

« e-ducation without borders »
conférence des 22 – 24 Avril 2001



bâtiment de la conférence

organisation :
Abu Dhabi Men's College

Abu Dhabi, Emirats Arabes Unis

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1. Introduction

La Conférence “ e-ducation without borders ” s’est déroulée sur trois jour, du dimanche 22 avril au mardi 24 avril 2001 à Abu Dhabi (Emirats Arabes Unis). Cette conférence internationale organisée par des étudiants d’une Université locale (Abu Dhabi men’s college) a réuni 200 étudiants originaires de 46 pays ainsi que des universitaires (enseignants ou administratifs) et des personnalités. Nous avons été accueillis durant nos phases de travail dans les locaux du Parlement Fédéral des Emirats Arabes Unis.

Le sujet de la conférence était le e-learning, c’est à dire l’apprentissage grâce à l’utilisation d’applications multimédias.

J’ai participé à cette conférence en ma qualité d’apprenti en Ingénierie Multimédia au Centre de Formation par l’Apprentissage de l’Université Pierre et Marie Curie, partenariat entre l’Université Pierre et Marie Curie et la société Thalès Université Coopération.

La participation à cette conférence a nécessité la rédaction et l’envoi préalable d’un texte sur un aspect de l’enseignement à distance via les applications multimédia : son processus, ses impacts ou l’analyse de cet enseignement.

Les textes de certains étudiants ont été sélectionnés avant la conférence par les organisateurs pour faire l’objet d’une présentation orale. Les présentations orales se sont effectuées soit dans l’hémicycle du parlement soit dans des salles annexes lors des discussions en groupes. Les premières soutenances se sont déroulées juste après la cérémonie d’ouverture. Une table ronde s’est également déroulée entre les participants de la conférence à Abu Dhabi et des membres (étudiants, enseignants et administratifs) de l’Université de Perth (Australie) grâce à la visioconférence.



salle de conférence

2. Déroutement de la conférence

2.1 Les interventions

Comme je l'ai dit précédemment, durant la conférence les interventions se sont déroulées dans plusieurs salles. Il m'a donc été impossible d'assister à toutes. D'autre part la majorité des textes présentés aux organisateurs n'ont pas fait l'objet d'une présentation orale. Je présenterais ici les thèmes développés par les étudiants et les deux personnalités invitées à la conférence.

2.1.1 Les étudiants

Parmi tous les étudiants que j'ai écoutés, certains ont attiré mon attention. Les sujets abordés lors de ces présentations ont été les suivants :

- Utilisation des outils Multimédias comme moyen de communication.

(textes de S. Al Jabri et A. Johnson)

- Collaboration entre les Industries et les Centres d'Enseignement par l'intermédiaire du Multimédia. (*textes de A. Johnson et E. Fosnight*)

- Fonctions des Applications Multimédia dans l'enseignement à distance (EAD).

(textes de R. Hughes et S. Thorpe)

- Rôle de l'enseignant dans le e-learning (texte de L. Swaminathan).

Le développement des applications multimédia s'est produit grâce à la collaboration de l'industrie et du monde enseignant. Cette collaboration est double :

D'une part l'industrie développe des applications utilisées dans l'enseignement classique et dans l'enseignement à distance.

D'autre part elle a permis la création d'un grand nombre de formations de ce secteur d'activité chapotées par une entreprise et un centre d'enseignement (dont ma formation en Ingénierie Multimédia pour l'Information Documentaire entre THALES Université et l'Université Pierre et Marie Curie).

L'EAD a évolué en utilisant voire en collaborant aux évolutions des outils multimédias.

Il existe des écoles spécialisées dans l'EAD (en Australie par exemple) destinées aux enfants géographiquement isolés. Ces écoles ont utilisé la radio comme mode de communication pendant les premières décennies de leur existence. Aujourd'hui les applications multimédias sont utilisées à tous niveaux dans ces établissements, y compris dans l'enseignement supérieur (*texte de Sharifa Al-Jabri*).

Le multimédia est un moyen de dialogue et de diffusion d'informations faisant abstraction de la distance séparant les personnes et de l'horaire, Internet en est l'exemple le plus connu.

L'utilisation d'applications multimédias dans l'enseignement nécessite la participation de l'apprenant par une interactivité accrue avec l'enseignant et une réflexion sur ce qu'il apprend (*textes de M. O'Brien et de R. Hughes*).

Cette implication est d'autant plus efficace que les premières phases du e-learning utilisent des objets concrets et maîtrisés par l'apprenant. Il faut cependant faire attention à l'utilisation des applications " on-line " car l'école " traditionnelle " possède deux rôles : la fonction d'enseignement et la fonction sociale de vie en communauté.

2.1.2 Les personnalités

Deux personnalités mondialement connues ont été invitées à faire part de leur expérience : M. Bertrand Picard et M. Jean-Michel Cousteau. Des universitaires (administratifs ou enseignants) sont aussi intervenus durant la conférence pour expliquer leurs liens avec l'activité Multimédia. Les interventions de messieurs Picard et Cousteau ont eu pour objet d'élargir le thème de la conférence en développant les liens qui peuvent exister entre l'activité qui les a rendus célèbres et le e-learning.



J-M Cousteau



B. Picard

M. Picard est intervenu lors de la cérémonie de clôture. Il a comparé Internet et le ciel en disant qu'il s'agissait là de deux espaces sans frontières physiques ou politiques. La circulation et la communication en sont facilitées. M. Picard a crédité Internet d'être un moyen important de communication entre les hommes sans se soucier du temps ni de l'espace. M. Picard a développé son enthousiasme concernant le fait que grâce à l'Internet des barrières tombent, et que justement des étudiants (et plus largement la jeunesse) peuvent ainsi mieux se connaître. Il pense que ce rapprochement de la jeunesse mondiale grâce à Internet peut influencer sur notre histoire.

M. Cousteau est intervenu lors du dîner de gala l'avant-dernier jour de la conférence. Il a été beaucoup plus critique quant au monde du Multimédia. Pour M. Cousteau le Multimédia ne doit pas faire oublier la Nature, chose qui est selon lui primordiale. Il a insisté sur l'opposition et l'antagonisme existants entre le « réel » de la Nature et le « virtuel » de l'Internet.

2.2 La table ronde

La table ronde s'est déroulée le premier jour pendant une heure et demi. Plusieurs aspects du "e-learning" y ont été abordés. Le plus développé au cours de la conversation est l'aspect technique du e-learning et principalement l'utilisation d'Internet, c'est-à-dire quelles possibilités nous fournit l'Internet dans la transmission des informations et du savoir.

En ce qui concerne les supports possibles d'une application d'enseignement multimédia il y a Internet (applications "on-line") et les CD-ROM (applications "off-line"). Selon moi cet autre type de support d'application qu'est le CD-ROM ne doit pas être délaissé et à été oublié durant la table ronde.

Un autre point important à mon avis n'a été que peut présenter : la place et la fonction de l'enseignant dans le développement du e-learning. Que se soit avec la méthode classique ou avec une application multimédia, l'enseignant est là pour définir le cours, c'est-à-dire le contenu de l'application. En fonction de la méthode utilisée, le travail demandé à l'enseignant n'est pas le même. L'utilisation d'applications multimédias nécessite d'inciter l'apprenant à s'investir d'avantage dans la leçon. Cette nécessité vient du fait qu'il n'y a pas de face à face entre l'apprenant et l'enseignant. L'enseignant doit donc trouver des méthodes différentes selon le mode d'enseignement pour intéresser ses élèves.

Cette conférence a tout de même été intéressante par le fait de son déroulement en visioconférence avec une Université australienne.

3. Bénéfices tirés de la conférence

J'ai tiré de cette expérience aux Emirats des bénéfices importants au niveau personnel et au niveau professionnel. Ces bénéfices sont distincts mais néanmoins très complémentaires.

