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Special issue on "Innovation in Distance Learning Technologies in Developing Countries"

Distance education has been widely spread across the developed as well as the developing world. The high population density, limited resources and infrastructure in the developing world make distance education an appealing alternative to deliver education to the vast number of people. Several distance learning technologies are being used in the world and number of technological advancements are being researched in the developed world. Due to the limited resources these technological advancements are not filtered into the developing countries. However, there have been many innovations in distance learning technologies carried out in the developing countries. Most of these innovations focus on getting the maximum benefit from the existing resources. This special issue on "Innovation in Distance Learning Technologies in Developing Countries" covers some of these innovations carried out in different parts of the developing world.

The paper by Prem Praksh and Madhulika Sinha looks at the distance learning technologies in the Indian context. This paper very concisely describes the different technologies being utilized in India to deliver distance education programmes. Ramos et. al. in their paper look at the technologies used to develop a distance education programme in Portugal. Fadde in his paper describes how peer assisted instruction can provide computer assisted instruction for students who do not have access to computers. He argues that peer assisted instruction can be developed in the same format as computer assisted instruction and conducted amongst peers, each helping one another. The fourth paper (by Wilson) looks at a project carried out in Brazil to exploit the characteristics of Advanced Internet in promoting the generation knowledge, developing human resources, and producing information technology projects geared towards education. Fox and Trinidad in their paper looks at rich assessment tasks, supported by technology, for distance learning which aims at preventing plagiarism. The next paper by Satar and Morshidi outlines a study conducted at Open University Malaysia looking into the web usability attributes of an in-house Learning Management System; myLMS. Amorim et. al. demonstrates how to overcome barriers due to low bandwidth Internet connections in developing countries. They demonstrated a system of text-based interaction to overcome the problem of low bandwidth for a target audience of one thousand teachers in Brazil.

"GUS program is a comprehensive and holistic approach to building smart and creative communities in developing countries for e-learning and e-healthcare/telemedicine". Takeshi describes the GUS program and its initiatives as well as financing bodies. The GUS program is a global program open for any interested parties and will help in the e-learning developments for developing countries. The final paper (by Isabella) looks at an ongoing project, looking at the role of ICT in teacher training in Brazil. Overall this issue of the newsletter looks at the some of the innovative projects carried out in the developing world to overcome economic and technological barriers in delivering distance education.

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Distance Education Technologies in the Indian Context

Introduction

Open and Distance Education in India effectively commenced with the Andhra Pradesh Open University (subsequently renamed B.R. Ambedkar Open University) in 1982 for higher education, and the National Institute of Open Schooling in 1989 for primary education. Distance Learning has progressed in rapid strides since then, and India is now home to some of the world's largest open universities, with over 100,000 enrollments each, and deploying a variety of educational media that include interactive radio and television, teleconferencing, multimedia and the World Wide Web. This article briefly dwells on the major distance learning technologies coming into common use in the Indian distance education scenario today.

In its initial phases, the mode of distance education was primarily through print medium-based correspondence courses. However, thanks to the IT revolution and Moore's Law, extensive use of electronic media has become a viable option, with most of today's open and distance education programs going this way. This article aims to take a brief look at the various technologies currently in use for distance education in India.

Radio

There are over 200 radio stations in India, reaching out to over 98% of the population. Despite the advent of television, it is estimated that there are close to 125 million radio sets in India (about one radio to eight individuals, given the current population of just over one billion). The use of radio as a means of distance instruction received a fillip with the introduction in 2002 of the country's first full-fledged educational radio station, ***Gyan Vani***, (Hindi, translates into Voice of Knowledge) providing a wide range of educational programs. Ten Gyan Vani stations currently operate from different cities in the country, with more on the anvil in the near future. Major open universities like the Indira Gandhi National Open University (IGNOU), Delhi and the B.R. Ambedkar Open University (BRAOU), Hyderabad use radio slots provided by All India Radio to broadcast educational course modules, and also provide interactive radio time to their students, during which they can phone-in and discuss their queries.

Television

Though quite late as compared to many other countries, the advent of the television has been phenomenal, with over 80 million (and rising) television sets in Indian homes today. The government owned national network, Doordarshan, launched it's first dedicated educational channel, ***Gyan Darshan*** (Vision of Knowledge), in 2000. ***Gyan Darshan-3***, launched three years later, is a technical education channel that broadcasts lectures from leading institutes like the prestigious IITs (Indian Institutes of Technology) to engineering students all over the country. While the use of television in educational broadcasts has become more popular, with universities like BRAOU launching their own KU-band channel and private channels like Zee starting the Zee Education Channel (ZED), it has been noticed that issues like telecast timings can have a considerable influence on dropout rates, as viewers have to compromise on routine chores in order to attend the courses.

Educational Videos

A common approach used by distance education providers is to set up well equipped study centers where students can view video lectures of the courses in the presence of a local instructor. A pioneering case to point in this context is the IIT, Kharagpur, which launched an off campus distance education programme in IT called "Electronically Networked Life Long Learning" or ElNet-3L in short. The ElNet-3L project followed a well researched academic model and at one point of time had nearly 110 study centers spread throughout India. More universities in India are recognizing the utility of such study center-oriented, video material based teaching methodologies : for instance, Dayalbagh Educational Institute, Agra, a mid-level deemed university based in northern India, has set up a distance learning center at M.T.V.Puram, a town in southern India, and is producing video lectures in vocational training for students at this remote center.

Satellite-based courses

Satellite-based communication has been in active use in India, ever since the Satellite Instructional Television Experiment (SITE) in 1975-76 was conducted with the American ATS-6 satellite. Satellite-based transmission for distance education is being used by premier schools like the Kanwal Rekhi School of Information Technology, IIT, Bombay, whose distance education model aims at making lectures by IIT faculty available in real-time to students at remote centers through a VSAT network. With the entry of international educational groups into the country, this model is being increasingly for the distance education programs of several foreign universities in India like the University of Illinois at Urbana-Champagne, Illinois Institute of Technology, Chicago and elite Indian schools like the Indian Institutes of Management (IIMs) at Bangalore and Calcutta.

In conclusion

The authors have endeavoured to present a very concise view of the technologies in use today for distance education in India. With the increasingly widespread availability of low cost and high speed broadband connectivity, there is strong evidence that web based distance learning and virtual classrooms will rapidly become de rigueur in the teaching-learning process of the near future.

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ICT in a Portugal-Cape Verde distance education program in Multimedia in education and training

Program presentation

In 2004, the Calouste Gulbenkian Foundation invited the University of Aveiro to organize an education and training program in advanced ICT topics for Cape Verde. The target audience should be higher education staff, including teaching staff and technical support staff, and the topic focus should be on technologies to support development of distance education in Cape Verde, a strategic asset in an archipelago type country.

The distance education program includes a 2 years Master's program in Multimedia in Education, and a set of 8 short duration training courses in topics related to multimedia technologies. The Master's program includes the following main subjects:

Year	Semester	Course topic	Credits
1st	1st	Development of Educational Multimedia	3
		Communication Technologies in Education	3
		Distributed Learning Management Environments	3
		Educational Software Evaluation	1,5
	2nd	Multimedia and Cognitive Architectures	3
		Distributed Learning Communities	3
		Seminar (dissertation project)	3
2nd		Dissertation	-

Each course topic has a duration of 4 working weeks, with the exception of Seminar that lasts for 8 working weeks, and includes two 3 daylong face-to-face sessions. Each course is pedagogically organised on a learner centred basis, achieved by an activity oriented work plan. For each activity an initial set of learning resources is provided, but extensive research on further information resources is actively promoted. Students, organized in groups, strongly engage in asynchronous interaction based on discussion groups. However, learners are free to use synchronous communication, although experience tells that this kind of tool is used basically to support short discussions mainly related with logistics issues (who does what, time organization, resource identification, etc) or to quickly generate consensus relating to "long" lasting unsolved issues. Figure 1 outlines the operational model used in each subject of the Master's program.

