future of universities (16 November 2010).

In introducing the concept of virtual classes and virtual universities on the Internet, Tiffin and Rajasingham (1995, 2003) sketch a philosophical foundation for the future of the university and have contributed to the debate and critical commentary on the challenges that universities face in the fast-changing, unpredictable future. The twin themes in these texts are that the contemporary university of the nation state will in the future become global, and that it will become largely virtual. It is salutary to review the ideas presented in the books to see the extent to which reality has matched predictions and expectations expressed just a few years ago, and to evaluate the validity of the heuristics and the ways of thinking about the issues involved within more recent research that relate to challenges in e-learning and its implementation (Bernath, Szűcs, Tait, & Vidal, 2009). However, there is still a problem of rubrics as applied to virtual or e-learning universities as they face new challenges with evolving innovative information and communications technologies (ICTs), learning processes, supporting pedagogies, and applications in the digital environment.

The validity of ongoing research on the future of higher education now faces new challenges. The empirical approach in science is dominating literature. While this approach has some merit, it also has some deficiency, in that empirical research is restricted in envisioning futures scenarios, because it draws from the past and describes what is the present. Increasingly, research that examines the impact of the Internet on society, and particularly education, and globalisation call for futures methodologies and scenarios designing given the dynamic concepts associated with globalisation and education. E-Learning and virtual education have changed the definition of global education, where previously this concept meant students travelling to study in different countries, today, it means using the Internet for anywhere, anytime, for anyone in any mode education. Ideas expressed in the literature reviews since the 1990s effected change. Today, it is suggested that change is effecting ideas, yet to be tested and become mainstream. Therefore, seeking current empirical evidence of new learning approaches is problematic. According to Tony Bates (2004) it seems that a new journal on e-learning opens every week and this is not necessarily good news. It is not difficult to create even a refereed online journal – find a few colleagues from different institutions who think similarly and peer-review each other's articles. The result is often narrowly focused articles of a poor quality. He suggests that there are some excellent journals on e-learning in other languages, particularly Spanish. This paper seeks to contribute to the debates on these critical issues facing universities.

Information and communication technologies (ICTs) still have some way to go to achieve the robustness required for fully immersive virtual environments. But the technical limitations of today's Internet are being resolved by increased computer-processing power, growth of bandwidth, and the increasing availability of wireless technology. Telecommunications are becoming more and more ubiquitous, especially in developing countries like India and China which, together with many African countries, have leapfrogged a lack of landline telephony by a reliance on mobile phones. The use of mobile phones as tools for learning is an emerging area of research.

In this paper, such neologisms as e-learning, online learning, open learning and m-learning (mobile learning) are used interchangeably, while the discrete characteristics of each approach are acknowledged. New paradigms such as just-in-time learning, constructivism, student-centred learning, self-directed learning, interactive learning and collaborative approaches to learning have emerged, supported by technological advancements such as simulations, virtual reality multi-agent systems, and wireless platforms, creating both opportunities and challenges. This paper considers such challenges to be an extension of, and within the framework of, the more traditional open learning and e-learning approaches.

Alan Tait (2008) proposes a useful framework within which to examine the purpose of open universities. He charts the histories of open universities that include The University of London External Study system, the first British Open University (Bell & Tight, 1993), The University of South Africa, Distance Education in the former USSR, Distance Education in Spain (UNED) and the Open University, UK (OU UK). Tait successfully examines the mandate of open university systems premised on their being agile, flexible, competitive, cooperative, national and language specific, and serving their societies well (Tait, 2008). The OU UK and the Indira Gandhi National Open University (IGNOU) have been and are very successful, and are internationally recognised. It is suggested the reason for their success is that these open universities were first and foremost created for national needs, had the support of their governments and the campus-based national universities, and were recognised, accredited institutions within their own location country, providing education *pro bono* rather than for profit before they went offshore.

A significant success story is the world's first continuous, and sustainable, virtual university, the Universitat Oberta de Catalunya (Open University of Catalonia). Based on some of the ideas expressed in Tiffin and Rajasingham (1995) it celebrated 15 years of successful existence and growth in 2009. A 100% Internet-based university, the Universitat Oberta de Catalunya (UOC) was created in response to Catalan society's desire for lifelong learning in Catalan to engender a community of practice. It was accredited from its inception in 1995, and is one of the eight public universities in Catalonia. It began with 200 enrolments, and today has more than 54,000 (6,000 international) enrolments (http://www.uoc.edu). Research into the UOC's critical factors contributes to an improved understanding of the complex local outcomes of the UOC's successful, robust and sustainable e-learning model, and especially, with implications for fostering national, regional and global learning communities. Such research also provides some useful insights into challenges facing universities in an Internet-driven global environment (Rajasingham, 2010).

In order to highlight the new challenges facing universities, it is useful to understand how universities transformed themselves from the place-based industrial age model to the current emerging knowledge age where their activities are conducted mostly online.