3.1 Bénéfices personnels

Je vois trois avantages prépondérants quant à ma participation à cette conférence :

La conférence s'est déroulée aux Emirats Arabes Unis, il ne s'agissait pas pour moi de ma première visite en pays étranger mais de la première en pays Arabe. Je ne connaissais le mode de vie local que par des reportages vus à la télévision. Aller aux E.A.U. fut donc en soit une première expérience. J'ai pu passer ces quelques jours en voyant vivre les nationaux dans leur pays. Cette visite m'a surtout permis de visiter plusieurs régions du pays et ainsi de me l'imaginer.

Le second avantage que j'en ai tiré est de côtoyer pendant trois jours des personnes de pays différents, de cultures et de langues différentes aux miennes. Les échanges provoqués du fait de ce "regroupement" a donc été un enrichissement personnel. Il m'a permis de voir comment se comportaient des jeunes originaires d'autres pays ayant approximativement mon âge.

La participation à cette conférence d'autant de jeunes m'a permis de nouer des contacts sur tous les continents et d'évoluer dans cet esprit cosmopolite.

3.2 Bénéfices professionnels

Tout comme dans l'optique personnelle, j'ai acquis dans l'optique professionnelle trois bénéfices importants :

Le premier point est que j'ai participé à cette conférence grâce au partenariat entre THALES Université Coopération et l'Université Pierre et Marie Curie. Le financement de mon séjour étant pris en charge soit par les organisateurs soit par ce partenariat, j'ai donc été chargé de mission pour cette conférence par THALES et l'UPMC. Il s'agissait là encore pour moi d'une première expérience. En effet je n'ai jamais eu à participer à ce type de conférence en tant que "représentant" d'une entreprise.

Le second bénéfice professionnel important que j'ai tiré de cette conférence est de pouvoir échanger des idées avec des personnes d'horizons plus ou moins différents du mien (âge, nationalité, culture, etc...). Cet échange m'a permis de préciser ou de corriger mes opinions concernant le sujet de la conférence, c'est à dire le "e-learning". J'espère avoir pu apporter les mêmes bénéfices aux quelques interlocuteurs avec qui j'ai discuté durant ces trois jours.

Cette année je suis apprenti en Ingénierie Multimédia, cela veut dire que l'une des charges qui m'incomberont durant ma carrière future est de développer des applications multimédia qui pourront être utilisées dans le e-learning. J'ai été l'un des rares participants à étudier dans ce domaine. Le fait de discuter avec des étudiants d'autres secteurs d'activité m'a permis de voir comment ils voyaient le e-learning et quelles utilités ils en auraient.

4. Propositions

Après réflexion sur le déroulement de la conférence, je suis arrivé à la conclusion que plusieurs points étaient nécessaires pour faire suite aux avancées de la conférence. Les propositions que j'ai à faire suivent deux axes :

Parlons d'abord du problème de fond : le sujet de la conférence

Avoir ensuite une continuité du travail et des propositions faites.

4.1 Réflexions issues de la conférence

Lors de la conférence, une grande partie des orateurs que j'ai écouté se sont limités à traiter de l'aspect "en ligne" des applications multimédia. Traiter cet aspect des applications multimédia est important car il s'agit d'un des deux éléments constitutifs du e-learning. L'autre point capital du e-learning est l'aspect "hors-ligne" de telles applications qui sont diffusées sur CD-Rom.

Selon moi l'enseignement à distance nécessite ces deux modes de communication. Ils sont d'importances égales et d'utilité complémentaire. L'enseignement en ligne permet aux apprenants d'avoir un contact direct avec l'enseignement, ce qui est l'intérêt de cette approche. L'inconvénient majeur en étant le coût d'accès à l'internet. Je pense qu'il faut développer ces deux méthodes parallèlement pour permettre un enseignement cohérent et le moins onéreux possible.

L'enseignement en-ligne, dans des salles virtuelles, peut remplacer un certain nombre de cours en salles "réelles" dans lesquelles la présence physique de l'enseignant et des apprenants est nécessaire. Ce type de cours est utile pour permettre l'interactivité entre les participants. L'enseignement "off-line" sur CD-ROM est également utile dans le cadre de certains cours, d'exercices ou de manipulations.

Il est toutefois important de dire qu'il faut définir précisément un plan d'enseignement dans lequel sont jumelés des enseignements traditionnels et les deux types d'applications multimédia.

4.2 Réflexions sur la continuité du travail

Cette conférence à été très intéressante et son contenu somme toute assez riche. Le e-learning est un mode d'enseignement voué à s'étendre, même s'il ne doit pas remplacer totalement l'enseignement traditionnel. Je pense qu'il ne faut pas arrêter l'organisation de ce genre de rencontres, d'ailleurs les E.A.U. ont l'intention d'organiser une autre conférence du même type en 2003. Je pense que pour assurer la continuité des réflexions d'une conférence à l'autre il est nécessaire d'inviter à toute nouvelle conférence des participants de la précédente.

Il pourrait être intéressant aussi dans la mesure du possible d'organiser régulièrement des rencontres entre les participants d'anciennes conférences pour discuter de l'évolution du e-learning et de l'évolution de l'opinion de chacun. Les participants de ces rencontres de suivi pourraient pourquoi pas être les représentants d'une université représentée ou d'un pays (en fonction de la participation). Si ce type de rencontres n'est pas organisée il serait intéressant d'inviter des délégués aux conférences citées dans le précédent paragraphe.

En résumé je pense intéressant et important de régulièrement organiser des conférences du type de celle à laquelle j'ai participé. Il faudrait aussi permettre un suivi dans la réflexion en invitant un nombre à déterminer de participants de la conférence précédente et d'autres s'étant déroulées plusieurs années avant.

5. Conclusion

Ma participation à cette conférence a été pour moi très instructive aussi bien sur un plan personnel que professionnel.

Sur un plan personnel cela m'a permis de voir une culture et un pays que je ne connaissais pas. Sur le plan professionnel cela m'a fourni des idées et des connaissances dans le travail qui sera le mien à la suite de mes études. Ces connaissances portent sur le contenu même de mon travail dans le domaine du développement d'applications multimédias ainsi que vis à vis de mes employeurs qui pourraient me détacher auprès d'autres structures professionnelles. Cette conférence a été pour moi une première expérience pour tout ce qui concerne ma future activité professionnelle.

Pour finir je voudrais remercier THALES Université Coopération et l'Université Pierre et Marie Curie ainsi que toutes les personnes qui ont œuvrées pour que je participe à cette conférence.

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ANNEXE A :
Léonard STRONG et Francis KLEIN
(non retenu car présenté trop tard !)
UNIVERSITE PIERRE ET MARIE CURIE (France)
A student's working day at the University

With the introduction of New Information Technologies at the Pierre & Marie Curie University (PMCU) (Paris 6), the typical working day of a student has been substantially modified.

We are going to follow Leonard, a student in Chemistry, through his working day at the PMCU. Of course, the following description is only straight out of my imagination. Any similarity with real facts or resemblance to any real person is purely accidental...

7:00

Leonard's computer, which is connected 24 hours per day to the University server, wakes up.

Leonard stretches his limbs and gets up. He strikes the Entry key and quickly checks the schedule for the day, which is updated in real time.

Today is a tough day:

- Room videoconferencing at 8:30 am
- Chemistry tutorial at 10:00 am
- Synchronous course session at 1:00 p.m.
- Chemistry workshop at 2:00 p.m. (asynchronous course)
- Chemistry university forum at 5:00 p.m.

Leonard quickly swallows his breakfast, downloads this schedule and the teaching aids in his personal digital notebook and sets out for University.

