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From the editor ..

Welcome to the July 2003 issue of *Learning Technology*.

This issue contains special section on "Pedagogy and Implementation Issues in the Synchronous Communication Based Educational Systems", guest edited by Prof. Nian-Shing Chen, National Sun Yat-sen University, Taiwan.

The IEEE International Conference on Advanced Learning Technologies (ICALT2003), Athens, Greece (July 9-11, 2003) turned out to be a very high quality conference. The website of the conference (http://lttf.ieee.org/icalt2003/) contains photos of the event and details of how to order the proceedings.

The next year's ICALT conference will take place at Joensuu, Finland (August 30 - September 2, 2004). The details are available at http://lttf.ieee.org/icalt2004/.

You are also welcome to complete the FREE MEMBERSHIP FORM for Learning Technology Task Force. Please complete the form at: http://lttf.ieee.org/join.htm.

Besides, if you are involved in research and/or implementation of any aspect of advanced learning technologies, I invite you to contribute your own work in progress, project reports, case studies, and events announcements in this newsletter. For more details, please refer author guidelines at http://lttf.ieee.org/learn_tech/authors.html.

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The LearningByDoing eClassroom©

Abstract: The LearningByDoing eClassroom© is a highly structured synchronous application for teaching and doing research on medium to large sized groups over the Internet and is an open system for content delivery. Forty students, four facilitators, and a principle instructor can successfully co-create an environment, which processes interactions similar to F2F classes, but without the apparent need, nor access to, traditional non-verbal social cues. The structure of the LearningByDoing eClassroom© was designed and developed over the last two years by observing the interaction of participants in university level eCourses: Interpersonal Communication and Relationships, and Computer Mediated Task Groups at ConcordiaUniversity, Montreal. The LearningByDoing eClassroom© has sufficient tools and "bandwidth" to observe and measure previously unknown components of social interaction in synchronous online environments.

Background

An analysis of the 2002 Proceedings of the Computer Support for Collaborative Learning: Foundations for CSCL Community, January 7-11, 2002 in Boulder Colorado, shows the following breakdown of papers on various types of group interactions:

Table I.

Topic	Number of Papers
Synchronous Online Groups	33
Asynchronous Online Groups	41
Face-to-Face Groups	24

A further analysis of the papers on synchronous online groups shows the following breakdown of group sizes:

Table II.

Synchronous Group Size	Number of Papers
2	14
3	12
4	5
5	1
6	
7	1

Perhaps the lack of large-group synchronous interaction data is a direct reflection of the kinds of applications that are available to do research. Most traditional synchronous online applications are java-based "chat" software, IRC, or ASCII-based MOOs. Their "narrowband" attributes, which allow synchronous online interaction to take place, are noted in Table III along with the "broadband" attributes of the Learningbydoing eClassroom©.

Table III.

Function	Learningbydoing	"chat" software*

	eClassroom©	
Content:		
Identity by name only	No	Yes
ASCII text only	No	Yes
Copy and Paste multiple paragraphs	Yes	No
URLs posted as links in the conversation	Yes	No
URLs posted as text in the conversation	Yes	Yes
Ability to change font size and color	Yes	No
Ability to format text as a table	Yes	No
Ability to format text as a list	Yes	No
Ability to input mathematical formulas as *.gifs	Yes	No
Automatic Scrolling of conversation	No	Yes
PowerPoint slide presentation as *.gifs	Yes	No
Photographs of students inline with text	Yes	No
Any graphic with a URL	Yes	No
Keyword tied to content	Yes	No
Private Messaging (whispering):		
Private Messaging	Yes	Yes
Private Messaging between students	No	Yes
Private Messaging between instructors and facilitators only	Yes	No
Special archive for all private messages	Yes	No
Private Messaging between instructors and facilitators while everyone is in a different Breakout Room	Yes	No
Private Messaging from student to facilitator stays in the room they are in	Yes	Yes
Data Collection:		
Data collection to allow a measure for "Attending"	Yes	No
Data collection to provide awareness of who is online	Yes	Yes
Data collection to display instantly the measures of "attending" and "participating"	Yes	No
Data collection to report on last post by a participant	Yes	No
Archives of graphics and text as delivered and interacted	Yes	No
Text based archives	Yes	Some
HTML archives	Yes	No
Functional Design		
Scroll back x number of posts	Yes	No
Breakout and Private rooms	Yes	Yes
eClassroom Design based on interactive research of online group dynamics and teaching experience	Yes	No
Formatting error traps	Yes	Yes
Security layers for protecting privacy	Yes	Yes
Administrator		
Define security to ban by name and/or user IP	Yes	Yes
Define passwords	Yes	Yes
Customize eClassroom appearance	Yes	Yes
Reset Post Numbering	Yes	No
Set maximum allowable size of post	Yes	No
Typical numbers during a 3 hour eClass Session		
Number of participants	>40	
Number of posted messages	2000	
Number of data requests to the server	6000	
Peak number of posted messages per minute	40	
Peak number of data requests to the server per minute	200	

*synchronous components of the distance learning content delivery systems such as WebCT 3.8, FirstClass 7.0, Blackboard 5.5, CentraOne 6.0, eCollege

It has been observed by our development team and confirmed by conversations with facilitators using "chat" software, that larger group sizes (>7) require "rules of engagement," similar to the rules used in face-to-face interactions. These "rules of engagement" are fundamentally a means to maintain order and avoid confusion among groups of participants and individuals in "narrow bandwidth" learning environments, where identities of participants are by name only, and the text is ASCII.