Higher education: past discourse

Universities have undergone a series of paradigm shifts from the classic Aristotelian model of the Greeks to the Ptolemaic Library at Alexandria and then from the medieval European university to the modern university we are familiar with. In responding to the needs of the society in which it operates, the modern university is place-based and uses transport technologies such as roads, seaways, railways and airways to bring teachers and learners together to effect education. Education is in the national language, operates under national law, and is assessed and accredited within national quality-control mechanisms.

The industrial age education system that most of us grew up in is only a little over 100 years old. People travelled in order to do business, shop, work, bank, learn, and entertain themselves. Teachers and learners came together by walking, or by using buses, cars, boats or sampans, and in the case of international education, by aircraft. Essentially, teacher-controlled information sources were contained within two covers of a book, and/or in the teacher's head, and education took place within the four walls of a classroom, and during six periods a day, a 2x4x6 model, to borrow a metaphor of the building trade. In this system, teachers set the problem to be addressed, based on national curricula. Education was government subsidised, and prepared people for their place in society by emulating factories and offices based on time-motion constructs.

Following the end of World War 2, increasing demand for educational opportunity from several groups of people, such as demobilised soldiers, women and the decolonised newly independent nations, led to one of the most significant breakthroughs in the delivery of higher learning in the last 50 years (Rajasingham, 1988). This was distance education.

Distance education has a long pedigree going back to the 18th century. In an attempt to define distance, Börje Holmberg (1983) describes distance education as a 'guided didactic conversation' and Michael Moore (1993) as one involving 'transactional distance'. These succinct metaphors, which emphasise the importance of communications in the education process, resonate with open learning, e-learning, online learning, virtual education and m-learning approaches where education is a kind of communication between teacher, learner and the problem to be solved and is enabled by ICTs. No precise definition for these new approaches can be given that is universally accepted (Mason and Rennie, 2006). However, as subsets of distance education, they share essential characteristics of education in which the learner is separated by distance, time or space, convenience or personal choice from their study source, which is usually within an institution. The bridge between learner and teacher is provided by media, or combinations of technology. Falling into the rubric of 'technology-mediated learning', according to John Daniel (2007) e-learning provides a unifying theme in many current educational developments (see http://www.col.org/RESOURCES/SPEECHES/Pages/default.aspx)

Higher education: current discourse

The main new challenges facing society since the 1990s relate to concepts associated with globalisation which continue to be contested. What is a global curriculum? Who will teach it, to whom and in what context? The Internet provides instant connectivity and defines how we bank, shop, communicate, think and learn. Universities face competition in, and the commercialisation of, education because information and communications infrastructures have been changed radically. As a consequence, the university's role and relevance are questioned by researchers, educationists and scholars (Coombs, 1968; Hanna, 2000; Readings, 1996; Tehranian, 1996; Tiffin and Rajasingham, 1995; 2003) who maintain that universities need to change if they are to survive in the twenty-first century. They are, it is claimed, too slow to incorporate new knowledge, and have Byzantine bureaucratic structures that belong to the industrial society, preparing people for past ideas, attitudes and values.

More recently, The National Science Foundation's Report on Cyber Learning (June 24, 2008) notes that few of the innovations tried over the 25 years since the US Department of Education report *A Nation at Risk* (1983) have resulted in large-scale systemic change in education. The National Science Foundation's Report argues that it is now time for a radical re-thinking of what constitutes successful learning, using the rich new environments enabled by the Internet (http://www.usatoday.com/news/education/2008-04-22-nation-at-risk_N.htm).

In their book *Disrupting Class: How Disruptive Innovation Will Change the Way the World Learns,* Christenson and colleagues argue that education's structure has made the market difficult to penetrate and lasting reform hard to come by (Lagace, 2008) . They suggest that to improve education as an industry, there needs to be investment by that industry in technological platforms that will allow for robust educational user networks to emerge.

What is needed is effective, efficient learning that responds to rapid technological change, and new kinds of knowledge, delivered interactively at the convenience of the learner, in any mode, at any time, anywhere for anyone, in culturally appropriate ways.

As the university, which has been successful for nearly a thousand years, becomes disconnected from the needs of the society in which it operates, it is challenged to examine what is taught, to whom, how and with what *effect,* and how all this is to be done cost-effectively in the future.

The reality today is, however, that with the consumer model of education and user pays, education is moving from a teacher-centred to a lifelong learner-controlled model and learners, now as paying customers, challenge universities to effectively align their resources with learner expectations in order to stay in business (Rajasingham, 2010).

Students rely increasingly on the Internet to get the information they need. This is not a seamless transition as faculty grapple with students' cut-and-paste plagiarism and copyright infringements. In a New York Times article titled *Brain drained by Google?* Edward Tenner (2006) suggests that today's students are less teachable than students used to be and the convenience of search engines could be the reason. He cites a British survey that finds that students are generally poorly prepared and the ability of undergraduates to read critically and write cogently has fallen significantly since 1992.