8:30

Videoconferencing room No. 12

Leonard is a little bit late. The room is almost full, and in spite of its seating capacity (150 persons), he has some difficulty finding a seat in front of the videoconferencing projection screen.

The titles are already being displayed on the screen. This is a conference presented by a highly qualified specialist in element classification.

Leonard is very fond of this kind of session because it enables several European Universities to attend live conferences, which are presented by experts that they would never have the opportunity of meeting otherwise. Furthermore, such a conference can be broadcast simultaneously in several University rooms to cater for the number of students attending.

A few constraints immediately appear :

- The session begins at a precise time. There is no question of being late! This is sometimes tricky when the time gap between the lecturer's transmission location and the receiving University is large.
 - It is very difficult to ask the lecturer questions, and the lecturer does not necessarily have correct visual feedback. Many conferences of this kind are still audio-conferences.
 - Sometimes, we feel that the lecture, though given by an expert in the matter, is not always well prepared. We can easily imagine that a synchronous lecture of this kind calls for a specific design process and, at least, one which differs from that of a face to face lecture.
- Let's be quiet now! The conference is underway. The lecturer appears on the screen only to be quickly replaced by the first slide.

9:30

End of the session. Leonard records the e-mail address of the lecturer: he has a question to ask. Then, Leonard goes to his chemistry laboratory where the tutorial session is to be held.

10:00

Test tubes and bottles are ready to be filled with all the mixtures provided. The professor walks behind the students, gives some advice or writes down his comment on documents. At last, it is rather relaxing to be back in a familiar environment...

The videoconference lasted one hour, which is deemed to be a maximum for this kind of activity. Leonard had some difficulty remaining attentive all through the conference. He is for distance teaching but not so highly dosed... Leonard thinks that teaching based on this method and making use of computer tools and multimedia techniques should not exceed 30-40% of the total teaching programme. In addition, some sessions, such as this practical work session, are hard to tackle other than in a face to face context.

However attached he may be to face to face learning, Leonard does not hesitate in entering data in his personal notebook that he will quickly synchronize with his computer once he is back home! Besides, the report that he will have to prepare at the end of this course will be typed on his computer and e-mailed to his professor.

13:00

Leonard is going to attend a synchronous course session involving collaborative work in one of the five University multimedia laboratories. The session will last 45 minutes only because the degree of involvement required of both the professor and the students is really very high.

Unlike this morning's conference, each student sits in front of a computer and can communicate in real time with the course leader provided the course leader allows him to do so. Leonard sits down in his place and logs on to the address specified for this session by typing in his password. The session is about to begin. The video picture of his professor soon appears in one of the windows opened on the screen. Leonard puts on his headset with a mike and says that he is ready.

The session consists in getting control of a chemistry software tool from a remote

site. The course leader is a manufacturer who has designed the software. What Leonard prefers in this kind of lecture are the demonstrations and the possibility for the course leader to take over control of his (Leonard's) own computer to explain a particularly intricate feature to him through an example. He can also ask a question using some sort of an electronic "finger". The course leader tries to answer the questions quickly but it is not always easy for him to read his instant mailbox and carry on with his lecture at the same time! He often "freezes" the questions until the session ends, and organizes a web chat for a few minutes. As a last resort, there is still the possibility of sending a question to the course leader at his e-mail address. The lecture goes on smoothly. The course leader uses all the resources available, including a "white board" on which he can draw a freehand chart. In his turn, he asks the audience a question. Leonard knows the answer and quickly gives it through his instant e-mail facility. The session ends. Leonard takes a 30-minute break. He will not be late for the next lecture since it is given in the same multimedia laboratory.

14:30

Leonard again sits down in front of his computer and logs on to the lecture server. He checks the list of asynchronous lectures of his training course, and selects the lecture planned for the day.

He notices that he cannot attend the lecture planned because his score during the preceding session was inadequate to access the current session. He is therefore obliged to go through the last exercises again. Fortunately, he had reviewed the subject thoroughly so that his score is now acceptable! He can thus attend the session of the day although with a few minutes loss.

This kind of course is very much to Leonard's liking. The student can progress at his own pace and can often obtain customized assistance from his professor who distance-monitors his progress. The multimedia training applications that he can access are very vivid with plenty of examples. Leonard is convinced that the integration of multimedia features in this type of teaching aid is really beneficial to the student. In fact, the multimedia features bring several senses into play simultaneously during the learning process: vision, hearing and even feeling and language (since the proposed training activities often include real interactivity with the computer). These senses 'capture' the multiple information items transmitted and this multimedia aspect makes the memory image more persistent.

Indeed, do we not learn simultaneously via vision, hearing or feeling? Are these not the immediate means available to a newborn baby to make his first steps in life? Leonard! Stop speculating! The session is nearing its end and you still have a few exercises to complete! Don't forget that there is a forum at 5 o'clock!

17:00

Since the beginning of the academic year, Leonard has been working on a scientific project with a group of students of his University. They are conducting this project jointly with their Strasbourg University counterparts. It is time for them to share the results of their working week during a discussion forum. He logs on again and joins the discussion forum. The Strasbourg team is way ahead of them, and Leonard is eager to read their last report. He downloads the documents and takes part in the

discussion. The possibility for students belonging to distinct Universities to collaborate has enabled Leonard to discover new points of view and progress faster with the development of his project. A specific task is assigned to each team member. Tonight, Leonard will have to investigate a very specific theme on the Internet. He will report the results of his investigations to the whole team early the next morning.

18:00

Leonard goes back home at the end of a busy day. Today, he has largely exceeded the 30-40% advisable distance learning limit, but it was an exceptional day! A day which has not ended yet! He switches his computer on and transfers his day's notes from his notebook. He takes advantage of this opportunity to order a pizza via the Internet. The evening will be long...

First of all, the investigations via powerful search engines at his disposal. Then, the preparation of the exams for the next day. The University library makes a vast number of computerized documents available to students who can consult them from home or on the spot. Should this facility be insufficient, Leonard can make investigations in computerized libraries in other partner Universities. Of course, it is strictly prohibited to use such data for any other purpose than the course for which it is intended. Retrieved documents are 'traced' and subject to copyrights. Leonard is well aware of the legal problems that arise with the use or duplication of computerized documents.

23:00

This time, the day is really over. A last glance at the schedule for the next day: midterm exams for the whole day. Leonard checks his provisional grading and, mentally relaxed, sets his computer to wake up at 6:30 am.

The next day at **6:30 a.m.**

The alarm clock rings. Leonard stretches his arm and stops the alarm. But... "Where is my computer?", he asks. Leonard understands that he was only dreaming... This kind of university is yet to come...

For the time being, he is going to carry his books under his arm once more and meet his friends at the University as usual in the lecture hall this morning. If Leonard hurries up, he can be among the first 400 students and attend the lecture that a highly qualified specialist in element classification from Brussels is going to give... Leonard's dream has left him one regret and one hope. He regrets having been born 3 years early, thereby missing the new distance learning environment, methods, and experience (it is Leonard's last year at university). His hope is to take part some day in a distance learning videoconference but on the other side of the barrier: as lecturer...

ANNEXE B :
Léonard STRONG et Francis KLEIN
(non retenu car présenté trop tard !)
UNIVERSITE PIERRE ET MARIE CURIE (F)

**Web-based learning and the changing role of
the student and teacher**

As web-based learning is progressively introduced into our schools and universities, we will probably see an evolution of teaching methods whereby the teachers, rather than being seen as the « owners » of the knowledge that they set out to « transmit » to their students, become more like « coaches » whose role is to guide the students through their own individualized learning programmes.

As this occurs, the debate between the two major schools of learning theory - on the one hand the « objectivists » for whom teaching involves the transmission of objective knowledge from the teacher to the learner, and on the other hand the « constructivists », for whom learning is an individual experience whereby the learners construct in their own minds their own knowledge of the world around them – will become more and more blurred.