The most common "rules of engagement" are:

1. A designated "speaker" presents while all other's listen.

2. Requests to speak are offered by "hand raising."
3. One person is chosen to speak at the exclusion of others.

In general, among participants in a learning environment, the deterministic outcome of these rules is a form of interaction we will call "serial." "Serial" has been the basic form of interaction available to humans up until the advent of the Internet. (Unfortunately, the paradigm shift from serial to parallel communications afforded by the Internet is slow to take place in the large and medium sized groups still communicating serially with "chat" software, audio-visual teleconferencing, webcasts, and other similar real-time web learning environments.)

It appears that as a direct result of the narrow bandwidth attributes in these "chat" software applications shown in Table III, 80% of the papers presented at CSCL2002 on synchronous online group collaboration and interaction were with group sizes of three or less. Clearly, there is a need for an "atom smasher" if we are to observe medium to large group dynamics in synchronous online environments.

Introduction

To fully implement the power of the Internet in the learning environment is to find a way to go beyond serial interaction to the "many-to-many", or parallel interaction. This is like going from classical mechanics to quantum mechanics. Suppose an individual is not "chosen" to speak, but all can "speak" and be understood at once? Suppose all participants can chose to whom they respond. In *asynchronous* message boards and similar forums, this is called "threaded conversation." That is, serial threads of conversation among a group can occur within the same "space" at *around the same time*, and individuals can pick and choose in which serial thread to engage.

In the Learningbydoing eClassroom©, a text and graphics based *synchronous* web based application, it is possible to engage in the same space and *at the same time* not only in the threaded discussion about the topics and activities, but also in the dynamics of threading the discussions, with over forty participants. By using a tool called the Graphically Unwrapped Interaction Diagram Along the Time Axis (GUIDATA©) in this unique learning environment, the process has been observed by which threaded conversations become true "parallel communications." (Lobel, Neubauer, & Swedburg. 2002a,b,c). There is also sufficient bandwidth in the application so that a participant, observing several threads, can respond to many threads at once in a single post to be read by all other participants. This process could be observed in the Learningbydoing eClassroom© as an acquired skill, similar to what Stephen Downes described in his important article, "The New Literacy" (Downes, 2002).

In the Learningbydoing eClassroom©, we have developed a learning environment that has successfully operated with over forty participants without any serial "rules of engagement". The Learningbydoing eClassroom© was designed to maximize the "bandwidth" available to participants and researchers so that learning moments and group processes could be enacted, observed, evaluated, and understood. This makes the research power of the Learningbydoing eClassroom© a "linear collider" in the distance learning community.

An Example of "Smashing the Atom" of Synchronous Online Group Interaction

Much discussion in the literature about synchronous online communication confuses the ideas about what is, or is not, Social Presence, Social Authenticity, and Social Immediacy. (Biocca, Harms, & Burgoon. 2001). This is most likely because of the "narrow" bandwidth of most synchronous software available to make these observations, although more recent studies are beginning to tease out some data indicating the differences between Presence and Authenticity. (Tu, & McIsaac. 2002).

In the Learningbydoing eClassroom©, there is sufficient bandwidth using the tools available to make a presence that is unique to a participant. This is achieved by using a combination of text font size, text font color, and a graphical image that can be either a photograph or a constructed image. (See for example Lobel. et.al. 2002a). This critical bifurcation of Social Presence from Social Authenticity is an example of "splitting the atom." The participant can now, move along either axis depending on their inclination, and the implications in Figure 1, become apparent.

Figure 1, identifies the forms used to communicate between individuals and groups through all mediums. This figure is designed to emphasize what was learned in the Learningbydoing eClassroom© about the specific attributes of Social Immediacy, Social Authenticity, and Social Presence and is extended to all mediums: text, audio, imaging, and face-to-face.

Social Authenticity is defined as the degree to which one chooses to present their open self to the "other." Social Immediacy is simply the amount of time that may pass between interactions in a given medium. Social Presence is defined as what is available about the "other" or what one can know by the data present in a given medium. In colloquial terms: Authenticity is what *you* bring to the party, Presence is what *they* bring to the party, and Immediacy is *when* y'all come to the same party.