Nicholas Carr (2008) argues that the Internet is fundamentally changing our brains and the way in which we think. Complex and powerful, the Internet computing system is subsuming most of our other intellectual technologies and it is becoming our map, our clock, our printing press, our typewriter, our calculator, our telephone, and our radio and television. Carr quotes Maryanne Wolf, who suggests that we are not only what we read, but also how we read; and that the reading promoted by the Internet, a style that puts "efficiency" and "immediacy" above all else, may be weakening our capacity for deep reading, with the result that we tend to become "mere decoders of information." The Internet may threaten our ability to interpret text, to make the rich mental connections that form when we read deeply and without distraction or when by any other act of contemplation we make our own associations, draw our own inferences and analogies and foster our own ideas. Deep reading is indistinguishable from deep thinking (Wolf, quoted in Carr, 2008). In his recent compelling text, Carr (2010) builds on the insights of Marshal McLuhan and warns that the media alters patterns of perception for its fiscal survival steadily and without resistance, because our focus on the medium's content can blind us to these deep effects.

Another challenge for universities is to become businesses while maintaining their core functions of creating, processing and disseminating knowledge that can be applied to the issues of our time. These issues are increasingly global issues, such as environmental degradation, global warming, natural disasters such as volcanic eruptions, tsunamis, pandemics, terrorism and ideological clashes, and credit crunches. These global problems need global solutions.

Higher education: future discourse

The world is changing dramatically both in technological infrastructures and societies' socioeconomic demands. However, the rapid changes brought about by advances in, the Internet particularly in relation to globalisation, competition, and the commercialisation of education mean we now need a new kind of higher education system. The new university, while maintaining those core functions that do not change whatever the paradigm and episteme, must address the impact of rapid changes on the learning needs of a global knowledge society that is becoming increasingly mobile and multicultural. The challenge will be the design and development of global curricula for localised learning, and the re-thinking of what we teach, and how we teach it, in the new global networked environment within the Vygotskian framework of the Zone of Proximal Development. The Zone of Proximal Development outlines three critical factors of education: *teachers*, who help *learners* to solve *problems* (Vygotsky, 1978). By inference, these factors effect education through communicative interaction.

In his helical model of communication, Frank Dance (2001) argues that teaching is a form of communication and that there is no teaching without communication. He concludes that the better the communication, the greater the chance of teaching success (Duff, 2003). Tiffin and Rajasingham use a neo-Vygotskian framework and consider knowledge to be the fourth critical factor in education. They submit that education is a kind of communication as both education and communication are information intensive and depend on communications technology for the teacher to help the learner to *apply knowledge* to a problem (Tiffin and Rajasingham, 1995, 2003). In the modern industrial age university, the four factors – teacher, learner, knowledge and problem – come together to effect education, using building and transport systems based on fossil fuels, which are rising costs and damaging the environment. In the knowledge age, the four factors of education will communicate and interact using the Internet that enables globalisation. However, the full power of the Internet is still emerging, changing the educational environment swiftly. New social networks, platforms allow speech recognition, wearable computers, wireless Internet, and social networks encourage the development of phenomena such as blogs, wikis, Facebook, Twitter, YouTube, Bebo, and new mobile technologies encourage the proliferation of devices such as PDAs, iPads, Blackberry, iPads, iPhones and smart phones. Examination of a plethora of new applications in relation to their potential as learning tools, connecting learners with teachers/sources of information and with one another from anywhere, at any time and in a variety of modes are beyond the scope of this paper.

Sean Park (2007) introduces a useful concept of complexity thinking in education, which draws upon themes of emergence, self-organisation and non-linearity that are relevant in learner-centred learning environments and new teaching approaches. The scientific research paradigm, which characterises accepted knowledge in conventional universities, is concerned with what can be proven through physical existence or extrapolated from statistical evidence. However, it is suggested that a quiet, grassroots citizen (student)-created content-controlled revolution on the web is challenging, in unprecedented ways, the traditional way knowledge has been viewed by established organisational systems and professional practice. Blogs, wikis and the unlimited potential of social networks are reshaping thinking about knowledge and its legitimacy.

Any innovation will, by definition, bring challenges as it struggles to become mainstream. It is time now to consider some characteristics of learning in the new multimediated global environment to identify challenges, to overcome barriers and to learn from examples of success in e-learning.

Twin strands of virtual reality and artificial intelligence

The conventional classroom provides a fully immersive, multimediated space for learning through our five senses. Today we look to technology to provide an alternative learning space where the communications functions of the conventional classroom can be replicated. As visual and verbal processors, we use pictures and images, which become increasingly available to e-learning and which are becoming far superior to the pictures available in the early days of educational television.