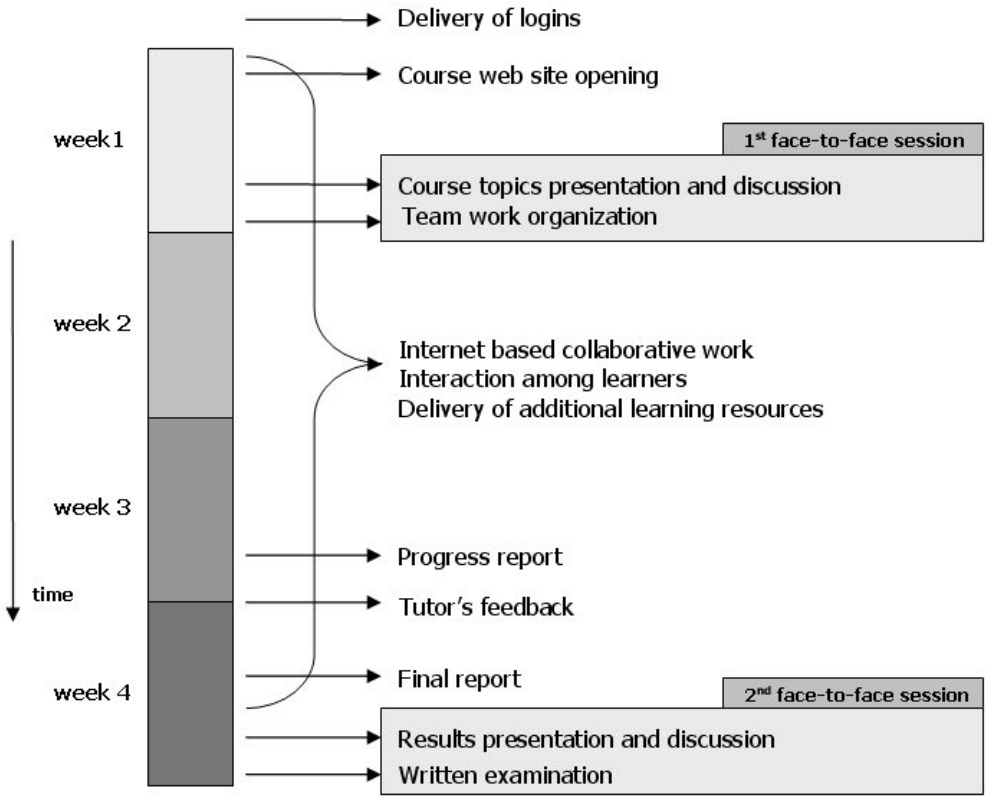

Figure 1: Operational model of each course of the Master's program.

The final Master's thesis must be presented and discussed with an academic tribunal, in a 90-minute public session. Three professors compose the tribunal, at least one of them from another University.

In parallel to this Master's program, a set of training courses in multimedia technologies are being organized. Eight subjects were selected from 17 available at the eLearning@UNAVE.pt ICT distance education program:

- Introduction to Multimedia
- HTML programming and web pages development
- JavaScript programming
- Digital image edition
- Digital video and audio edition
- Multimedia scripting
- Multimedia authoring
- eLearning technologies

Each topic has a 4-week duration, with a 3 daylong face-to-face session in the first week. Work in the following weeks is organised according to a model similar to the one used for the Master's program.

Technological support

The distance operation in this program mainly relies on an LMS-Learning Management System. Currently the Blackboard Academic Suite™ is being used. The LMS provides tools for document delivery and sharing, and asynchronous and synchronous communications among students, located in different islands of Cape Verde, and among students and tutors located in Portugal.

The program included the creation of a resource centre in Cape Verde, actually installed at ISE-Instituto Superior de Educação, on the country's capital, Praia. This centre is equipped with 10 desktop computers, printer, scanner, digital photo and video cameras, wifi 54 Mbps hotspot and a dedicated ADSL 512kbps Internet connection, limited, however, to 128kbps on the upstream.

Beyond the LMS, experiments on the use of blogs and wikis are being carried out providing additional contexts for interaction and shared knowledge construction. For this purpose a local installation of Wordpress Multiuser and MediaWiki are being used. To allow students to easily follow all posts and comments produced by the community members (20 blogs - teachers and students) some RSS feed aggregation tools (Netvibes and Google Reader) were introduced and used along the courses. These additional tools are proving to be very effective, because students started to look at the Web in a different perspective, increasing the sense of community inside the class. Most students had low technological skills and this situation made it difficult for them to become Web content developers with traditional Web development tools. The use of blogs and wikis contributed to the modification of this scenario, and was a starting point and a challenge for students to develop their technological skills. The use of blogs also had a special impact on the strengthening of personal relationships between community members. Within each individual blog, teachers and students had the opportunity to publish content related to the course topics, as well as content of a personal nature, giving each student a space for self expression, essential for community members to share personal experiences, interests and expectations. This form of communication, usually difficult to develop inside the LMS discussion forums, had a key role on the establishment of stronger connections between community members and had a positive impact on the growth of communication during the course.

Currently, videoconferencing is being prepared, also, to help support the 2nd year operation of the Master's program, which comprises the thesis preparation that requires strong interaction, on an individual basis, between students and theirs supervisors. Furthermore, videoconferencing will be mandatory for the final master's thesis public discussion, as a cost effective alternative to displacing to Cape Verde a huge number of professors for the vivas.

The University of Aveiro has a videoconferencing studio supporting H.320 and H.323 communications. It is a high performance facility installed by the Portuguese national computing agency (FCCN), and runs over a broadband connection. However, its investment and operation costs and its end-to-end high quality are not compatible with the limited budget of the project and with the technological options available in Cape Verde, namely as far as the upstream ADSL connection bit rate is concerned. Currently, a more modest, but cost-effective, portable H.323/H.264 desktop PC based option is being identified and will be installed for trial operation starting October 2006.

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Delivering Computer-Assisted Instruction Without Computers

Introduction

The effectiveness of computer-assisted instruction (CAI) programs has been well documented, especially in the areas of basic arithmetic and language learning. The problem in developing countries is that many classrooms and homes don't have the computer capability to take advantage of the interactive, individualized instruction that CAI offers. Peer-assisted instruction (PAI) incorporates two proven instructional methods, CAI and peer tutoring, and addresses the major limitations of both – CAI's need for computers and peer tutoring's need for skilled tutors. In a PAI classroom activity, pairs of students alternate roles as learner and facilitator. In a home setting, a relative can act as the PAI facilitator. The facilitating peer performs the instructional management tasks handled by the computer in CAI programs: presenting items, taking and judging learner input, providing immediate feedback, branching based on learner achievement, and record keeping.

Note that the facilitating peer is not acting as a teacher. The organizing principle of PAI is that the facilitator's role is based on and limited to the basic CAI approach as it was established in the 1960s and which was an extension of what programmed instruction and teaching machines had been doing since the 1920s (Fry, 1963).

Individualized Instruction

The goal of PAI is to provide interactive, individualized instruction. Writing in 1967, Patrick Suppes – an early designer and researcher of computer-assisted instruction – noted that the theme of individualized instruction had been prominent in educational theory for over 50 years. "Psychologists have shown that individuals differ in their abilities and their rates of learning. Unfortunately, the cost to provide individualized instruction that adapts to these differences is prohibitive if it depends on the use of professional teachers. The computer offers perhaps the most practical hope for a program of individualized instruction under the supervision of a single teacher in a classroom of 25 to 35 students (Taylor, 1980, pg. 233)."