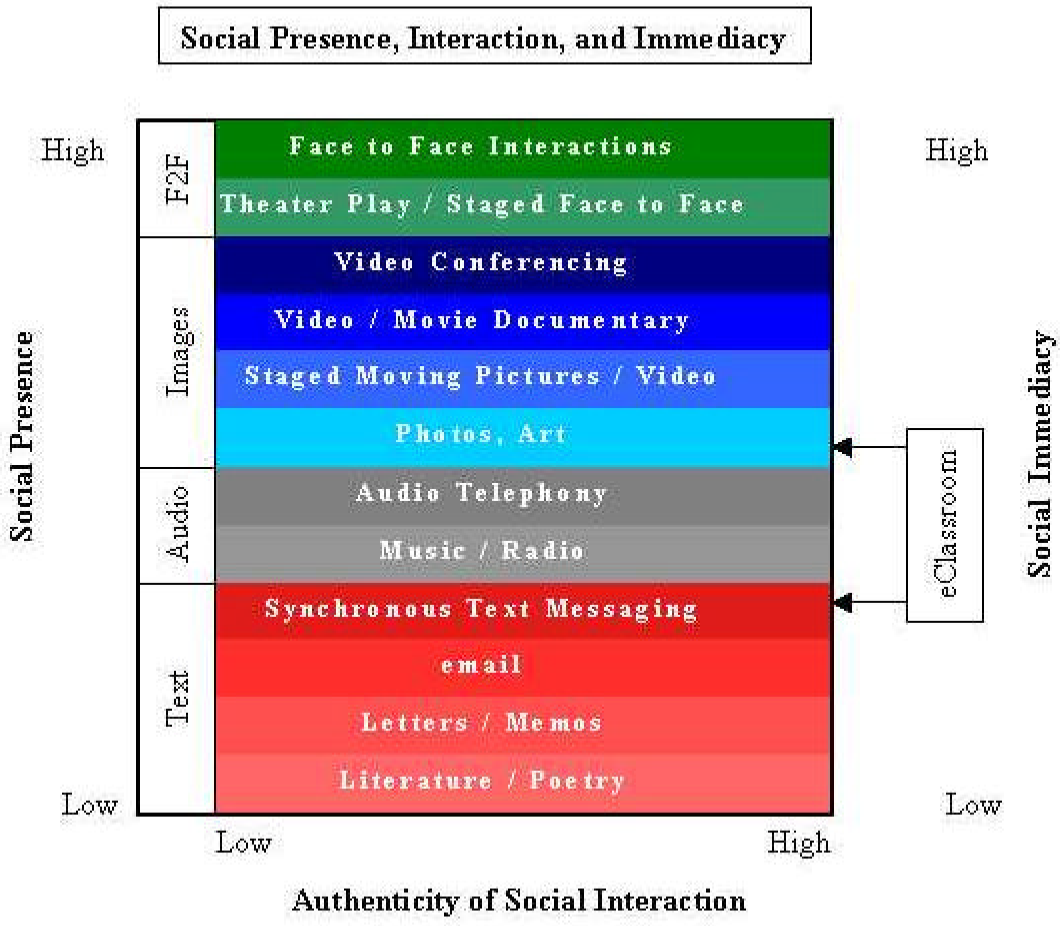

Figure 1.

Data Flow

The data presented in the Learningbydoing eClassroom© comes from either the participants own computer, or from a URL on the Internet. It is an open system for content delivery. As shown in Figure 2, the data is text and graphics. All graphics must be available as a URL. The process of making graphics into a URL is simple and straightforward. The students in the Learningbydoing eClassroom© learned the process quite easily, and those that learned first, helped others.

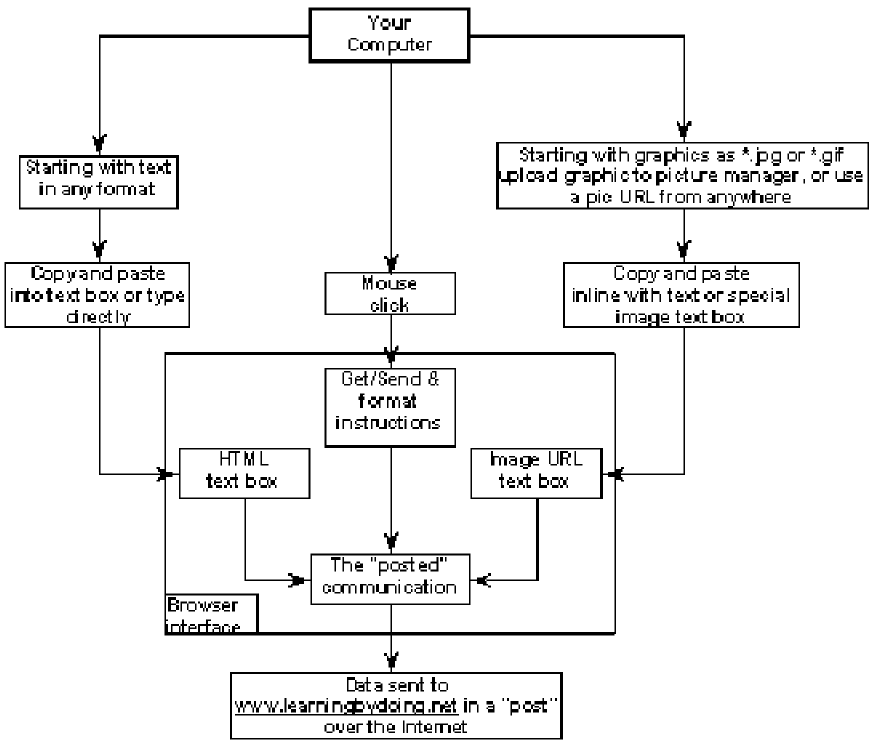

Figure 2. The input data flow and functions of the participant for text and graphics content, course delivery, and interaction

Data at the Server

Once the "Get/Send" button is clicked on, the data is sent to the server and processed by the Learningbydoing software. The software collects information, makes security checks, initiates formatting error traps, archives it, and then writes the data as an individual HTML file to be read by each participant. Each participant sees what he or she has asked for from the server. This process takes place hundreds of times a minute. The Control Panel has all the configuration files and software switches for the administrator to control the attributes listed in Table III.

