

Peak Oil to Peak People: Education – A Resource in the Knowledge Society

Lalita Rajasingham, Victoria University of Wellington, New Zealand; E-mail: lalita.rajasingham@vuw.ac.nz

INTRODUCTION

This paper suggests that as oil supplies run out and prices rise in the knowledge economy, an education system is needed that is based on information technology rather than on transport and building technologies to provide an alternate resource for sustained economic growth. The world is at a tipping point where it is running out of oil, but not people. It is argued that the knowledge society will be based on the infinite resources of the world-its people. We need to tap and develop this resource through education and training and so move from peak oil to the production of peak people. The key driver of change is going to be innovative rethinking on how people are educated for an unpredictable, information technology-based future. The current debate under the rubric of globalisation is on peak oil, and a clear contradiction between peak oil theory, the continual increase in oil reserves and production, and the rising cost. Peter Huber and Mark Mills (2005) argue that the price of oil remains high because the cost of oil remains so low. We are not dependent on the Middle East for oil because the world's supplies are diminishing, but because it is more profitable to tap Middle East supplies. New sources are not being explored and new refineries not being built (Huber and Mills, 2005). Since the industrial revolution, world economies have run on oil. Societies have been through 'peaks' in critical resources throughout history, only to be saved by some human ingenuity and discovery of a new and 'inexhaustible' resource. It was oil that 'rescued' civilisation to deal with sustainable economic growth. Can highly educated peak people do the same? As the price of oil worldwide continues to soar, societies globally struggle to find alternative fuels that range from coal, solar, wind farms and nuclear energy to drive their economies. But these are still expensive, and the means to exploit alternative energy using technology remain oil fed. That oil will run out is certain; only the timing is not. However, when oil does run out or becomes unaffordable particularly for the developing nations and their growing populations, its decline will change the world in radical and unpredictable ways. Perhaps even more concerning is that because oil is a strategic resource, as supplies become scarce, societies are witnessing increasing geopolitical and global conflicts, environmental deterioration, pandemics and ideological and cultural clashes. Oil created the industrial society as we know it, but at the dawn of the knowledge society, it is a finite resource. Around the world, societies now believe that their future advancement can no longer only depend on their land, climate and extractive fuels, but rather upon the peak capability of their people. Therefore, with knowledge as competitive advantage, education for human resources development will be the engine that drives the global economy.

DUAL CRISES AND THE NEED FOR A NEW PARADIGM

Philip Coombs's 1968 classic *The World Crisis in Education* reflected a universal concern that educational systems were becoming dinosaurs out of synch with societies' needs. He revisited the issue in 1985 and found that in fact the crisis had deepened (Coombs, 1985).

Today we face two crises, peak oil and the crisis in education where current education systems seem unable to provide the dimensions and skills needed for problem solving in an unpredictable and fast-moving future.

The modern university as we know it is designed to operate according to the prevailing paradigm and infrastructures in the society in which it is located. It is based on building and transport technologies that bring together teachers, learners, knowledge and problems by providing communication networks to effect education. However, building and transport technologies based on depleting oil

supplies are becoming more costly. At the same time, rapid advances in communication and information technologies especially the internet offer alternative and complementary learning spaces to respond to the increasing demand for tertiary education worldwide to up skill employees for the emerging, competitive, global knowledge economy.

FROM PLACE-BASED TO SPACE-BASED LEARNING

In his speech on July 26 2006 to the OAS, Nicholas Negroponte suggested that no matter which global problem we address, the solution always includes education. He argues that it is through using IT both as a tool of learning and as a window on the world that people will learn most.

Some of the main challenges facing universities today include the need to break away from the limitations of time and space the conventional classroom imposes; and to consider the impact of the internet as education becomes global competitive and commercial.

THE UNIVERSALS OF UNIVERSITIES: TEACHING/LEARNING/KNOWLEDGE

Some critical factors that constitute higher education, the universals of a university-the creation processing and application of knowledge to real-life problems in culturally appropriate ways-will not change whatever the episteme, the place, the language, the culture or the medium used. The main difference that distinguishes e-learning from on-campus learning is that instead of bringing students and teachers together physically by means of local transport systems and buildings for face-to-face interaction, e-learning uses computers and telecommunications to bring them together as telepresences on the global internet (Tiffin and Rajasingham, 2003).

The internet is still evolving and will continue to do so as computers become more powerful and wearable, and bandwidth increases. Today computers are an essential tool for communication as interactive multimedia on the internet allows the global networking of human intelligence in unprecedented and revolutionary ways.