The technology that does this will also make it possible for e-learning to be conducted in a HyperReality that allows teachers and students to come together as telepresences no matter where they actually live. HyperReality is an advanced technology conceptualised by Nobuyoshi Terashima that seeks to make the interaction between the physically real world and virtual worlds, and between human intelligence and artificial intelligence (AI), seamless (Terashima, 2001; Tiffin and Rajasingham, 2001). It is suggested that ten years have passed since the vision of HyperReality providing an e-learning platform, and its metaphor today is the Internet.

Distributed virtual realities that make such interaction possible have been available on the Internet for over a decade. ActiveWorlds and SecondLife educational universes are now home to hundreds of experiments in education in virtual reality. Similarly, in December 2007, the Croquet Consortium released its Open-Source Software Toolkit to promote collaborative 3-D virtual environments to support learning and commerce. Croquet SDK 1.0 promotes collaboration amongst non-collocated research teams, educators and industry. These networked 3-D teams are able to work together across a variety of computer platforms and devices, from laptops to cell phones. According to a principal researcher in the Croquet project, Julian Lombardi, the free kit provides developers with a flexible tool to create virtual spaces with built-in networked telephony and a "late-binding object-oriented" programming language that allows multiple users to jointly create, animate or modify 3-D objects and dynamic simulations, in real-time. See: http://en.wikipedia.org/wiki/Croquet_Project (Retrieved 24 June 2011) .

Theoretically and technologically, whatever can be done when teachers and students come together in a conventional bricks and mortar classroom can be done in a virtual class. However, where conventional classrooms are available only to teachers and students who live in the area around the classrooms that is made available by local transport systems, e-learning and virtual classes are available to anyone, anywhere, any time, and make the globalisation of education possible.

Given that there are challenges for new educational approaches as they move from experimental and pilot stages to mainstream practices, this article now examines some of these challenges specific to stakeholders of universities in the future.

Challenge 1: Knowledge in universities and the need for global curricula

Knowledge is a universal of the university paradigm. As the university changes with the new episteme, so too does the knowledge it teaches and researches. A key question to be addressed is what shape knowledge will take to address the issues and problems of the future.

In theosophical, mediaeval universities there was only one knowledge paradigm but in the modern university knowledge takes paradigmatic forms in each of the different subject disciplines that are taught. University degrees certify that holders are proficient in the application of a knowledge paradigm. What counts as knowledge, in what contexts, who is empowered to teach it, what counts as learning achievements, and how these matters are measured are subjects of continuing debate. The issues of who is allowed to question, critique, assess and accredit will be among the critical issues in the future.

The main changes taking place in knowledge come from the Internet, which is making professional knowledge available outside universities and taking over many of the functions of university libraries. Two technologies that enable this are multilingual knowledge systems and three-dimensional time-variable modelling of phenomena are available on the Internet, for example, in the gaming world.

Today, not only has knowledge been broken into a multiplicity of subjects, but the way subjects themselves are seen varies from university to university, from country to country and from language to language. Where the mediaeval universities of Europe had a common language in Latin, and modern universities use the written language of the nation that supports them, the future requires a new online cyber literacy.

Today's postmodern mood sees virtue in multiple knowledge on the same theme, and constructivism suggests that knowledge is individual to each of us. The growing fragmentation and lack of consensus as to what constitutes knowledge creates a context for chaos, and for ideological and cultural clashes. If a language means all things to all people it is just 'noise' – the element that prevents the message getting from the sender to its destination in a coherent way. If knowledge is whatever an individual thinks it is, then there is no paradigm and no way people can communicate and cooperate in its application. If paradigms of knowledge vary according to country or culture, then global issues can be addressed only

from the perspective of each country or culture. It is suggested that we are witnessing a clash of knowledge paradigms that may account for the global and regional upheavals we are witnessing today.

Challenge 2: Globalised curricula for localised learning

In his 1902 collection of essays, *The Idea of a University*, Frank Turner said: 'A university, I should lay down, by its very name professes to teach universal knowledge'(Newman; Turner et al, 1996, p. 25). Curricula for the global environment need to incorporate as an integrated whole what is universal in university curricula, whatever the episteme. Technological ideals pitched against pedagogical imperatives, and the managerialism of the conventional modern university, result in re-evaluation of internet-based curricula that focus on design issues rather than on pedagogical rationale and application, and is technology pushed rather than demand pulled (Nemet, 2009).

Curricula that deal with global issues and are designed according to rigorous instructional criteria are critical: but learning always takes place in consonance with local contexts, paradigms and epistemes, and learning styles. There is no one size fits all in this game as learners apply knowledge to problems in culturally appropriate ways. Global education is where we find such subjects as mathematics, science and medicine, and national education where we find subjects such as history, literature and law as learners apply global knowledge and concepts in their own local contexts. When more knowledge is gained through culturally diverse interaction, more world views are being asserted, giving rise to increasing cultural, political and ideological conflict as value, power and cultural claims are asserted. These concepts have been further explored by the Development Education Association (2006).