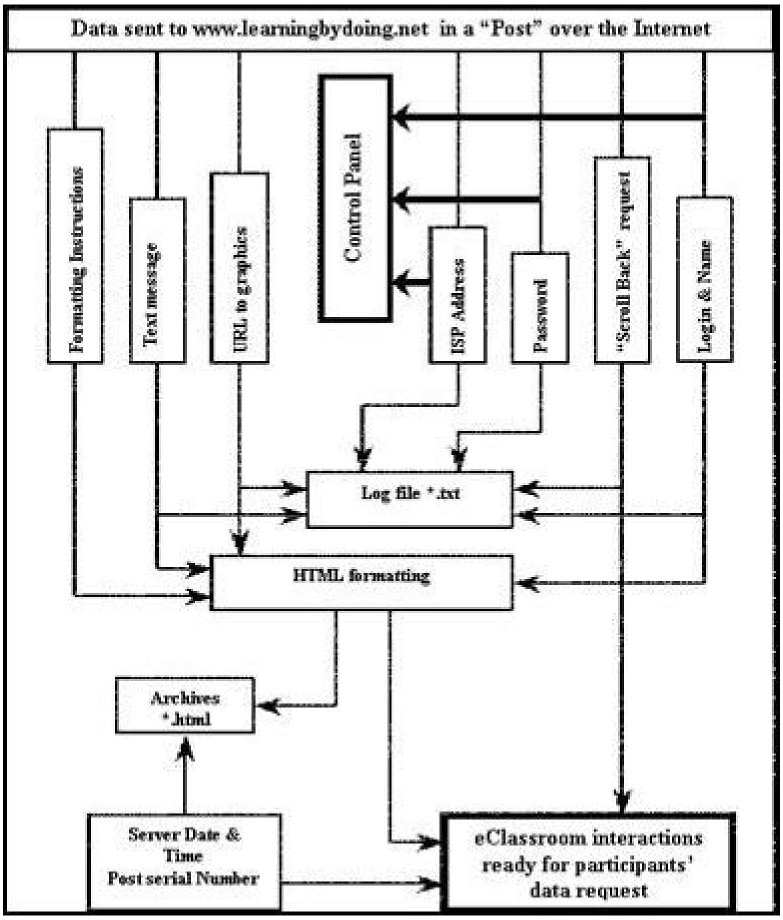

Figure 3. A summary of the flow of data in the server software

Instantaneous Feedback

The principle instructor, facilitators, and staff have the ability to observe quantified data in real-time in the Learningbydoing eClassroom©. This data is presented in HTML files requested by the staff. The following data is currently displayed:

1. The last time a participant posted a message
2. The last time a participant clicked on the "Get/Send" button requesting data
3. The total number of times the participant posted a message during the eClass session (Participating)
4. The total number of times the participant requested data from the server (Attending)
5. A listing by time of every request for data and every post made by a participant
6. All the above is made available by breakout room, date, and participant

An example of this instantaneous feedback is shown in Figure 4.

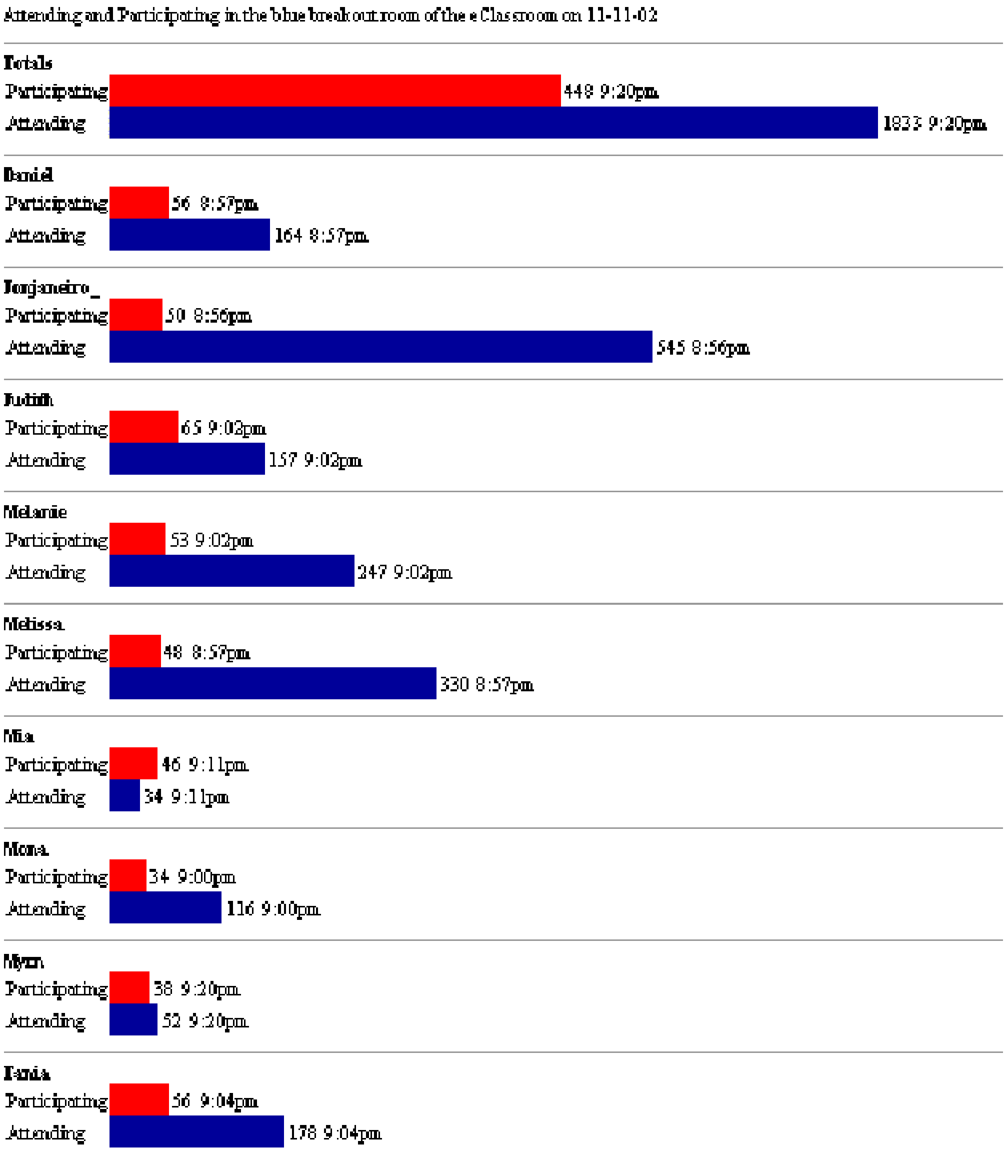

Figure 4. Instantaneous feedback from one and a half hours of activity in the blue breakout room during the 11-11-02 session.