Curricula designed for use in a particular institution within a particular nation and context and posted on the Internet are now open to scrutiny from a global perspective as the professional application of knowledge increasingly takes place in a global as well as in local contexts. The conventional university system is designed and localised for the nation in which it operates according to the rules, regulations, taxation, laws and language of that country.

Universities are associated with knowledge, which by singularly adding value is the engine that drives economic growth. But knowledge is an elusive and abstract concept that defies definition. Knowledge exists in explicit as well as implicit modalities. Not only is knowledge being deconstructed into a multiplicity of subjects, but is seen differently from university to university, country to country and language to language. The growing fragmentation of knowledge and lack of consensus as to what constitutes knowledge creates a context for discordant value and quality judgement. From a postmodern perspective, we see multiple 'knowledges' on the same theme (Lyotard, 1984) and all seek legitimisation for problem solving in their own cultural settings. As the university changes with a new episteme, so too must the knowledge it teaches and researches.

Today, professionals need to know about international practice as it operates in the global economy. Pandemics such as AIDS, SARS and Avian Flu, terrorism and

environmental issues know no frontiers, and people everywhere need to be able to collaborate internationally to deal with these global issues. The trickle down of knowledge over time is suddenly bypassed and so is the intermediary position of the teacher as education becomes learner-centred, non-linear, and self-directed, thus shifting paradigms.

Furthermore, universities face competition and commercialisation as students as fee-paying customers now compare and evaluate what is taught in other countries by using the World Wide Web and linking in chat rooms with students from around the world. Universities need to attract students, remove the regulatory and administrative barriers to developing innovative research and quality curricula. Let the customer decide what they want, and provide it. Good teachers and good researchers should be well remunerated and supported. The ineffective ones should go.

As education becomes big business, universities are challenged to resolve the dichotomy between business ideals and pedagogical imperatives that embody the universals of a university, and help improve the quality of **what** and **how** we teach with integrity and maintain their *raison d'être*—the creation, processing, dissemination and application of knowledge. As universities face increasing fiscal constraints resulting from reduced government subsidies, they seek to become businesses for profit. With reduced staffing, increasing on-seat student numbers and cutting staff and student support systems, staff/student ratios rise. Inevitably, standards fall (Rajasingham, 2006).

THE NEED

What is needed is effective, cost-efficient, culturally appropriate instruction that can match the needs for global skills related to rapid technological change, delivered interactively at the convenience of the learner. The learner, no matter where their physical location will be able to interact with the teacher, content and one another in synchronous and/or asynchronous mode using text, words and still and moving images, and in future smell, taste and touch. A global virtual university on the internet could meet this need. It will be global, competitive, commercial, and will be on broadband using virtual reality (VR) HyperReality (HR) and artificial intelligence (AI) providing learning through our five senses.

Curricula design for the global market is needed to allow societies to act global, and then localise in consonance with local thinking and upgrade the relevance of what is taught. With instructional design principles for internet based learning, basic courses that are the currency of higher education whatever the country can be re-addressed from the multiple perspectives of different countries, cultures and languages to develop new curricula to match global concerns (Tiffin and Rajasingham, 2003).

FORWARD MARCH

Education is communications. Both are information intensive, technology-based and culturally contextualised activities. The 1900s saw the use of correspondence based on postal services and radio in education. The 1960s, saw educational television and the 1980s, the advent of the personal computer in education. The 1990s saw the use of narrowband internet and virtual reality in education. In this decade of the new millennium we see the rapid advances in computer power that bring new sophisticated clusters of technology such as nanotechnology, AI and HyperReality on broadband internet changing the way we bank, shop, play and learn.

Virtual universities today proliferate on the internet with variable success and shelf-lives. Globalisation and the rapid advances in the internet will introduce new ways of learning and teaching and challenge the traditional classroom, not replace it but to provide alternative and complementary communications environments that will extend educational opportunities for more people than is possible with conventional classrooms. This is the virtual class based on distributed virtual realities on the internet where teachers and learners and curricula interact in telepresence and make globalisation of education a reality for anyone, anywhere.

THE FUTURE UNIVERSITY: GLOBAL, MULTICULTURAL, MULTILINGUAL AND BIG BUSINESS

In his foreword to the text *The Virtual Class: Education in an Information Society* (1995) Reidar Roll, the Secretary General of the International Council for Distance Education made an important distinction between quality in what we now call

e-learning, and quality in conventional education and argued that we are not only talking about better educated citizens but differently educated citizens. He called for a balance between the need for global skills and knowledge and the need to respect and preserve cultural identity. This is a yin and yang relationship between global and national education.