E-learning is certainly an individual experience for the learner, but it also depends on a wealth of expert knowledge that must be built into a learning programme. As such it becomes an object of learning. Content is critical.

Constructing suitable educational programmes and designing effective web-based teaching methods will be an on-going task for education authorities.

The world wide web is both an enormous document repository, and a virtual classroom.

Internet and Intranet can be used to create or to simulate most present-day educational situations : from classroom, lecture hall, laboratory, to study group or self teaching – without the constraints of place and time. And they can also use enriched audio and video media, in an interactive way, either by web-casting, dialogue, or document exchange.

Learning how we can learn best, and learning what we really need to learn (i.e. constructing new and more effective pedagogical methods) will be a key issue in this process.

Questions and answers

Q. What is the difference between e-learning and computer-aided learning ?

A. E-learning uses the Internet (or Intranet) ; it is web-based (it provides a remote access to learning programmes)

Q. What are the main types of (traditional) learning situation ?

A. Classroom, lecture hall, tutorial, laboratory, library, home, study group, workshop,

...

(E-learning can either provide an equivalent, or can simulate these contexts)

Q. What are the different media involved in e-learning ?

A. Audio, video, interactive text, computer application, ...

Q. What are the main advantages of e-learning (e-education) with respect to the traditional methods

A. It overcomes most space/time constraints. It includes all the features of computer-aided teaching, with the addition of remote access and remote dialogue.

It combines the features of classroom, cinema, library, laboratory,...

Students can form working groups, can exchange source documents, can research new documents, can discuss working methods. This can be co-ordinated by a teacher or tutor.

It reduces the load of the teacher for corrections, examinations, tests.

It enables students to work at their own speed.

Dangers and disadvantages

A few words on the dangers.

Losing track of the purpose of what we are doing, due to the enormous quantity of information that is available immediately.

Losing contact with real-life situations.

ANNEXE C :
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A student view on educational Technology

The Internet and many other forms of telecommunication can make higher and continuing education available to a much wider range of people who would not otherwise have the opportunity.

IT applications, specifically the Internet have undoubtedly affected the educational process in two main ways: (A): as productivity aid, for enrichment of content and, (B): as a facilitator for student-initiated learning. According to a recent study by the International Data Corporation (IDC), the number of college students enrolled in distance-learning courses was to triple by 2000 reaching 2.2 million or 15 percent of all higher education students.¹

The trend in the market shows that on-line education is catching on quickly. As per a report by UNESCO, there were approximately 80 million students enrolled in higher education programs world wide in 1999, of which 6,150,000 are on-line. Australia alone enrolled 690,006 students in higher education courses. In the US, which is proving to be a big base for on-line education, 7 10,000 students were enrolled in distance learning last year. By 2002 this number is estimated to reach 2.2 Million.²

According to IDC, a whopping 90 percent of the on-line learning market is still untapped. The University of Southern Queensland in Australia claims that 75 percent of its 20,000 students are studying through distance education that involves some form of electronic delivery. Further according to the Campus Computing Project, 30 percent of US colleges and universities plan to incorporate the Internet into their distance learning initiatives.

The great change and spread of Internet-based and distance (particularly on-line) education has not gone without criticism. The fundamental difficulty and the real challenge for institutions that rely on electronic education is that they can not assure the quality of instructions and resources. Such issues are very prevalent and create difficulties in learning and teaching. The lack of physical connection and face-to-face interaction between faculty and students makes the performance of virtual institutions doubtful.

Are teachers ready to put their hearts and souls into creating IT-enabled learning materials which attract students and make studying a truly enjoyable activity? Are institutions prepared to invest in the facilities, training and staff development that will be required to enable faculty to make full use of the benefits of the technology without being overwhelmed by it?

Considering the quality assurance of courses offered over the Internet brings up the questions "what if students rely totally on electronic-based education and virtual libraries for resources, who sets the standards?" "Who grants the degree for these students?" And "what kind of degree?"

Electronic education institutions must believe that the human, technical and financial resources needed for teaching and learning and for quality assurance need to be made available when and where needed. There is a need for assurance that adequate resources will continue to be provided :

- (A): improve teaching,
- (B): to enhance learning by introducing better facilities for learning of languages,
- (C) : to strengthen general education programs to broaden the students' outlook.

¹ <http://www.ide.com/>

² <http://www.unesco.org>

By observing the quality of virtual colleges and universities, we can see that some of them already have typical systems to help in improving the quality of their resources and courses, but better monitoring systems are still needed. There is an essential need for established quality assurance systems. Such systems could be developed and implemented in a way that assures quality and security to distance-learners. Staff and students must be fully aware of the academic standards procedures to maximize the effectiveness of these procedures and to ensure the quality of teaching and its continual improvement. Students need also to be informed of the existence of academic standards policy statements. Students should also be informed of the availability of these statements via websites.

Electronic education presents both a good opportunity and a challenge and already it is significantly affecting the educational process all over the world. We need to take an advantage of this technology without sacrificing educational quality. Electronic storage of and networked access to, library resource is one obvious area where much has been done, but more could still be achieved. The applications of IT and telecommunications technology in the higher education setting requires considerable input of staff time and effort to be effective.

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ANNEXE D :
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**The Potential of Applying Current Engineering Design
Education Methods in Technology- Based Curriculum**

The scope of learning methods used in higher education has increased with the advent of modern communication technology. Considering itself to be a part of an ever-evolving society, the university can and should provide the foundation of social and technical skills, experience and judgement within the students' university education. This responsibility has and will continue to affect the function of the modern university. To facilitate this, many traditional university curricula are being revised to reflect outcomes-based learning. Courses now emphasise the practical and creative use of classroom information, the development and application of new technologies in business and industry, continual professional development, entrepreneurship, and relevance to local and regional needs to ensure that new graduates will be productive workers.

Recent literature reveals some methods that may facilitate the achievement of these objectives. Roman [2001] reports that studies done in the last decade show that interdisciplinary work has a positive impact on thinking and learning. He observes that teaching subjects as connected bodies of information fosters efficient and rapid learning in adapting to competitive conditions. A study done by Nembhard [et. al. 2000] indicates that workers with previous experience tend to have higher productivity levels and are able to be productive in new posts more quickly. Barone [et. al. 2000] notes that successful business careers depend upon good theoretical knowledge, technological competence, and emotional intelligence. High quality curriculum models incorporate training and evaluation in effective group performance.

Students benefit from the experience of real-world, team-based, multidisciplinary problem solving exercises. To meet the industry's requirements, engineering programmes now emphasise design education by incorporating design opportunities in courses, reflecting these approaches and the very important component of technology utilisation. Open-ended instead of close ended problem solving and increased group work are now commonplace in the engineering design curriculum. Jenkinson [et. al. 2000] describes an aircraft design course collaboration between US and UK universities. Students were most successful when integrated university teams worked together on the same project. The teams met at the beginning and end of the project. International teaming was facilitated by regular electronic communication during the project. The common educational objectives, the mixture of skills and background and the knowledge of core fundamentals contributed to project successes.

Business education practices could be used to compensate for instances when all the experts are not available within one university. Navarro [2000] reviews economics instruction in the cyber classroom using "on-line" interactive websites or "off-line" CD ROM based lectures. In a cyber classroom, guest lecturers from other universities or practising engineers from industry could teach design sections of courses - or even complete courses - to provide the common knowledge of fundamentals. External examiners can also be used to test fundamentals in higher degree programs.

Young [2000] states that the training of future designers must make them aware of and experienced in all stages between concept design and certification in as realistic an environment as possible. Kundu [et. al. 2000] proposes collaboration between university, industry, and possibly national labs for an aircraft design using a "virtual company" to bridge the gap between education and industry. This virtual company is constituted of independent bodies geographically dispersed and managed as a complete unit.