Peter Rosenbaum, an early participant in the development of CAI programs, expressed the idea of replacing the computer with a peer facilitator in a 1973 book titled Peer-Mediated Instruction. "Might it not be possible to devise a special buddy system interaction that would simulate these causes [of proven CAI effects], thereby achieving similar, conceivable even greater, instructional gains at low cost? In other words, might it not be possible for one student to simulate the computer for his peer (pg. 14)?" Rosenbaum oversaw the development and implementation of a number of peer-mediated instruction programs in public education and corporate training, but there is little evidence of continued use or development of the approach. However, some peer-tutoring strategies have incorporated elements of the "simulated CAI" approach.

Peer-Tutoring

There is a large body of research and writing related to peer tutoring strategies. These usually involve a student at a higher grade or achievement level providing direct instruction to younger or less successful students, either in classroom or individualized settings. Although the student tutor is a peer, such interventions cast the tutor as the teacher. However, the focus here is on interventions that emphasize in-group, reciprocal, paired-learner strategies. One such strategy is Peer-Assisted Learning Strategies (PALS). The PALS approach involves the use of prepared materials (that are available for purchase) and focuses on basic mathematics and reading skills (Fuchs et al. 2001). A central concern of reciprocal peer-tutoring strategies is how much can be expected from the peer who is assisting the learner. PAI's organizing principle of simulating CAI ensures that the facilitator role does not extend beyond the capability of peers.

Peer-Assisted Instruction

PAI is an organizing principle more than it is a distinct process or product. Teaches and instructional developers can enhance existing instructional activities by incorporating the type of interactions that would take place in a CAI program designed to teach the particular content. Consider an instructor in a foreign language class who

uses vocabulary flashcards in a group setting. In PAI the instructor arranges learners in pairs and has them drill each other using multiple sets of flashcards. One student is in the role of learner and the other in the role of facilitator. The facilitator is responsible for the instructional management tasks that a CAI program would typically perform, including:

1. Select an appropriate level of initial difficulty based on the learner's choice or on a record of the learner's previous achievement.
2. Define the item pool and randomize items (i.e., shuffle the cards).
3. Present items, take learner input, provide immediate and corrective feedback, and keep score.
4. Retire items or place them in the item queue according to the rules of the particular queuing routine being used.
5. Provide summary feedback at the end of the drill and – based on the learner's performance – direct the learner to repeat the drill, branch to a more difficult level of the drill, reference remedial instruction, or end the session.
6. Record data concerning the particular drill, the level of difficulty, and the learner's score in a database that can be checked by the instructor and can be used to direct the learner's progressive mastery over numerous sessions.

The teacher's role in a PAI activity is that of a learning consultant who circulates between dyads monitoring progress and providing needed assistance. The instructor who embraces PAI is led into a level of instructional design that is seldom engaged in classroom settings. It requires discipline and creativity, but rewards the effort with low-cost, interactive, individualized instruction.

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TIDIA Ae: Electronic Learning on the Advanced Internet

The TIDIA Ae electronic learning project is an induced research initiative funded by FAPESP in Brazil as part of the program Information Technology for Advanced Internet Development – **TIDIA**.

The purpose of the TIDIA e-learning project is to promote the generation of knowledge, the formation of human resources, and the production of science, technology and products in the area of Information Technology applied to education, exploiting the characteristics of the Advanced Internet.

The project aims to build a flexible platform for learning management system (TIDIA Ae LMS). This platform will serve as a practical environment for conducting research experiments and developing e-learning related issues and products. It will play an important role as a platform for the large-scale use of e-learning in academic and business training environments.

To render its development and use more transparent, independent of an operational platform, with interoperability and portability, and to ensure its wide availability, this platform is organized according to an open architecture. Its implementation is based on JAVA technology and the distribution regulated by an open source GPL license.

The major issue addressed in the project is: "How can the potential of the new information and communication technologies be exploited to support the continued e-learning process on a large scale? (Learning Forever)"
In the search for the answer to this question, several challenges are identified which must guide the process of research and development of e-learning in the coming years. Highlighted below are some of the fundamental aspects that will enable the TIDIA e-learning project to produce results:

- A conceptual model for the representation, modeling and implementation of the e-learning process designed for the large-scale application of multiple pedagogical methodologies.

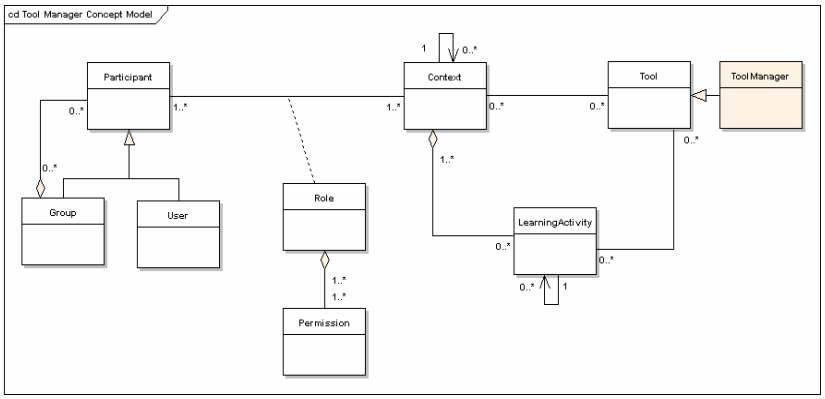

Figure 1: TIDIA Ae conceptual model

- An open architecture establishing a reference model and supporting modular components composition.

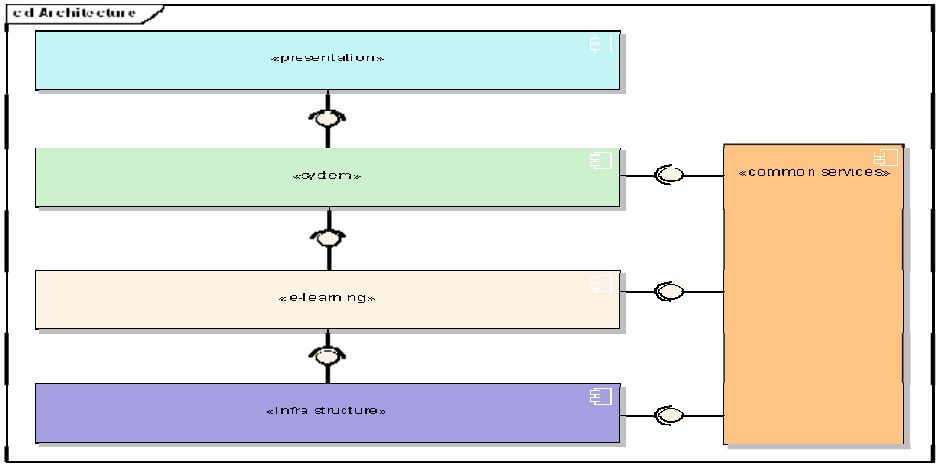

Figure 2: TIDIA Ae open architecture and reference model

- Design methodologies, methods and tools for the large-scale development of e-learning systems adaptable to the profile and context of its learners.
- Development of devices, techniques and tools for interaction and collaboration in community environments, including mobile learning communities.
- Development of a testing environment (test bed) to allow practical experiments to be carried out involving situations of interaction, collaboration and evaluation of learning in this new environment.
- Interface techniques aimed at facilitating the learner's interaction with the machines, tools and systems of electronic learning.
- New forms of support for the memory of these learning communities based on efficient search processes and the presentation of multimedia contents.
- Techniques, processes, tools and systems of immersion and virtual or enhanced reality, enabling the learner to gain a deep and meaningful understanding of the aspects represented therein.
- Definition or adaptation of standards and profiles for service interfaces and object representation and learning actions to render feasible the reuse of systems, tools and contents developed in different communities, increasing the synergy and efficiency of the material production process for the construction of knowledge.
- Advanced authoring tools that can enhance the learning environment through the construction of interactive learning objects and actions, including software agents and intelligent avatars.
- Development of educational games with multiples agents or intelligent avatars adaptable to the learners' profiles.
- Collaborative and problem based authoring methods, techniques and tools for the performance of complex tasks.
- Techniques, methods and interfaces adaptable to mobile devices and to their limited input and output interfaces.
- Generalization of the conceptual model of e-learning, allowing for its application in several possible areas of knowledge, constituting an infrastructure ("e-all") for secure, continued and efficient online services and business on ubiquitous and pervasive networks.