Teaching/learning in the global virtual university

Antonio Gramsci profoundly noted that, 'Every teacher is always a pupil and every pupil a teacher' (Gramsci, 1971, p. 350). It can be said that teachers teach the way they were taught, and the way teachers think does not change readily. The paradigm of teaching tends to be teacher-controlled rather than learner-centred. Teachers are a universal of the university paradigm and as universities change to adapt to the new episteme, so too must teachers. Teacher development for the new technology-mediated environment becomes a high priority for universities, as is the need for learners to learn in multiple and mobile environments in culturally appropriate ways.

Is there anything in the way academics teach that can be said to transcend nation, culture and time and therefore needs to be incorporated in a university of the future? The neo-Vygotskian communication model defines the role of a teacher as helping students to apply knowledge to problems. What differentiates the university teacher is that they also help the student critique the relationship between knowledge and problem because they are involved in research. Along with these capabilities go the communications skills of knowing when, for how long, in what tenor, in what sequence, with which students, and in what setting to explain, demonstrate, question and give feedback . The job also calls for sensitive management of the many contingencies that occur in the teacher-student communication axis. The challenge is that this process is now conducted on the Internet.

Changing teacher roles

In foreshadowing a new model of teaching and learning, in 1982 Christopher Dede predicted challenges in teaching and learning that remarkably reflect today's environment. He observed:

> "...perhaps fifteen or twenty years from now, with centralised production and decentralised distribution systems, with privatisation of education, with new teaching and diagnostic and evaluation and administration strategies, we will have such new teacher roles, such new teacher skills, such new pay scales, and such new distributions of where teachers work, that the model we see for education will be fundamentally different from what we have seen in the last hundred years. It will be a completely new Profession" (Dede, 1982).

Because there are so many different aspects to teaching, good teaching is hard to define and no single system of evaluation can ever measure it accurately. There is no 'right' way to be a good teacher. A good teacher to one student may be a nightmare to another.

Studies of teachers and teaching are usually based on the supposition that teaching is the independent variable and learning the dependent variable and that teaching is responsible for learning, while the measurement of learning outcomes remains complex. Yet the teacher-learner communication axis is one of interaction that can function only with what, in cybernetics, is known as circular causality, or feedback. In traditional Western pedagogy, university teachers were regarded more as content providers than teachers and learning was thought of as a function of student intelligence and application rather than the outcome of teaching.

Scientific management, the brainchild of Frederick Taylor in the nineteenth century, held that the manufacture of a product could be divided into a sequence of tasks that would allow people to do the tasks they were best at, as distinct from trying to complete the whole product (Kanigel 2000).

According to Carr (2008), Taylor's ethic is beginning to govern the realm of the mind as well. The Internet is a machine designed for the efficient and automated collection, transmission, and manipulation of information, and its legions of programmers are intent on finding the "one best method"– the perfect

algorithm – to carry out every mental movement of what we've come to describe as "knowledge work".

What Taylor did for the work of the hand, Google is doing for the work of the mind: 'to organize the world's information and make it universally accessible and useful'. It seeks to develop "the perfect search engine", which it defines as something that "understands exactly what you mean and gives you back exactly what you want". In Google's view, information is a kind of commodity, a utilitarian resource that can be mined and processed with industrial efficiency. The more pieces of information we can "access" and the faster we can extract their gist, the more productive we become as thinkers (Carr 2008). This assertion is today being debated.

We can see something like this happening in universities. Carried to its logical conclusion teaching itself could be subdivided into its component processes so that different people could be assigned to do different parts. In Taylorist terms, people who are good at lecturing would lecture, people who are good tutors would tutor, people who enjoyed assessment and marking would do so, and so on.

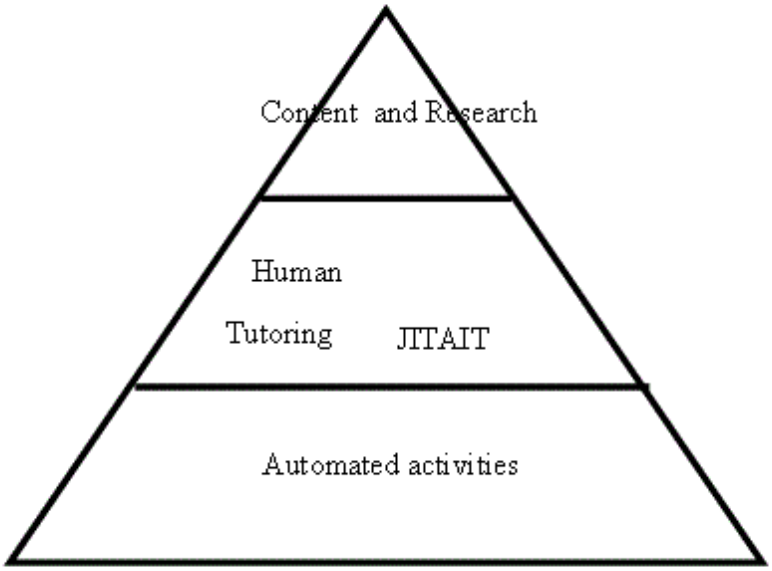
However, it is as naive to think that universities in the next decades will still be totally taught by humans as it is to think of them as being totally taught by computers.