This virtual company consists of four main components, combined for a specific project and dissolved on task completion. The primary industry partner is a master company with a committed chief engineer, responsible for certification and liability of the end product. The secondary industry partner provides high tech resources and experienced mentors. The university contributes faculty and student design, using development and testing in coursework. The fourth partners are technical colleges and vocational institutions with manufacturing expertise responsible for providing design support, and for constructing prototypes in coursework.

The collaboration of academic and industrial expertise could guide reality-based student design projects. Elements of the cyber classroom and unbounded geographical partnerships could be enhanced with web portals for increased access to tools. Graduate students could also be involved in a sub-supervisory role for undergraduate student teams. This system could be modified to incorporate computing, business and professional technology-based degree programs. Large projects could incorporate partnerships with multiple universities and faculties. The engineering curriculum would be complemented by the application of business principles to integrated design, development and manufacturing, the provision of service and marketing. In this framework, effective university collaboration on developing and improving the education process is crucial. All concerned partners would agree on policies for allocating financial resources to project work, approving expenditure, and adapting to change as required.

When international teaming, use of the cyber classroom and the virtual company are implemented quality assurance methods will change. Student evaluation of course presentation and content will become increasingly important. Traditional testing of fundamentals will be integrated with group grading components. Real teamwork is difficult to achieve in an environment that awards degrees or individual performance. Student groups will be graded on the entire project. Success and individuals graded on assigned responsibilities. Grading derived from the assessment of solutions to open-ended problem solving will stimulate student creativity. The performance measures for assessing staff will also change. Universities will be able to recognise the relevance of resources developed and determine their equivalence to research experience rather than placing value solely on papers produced by staff.

Incorporating collaboration and modern design education methods in contemporary curricula present many possibilities. Successful academic-industrial collaborations could contribute to the development of resources and emergent technologies, industry would benefit by acquiring qualified graduates with product development experience. Students would learn to manipulate large amounts of information available from diverse sources, typical of today's global village. Students will also benefit from improved communication and organisational skills, and gain broader perspectives on workplace and technological practices. With this goal of expanding education beyond traditional boundaries, government, academia, and industry will all play a role in this ultimate effort towards global socio-techno-economic development.

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ANNEXE E :
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How to Leverage Technology in the "Business" of Education

The term "Digital Divide" is used often lately, and refers to an ever-widening gap between those with the access to technology and those without such access. However, a digital divide also exists between the for-profit. business sector and our academic institutions and organizations. While many educational organizations are struggling with issues around new approaches to teaching and evaluating in the world of on-line learning, many businesses have ironed out similar wrinkles in the past few years.

This is not to say that all on-line programs and systems developed in the professional arena have been outright successes, but instead is to comment on the ability of some companies to effectively utilize technology for educational purposes. These companies have, in some instances, gone through multiple iterations of their on-line learning methodologies and systems over the course of several years, only recently to end up with a successful end-product. However, it is this trial and error, these multiple iterations, and these successful methodologies that the educational world can capitalize on. These years of testing in a professional environment allow for a faster and more successful implementation of distance learning in our academic institutions if we are able to learn the lessons and capture the best practices. As is often said. "There is no need to reinvent the wheel."

Global companies face many of the same issues that are at the forefront of the academic discussion of on-line learning today. These companies deal daily with multiple cultures and a need to share knowledge and expertise throughout their organizations. Yet, with their access to funding and the "bottom line" or "shareholder value" as their incentive, these companies are able to move much more rapidly along the technology curve than many educational institutions.

- Working across borders and cultures: As we move into a global economy and companies find themselves located in all corners of the world, challenges are inevitable. Firms must deal with the logistics of multiple time zones as well as how to *transfer concepts* such as a specific engineering expertise more effectively than by a plant visit several thousand miles away. But, if a firm can overcome these challenges, there exists the possibility of greater competitive advantage through the generation of new ideas. Educational institutions can gain the same benefits from cross-cultural interaction. Bringing international students together through technology can create the synergies necessary for the discovery and invention of new ideas and thoughts. Technology is a way to transcend cultural and language barriers by providing virtual forums where students can learn from great minds as well as each other. Business uses technology to transfer knowledge between experts in the firm as well as best practices from one office or area to another. The true winners of the information revolution are those companies that can take information, create knowledge, and then leverage that knowledge to increase collaboration and competitive advantage through the intelligent use of technology. The same situation exists for

academic institutions. The educational programs that can bring together the students of the world through technology will produce students with a greater understanding of the world they live in and the impact they can have on it.

- Knowledge Management: While it is obvious why companies must collect, store and manage the information and knowledge to create strategic advantage, it is not as clear how educational systems can benefit from knowledge management. To view it as a business, an academic institution sells knowledge as their product. So, as information, and thus the potential to create knowledge, becomes ever more prolific due to major changes in technological systems, academic institutions must make shifts in how they collect and disseminate their "product". The institutions that successfully manage knowledge will reap the benefits of a more educated student body. Knowledge management is important to educational programs because these programs must do all that is possible to capture information, allow access to it and encourage the use of this information in the development of new ideas. Additionally, the students with an opportunity to experience the use of technology in knowledge management will be better prepared to utilize similar technologies in their future careers.

How can the world of academia learn from the world of business during this exciting time? Educational programs must learn to incorporate some of the fundamental principles of business; specifically that knowledge is the "product" the program is selling. And, it is the "job" of the program to provide the best "product" to the market. Students, or the "consumers" of the product will examine the marketplace and choose the best product. It is up to the programs to ensure that they are the best in their market. As businesses have learned in the information age, technology can often be the key differentiator between those firms that succeed in the marketplace and those that do not.

I would encourage educational programs to seek out partnerships companies that have made strides in the area of using technology as a medium for education anti collaboration. By examining company intranets, collaboration virtual workspaces, online training programs and knowledge repositories, academic programs can have a greater understanding of how best to use technology in their business of providing an education. Through these partnerships, academic programs may learn more quickly and less expensively the best practices of using technology for education.

ANNEXE F :
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Learning in a Connected World

Abstract. *The idea of distance learning is not a new one, but current technologies and those soon to be available will mean that the way it affects; us will change. By its definition. links between people and countries mean that in an increasingly global economy students will be better prepared for and aware of a world marketplace, However, to succeed, learning in a connected world must include, all of the benefits of traditional teaching techniques.*

Introduction

Before the dot-com revolution, and before everybody seemed to get carried away with swapping music files, the Internet was simply a tool of education. In fact, despite the massive influx of commercial content, the third largest group of hosts still belong to educational domains¹.

In these early days, there were no dedicated teaching facilities, and information was published how and when it was needed by others. In fact, before the World Wide Web was created² to help navigate the Net, there wasn't even a standard method of finding all this information.

We have now reached the point where many educational institutions are connected to the Internet, and more are set to get on-line in the coming years. The major goal is to use this connectivity not only as a means of dissipating information, but also for collaboration among students and institutions, ensuring that similar research does not happen concurrently in different institutions.

Learning in a connected world

Education is a bidirectional process. It is not just coincidence that the writings of arguably the most famous teachers of all time - Socrates and Plato - were in the form of dialogues. Discussion actively encouraged their students to *think* about what they were learning, and through verbalising their ideas the teacher was able to understand how his pupils thought. Getting a reaction from a pupil can help a teacher decide whether they are going too fast or not explaining correctly. Any new form of learning should allow a pupil to discuss directly and instantly with their teacher.

Education is also a social process. Going to school for a young child is as much about learning maths, science and literature as it is about learning how to interact with their peers. Team games develop skills and strategic thinking used later in life in the world of business. Being with others their age creates friendships, and all the breaking-up and making-up that comes with them. For this reason, isolated distance learning should only be used when it is the best option, perhaps over no learning at all.