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For large and medium size groups it appears important to maintain communication between team leaders. When working with groups of twenty students, a staff of three facilitators and one principle instructor was more than adequate.(Lobel, et.al. 2002a). In the most recent eClasses, when working with groups of forty students, the teaching team included a principle instructor, four facilitators and one technical administrator. The participants and the teaching team were spread out in Montreal, Boston, Toronto, and California during the entire semester.

What was learned during this last semester, was that the teaching team needed to be able to communicate with one another in the Learningbydoing eClassroom© apart from the students. A new feature was added so that when Private Messages (PMs) were sent from one staff member to another, all other staff members could read it. This helped coordinate activities, and keep track of student-facilitator interactions. At the same time, it was determined that PMs should be local to a breakout group between students and facilitators. This maintained group cohesiveness and proved to be a successful intervention.

As a matter of course, in the Learningbydoing eClassroom© students do not have the ability to PM other students.

Conclusion

The Learningbydoing eClassroom© has emerged over the last two years as the "atom smasher" for research into medium to large synchronous online group interactions. The fundamental nature of Learningbydoing eClassroom© is that it designed to be flexible and to grow based upon the experience of the students and teaching team in a 'learning-by-doing' manner. As it currently stands, the Learningbydoing eClassroom© is broad enough in bandwidth to facilitate and capture behaviors that express the participants' Social Presence and Social Authenticity. The Learningbydoing eClassroom© provides feedback data instantaneously which allows facilitators to observe the group's dynamics, diagnose areas of difficulties, intervene and evaluate the results. The Learningbydoing eClassroom© is available for use by other trainers, teachers, and researchers by contacting mia@alcor.condordia.ca

Acknowledgments

Thanks to all the students, and particularly those who signed releases for us to use their real names in this paper. Thanks to Dan Abman, Susan Dinan, Judith Grad, and Kim Ward, our co-facilitators, without whom the eClasses could not have been completed.

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Implementation of Distance Learning based on Synchronous Collaboration Methodology for Dispersed Public Organizations

Abstract: A significant problem in continuous vocational training for big public organizations is the territorial dispersion of the personnel in a wide geographical area. Typically in every training course, the personnel are gathering in training places, prepared for this purpose, and attend the lessons. The specific model obliges the personnel to leave their position and travel occasionally miles away from their base. The application of distance learning techniques seems in a position to solve this problem. The present report describes the results and the experience acquired during the implementation of synchronous collaboration learning in two training courses conducted with cooperation with (a) The Greek Army and (b) The Department of Technical Secondary Education of Ministry of Education.

Introduction

Current telecommunications and information technologies provide the indispensable capabilities for lifelong education without the need for presence at a physical classroom; this is defined as 'distance learning' [1][2]. In order to study the effects of synchronous distance learning [3][4] in the training of personnel from public organizations, we organized two pilot educational programs. The first was conducted in cooperation with the School for the Research and Informatics Officers of the Hellenic Army, and involved the training of 58 officers for a six month period, on the thematic area of "Operational Management". The second was organized in cooperation with the Ministry of Education for 104 Teachers of Secondary Education from 87 Technical Schools and 3 public Vocational Training Institutes. The scope of the course was learning how to teach Entrepreneurship at School and it lasted also six months. The courses had also asynchronous part, but a number of lessons were based on synchronous collaboration, conducted with the form of lectures broadcasted live via the Internet in one virtual classroom. The majority of the learners had experience in Personal Computer and Internet use, but were never trained by Distance Learning methods. The following sections describe the results and the experience acquired during the implementation of the synchronous collaboration learning part.

Architecture, Hardware and Software Infrastructure

All learners had personal Internet accounts in independent ISPs. This scheme provides a number of advantages, such as low deployment cost, exploitation of existing ISP infrastructure and inexpensive access for the learners [5]. Synchronous teaching was implemented in the form of on-line lectures, which were delivered by the Centra symposium application as a part of the e-class services of Otenet. This service was provided to users with utilities such as: Integrated videoconference, Shared use of Windows applications, Chatting, Introduction of PowerPoint presentations, Possibility of a co-presenter (the lecturer could designate as co-presenter anyone from the participants), Possibility to separate the e-class into work groups (breakout groups), Possibility to a synchronous lecture and playback it on request, Possibility to record the answers of the participants during the evaluation tests. Figure 1 depicts a screenshot from a synchronous lecture.