Based on this broad-scoped perspective, the long-term vision of the TIDIA project is to generalize the results of e-learning in the definition of new models, architectures, solutions and systems for providing online services and making business operational on the advanced Internet in distributed environments. The determination of the distinctive characteristics of each of these new environments represents further research challenges that will undoubtedly be overcome by using the results obtained through e-learning.

This project has been conducted by more than one hundred researchers working at 15 of the most important research laboratories acting in the field of e-learning in the state of São Paulo, Brazil.

The project is organized in two phases. The first phase focuses mainly on the development of a platform to carry out experiments and to allow for the practice of e-learning with aspects of interaction and collaboration, exploring the characteristics of the advanced Internet – the TIDIA e-learning system. A proof of concept is already available: http://tidia-ae.usp.br .

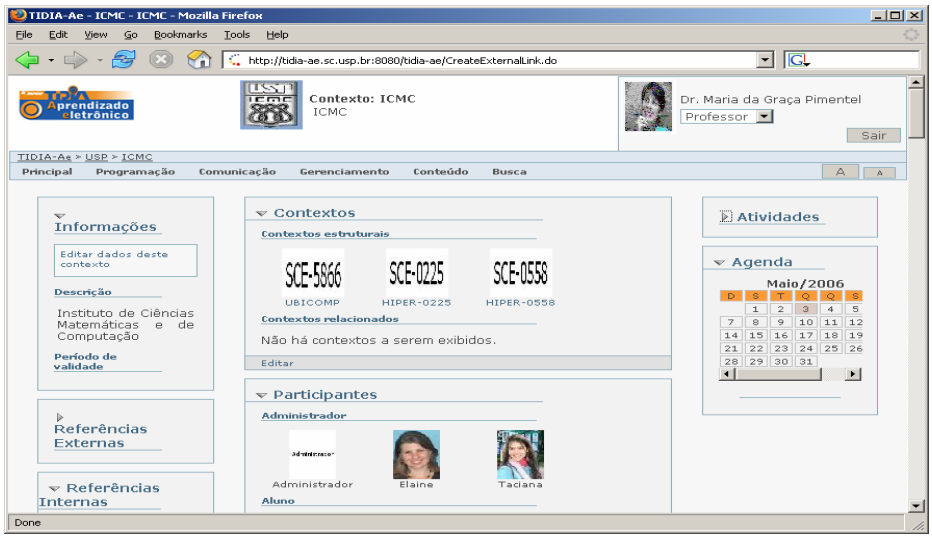

Figure 3: TIDIA Ae platform – Proof of Concept

The second phase, which is currently being started, focuses on the complementation of the TIDIA e-learning platform and the conduction of exploratory research activities, using the experimental platform produced in the first phase to generate knowledge and expand the practice of the learning actions developed and mediated with the TIDIA e-learning manager.

The foundations of the e-learning research project can be summarized as follows: assured quality of service, high fidelity interactivity, large-scale collaboration, a balance between security, privacy, flexibility and easy use of the systems and tools, technical and scientific innovations resulting from the challenges of the implementations produced, and generalization of the results of e-learning enabling services to be rendered in a wide range of online business areas.

The successful generalization of the conceptual and architectural results of the TIDIA e-learning project will underpin the opening of new research lines for the investigation of new models to render services and make online business operational on the advanced Internet. Areas such as telecommunications, e-business, telemedicine, teleservices, telesupport and others will be able to apply the "e-all" infrastructure to implement and render operational their online business transactions.

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Assessment Driving The Learning, Technology Supporting The Process

Abstract: Assessment tasks should be designed and developed to focus on the student's learning and not just the teaching of a module. In this module a series of rich assessment tasks are used to allow individuals and groups of students to construct their own knowledge in a social context to produce quality learning outcomes. This paper illustrates how such assessment tasks supported by the technology can drive the learning and prevent students from regurgitating plagiarized facts.

Background

The University of Hong Kong provides on-going education for teachers and education professionals within the Faculty of Education through a Masters degree in Information Technology in Education or MSc[ITE]. The MSc[ITE] offers a flexible modular structure enabling students to progress according to their own pace. Central to the course is an online course room - Interactive Learner Network (ILN) which supports computer-mediated-communications.

Using the technology to support the teaching and learning process

ILN is a community-building environment designed to scaffold virtual education communities of practice where teachers and students work together as teams and engage in reflective, collegial patterns of work. ILN facilitates both cognitive as well as social scaffolding, which enables educators and students to become progressively more involved in the community and to sustain their commitment and interests. This environment is designed to support academic programmes that rely heavily on pedagogies that emphasize the emergence and growth of autonomous collaborative learning, rather than teacher-directed delivery of learning materials.

The experiences discussed in this paper are based on those used in the foundation module. This first module sets the scene for the course by modeling sound learning, teaching and assessment practices. It uses a series of rich assessment tasks (Trinidad & Albon, 2002) where students compose elements of group and individual activities to construct their own knowledge. A social constructivist approach is used where the learning experiences are structured with the philosophy that learning does not take place in a solitary manner but in a social active learning environment where the learner is given every opportunity to construct their own learning in a social context.

Building quality teaching, learning and assessment environments

There is a growing movement towards designing electronic learning environments that recognize the communicative powers of the Internet to support an active and constructive role for learners (Oliver & Omari, 1999; Salmon, 2000; Trinidad & Albon, 2002) this module is used to model such modern ways of learning, teaching and assessment. There are many factors that influence the learning experience such as the infrastructure, the quality of content and assessment, the quality of learner support systems, the assumptions made by learners and educators about the learning experience itself, the educational design and peer support networks for learners and educators (Aldridge et. al., 2003; Macnish, Trinidad, Fisher & Aldridge, 2003; Trinidad et. al., 2001). Considering the complexity of these factors can have on the learning experience the module content and assessment tasks are carefully structured to assist the students to learn in a supported and effective learning environment where the assessment tasks drive the learning and the technology supports the learning process (Albon & Trinidad, 2002; Trinidad & Albon, 2002). The module consisted of authentic activities, materials and assessment tasks that involve real life challenges through engaging and collaborative efforts as shown in Table 1. Herrington et. al. (2001) guidelines for pedagogies used in producing quality learning, teaching and assessment materials.

Table 1: The pedagogies used in quality learning materials

	Description	Examples
Authentic tasks	The learning activities involve tasks that reflect the way in which the knowledge will be used in real life settings	Problem-based learning activities using real-life contexts; Learning tasks based in workplace settings Tasks are complex and sustained
Opportunities for collaboration	Students collaborate to create products that could not be produced individually	Tasks are set that require students to collaborate meaningfully Peer-evaluation, industry mentors Buddy systems employed to connect learners
Learner-centred environments	There is a focus on student learning rather than teaching	Teacher s role is one of coach and facilitator Inquiry and problem-based learning tasks Activities support and develop students metacognitive skills
Engaging	Learning environments and tasks challenge and motivate learners	Interesting, complex problems and activities rather than decontextualised theory Activities arouse students curiosity and interests Activities and assessments linked to learners own experiences
Meaningful assessments	Authentic and integrated assessment is used to evaluate students achievement	Assessment is integrated with activities rather than separate from them Opportunity to present polished products rather than simple drafts Opportunities exist for students and their teachers to provide support on academic endeavour

Source: Herrington et. al. (2001, p. 267).