Bearing these opinions in mind, we can begin to look at the way that technology can be used to bring teaching and information to those who require it. Exploration into the social and communication issues arising from increasing and distributing an audience is required. Most importantly, any new technique must not be any worse than existing solutions, otherwise the benefits will be outweighed by the costs.

Established Distance Learning Techniques

Distance learning is not a product of the Internet age. In fact, the biggest university in the UK is based entirely on the concept. Established in 1971, the Open University currently admits some 200,000 students per year, catering for 20% of the part-time student population³. Initially, it used home audio cassettes and TV broadcasts complemented with regular study centre visits to provide its teaching.

*The Multi-University Research Laboratory*⁴ is a collaboration between four universities and two commercial research labs, and its aims are to provide access anywhere and anytime to a rich selection of lectures and seminars. It also aims to increase awareness among researchers across the world. A second, similar service is the "e-Lecture Series" provided by *Boxtnind.com*⁵. Again, lectures are provided in streaming video, but this time they are complemented with transcripts, slides and diagrams that update as the lecture progresses.

However, this style doesn't add much to the TV lectures of the 1970s from the Open University. We still don't get the interaction between pupil and teacher, and the learning is an entirely passive experience. To provide the human interaction, *Microsoft Research*⁶ has spawned the *Virtual Worlds Platform*⁷, a set of technologies that form a common infrastructure for custom-built environments. For example, *HutchWorld*⁸ is a 3D environment where people learn from each other and share their experiences despite being separated by many thousand miles.

Institutional Collaboration

Technologically speaking, this is just the beginning. While streaming video and interactive discussion boards are a good way to learn, they still don't provide the richness and experience of a classroom. What is needed is a way to provide all the feedback and communication of a face-to-face situation.

It is also important that the technologies used are open and available for all. If a thousand universities provide access to their lectures, but they all use different and conflicting systems we are no better off than before. Open standards are required, and a comprehensive method of finding out where and when content is available must be created. Perhaps too, it should be considered that across the world teaching styles differ and that the major barrier that still exists is language. We are still a number of years away from real-time speech-to-speech language translation, but perhaps this is a goal that is not too unrealistic.

Some high level collaboration has already taken place. Closest to home - for me - is the *Cambridge-MIT Institute*⁹, an organisation set-up to foster links between UK and US universities and business. While its main goals are to integrate research programmes, an exciting part of that is a curriculum of common courses to be taught using distance-learning technologies and web-based teaching tools. These will take the form of video-conferences between lecture rooms either side of the Atlantic. It is not just lectures that are shared, though. Students will gain

experience of other cultures through exchanges, and that in itself will help establish links. These links in themselves will also open up otherwise impossible business opportunities for enterprising students.

Conclusion

We can see that distance can be overcome when trying to communicate and pass on knowledge. However, it has been argued that the core requirements for learning are retained. A student needs feedback about their progress, and interaction with the person teaching. They also need the relations with their peers that build interpersonal skills essential for life and business.

The most important point, however, is that a coherent and distributed learning framework is not just good for the student, but good for academia as a whole. With more and more research taking place across the world, it is important that as much as possible is not repeated or conducted in isolation.

¹ Domain Names by Host Count, January 2001

<http://www.isc.org/ds/WWW-200101/dist-bynum.html>

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<http://www.w3.org/People/Berners-Lee/WorldWideWeb.html>

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ANNEXE G :
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E-ducation as an Opportunity for Higher Learning Institutions

Introduction

Talent is the new capital. The knowledge economy is being replaced by the learning economy. The significant difference today is the way in which people are being educated. Education is no longer solely the domain of physical institutions, universities, and schools. Education is being sought online and globally. The definition of education is shifting to embrace the Internet as an important tool that supports rather than threatens traditional education. After-hours asynchronous and synchronous access to collaborative learning tools that utilize the power of the Internet to boost learning, create anytime, anywhere opportunities for both students and educators.

E-ducation

E-ducation, also known as e-learning, on-line learning, web-based training, and computer-based training, comes to students via the Internet¹. Electronic learning offers in its most sophisticated incarnations such elements as streaming audio and video, built-in PowerPoint presentations, hot links to related information on the Web, animation, flip books, and self-running screen-capture display programs. E learning claims to be cheaper, more productive, and can be delivered with more timeliness than either classroom learning or traditional computer-enhanced teaching. Essentially the key components of a total e-learning solution are content, technology, and services. The myriads of products currently on offer invariably fall into one of these three categories.²

A business example of e-learning is MicroAge, a Fortune 500 company in the USA. MicroAge is a global provider of efficient technology solutions and has had web-based training for its sales teams since 1997.³ In addition to saving the costs of running classroom sessions in multiple locations, MicroAge found that tile training was producing sales increases in specific lines.⁴ Simply applying the classroom based learning materials was not enough; the new style of learning required new techniques. What MicroAge found with their e-learning environment was that tracking student's attendance and level of understanding was crucial, The site also had to be interactive, and the training program scalable to handle future growth.⁵ If MicroAge users needed more than the basic information presented in a course, they could "drill down" to brochures and technical sheets available on the net3web site.⁵

Elliot Masie, founder of the Masie Center, an educational think tank in Saratoga Springs, New York, says that e-learning has yet to reach its potential. He believes that successful e-learning must present three features to users: "well-structured content, the ability to do more than read, and a place to go when you're confused or have questions."¹

E-ducation is new and provided through many new organizations using new technologies. This newness means that the deliverables that e-education attempts to deliver pale in the quality that higher learning institutions such as universities produce with time-established methods. The most common complaints of online learning are unexpectedly high front-end costs, high drop-out rates from lack of motivation, non-existent management support, poor on-line tutoring, badly designed websites and unrealistic expectations about what the technology can achieve.⁶

In contrast, traditional universities and higher learning institutions provide student focused learning. Learning that focuses on course content to develop skills, techniques and critical thinking. There are many products that universities and higher learning institutions provide for students. Lecturers reveal the value of learning by helping students grasp knowledge that makes sense out of their experience and insight. These institutions allow students to construct and explore their own meanings out of the subject matter. Learning is tailored as individual students learn differently. Monitoring and evaluation of individuals ensure that student capabilities are developed. Different styles of tutoring are also applied to combine content and technique together with attitudes and perspectives. Higher learning institutions again provide student participation rather than passive reception of instruction. Learning is not a one-way process; knowledge is acquired with the interactivity between the student, class and tutor. The informative feedback process that higher learning institutions provide also promotes the learning quality both for teaching and student performance. They, provide organized information within a structured framework; students' previous learning is built upon to produce the final graduate. The cooperative environment within such an institution facilitates student satisfaction from the achieving of excellence. The learning also provides anchored instruction that relates classroom activities to those that take place in the real world.⁷ These are some of the elements that higher learning institutions and universities provide. They are not all conducive to current online learning situations and this is where the advantage lies for higher learning institutions over the new e-education environments.

Predictions

E-learning has been growing through technology gains. The continued production of faster, more powerful computers combined with the proliferation of the Internet into people's lives creates many new opportunities for e-learning. Some predictions from industry research specialists see e-education growing dramatically over the next few years,

E-learning will account for almost half of the projected \$16.9 billion business skills training market by 2004.⁸ International Data Corporation (IDC), a Massachusetts-based market research firm for the IT industry worldwide, estimates that there will be 2.23 million students enrolled in online distance learning by 2002.⁹ IDC also projects e-learning will be a \$12 billion market by year-end 2004.¹⁰ According to IDC, the market for web-based corporate training will increase from \$2 billion today to \$11.5 billion in 2003.¹¹ Conservative figures from analysts at Thomas Weisel Partners, a merchant bank in San Francisco, estimate a \$10 billion virtual higher-education market by 2003 and an \$11 billion corporate learning market by the same year.¹² But even the most bullish figures mask a fundamental debate in the academic community about how people absorb and retain information and whether e-learning will be the panacea its supporters claim.⁶

E-learning is predicted to also change the share distribution for total education. According to Gartner Group, in the education industry, the e-learning share represented 10 percent in 1999 and 13 percent in 2000, and is projected to be 30 percent by the end of 2001.¹¹ These predictions show very rapid adoption of technology and internet-based learning. The shape and growth in

education will change especially through the next few years by the influence of both technology and business demands.