Figure 1 suggests a possible pedestal for a future teaching hierarchy that will be computerised, where the bottom level of teaching activities, consisting of often repetitive tasks such as marking exams, tests and assignments that have predetermined answers, collating marks, providing data on student activities and so on, can be done by computers to relieve teachers of these burdens.

The second level is tutoring. In his description of the international role of UK higher education in 1858, Tait (2008) acknowledges the importance of this tutorial level, which took place in 'colonial centres' around the UK and, in the 1930s, around the world. This is where teachers interact with students to guide their learning. It involves listening to students, comprehending the difficulties they have in mastering a subject and its application, eliciting performance, being able to explain and demonstrate, monitoring student practice, marking assignments, tests and exams in which answers are open ended, providing detailed feedback and answering questions. It requires considerable one-on-one or small group communication and is the reason that low teacher-to-student ratios make for good instruction in a university. This level is labour intensive and, as they become commercial, universities will look for ways to reduce costs by automating tutoring. Increasingly this will involve just-in-time artificially intelligent tutors (JITAITs). These are expert systems that, with human input such as frequently asked questions (FAQs), become more intuitive and useful (Tiffin and Rajasingham, 2003).

The third level of the hierarchy is that of the master professors. Here we would find teachers in the old-fashioned sense of content providers. They would be people who had achieved academic stature through research and publication and, therefore, really did have content to provide. They would have responsibility for the knowledge paradigm. Their primary purpose would be to communicate a synthesis of the subject matter in a way that brought it up to date, placed it in context and encouraged students to question it. Professors would do this by lecturing and giving seminars. Using technological platforms like HyperReality, Croquet, streaming video and other multimedia applications coming online, a global virtual university would be a means whereby no matter where professors lived they could be available to students worldwide and focus on the media events of their virtual lectures, leaving all the interaction to a network of tutors in different countries. These lectures might well be open to the public, attracting new students and giving them a feel for the level and nature of study. Because of its size, the cost of such a course could be lower than is typically the case in conventional universities. The more students the professor had the higher might be their remuneration, similar to the way authors relate to their publishers through royalty payments.

Figure 1. Future hierarchy of academic functions in Higher Education (Tiffin & Rajasingham, 2003)



Changing student expectations

The extraordinary growth in demand for lifelong tertiary education provides the driving force behind the emergence of a global trade in university education. An important response is The General Agreement on Trade in Services (GATS), a treaty of the World Trade Organization (WTO) that came into force in January 1995. The world continues to face an explosion of higher education. It would not be unreasonable to suppose that at some time in the next decade over 200 million tertiary students will be enrolled worldwide. Yet growth in tertiary enrolments in the populations of China, India, Brazil, Indonesia, the Philippines, Pakistan and Bangladesh will have hardly begun. See http://www.nationmaster.com/graph/edu_ter_enr-education-tertiary-enrollment (retrieved 25 April 2011).

However, the increased demand seen as a problem for the old generation of national universities becomes an opportunity for a new generation of commercial global virtual universities, which views the expanding demand for university education as a business opportunity in a sellers' market.

Mobile technologies that increase access to quality education for increasingly mobile learners seeking just-in-time, and just-for-me education solutions, challenge universities to align their capacities to respond to the new expectations of learners.

Challenge 3: Interoperability of intelligent learning content in learning management systems

Currently, considerable effort is being put into standardising e-learning initiatives to ensure the development of quality content (learning objects) that can be adapted, reused and contextualised many times in different cultural environments. Each learning object needs to be stored in a secure repository and tagged with metadata that can be easily accessed by teachers and learners for interoperability solutions. However, current Learning Management Systems (LMSs), for example, WebCT, Blackboard and SCORM, are yet to provide appropriate personalised support for using rich (for example, simulations), intelligent content and learning activity. Challenges to LMSs arise because typically learning activity is spread over time, while the learner changes the simulation parameters, for example, to problem solve in real time, synchronously. What is needed is a run-time environment that allows LMS to launch, track and communicate with learning objects. Marta Rey-Lopez and colleagues (2008) address the restrictions on run-time by comparing several standardised run-time environments with non-standard solutions that aim to overcome these constraints. See http://www.editlib.org/p/26219 (retrieved 25 April 2011).