In ensuring quality education and the universals in curricula, it is argued that if knowledge varies according to a country or a culture, then global issues can only be addressed from the perspective of that country and culture. As universities offer their courses online and become competitive, the question as to who determines quality which is a complex and nebulous subjective concept becomes an issue that education must urgently address. When the quality of education is only measured and promoted by national standards we have a recipe for the kind of clash in cultures that we have today where one nation's freedom fighter is another nation's terrorist. No country is an island unto itself as all societies are inextricably interconnected through the internet. So what kind of university will be needed in the knowledge society?

Lev Vygotsky (1978) suggested that education at its simplest is the coming together for interaction between teacher, learner and problem. As there is a close relationship between universities, knowledge and civilisation, it is argued that teachers help learners to apply knowledge to problems. Vygotsky, however did not envisage that the teacher need not be human.

To respond to multiperspectives in a globalised world, the virtual university on the internet will need to be global, commercial, multilingual and multicultural, where students are equipped with global skills to solve global problems, and at the same time act local in consonance with their own cultures and social networks. The HyperClass is a step towards this.

THE HYPERCLASS IN THE VIRTUAL UNIVERSITY

The HyperClass is based on HyperReality, a technological platform conceptualised by Nobiyoshi Terashima. It allows the intermeshing of virtual reality (VR) physical reality (PR) and artificial intelligence (AI) in a way that is seamless and allows interaction in fully immersive environments. A HyperClass is the interactive conjunction of a real class made of atoms with a virtual class made of bits of information. It makes possible a future where the people and the objects around you may be real or may be virtual and may have human intelligence or artificial intelligence, providing multimediated, immersive simulated learning environments. Because HyperClasses in universities can exist in real and virtual dimensions at the same time, they will provide an intersection between the local and global dimensions in education.

A student could go to a conventional class in a conventional university or stay at home and use a PC and the internet to link to a virtual class in a virtual university. A HyperClass allows a student to do both. A HyperClass exists where the virtual and real dimensions intersect. This is a coaction field where students and teachers in a conventional classroom can synchronously interact with students and teachers in other universities that may be in other countries.

A coaction field conceptualised by Terashima (2001:9-12) is where students and teachers in a conventional classroom can synchronously interact for the purpose of learning with students and teachers in other universities, possibly in other countries. The HyperClass is where real and virtual dimensions of students and teachers intersect providing a common field to reconcile the learning that is local with learning that is global in order to understand the subject from multiple perspectives of other cultures than one's own (Tiffin and Rajasingham, 2001; 2003).

Participants in a HyperClass come together because of their interests in a specific subject on a shared domain of knowledge. In the HyperClass, the relationship between knowledge and problem domains suggests another important contrast to conventional classroom processes. In a conventional classroom the application of knowledge to problems is expressed symbolically, through alphanumeric notation and two-dimensional still pictures displayed on a display unit such as a whiteboard.

However, it is suggested that when problems have a real life referent in the participants' social reality, then classrooms with whiteboards may not be the best place for learning and proves the inadequacy of alphanumeric and diagrammatic instruction alone. The challenge is to transfer learning from the classrooms to real life situations and testing the application of knowledge to real life situations in whatever form they take in multimediated simulated environments. The

HyperClass introduces a new dimension in education with the juxtaposition of knowledge with problems that have a referent in physical reality (Tiffin and Rajasingham, 2001).

With HyperReality technology, objects are created in 3-D using an array of videocameras, creating a database/library of problem case studies that could include dangerous conditions. Learners could for example, be faced with a vast array of different situations and could seek solutions to their problems with the help of their teachers and peers from diverse cultural perspectives where each participant or group can manipulate the 3-D modelled learning objects (Terashima, 2001). A significant strength of HyperReality as contrasted with virtual reality today is that while the communication process in a virtual class is prescribed using the shapes and designs that have already been created as computer generated virtual reality by computer graphic designers, HyperReality on the other hand allows a syncretion of cultures, where the quality of the content being studied can be designed, altered, and objects modelled by the participants themselves to catalyse collaborative learning from multicultural perspectives, and this capability that is contextualised is critical for improving the quality of the knowledge content being studied. Problems can be real. But knowledge is always abstract (Rajasingham 2006).

LEARNING, TEACHING AND JITAITS

Perhaps the most profound aspect of the teacher/learner axis in a HyperClass is that the avatars of teachers and students may not necessarily represent human intelligence. Today we are familiar with the little cartoon character, a wizard looking like a paper clip that keeps popping up on the computer screen offering to help where someone has tried to programme a just-in-time (JITAIT) artificially intelligent teacher. In a HyperClass a teacher and a learner can be virtual or real. A virtual teacher can have human intelligence (HI) or artificial intelligence (AI). Teachers and learners can communicate synchronously, using speaking avatars, or asynchronously, using written words or visuals. Knowledge and problems can be embodied in the teacher and the learner or they can be represented alphanumerically, or in simulacra.