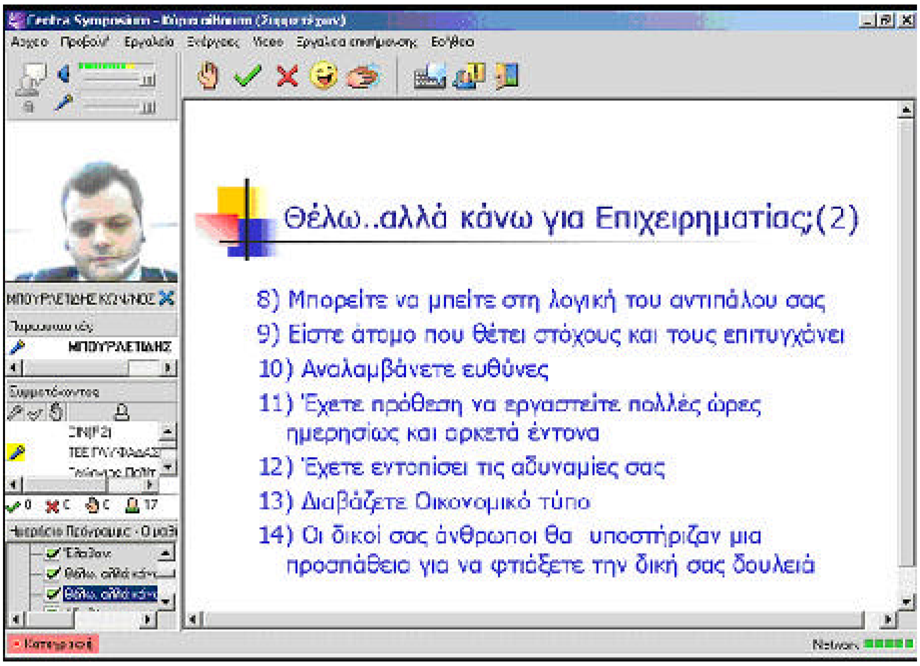

Figure 1: Screenshot from the on-line virtual classroom

Statistics from Running the Synchronous Learning Part

Table 1 depicts the overall statistical data from the participant's participation, as extracted by the synchronous platform administration reports. The participation figures fluctuated from 68% to 100% and 72% to 100% for the two programs respectively. The highest percentages refer to the beginning of the course while the lowest occurred after 3 months. The figures were raised again as the courses were close to the end but did not reach 100%.

Table 1: Overall Statistical Data

PROGRAM	NUMBER OF PARTICIPANTS	INSTRUCTORS	SESSIONS	DURATION PER SESSION
Operation Management	40-58	5	15	2 HOURS
Teaching Entrepreneurship	75-104	2	10	2 HOURS
TOTAL	129-162	7	19	50 HOURS

The most popular application was the *"playback on request"* utility. According to the reports 105 out of 162 participants in both programs used this service a few hours or a few days later to recite the session. Other popular utilities that were used thoroughly are the "*Chat service*", "*Evaluation Tests*" and "*Application Sharing*". A more complete figure of how the participants used the synchronous platform is displayed in Table 2.

Table 2: How the participants used the synchronous platform

E- CLASS SERVICES	NUMBER OF PARTICIPANTS USED THE SERVICE	EXPRESSION AS PART OF TOTAL
Playback on Request	105 participants	65%
Chat Service	95 participants	59%
Evaluation Tests	88 participants	54%
Ask to participate	55 participants	34%
Other Tools	25 participants	15%
Web Safari	12 participants	2%
Application Sharing	52 times	2,7 PER SESSION
PowerPoint presentation	16 presentations	0,8 PER SESSION

A significant conclusion extracted by the table above, is that although 95 learners used the chat service to set a question for the instructor or other participants during the on-line lectures, only 55 of them asked to take the floor in order to speak on-line. This figure, along with the 67 learners that did not communicate at all in the virtual classroom, shows a relative reluctance in using the new interactive communication tools for speaking with the instructor. Therefore the corresponding speaker should always encourage the learners to participate, so as he was in an actual classroom with physical presence. A final important statistic is that the 55 participants, who took the floor during the on-line lectures covered 12 hours out of the totally 38 hours of educational time; a figure that is relative high.

Evaluation from the Participants

In order to asses the synchronous learning process we asked from the participants to evaluate the programs by filling questionnaires. We have totally received 120 questionnaires. According to the selected answers, we have found out the following:

1. The majority of participants found the "e-class" service of synchronous learning very interesting (75%).
2. The 65% of the trainees, that attended the sessions, have evaluated some of the tools. A 35% of them had simply preferred to declare its presence replying with "yes" or "no" to the questions of the type "Have you understand this meaning", or to attend without intervening.
3. The role of instructor in synchronous learning seems to be of great importance. The 75% of the learner's answer that participated in the sessions, which were interested as a result of instructor's behavior. The participants have evaluated each one of the 7 instructors and their opinion was reflected in the participation figures as well.
4. The 85% of trainees wish to attend again courses included synchronous collaboration.

Conclusions

In the present report we presented our experience gained by the implementation of two synchronous distance learning courses. According to the gathered information two are the major issues that should be taken into account during the design of such courses. The first refers to the ensuring that learners will have the ability to participate in synchronous platforms. Therefore before the start of a course, the learners must test the necessary infrastructure and become familiar with the tools to be used within the course, as it is very easy for them to feel disappointed and abandon the education procedure. The second important issue is the great importance of the instructor's role, which was proved crucial for the success of the synchronous learning. Therefore an instructor should be well trained and prepared, not only on the content of his presentation, but on how he will stimulate the learner's interest and ensure their active participation, before he enters the virtual classroom.

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[1] Otenet is a major Greek ISP

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Classroom BRIDGE: Providing Activity Awareness in Distributed Group Learning

The Classroom BRIDGE project seeks to facilitate and investigate inter-classroom collaboration on small group projects. The project is a testbed for the development and evaluation of software tools to support those activities.

This project builds from our experience on the Learning in Networked Communities (LiNC) project. The LiNC project began in 1994 as a partnership with Montgomery County Public Schools and includes an ongoing evolution of scenario-based and participatory design techniques with teachers and students for system development. These efforts focus on the development of science learning activities that include both synchronous and asynchronous work on tasks that span a few weeks to a few months. A typical project would include small groups of 2 to 5 students working proximally as part of a larger team across two or more classrooms. Often these students would meet synchronously to plan future work or edit project reports and asynchronously work on labs and research for the project. To support these tasks, we developed a Java-based “virtual school” learning environment. Along with integrated tools for synchronous and asynchronous communication, the central focus of the software was on a collaborative notebook that provided shared pages where students could edit text, drawings, bibliographies and other content. (See Carroll, Rosson, et. al. 2000; Carroll, Chin, Rosson and Neale 2000).