The rich-assessment tasks that drive the learning

This module is successfully run by forming groups of two to four members and these groups participate in online activities for the 12-week duration of the module. Students are expected to complete two assessment tasks which are made up of an individual component worth 60% of their grade and a group component which is worth 40% of their grade. The individual assessment task takes the form of an e-portfolio, which consists of a number of compulsory components, including reflections from each session using the KWL process (Ogle, 1986), documenting roles, responsibilities and participation undertaken in the group assignment and a 2000 word report evaluating the use of ICT in the student's own workplace.

The group work consists of two parts. In Part 1 each group is given a topic with one "suggested" reading to comment on online. Student groups are asked to critically evaluate the usefulness of each of topic, the group's comments on the reading and then submit their findings to the online course room ILN. Each group has to critique at least two other group's papers and reviews and complete the quiz/questions provided. Therefore each group, in an attempt to analyze, synthesize and evaluate new information, has to prepare a summary of a minimum of one paper within their group, one book chapter, prepare a quiz or set of questions that can help the other groups learn about the topic.

For Part 2 of the group component assignment, members need to construct a report that compares and contrasts the practical application of the use of ICT in their own individual workplaces. This summary report is constructed from the group member's individual reports and shared online for comment. This gives the group an opportunity to again analyze, synthesize and evaluate data within the group and across the class as a whole. Such data is produced with a purpose and for an audience not just the lecturer to grade. All assessment components require original thought and comment by one or more members and therefore there is less opportunity to regurgitate facts or to plagiarize. The groups design and comment on the assessment rubric used to give feedback to peers during the process.

Conclusion

This paper reported on the teaching, learning and assessment tasks used in the foundation module for the Masters programme. In this module, technology is used to support a pedagogical practice which is important for students in a programme where the integration of the technology, study and assessment strategies, and collegial work are fundamental to the teaching and learning process. The learning experiences used in this class and offered online, provide students with a rich experience that enables and empowers them to extend their study and continue individual and group work activities at a time and place convenient to them. The learning, teaching and assessment processes provided through the e-learning activities also give students an opportunity to work, reflect on, share and develop new ideas and learning experiences which is critical to constructing new knowledge and enduring understanding.

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Web Usability Attributes of e-learning System Platform in Malaysia: A Progress Report

Developments globally seem to have elevated the importance of lifelong learning, making them central to the discourse of education and training in Malaysia. Increased globalization and interdependency of national economies, helped by the worldwide removal of trade barriers and the lowering of transportation costs, have created a more homogenized international system of processes and transactions and a global structure of economic competition (Walters, 1997). Human capital is becoming the chief source of economic value while education and training are become lifelong endeavors for millions of workers (Stokes, 2003, Urdan & Weggen, 2000). This study focuses on an empirical evaluation of e-learning system platform, namely myLMS web usability attributes. In this very study, web usability attributes measured are Learnability, Accessibility, Navigation, Consistency and Visual Design. The main aim is to find whether younger learners experience better web usability compared to their older peers.

Despite of the advancement and usage of e-learning as a life long learning tools, however, e-learning needs to be designed in a manner that will support the quality of learning effectiveness and usability. The issue being that the focus is so far has been more on technology problems rather than on quality of learning, mainly it is focus on the "e" and not on the"learning" part (Zaharias, 2003; Lohr, 2000). The issue with e-learning design rooted from two main causes: the first has to do with techno-centric design (Lohr, 2000) where pedagogical design elements are not clearly reflected in e-learning design and the second refers to poor usability of e-learning courses (Zaharias, 2003). Techno-centric design currently is the dominant approach; in such designs software orientations that often make more sense to a computer programmer than to a learner are mostly represented in e-learning course interfaces.

In addition, many current e-learning interfaces are also poor examples of graphic design featuring fussy background fills and distracting animations that ultimately direct the learners' attention to the elements that surround the core learning information, rather than the core information itself (Lohr, 2000). Effective pedagogical considerations and key tenets of latest developments in learning theories are usually neglected or not effectively implemented in techno-centric e-learning design. Furthermore poor design and usability significantly adds to the quality problem (Bonk, 2002; Massy, 2002; Notess, 2001; Smulders, 2002) resulting in non-motivated learners (O'Regan, 2003). High drop-out rates for e-learning courses reflect that learners fail to complete e-learning courses (Clark & Meyer, 2003, Ganzel, 2001; Svetcov, 2000), low levels of learners' satisfaction and motivation (Piccoli et al., 2001) and learners' frustration (Nielsen, 2001).

The learning management system known as MyLMS is used at OUM as the e-learning platform. Through the mediation of MyLMS learners are able to control their learning at their own pace and convenience. MyLMS is packed with e-learning tools enablers such digital library, e-mail, chat, online forum, academic links as well as courses information. Electronic communication tools such as e-mail, online forum and chat rooms are provided to facilitate interaction among learners, tutors and Subject Matter Expert (SME).

Usability has many working definitions. According to Shackel (1991), the usability of a system can be defined as "…capability in human functional terms to be used easily and effectively by the specified range of users, given specified training and user support, to fulfil the specified range of tasks, with the specified range of environmental scenarios". Nielsen (1993) supports that "usability is a main component of system's acceptability; it is a multidimensional property of user interface". ISO standard (1997, 1999) also views usability as a measure of the quality of a software system; it determines the quality of the user experience or the user interaction with the software system. It can be said that the most widely used and recognized definition of usability is that of ISO (1997): "Usability is the extent to which a product or a system can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use". Collectively, there are three main working definitions as simplified in this the following table:

Table I: Differences definitions of Usability

Shackel (1986)	Nielsen (1993)	ISO 9241-11 (1998)
Learnability	Efficiency; Learnability	Efficiency
Effectiveness	Memorability; Few Errors	Effectiveness
Attitude	Subjectively Pleasing	Satisfaction

A survey was conducted on a group of Information technology learners from Open University Malaysia (OUM). The learners have been using the platform for the last 2 years as their main asynchronous learning tool. There are more than 42,000 registered learners in this university representing the total population of 26.04 million Malaysian (Malaysia, 2005). These learners depict multi-cultural races such as Malays, Chinese, Indians, Ibans, Kadazans, Bidayuh and others. (DOI, 2005). Hence, appropriate awareness of usability and instructional design on the learners is vital to a success of usable e-learning design.

The result has shown that the levels of web usability attributes are at medium level. Bonferroni test result collectively older learners tend to report better usability experience compare with younger learners. The general web usability level of older learners registered higher level than of the younger learners (mean difference = -0.17716, $p<0.000$) All other five facet attributes registered the similar results. Refer to the simplified Table II. This findings may be caused by the fact that the more experienced and senior IT learners posses higher computer navigational skill than their younger and less experienced peers.

In conclusion, the present study findings contradicts the popular myth of younger learners tend to adapt and use e-learning system or technology easier than their older peers. Apart from that, this study also signifies the need to extend the research to learners of different subfields such as liberal arts or business.

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Distance, Flexible and ICT-based Education in Brazil

Abstract: This article demonstrates how the use of a GNU General Public License software for Distant Learning developed at UNICAMP guaranteed text-based interaction for a population deprived of broad-band Internet access in a course for one thousand teachers in Brazil. This research showed that an institution committed to reducing the digital divide may offer ICT-based solutions for education that favor quality learning under different restrictions.

Introduction

Although the power of the Web is in its universality, most people in developing countries cannot use ICT (Information and Communication Technology) in their daily lives. In Brazil, many economic and social barriers to computer use result in lack of opportunities for training, limited access to a social environment that encourages Web use and restricted access to high-bandwidth connections.

The State University of Campinas, one of the highest academic centers in Brazil, is committed to reducing the digital divide by offering ICT-based solutions for education. This paper describes a course for one thousand High School teachers in which opportunities for training were provided, composed of two thirds of traditional classes, and one third of Distant Learning interaction through the use of TelEduc, a free educational software for the Linux operating system.