Today human teachers can only respond immediately to a learner in working hours and if there is only one student seeking help. In large classes student questions have to wait until a teacher is available. In higher education much learning is done asynchronously and students get feedback on an assignment a week or more after doing it and most students have forgotten the things they found difficult. It is time for the just in time artificially intelligent teacher (JITAIT). As the name implies, this is an AI teacher that can be available whenever and wherever a student needs help (Tiffin and Rajasingham, 2003).

JITAITs are expert systems, effective where the domain of knowledge they address is restricted, paradigmatic and orientated toward problem solving. A JITAIT can therefore be an expert teacher on a subject that formed the domain knowledge of a coaction field in HyperReality. JITAITs would always be ready to help any learner in the coaction field and would improve from each encounter with a learner provided it received feedback from a human teacher, and could act as personal teachers to individual students. JITAITs could have avatar form and a personality and act as a guide and mentor in the manner of the servant-tutor pedagogues of ancient Greece. As each intake of students asks the same questions and has the same problems, JITAITs can be used and at this level could be shared between human and AI tutors. As time went by and JITAITs handled more and more FAQ's, their role would increase and the student teacher ratio could be progressively increased without lowering quality.

The upper level is that of the subject specialist, the professors and professionals who have achieved academic stature through research, publications and experience and can arbitrate on content. Their primary purpose is to communicate a synthesis of the subject matter in a way that brings it up to date, places it in context and encourages students to question. They do this by lecturing, and are supported by a team of teaching assistants who do the tutoring at the local level, leaving the professor to lecture to very large classes. With e-learning they could stream their lectures to the whole world, and there need be no limits to the numbers who could attend. Instead of being salaried employees, professors who could attract such numbers would be valuable property and they could relate to their universities in the way authors relate to their publishers (Kats, 1999: 48) receiving royalties for each student taking their programme.

THE GLOBAL VIRTUAL UNIVERSITY

The infrastructure of the virtual university which is on the internet is the technology that makes possible telelearning, telebanking, teleworking, teleshopping and telemedicine without leaving one's home. Distance from any place need no longer be a limiting factor. It does not matter where the university is physically located and learners in any country can as easily access courses from the global virtual university as they can from their neighbourhood university. In fact as internet access increases for people who are housebound, in hospitals, at work or travelling, or for convenience, it offers an invaluable alternative access to educational opportunities.

In the case of modern universities, accreditation of a degree programme, who can teach and how is legally defined by the government that supports the university through taxation. Curricula were set in concrete and it took years to bring in changes. Inevitably, national universities as virtual universities promulgate the national culture. This was acceptable and successful in the industrial age. But in the knowledge society, it creates problems for global education that not only caters for the English speaking world, but also for multilingual and multicultural environments.

The internet is a strangely dynamic environment that changes the nature of access to knowledge and hence the very nature of higher education. Knowledge is no longer based on the scientific paradigm, fixed and an end in itself. Virtual universities on the Internet opens up choice in content as well as learning styles, and provided there is access to the internet, equity of opportunity becomes an achievable ideal.

However, it must be noted that the issue of accreditation of a global virtual university is critical. If learners can choose from a smorgasbord of subjects offered by different universities in the education marketplace for credit towards their degree, who will validate the degree and give appropriate credit value?

Perhaps there could be a board of eminent international scholars and professors in the manner of a top journal's editorial board to scrutinise quality and provide the accreditation. Further discussion on this important topic is beyond the scope of this paper.

IN CONCLUDING...

Seymour Papert said: "Errors benefit us because they lead us to study what happened, to understand what went wrong, and through understanding, to fix it" (Brand, 1988: 127).

Whereas conventional universities are geared to the study of what is known and what is knowable, virtual universities address the unknowable in order to prepare people who can shape the future.

A global virtual university will by definition be open to competition and commercialism. What happens to education as a public good when it is open to market forces? However, we have to find a balance between the old and the new; and between the virtual and the real. It is therefore critical to research on how the world's untapped resource, its people can be educated for an unpredictable, rapidly changing future.

This paper suggests that if globalisation is to mean anything other than continued exploitation and increasing differentials of wealth and poverty then the development of global virtual universities will be one way to meet the social and economic needs of the world in the 21st century.

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