In supporting these collaborative activities where students are not co-located, considerable research attention has been focused on providing *awareness* of what distributed team members are doing. Much of this research has focused on social awareness (who is present) and action awareness (what are they doing). Our experiences with the LiNC project showed that many awareness breakdowns could be attributed to *activity awareness*. Activity awareness in contrast focuses on the higher-level meaning behind the tasks such as roles and expectations of the team members, planning and goals along with their dependencies, and overall project status. (See Carroll, Neale, Isenhour, Rosson and McCrickard 2003).

The Classroom BRIDGE software resulted from enhancement of the virtual school software originally designed for the LiNC project. It supports activity awareness in the individual groups by passively collecting information from automatic versioning of documents as well as events added to the calendar tool. That information is then presented in a timeline interface that the students use to access their documents. The timeline then provides an instant visual look into team deadlines and goals along with the history of document changes toward those goals. Students then also have instant access to archived versions of their documents. A large screen interactive display in each classroom provides a summary display with an individual timeline for each project group. The large screen allows teachers to track student progress in real-time without having to query each group for status. Students can quickly compare their group’s progress to that of other groups by comparing their timeline to the others. We believe these features combine basic timeline metaphor with the necessary combination of tool integration, automatic data collection and public information to enhance activity awareness. (See Ganoe, Somervell, Neale, Isenhour, Carroll, Rosson and McCrickard 2003).

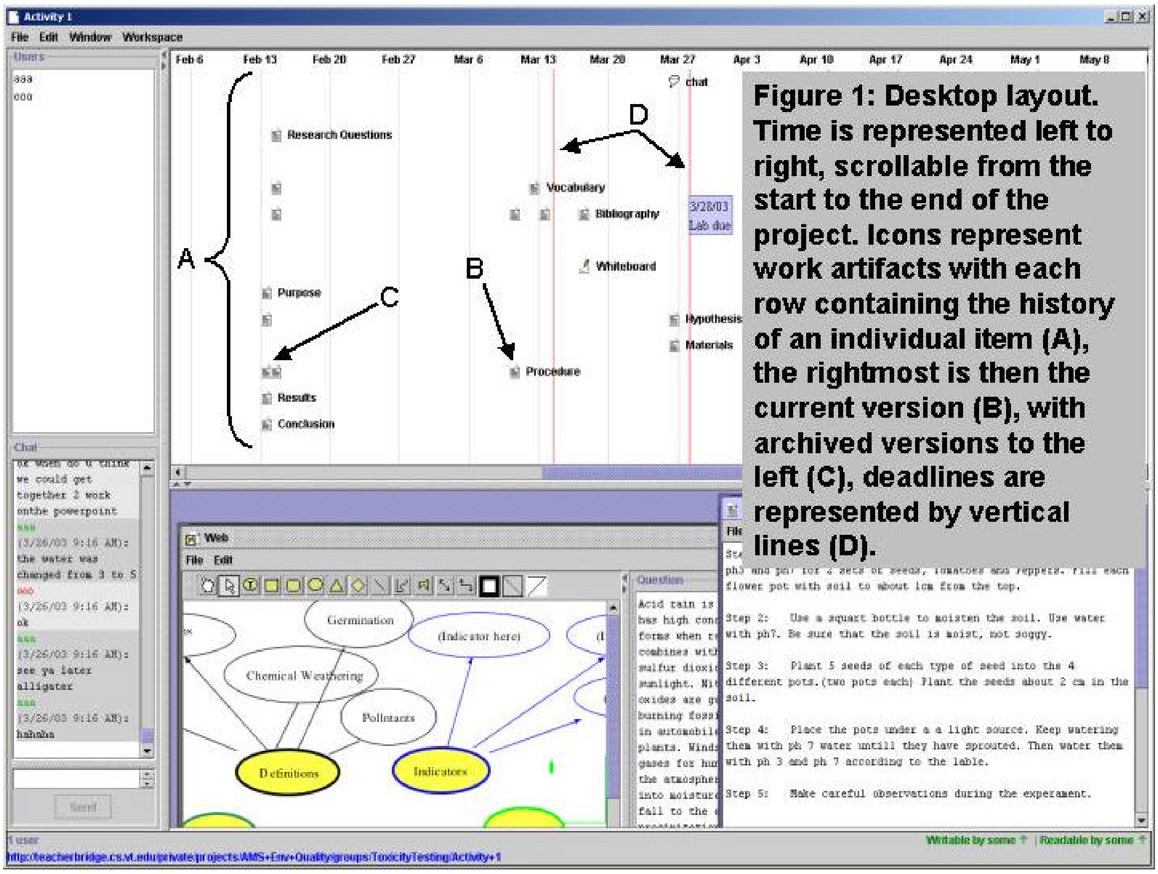

Figure 1: Desktop layout. Time is represented left to right, scrollable from the start to the end of the project. Icons represent work artifacts with each row containing the history of an individual item (A), the rightmost is then the current version (B), with archived versions to the left (C), deadlines are represented by vertical lines (D).