In his paper, Mathias Hatakka (2009) examines the inhibiting factors for reuse of open content in developing countries where open, free-to-use content has the potential to offer individuals the right to education. Despite the benefits of open content, usage is very low in developing countries such as Bangladesh and Sri Lanka. Findings show that many of the factors inhibiting reuse of open content do not necessarily relate to the actual content, but to bureaucratic educational rules and regulations, lack of infrastructure, teaching practices and traditions that are major obstacles yet to be addressed. See www.ejisdc.org/ojs2/index.php/ejisdc/article/view/545/279 (retrieved 25 April 2011).

Challenge 4: Bridging past and future education: overcoming barriers to e-learning

Blackmore *et. al.* (2008) identify several barriers to employees' e-learningand cite Mungania's (2003) seven multidimensional barriers: (1) personal or dispositional, (2) learning style (3) instructional, (4) situational, (5) organizational, (6) content suitability, and (7) technological barriers. Situational barriers are the most prevalent while personal barriers were the least common (Mungania, 2003).

To explore this challenge, the Sloan-C's Five Pillars of Quality Online Education (Frank Mayadas, 1997) framework is useful for defining how to overcome the barriers to successful e-learning (Rajasingham, 2010).The Pillars are: *Learning Effectiveness, Scale, Access, Faculty Satisfaction, and Student Satisfaction*. The Pillars are inter-related, and conventional universities have a long and successful history of established procedures and structures for the interaction between the Pillars. However rapid advances in the Internet, multimedia and m-learning will have their affect on the interrelation between Sloan-C's Pillars, changing how teaching, learning, knowledge creation and dissemination, the universals of universities, will be conducted in the future as education moves from being teacher-controlled to being learner-centred and concentrates on achieving quality learning outcomes. See http://www.sloan-c.org/publications/books /pillarreport1.pdf (retrieved 25 April 2011).

Conclusion and Outlook

This paper explores some new challenges facing universities in a global multimediated Internet-based environment as they seek alternative paradigms and options to remain true to their core business. At a time of rapid technological change, and contested, complex concepts associated with globalisation, knowledge is becoming a primary factor of production in a global economy. The findings are not prescriptive, but rather highlight some inhibiting and some success factors facing universities at a time of rapid technological change. As knowledge is becoming a primary factor of production and competitive advantage in a global economy, universities face macro challenges in responding to the exponential growth in demand for higher education, and to the changing concepts of globalisation, commercialisation and competition. While Internet advances can theoretically support constructivist, learner-centred and interactive learning, challenges of Internet-enabled learning such as e-learning considered within the changing nature of knowledge, changing needs of society, changing teacher roles, and learner expectations need further investigation. These challenges go beyond innovative ICT implementations to the design and development of a holistic university system, that responds national and global needs, and to the community of demand, as for example, in the case of UOC. Answering the challenge entails a paradigm shift from the modern national university to a sustainable global higher learning system that provides rigorous quality in teaching and learning, and processing and application of knowledge to real-life problems in diverse cultural contexts. How we assess learning effectiveness, and whether we assess according to global and/or local standards will become increasingly important, and contestable as universities seek to respond to the global issues of our time.

References

[1] Bates, A. (2004). (Blogpost 2009) The-bureaucratic-model-and-the-grammar-and-future-of-universities. http://www.davidtjones.wordpress.com/

[2] Bell, R., & Tight, M. (1993). *Open Universities: a British tradition?* Milton Keynes: Open University Press.

[3] Bernath, U., Szűcs, A., Tait, A., & Vidal M. (2009). *Distance and e-learning in transition*. London & US: Wiley.

[4] Blackmore, C., Tantam, D., & van Deurzen, E. *(*2008). Evaluation or e-learning outcomes: experience from an online psychotherapy education programme. *Open Learning, 23*(3), pp.185-201.

[5] Carr, N. (2008). Is Google making us stupid? *ATLANTIC*, July/August 2008.

[6] Carr, M. (2010). *The Shallows: What the Internet is doing to our brains*. New York, London: W.W. Norton & Company.

[7] Coombs, P.W. (1968). *The world educational crisis: A systems analysis*. New York: Oxford University Press.

[8] Dance, F. (2001). Teaching is a form of communication. There is no teaching without communication. Interview with the author). In Duff, A. (2003). *Higher education teaching,* Vol. 4 (3) 256–270, London, CA & Delhi: Sage.

[9] Daniel, J. (1996). 'The world cuisine of borderless knowledge' http://www.timeshighereducation.co.uk/story.asp?storyCode=99628&sectioncode=26 (retrieved (24 June 2011).

[9] Daniel, J. (2007). 'What is an Open University'? http://www.col.org/resources/speeches /2007presentations/Pages/2007-01-11.aspx (Retrieved 24 June 2011).