Drivers

Large-scale e-learning claims a huge cost advantage but, it is actually the time savings that is driving this new venue. E-education owes its rapid growth to the business sector. Employers are experiencing skill shortages and their need for speed drives a need for quick and efficient means of training. As new technologies come online, employees must update their skills as quickly as possible. Employers have also needed to distribute updated information quickly to a geographically dispersed workforce. Widespread Internet access, increasing bandwidth and better training technology make all that possible."¹³

Skills shortages in the knowledge areas are driving the shift to find new ways to up-skill and train people. This is also seen within the e-education sector itself. There are so many new organizations and so much interest that it's very difficult to find people. I don't know of any e-learning organization that doesn't have more jobs open than heads."¹⁴ Standards are emerging in order to address the many quality issues that have been raised by e-educational institutions. Elliott Masie, director of the Masie Centre For Learning in New York, says: "A recent memorandum of understanding signed by the key standards groups in e-learning signifies that a core set of specifications and accredited standards are emerging to support an inter-operable infrastructure for worldwide e-learning."² Employer needs, technology and business information demands are the strong drivers for this technology.

What does e-education mean for Higher Learning Institutions ?

Web education has not yet met its greatest challenge: how to create online courses as conducive to learning as classrooms.¹³ Graduates are the most sustainable competitive advantage that higher learning institutions produce. These institutions must be continually changing in order to produce the best graduates possible. This may not mean creating totally online courses but rather hybrid approaches that involve classroom contact that is combined with Information Technology. For students, not everyone is receptive to e-learning. Some are uncomfortable with the technology and prefer the old-fashioned, person-to-person method, states Patrick Von Schlag, director of strategic business development for Global Knowledge Network of Burlington, Mass., which specializes in training corporate information systems staff.¹⁴ Maintaining student focus is a strong challenge. Vicky Phillips, founder of www.geteducated.com, a consulting agency for distance educators, estimates the online student dropout rate at around 35%. The average attrition rate for college freshman at U.S. universities is around 20%¹³.

Bandwidth also remains a pressing issue; it is certainly not feasible to deliver, wholesale university courses online using 56K modems. Not everyone has computers in their home or workplace, coming into a physical setting would also be required for many. Continuing technology improvements will negate many of these physical barriers to e-education, but the elements of learning remain overlooked.

More and more in the commercial arena, companies are exploring how e-training can work with, rather than in place of, classroom training. HewlettPackard (HP), for instance, recently announced grants supporting studies of how people learn in Net-centric environments¹⁵. HP, which sells virtual classroom space through E-Learning-on-Tap, hopes the research will help determine the

right mix of instructional media and traditional training methods.¹¹ Web-based training enables companies to leverage the intellectual content of professors from the most prestigious universities and names such as Tom Peters, Ken Blanchard and an army of wannabes. Most of these thought leaders are eager to get aboard the e-learning express because they have recognized one immutable fact: no matter how good they are, they can only teach so many students in person. But with e-learning, the geographic barriers are lifted.¹¹ Companies like Deutsche Bank, People's Bank and Continental Airlines have partnered with outside companies to develop, host, and track part or all of their e-learning initiatives for a wide range of reasons.⁸ A senior manager in flexible learning delivery says "the general attitude of companies like Microsoft and BHP is that they know best, but they are making a fundamental error if they think the technology is the centre of online learning."⁶

An expert on adult learning, Stephame Burns has been studying and researching online learning since the early 1980s. Getting online learning right is important because Burns believes that the Internet can, if used properly, provide an unprecedented level of educational opportunity. "Poor-quality learning can have an insidious, debilitating effect. The difference with online learning is that we can switch off millions of people in one fell swoop."¹⁶

This is the opportunity for higher learning institutions to combine resources from business with the quality of their organizational and educational knowledge. Higher learning institutions have a vast wealth of experience and expertise that could be applied to business learning. The University of Phoenix, which has 10,000 online students, is one of the best examples of how a traditional institution can branch out into virtual education.¹⁷ This example could be applied to many higher learning institutions. If they are to work, virtual campuses have to create a sense of community in the same way as a physical campus - and the same applies to people at work.¹⁷ Tertiary education is a prime place for e-learning, with recognized c-learning providers such as ExecuTrain, SmartForce and NetG already attempting to provide an integrated virtual campus replicating what students would find on a real campus.

Higher learning institutions as e-ducators

Improvements in interactivity and the quality of course content will play major roles in how e-learning shakes out in the future. Higher learning institutions and organizations are beginning to recognize that web-based classes present a viable alternative to traditional training, and as bandwidth continues to improve, the number of users who take online courses is expected to increase. The problems to be addressed however will not be addressed by improved technology. Broadband advancements, bigger screens and improved two-way audio and video will make online training much more compelling but these aspects are not what constitutes learning. Pure online institutions are not providing what students require because they are focused on the technology and content rather than student learning. Higher learning institutions have the elements that are missing, they have the opportunity to provide the elements e-education does not currently provide. They have specialist educational and institutional capabilities that students benefit from. Change is not new to these organizations and more importantly their focus is on students rather than the elements of technology. Higher learning institutions can create online student learning by providing educational learning based upon their expertise rather than new technology and business drivers.

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ANNEXE H :
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What Constitutes Quality Teaching and Learning?

The new century has brought with it various technological breakthroughs that have given us new opportunities for creativity. What seems to be the emerging trend is that everything is going online. Dot.com companies keep multiplying. We have virtual libraries and online shopping facilities. Mobile phones now come equipped with WAP -enabled (Wireless Applications Protocol) technology that allows Internet access at the touch of a few buttons.

in the workplace, human beings are being replaced xvith mechanisation, in order to promote greater organisational efficiency, and effectiveness through the monitoring of workflow. Transactions between individuals are conducted (with the aid of electronic cash) across the virtual realm through fibre-optic and coaxial cables, rather than face-to-face.

Thus, considering the many things that are going online, the main question is "Should education follow suit by going online as well. If so, how would this new methodology improve the quality of teaching and learning?" Before answering this question, let LIS examine how far the concept of education itself has shifted from what was perceived as education in the past.

In *Temasek Polytechnic* we are taking a different approach to learning. Here, the students are currently experiencing a new scheme called Problem Based Learning (PBL). In PBL, the students are given a problem scenario that encompasses the topics for a particular subject. It is then up to us to do the necessary research, reading and inquiring to find the solution to the problem. The teacher is no longer there to teach in the traditional way, but to facilitate instead.

After we complete our work to a certain level, our facilitator will go through a list of the common errors that we had made, and then ask us a series of questions that help broaden our perspective on the subject in question and see where we went wrong. it is at this stage that we are most critical in thinking at different levels, instead of just focusing on one issue; it is here that we get to see the big picture.

The facilitator is a person who guides our work and monitors whether we are on the right track. His/her role is similar to that of possessing a compass when lost in a forest. Unlike a map, which tells you exactly where you should go, the compass just provides a sense of direction that may eventually show the way out.

Another difference in the PBL approach to education is that no lectures are held, and the students embark on finding the solution as groups. The basis of having its work in groups is to generate various viewpoints and information. It also fosters interaction with people, which is crucial in today's working world.