Due to the limited access to high-bandwidth connections, these teachers/students would not be able to use a rich combination of media, benefiting from the pedagogical strengths of each medium. Despite the fact that print and simple hypertext were the most common media used, we observe that the way a medium is used is more important than the particular technologies selected.

That is, the design and development methods used guaranteed the expected learning outcomes while focusing on regular feedback on assignments, extensive commentary and examples, clear objectives, good course structure, opportunities for interaction, small units with a single instructional objective, etc. Persistence and the need to succeed were fundamental characteristics from students that positively affected the completion of the course.

Next we briefly demonstrate how the use of the Distance Learning environment TelEduc guaranteed the quality through a text-based interaction for a population deprived of broad-band Internet access.

The Situation, The Challenge And The Solution

In Brazil the main obstacles to the Internet use for education and training are shortage of computers and Internet connection in classrooms, insufficient teacher training and lack of appropriate content, which were confirmed in a Specialization Course in the field of Human Sciences and its Technologies entitled “Citizenship and Culture”.

In a knowledge-based economy, the lack of access to the Internet deprives people from information. In order to educate the next generations, UNICAMP’s faculty perceived that it is crucial to prepare teachers from all educational levels to handle technology, qualifying them to integrate this tool in their praxis, as a source of information and as a means of exercising citizenship.

The course pursued the achievement of intellectual and pedagogical competences, having as axis the theme of Citizenship and Culture, following the idea of the education of the person for the life and the world of work. It was conceived in modules on concepts of Historicity, Patrimony, Memory, Diversity, Work, Technology, Ethics, and Nature.

Initially, a module of basic computers classes was not planned nor even informatics applied to education, due to the expectation that all the teachers enrolled would be acquainted with the use of technologies in general, particularly the Internet, as more and more the teachers have been facing the ICT, in order to raise productivity and the access to the updated information. Although the heavy federal and state investments in the informatization of schools, most of the teachers/students did not access the “virtual classroom” in the beginning of the course, in the second semester of 2005.

This made urgent the realization of a week of classes on Distance Learning, focusing on the use of TelEduc, because the difficulty detected was not related to Distance Learning itself, but to the lack of understanding of basic informatics, which prevented the teachers from accessing the "virtual classroom" frequently.

Thus, the professors from UNICAMP preferred to add two live meetings to elucidate not only doubts about the modules and the Monograph, but also about basic informatics and Distance Learning, emphasizing the fundamental competences for the use of TelEduc.

The great difficulty of the teachers in using the Internet in the teaching and learning processes is explained by the activation of self-teaching and self-discipline, due to the necessity of achieving targets and deadlines following basically written instructions; a task that generally demands more from the students than the traditional educational activities, in which the orality is more emphasized than the writing.

It called our attention the fact that many teachers expressed concern with the occasional use of the tool of statistics generation of accesses in the TelEduc as instrument of evaluation, because they intended to access the environment only in the moment of the submission of the Monograph. Such teachers had access to the material displayed at the TelEduc by their colleagues, who shared files stored in floppy disks or in printed form.

In this sense, this pioneering offering of a course partially via Internet to such a heterogeneous public created especial conditions that led to a necessary adaptation by the faculty of UNICAMP. This in no way compromised the quality of the original proposal, but tried to meet the more specific needs of the teachers, stimulating a pro-active attitude relative to the use of the environment of Distance Learning for the sending of the activities within the deadlines.

Conclusion

As a suggestion to a future similar course, it should be considered the inclusion of specific classes on basic ICT, with emphasis on Distance Learning. Having the fluency in technology and the infra-structure of access guaranteed, it would facilitate the development of the activities involving more interaction between the faculty of UNICAMP and the public school teachers, which would reflect in a major utilization of the tools of TelEduc.

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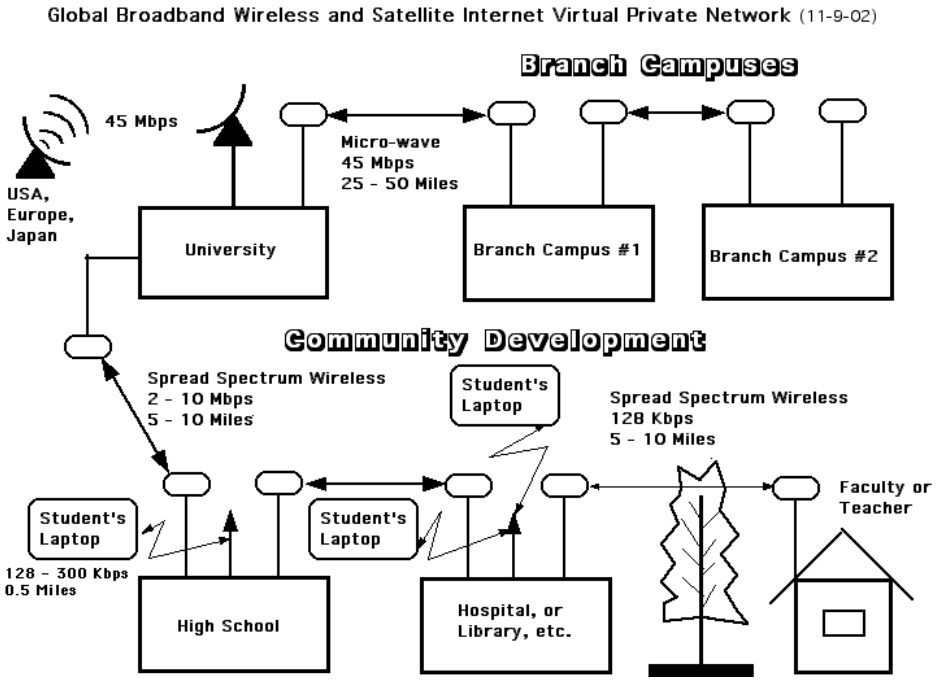
Global Collaborative Innovation Network with Global University System

Economic interdependence among nations and cultures is spawning a global economy. Globalization also highlights clashes of divergent cultures and belief systems, both political and religious. If global peace is ever to be achieved, global-scale education, with the use of the modern digital telecommunications, will be needed to create mutual understanding among nations, cultures, ethnic groups, and religions. The Internet is the future of telecommunications and can be a medium for building peace.

Global University System (GUS) aims to build a higher level of humanity with intercultural understanding across national and cultural boundaries for global peace. GUS is a worldwide initiative to create advanced telecom infrastructure around the world for global e-learning and e-healthcare/ telemedicine. GUS aims to create a worldwide consortium of educational and healthcare institutions to provide all world citizens with special emphasis on the underdeveloped world with access to 21st Century education and healthcare via broadband Internet. The philosophy of GUS is based on the belief that global peace and prosperity would only be sustainable through education. Education and job skills are the keys in determining a nation's wealth and influence. The aim is to achieve "education and healthcare for all," anywhere, anytime and at any pace.