[10] Dede. C. (1982).What really will happen as communications devices revolutionise education? Paper presentation *Communications in the future,* Conference, World Future Society,1982. Quoted in

Rajasingham, L. (1990). *Innovations in Education and Teaching International, 27*(3), pp. 301–304. http://www.informaworld.com /smpp/title~db=all~content=t713685495~tab=issueslist~branches=27#v27

[11] Development Education Association. (2006). The global university: The role of the curriculum. Available at http://www.international.ac.uk/resources/dea_global_university_curriculum.pdf (retrieved 26 March, 2010).

[12] Duff, A. (2003). *Higher education teaching.* Vol. 4 (3) 256-270, London, CA & Delhi: Sage.

[13] Gramsci, A. (1971). *Selections from the prison notebooks of Antonio Gramsci.* New York: International Publishers.

[14] Grocock, A. (2002). Universities in the future., *Journal of the Royal Society of Medicine, 95*(1), pp. 48–49.

[15] Hanna, D. E. (2000). Higher education in an era of digital competition: global consequences. In D. E. Hanna & Associates (eds.) *Higher Education in an Era of Digital Competition: Choices and Challenges*. Madison Wisconsin: Atwood Publishing, 19–44.

[16] Hatakka, M. (2009). Build it and they will come. Available at http://www.ejisdc.org/ojs2/index.php /ejisdc/article/view/545/279 (retrieved 18 March 2010).

[17] Holmberg, B. (1983). Guided didactic conversation in distance education. In D. Sewart, D. Keegan, & B. Holmberg (Eds.), *Distance education: International perspectives* (pp.114-122). New York: St Martin's Press.

[18] Kanigel, R. (2000). *One best way: Frederick Winslow Taylor and the enigma of efficiency.* London: Abacus.

[19] Lagace, M. (2008). How disruptive innovation changes education. Retrieved from http://hbswk.hbs.edu/item/5978.html

[20] Mason, R. & Rennie, F. (2006). *E-learning: the key concepts.* London: Routledge.

[] Mayadas, Frank (1997). *Sloan-C's Five Pillars of Quality Online Education*, http://www.old.sloanconsortium.org/5pillars (retrieved 24 June 2011)

[21] Moore, M. (1993). Theory of transactional distance. In D. Keegan (Ed.), *Theoretical principles of distance education* 1997 (pp. 22-38). London: Routledge.

[22] Mungania, P. (2003). The 7 e-learning barriers facing employees - Penina Mungania 2003 PDF http://www.tjtaylor.net/goto3.php?w=research/The-Seven-E-Learning-Barriers-facing-Employees-Penina-Mungania-2003.pdf (retrieved 28 July, 2010).

[24] Nemet, G. (2009). Demand-pull, technology-push, and government-led incentives for non-incremental technical change, *Research Policy, 38*: 700–709, 2009.

[25] Newman, J. H.; Turner, F. M. et al (1996). *The idea of a university,* New Haven: Yale University Press.

[26] Park, S. (2007). Enacting a 'Curriculum of Life': Mindfulness and complexity thinking in the classroom. *Paideusis, 16*(3).

[27] Rajasingham, L. (1988). *Distance Education and New Communications Technologies.* New Zealand: Telecom Corporation.

[28] Rajasingham, L. (2010). *Critical factors for Successful E-learning: A case study of the Universitat Oberta de Catalunya.* UOC: Barcelona Spain.

[29] Readings, B. (1996). *The university in ruins.* Cambridge Mass: Harvard University Press.

[30] Rey-López,M., Brusilovsky, P., Meccawy, M., Díaz-Redondo, R., Fernández-Vilas, A., Ashman, H. (2008). Resolving the Problem of Intelligent Learning Content in Learning Management Systems. *International Journal on E-Learning*, 7 (3), 2008.

[31] Tait, A. (2008). What are open universities for? *Open Learning 23*(2), pp. 85–93.

[32] Tehranian, M. (1996). The end of university? *Information Society. 12*(4), pp. 441–447.

[33] Tenner, E. (2006). Brain drained by Google. Are search engines making today's students dumber? New York Times, 26 March 2006.

[34] Terashima, N. (2001). In J. Tiffin, and N. Terashima (Eds.). *Hyper reality: Paradigm for the third millennium*. London and New York: Routledge.

[35] Tiffin, J. & Rajasingham, L. (1995). *In search of the virtual class: Education in an information society*. London and New York: Routledge.

[36] Tiffin, J. & Rajasingham, L. (2001). Hyper Class. In J. Tiffin, and N. Terashima (Eds.). *Hyper reality: Paradigm for the third millennium*. London and New York: Routledge.

[37] Tiffin, J. & Rajasingham, L. (2003). *The global virtual university*. London, New York and Canada: Routledge.

[38] Vygotsky, L. (1978). *Mind in society: The development of the higher psychological processes*. Cambridge MA: Harvard University Press.