Only after coming up with sufficient information would the students be able to consult their facilitators to check if they are on the right track. This approach is desirable in that it makes students more independent (because they do not depend on the teachers to find answers) and more interdependent (because the students have to rely on the synergy between themselves and their group members to successfully find the solution to the problem).

it took me a while to get accustomed to this method of teaching, but after having been through it for one and a half years, I have grown to appreciate its ability to bring out the information stored intrinsically within students.

It is analogous to growing a plant. The previous method of teaching involved just providing the answers as and when the students requested them. It was something like just pulling the plant tip from the soil, in order to make it look taller.

With the PBL approach, the tutor draws the answers from the students. So, just as a plant naturally grows out towards the sunlight, the students grow mentally from the tutor's guidance.

Another approach is gaining increasing recognition in society. Around the world, we see schools implementing more Information Technology subjects in their syllabuses, and embedding elements of IT in core subjects such as English, Mathematics and Science. In *Temasek Polytechnic*, we too participate in an online Business Correspondence class, online tests and various other online activities.

Reverting to the question raised at the beginning of this essay, why do we want to branch out into e-education? What possible advantages are there in doing this? The answer is that students can get the information they need anytime in any place, since online capabilities make it possible that a student does not have to be physically present in a classroom.

So, now we have two potential tools for developing a more meaningful learning experience, namely problem based learning and online learning. The optimal e-education situation would be to somehow merge both philosophies. Perhaps, this may be done through online facilitation sessions in place of face-to-face meetings with the tutor, or online submissions of solutions to PBL problems. These are mere suggestions, and I believe the management of educational institutions would be able to come up with better ideas for combining both approaches, since they are more aware of how their respective organisations function,

In my opinion, PBL integrated with online learning would be an exceptional example of quality learning and teaching. This scenario would contain a balance between human interaction (i.e. through group PBL) and efficiency and effectiveness (i.e. through the use of technology) and would provide its with, inter alia, opportunities to expand our horizons of thinking and thus become better thinkers.

Moreover, it would emulate the working environment, and in doing so would create a strong base for students to become quality workers. I strongly believe that other learning institutions should consider adapting this approach. Remember, at the end of the day you do not want your students to graduate with just a slip of paper containing transcriptions of meaningless grades. You want them to be quality workers, and *Problem Based Online Learning* would make that goal not only possible, but probable.

ANNEXE I :
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**Learning to Live in an Online World: Exploring Abstract
Concepts Using Concrete Analogies**

Whole class or large group activities using learning technologies are logistically challenging when IT resources are scarce or in high demand. This applies not only in developing nations where access to computing equipment may be limited, but also in countries like the United States and Australia where sections of the community have reduced opportunities to participate in the new information based economy. A 1999 report of US Department of Commerce concluded that Americans on the wrong side of the so-called - digital divide - are about 20 times more in danger of being "left behind" (Irving 1999).

Educators across the world face the challenge to devise creative 'low tech' activities that can still powerfully explore terminology and issues to be encountered in the online world. Such activities allow those who have limited access an opportunity to learn about technology. To be effective, these learning activities should *engage* students in learning, whether or not technology is used.

Project Pegasus, an IT initiative of Edmonton Public Schools, Canada (1999), encourages educators to think about the difference between engaged and passive learning. In a nutshell, *passive learning* involves lower-level thinking skills such as comprehension and recall, focuses on content rather than the process and is generally physically inactive (an example might be sitting in a lecture theatre, listening to a lecture and taking notes). *Engaged* learning involves processes of inquiry, problem solving and creativity in which the student works both with other people and materials. However if computer resources are limited - or even nonexistent - the challenge is to find or develop materials for students that will engage them and enable them to gain an understanding of and confidence about online technology.

Following are several 'low tech' activities about the Internet and online technology I have used with teacher education students and with primary school students. They are effective because they start with existing reference points the students understand. Abstract concepts such as hosts, packets, glitches, security, anonymity, confidentiality, acceptable use, 'Spam', the perils of 'chatrooms' and even cyclical redundancy checking become clear when students use concrete objects such as balls, pens and paper, and each other to explore the issues. By engaging in the learning process, the students are able to gain an understanding of issues relating to being online and how the Internet works, in ways passively listening to a lecturer standing at the front of the room - or even watching a slick multimedia presentation - cannot.

One of the activities we have used is a game called Internet Ball from Stephen Gard's *The Internet: a resource for Australian Schools* (Gard, 1998). In this activity the participants stand in a large space in a grid pattern. Each student represents a 'host' in the 'network'. The aim of the game is to pass a ball - that represents a message sent over the Internet - from one end of the grid to the other, as fast as possible. Hosts unexpectedly become afflicted by 'glitches' and become non-functional, and an alternate host must be found.

This activity demonstrates the original purpose of the Internet: to create a highly reliable system for data communication. If one host in the system is knocked out, there is always another to turn to and the message gets through.

Another effective activity from Gard (1998) is Packet Panic, a game that demonstrates how messages are passed over the Internet in 'packets', with 'error-checking' to ensure that the whole message has been passed, and that its parts are reassembled in the correct order at the receiving end.

This is similar to the childhood game where a child is given a message and it is whispered to the next child and so on until the last child tells the group the message they received, which after passing through a succession of players invariably ends up different to the original.

Where Packet Panic differs from the children's game is that the 'sender' and the 'receiver' also maintain a dialogue in which they compare notes about what's been sent: any lost or damaged packets are resent until the message is complete and correct. The activity vividly demonstrates that modern data transmission techniques ensure almost error-free message handling (cyclical redundancy checking).

Finally, an activity developed by the senior author PaperNet (O'Brien 1998) is a 'pen and paper' exercise that introduces issues raised by online chat and email.

In this activity each participant is given a number - that represents their 'email address' - and sits in a large circle, facing outwards. The students send 'email' messages, written on paper, to the others that are delivered by students inside the circle representing the 'network'. Because (initially) no one knows who anyone else is, the students gain an understanding of being participants in a chat-room.

Later, the students sit facing inwards and repeat the exercise. Because they now know who they are communicating with, it is like sending and receiving email.

Following the activities, complex issues can be discussed and explored further. Questions that might arise are:

- *What are the advantages/disadvantages of being anonymous on the Internet?*
- *How easy is it to pretend you are someone else? What implications does this have when communicating online?*
- *Should ISPs be responsible for what people say to each other over the net?*
- *Did anyone send or receive a bogus message? Discuss the implications of this kind of online behaviour.*
- *How do we know someone is who they say they are?*
- *Should we give our personal details out over the Internet?*
- *What things can we do to make using the Internet safe?*

If an organisation is developing an Acceptable Use Policy, active engagement in exercises such as these will help the students involved understand the implications of such a document.

Here are some comments by year 4, 5 and 6 students (aged 10-12 years) who played the PaperNet game. At the time, none had ever used e-mail or chat before:

- *" I liked the first internet game the best because no one knows who you are and you can annoy people. I also liked being a networker. "*
- *" The Blind game was the best because I couldn't see who I was writing to. I got an e-mail saying, 'Who do you love ? ' I wrote 'Tom Cruise' as my answer. "*
- *" I liked the second game because I got lots and lots of mail. I got a letter that I hated. It said, 'You've got lovely eyes'".*
- *" It was hard being a networker there was so much mail to deliver I couldn't handle it. "*
- *" Someone asked me if I was a boy or a girl, and I said that I was a boy when I'm really a girl. It was fun Pretending to be someone else. "*

Students must learn to use technology well in context. By immersion in engaged learning activities such as these activities and others like it, students create a scaffold of understanding by operating within paradigms they are comfortable with. Abstract concepts can be explored, discussed, and dissected. Technology novices can gain confidence and awareness of what awaits them in the online world, even before they have access to a computer or the internet.

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