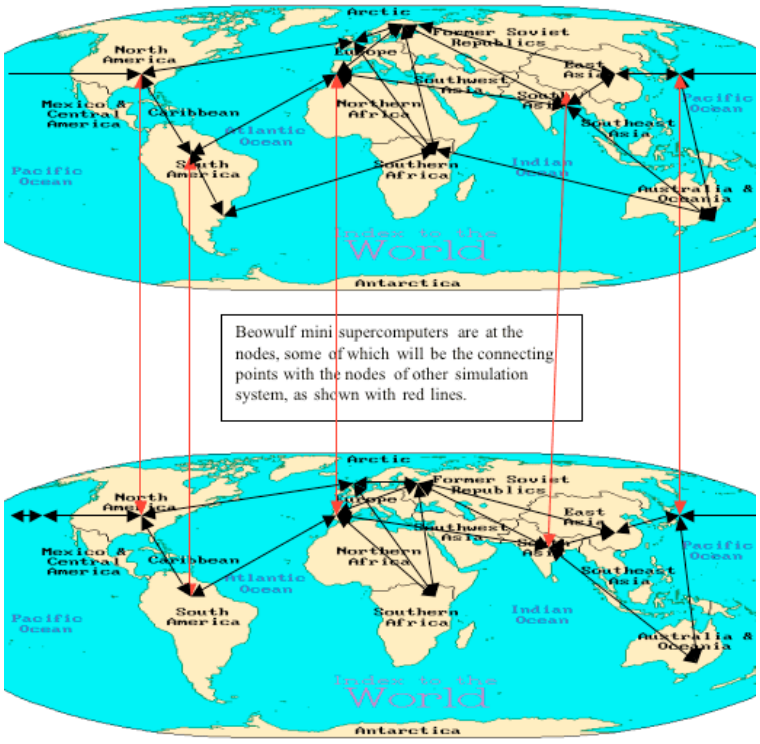


GUS helps higher educational and healthcare institutions in remote/rural areas of developing countries to deploy broadband Internet in order for them to close the digital divide. Learners will be able to take their courses from member institutions around the world to receive a GUS degree, thus freeing them from being confined to one academic culture of a single university or country. These institutions also act as the knowledge center of their community for the eradication of poverty and isolation through the use of advanced Information and Communications Technologies (ICTs). These learners and their professors from participating institutions will form a global forum for exchange of ideas and information and for conducting collaborative research and development with emerging global GRID computer network technology.

GUS has group activities in the major regions of the globe in partnership with higher learning and healthcare institutions. These will then connect the universities with secondary and elementary schools, libraries, hospitals, local government offices and NGOs, etc., through broadband wireless Internet at drastically discounted rates. Those institutions affiliated with GUS become members of the GUS/UNESCO/UNITWIN Networking Chair Program located at the University of Tampere in Finland. GUS projects are now starting in Nigeria, Ghana, Sierra Leone, Egypt and Ethiopia in Africa, and, Mongolia and Siberia in Asia and have received inquiries from several other countries for review.

Globally Collaborative Environmental Peace Gaming (GCEPG) project with a globally distributed computer simulation system, focusing on the issue of environment and sustainable development in developing countries, can be used to train would-be decision-makers in crisis management, conflict resolution, and negotiation techniques basing on "facts and figures." It will also help decision makers construct a globally distributed decision-support system for positive sum/win-win alternatives to conflict and war. The idea involves interconnecting experts in many countries via the global Internet to collaborate in the discovery of new solutions for world crises, such as the deteriorating global environment, and to explore new alternatives for a world order capable of addressing the problems and opportunities of an interdependent globe. With global GRID computer networking technology and Beowulf mini-supercomputers using cluster computing technology we plan to develop a socio-economic environmental simulation system and a climate simulation system in parallel, both of which will be interconnected on a global scale. GUS will supply game players, simulationists and technical support from around the world.

Global Distributed Climate Simulation System



Global Distributed Socio-Economy-Environmental Simulation System

Gaming/simulation is the best tool we have for understanding the world's interwoven problems and the solutions we propose for them. Systems analysis for systemic change at the global level is a precondition for any significant resolution of today's global scale problems. The understanding gained by scientific and rational analysis and critical thinking based on 'facts and figures' would be the basis of conflict resolution for world peace and, hence, ought to provide the basic principles of global education for peace.

As a powerful consequential extension of our GCEPG project, we will foster creativity of youngsters around the world. Researchers in developing countries can co-work with colleagues in advanced countries to perform joint collaborative research with use of virtual laboratories for experiential/ constructive learning and creation of knowledge through the global GRID technology, thus forming Globally Collaborative Innovation Network (GCIN).

The growth of advanced economies is driven largely by knowledge workers, such as scientists, engineers, managers, professionals and artists. We now need to train the youth of the world to become world class knowledge workers with global e-learning and create an environment in which they can collaborate with the use

of advanced ICTs and GRID networking technology. This is because the entire global economy increasingly revolves around innovations that flow from the creative classes.

Our projects focus on the content delivery through broadband Internet to construct information and knowledge societies, and to bridge the knowledge and digital gap that exists between developed and developing countries, as promoting free exchange of ideas and knowledge; to maintain, increase and disseminate knowledge through our work in education, sciences, healthcare, culture and communication. A GUS education thus hopes to promote world prosperity, justice, and peace, based on moral principles rather than political or ideological doctrines.

Financing GUS

GUS projects will combine the Japanese government's Official Development Assistance (ODA) funds and Japanese electronic equipment with the Internet technology and content development of North America and Europe.

Conclusions

The GUS program is a comprehensive and holistic approach to building smart and creative communities in developing countries for e-learning and e-healthcare/telemedicine. Initiatives are underway to create the necessary infrastructure and educational liaisons, and some near-term educational access is expected.

GUS and GCEPG are clearly ambitious programs that cannot be achieved by any one group, university, or national government. The programs require substantial collaborative contribution of ideas, expertise, technology resources and funds from multiple sources. Those who value the vision of GUS and GCEPG are invited to join this great and noble enterprise.

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BET K-12: Brazilian eLearning Teacher training in K-12

This paper aims at presenting an ongoing project on the use of Information and Communication Technologies (ICTs) in the in-service training of primary school teachers, working in community schools in the area of Salvador Bahia (State of Bahia, Brazil). The project – whose acronym is BET K-12: Brazilian eLearning Teacher training in K-12 – is managed in collaboration by the NewMinE Lab of the University of Lugano (Switzerland) and the CEAP - Centro de Estudos e Assessoria Pedagogica, and is funded by the Swiss National Science Foundation and the Swiss Agency for Development and Cooperation.

BET K-12 focuses in particular on Brazil, a country where the teacher training issue became very relevant; in fact in 1996 the Brazilian government decided that teachers at all levels have to obtain an academic degree by 2007, in order to continue practicing. Due to the government decision, the demand for in-service teacher training dramatically increased.

In this context, the crucial role ICTs could play in fulfilling this urgent need of teacher training lead to the creation of many programs involving, at different levels of integration, eLearning activities. However, researches and evaluation studies do not always keep the pace as program implementation. The issue of quality, of how to implement eLearning in order to offer high quality learning experiences is one of the crucial aspects to consider together with the management issue.

Moreover, Brazil has a consistent number of teachers working in the so called "community schools", schools promoted and sustained by disadvantaged communities; often teachers working in this kind of schools do not have access to good quality education during their own school period and lack of knowledge and training. eLearning is a option to reduce the gap between the level of education of teachers in community schools and in public school, giving to the first ones the possibility of attending more frequently training courses, without moving from their neighbourhood to the training center for each training session (teachers often face trip of more than two hours by bus to reach training centers). CEAP works with this kind of teachers helping them to pass the admission exam at universities, called vestibular, and to sustain those who were able to pass it and are enrolled in universities.

BET K-12: Context, goals and structure

The urgent need of studying the impact of eLearning in primary school teacher training in Brazil and assessing its possible applications and advantages, as well as success conditions and shortcomings arose from the setting up of this first project and the idea of BET-K12 started to be conceived.

BET-K12 wants to investigate three main issues:

- The issue of **access** to ICTs: this involves technical, economic, sociological and psychological factors influencing persons' opportunities to use the technologies;
- The issue of **quality**: the conditions under which it is possible to implement an effective and efficient eLearning program for primary teachers in disadvantaged Brazilian areas;
- The issue of **impact**: the readiness of Brazilian primary teachers to use eLearning in their training, and their adoption patterns.

The project is divided into two main phases: phase A aims at understanding the quality of eLearning environment and models in teacher training in Brazil, while phase B aims at studying the access and the impact issues in a specific case study: CEAP courses.
In the following paragraphs each phase will be connected with its research field

Quality

The first main objective of BET K-12 is to map different models of teacher training programs involving ICTs in Brazil and at understanding the quality of these programs; this is done in order to seek and suggest innovative eLearning models, which can allow effective and efficient learning practice.

In order to accomplish this objective the Swiss-Brazilian team is compiling a list with all the initiatives of pre-service and in-service teacher training using ICTs currently in place in Brazil. The second step consists in drawing, starting from previous researches and adapting existing models, specific quality criteria for the given field; while the third step is the conceiving of a questionnaire, which has to be submitted, quite likely via telephone, to the identified sample. BET-K12 team will then analyse it and will plan a more in depth interview session with key elements of the sample.

Access and Impact

The second objective of BET-K12 is to understand how primary school teachers, in a disadvantaged Brazilian area, react to their first eLearning experience, along three different dimensions:

- The impact on their way of teaching and learning;
- The impact on other fields of their life (snowball effect);
- The impact on the transmission of ICTs potentialities to their community.

In order to accomplish this phase, the research focuses on the case of the CEAP in-service curriculum, designed and implemented by NewMinE Lab, and including 3 courses: Computer Literacy, ICTs in Educational Contexts Theory of Communication.

The already existing collaboration between the involved institutions allows carrying on a longitudinal study. A questionnaire has been designed by the Swiss-Brazilian team in order to test the group on the following matters:

- its use and exposure to ICTs,
- its perception of the computer and the internet
- its perception of eLearning
- its learning behaviours, its teaching behaviours, and their role as change agents (not including the first turn of questionnaire submission)

In this phase teachers enrolled in the CEAP curriculum are asked to answer the questionnaire at the beginning of their learning experience with ICTs during the “Computer Literacy” course, once during the “ICTs in Educational Contexts” course, once during the “Theory of Communication” course and finally after six months to the completion of the curriculum. After each questionnaire submission and the consequent analysis the BET-K12 team wants to organize a focus group with the class to monitor in a more qualitative manner the trend of the activity.

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Innovations in Education for the Health Sector: The Program of Remote Education of the Oswaldo Cruz Foundation, Brazil

The Program of Distance Education (Prog.EAD) was created in 1998 to meet an institutional need for, two years later, taking over the mission of consolidating the national policy for the promotion of health through the educational development of workers in the health sector in their several levels (around 2 million distributed all over the national territory).

Because it is inserted into the National Public Health School (www.ensp.fiocruz.br) and the Oswaldo Cruz Foundation (www.fiocruz.br), the educational projects developed by the Prog.EAD are the result of scientifically built methodologies, oriented by the expanded concept of Distance Education (EAD), which is understood as an educational process with political, pedagogical and social implications and not only as an alternative to formal and attendance education. It makes use of, as theoretical cornerstones, the presumptions of the indivisibility of theory and practice, where the student's reality has, as a primary role, the collective construction of knowledge, the education based on competences and abilities, the professor as a facilitator to learning and the education centered on the student.

In order to reduce the distance, it studies the technologies of communication and information so as to use them not only to benefit learning, but also to enable social inclusion. For the social interaction of the learning community, it uses a Virtual Learning Environment and all the communications, remittance and receipt of guidelines and exercises are followed through an Academic Management Environment (Ambiente de Gestão Acadêmica - AGA). The latter issues reports that enable the construction of evaluation indicators prepared by different technical and coordinating staffs.

Today, the educational proposals of the Prog.EAD, further to the capillarity in the entire Brazilian territory, are already expanding throughout Latin America by means of partnerships in Mercosul countries. Due to this experience, its methodology had to incorporate different construction processes, a result both of the political socioeconomic differences in the several regions of Brazil and of the different realities outside. Such a scenario imposed on the project development methodology a high level of flexibility and creativity, which justifies the innovations listed below:

1. The adoption of **Remote Education as a Government Strategy**, consolidating the public policies of the Ministry of Health in Brazil through education, which places the Prog.EAD as a strategic and institutional locus and as an important change agent of the schooling models in the health area (Dupret et al., 2005). The main policies involved are: Permanent Health Education, Worker's Health and Human Ecology, Change Activators of Health Graduate Education and Negotiation of Health Work.

2. Use of the concept of **Permanent Education (Educação Permanente - EP)** which seeks to enhance changes in the work processes, questioning issues derived from the practice itself.

3. Development methodology of the Courses based on the collective and cooperative construction, which impels the establishment of institutional partnerships.

4. **Tools Developed**:
    a. Methodological Schedule – Used as a starting point for the construction of projects. It tries to guide the construction process from the student's profile and his activities. These unveil the competences to be developed, as well as the axes of knowledge required. The result of this process is the preliminary design of the Course.
    b. Term of Reference – A tool used to guide the preparation by the author of the didactic material. It is applied in the so-called Authors' Workshops. From the preliminary design of the course, the authors redefine the Learning Units, the pedagogic strategies, as well as the medias.
    c. Analytical Appreciation – Used by the tutors to validate the didactic material. Only after this process will the final version be produced.

5. **Tutoring**
    a. **Profile of the tutor**: The Prog.EAD works with the so-called "Generalist Tutor". Instead of the specialized professor, it prefers professors with wide knowledge and experience in the health field. It is believed that this is advantageous for the learning of both. In case there is the

need of specific knowledge, the tutors rely on assistance from a set of specialists, in addition to the support of the pedagogic staff.

b. **Permanent Formation of the Tutor** – The tutors selected through public bidding are automatically enrolled with the Course of Pedagogic Formation, which is comprised of an initial attendance schooling of forty hours (certificate of graduation lato sensu at the level of Updating), improving themselves throughout the whole schooling year by means of attending meetings and remote interactivity.

c. **Academic Follow-up** – The tutor complies with a weekly work journey of 20 hours, during which 16 hours are spent at a distance (through the AVA) and the four remaining hours are spent at the headquarters of the Prog.EAD with the objective of being available for the student's telephone contact, as well as to facilitate integration with the support technical staffs. The tutor-student relationship has to adapt to the 'premise of the one-on-one pedagogic follow-up'.

6. **Strong inclusion in scientific research**. There are nowadays two theses (study the use of methods and techniques of Virtual Reality in Distance Education) and one dissertation whose themes involve the Prog. EAD's expertise.

7. **Program of Human and Professional Development** – possibility of valorization of the professionals who act in the Prog. EAD through schooling programs that contemplate, from the learning of foreign languages up to post-graduate courses. For such, the headquarters of the Prog.EAD relies on its own space equipped with state-of-the-art technology to favor the processes of teaching, reading and integration.

8. **Didactic Material Production Center** – A space destined for the research of technology oriented toward the production of didactic material of different shapes and means of representation and presentation of the information (the didactic material of the Bio-safety Course received an Excellent Award in Remote Education from ABED/Embratel 2003).

9. Adoption of methodologies and tools connected with **Knowledge Management** in order to facilitate the sharing, the distribution and the improvement of the knowledge generated through the search for new opportunities and overcoming of technical and institutional hindrances by means of production and application of knowledge (Barilli et al., 2005). Today, the intellectual capital of the Prog.EAD consists of doctors, masters, specialists, who make up the development staffs of the Courses, academic follow-up (around 400 tutors) and the coordination of the courses. In addition to these, it can still count on professionals who are active in their organizational areas. The Prog.EAD has today 15 thousand under graduate students and 33 thousand who have enrolled. The latter are scattered in semi-attendance courses and remote courses, divided into: 1) Regular Courses (available for the entire set of health workers) and 2) Special Projects (courses developed to supply the public policies)

As an instance related to the federal public Institution, the Prog.EAD has built its experience aiming at contributing to the national health policies through the Education of the workers in the area, establishing its work flows within the participating principles and with a vision of the future oriented toward research, innovation and sustainability.

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