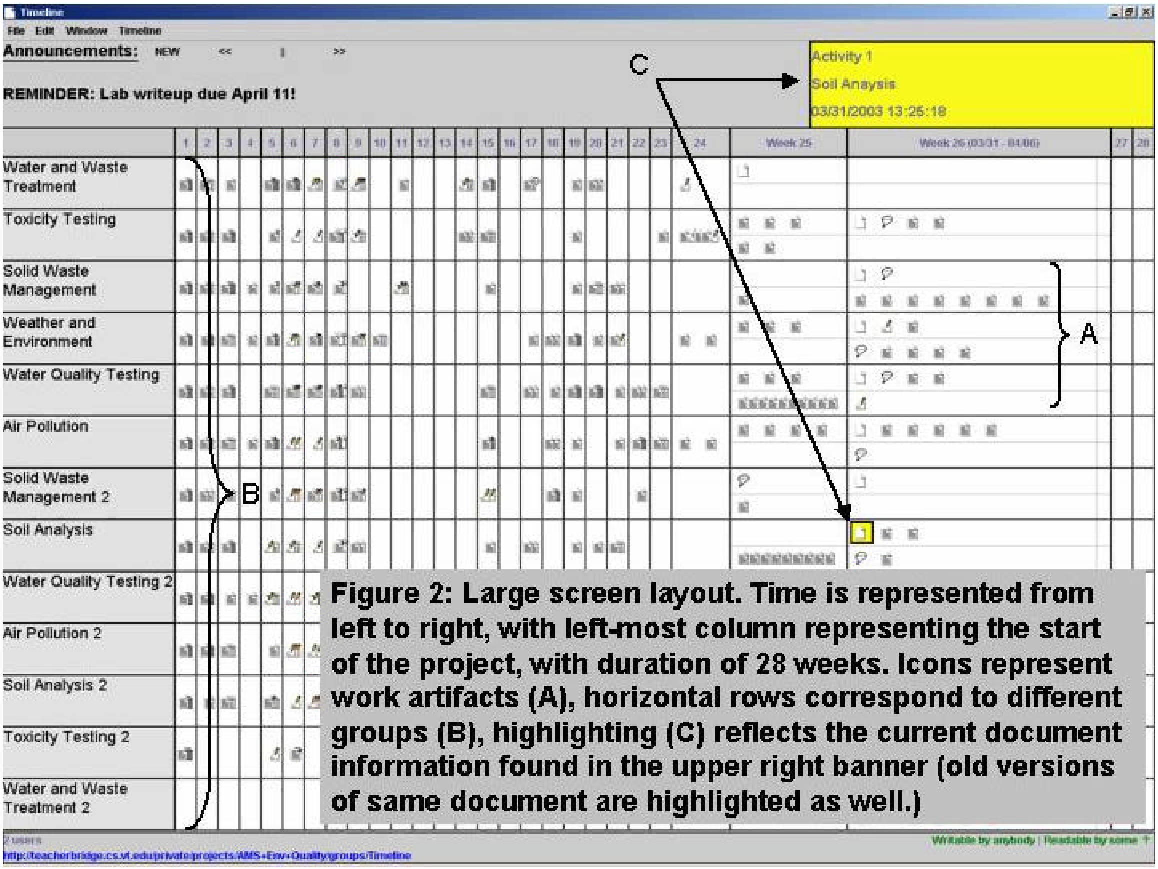

Figure 2: Large screen layout. Time is represented from left to right, with left-most column representing the start of the project, with duration of 28 weeks. Icons represent work artifacts (A), horizontal rows correspond to different groups (B), highlighting (C) reflects the current document information found in the upper right banner (old versions of same document are highlighted as well.)

We are continuing a multifaceted evaluation approach developed during the LiNC project. We are currently working to extend this evaluation approach to include a more detailed analysis of activity awareness. (See Helms, Neale and Carroll 2000; Neale and Carroll 1999). We are using activity set analyzes to categorize proximal and remote collaboration, parallel activities, and face-to-face interaction. Using this information we are identifying a number of factors that contribute to activity awareness based on a framework that considers work coupling (communication demands), coordination, common ground, and distributed contextual factors. Qualitative and quantitative measures are used at each level of the framework to generate an aggregate profile of awareness processes and outcomes.

This project is complementary to our TeacherBridge project, which provides online synchronous and asynchronous tools for supporting collaborative teacher professional resource management for teachers in two local counties (http://teacherbridge.cs.vt.edu/). Classroom BRIDGE is supported by the National Science Foundation and an equipment grant from SMART Technologies.

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Synchronous virtual environments in computer assisted language learning (CALL): New pedagogical approaches

The application in CALL of computer mediated communications (CMC) technologies raises a number of issues with regard to pedagogy. In recent years, educators have attempted to develop pedagogical approaches that seek to exploit the potential of synchronous network-based learning. Among the most promising of the numerous emergent learning environments now being investigated by researchers, are object-orientated chat environments, known as MOOs. This paper will examine some of the ways in which MOO virtual worlds are being utilized in second language education.

MOOs and CALL pedagogy

The present literature highlights the value of integrating learning in MOOs with task-based pedagogies (Becker 2001, Shield et al. 1999). While currentresearch into the use of MOO environments in CALL is still at a relatively early stage, a variety of task-based approaches have been adopted by researchers in a number of language learning projects. Drawing on current conceptions of the importance of interaction and collaboration in language learning, several recent projects have attempted to utilize the networked nature of MOOs to bring together diverse groups of learners in meaning-focused collaborative learning tasks (Peterson 2001).

MOO-based learning projects

Examples of the above approach may be found in a tandem learning project involving two groups of language learners conducted by Donaldson and Kotter (1999). In this 5 month project, a group of ESL students in Germany and a partner class of students of German in America participated in weekly MOO-based learning tasks. These included the building by groups of learners, of virtual spaces known as rooms within a MOO. These rooms were then utilized as a forum for various theme-based discussions. These discussions focused on issues relating to the cultural differences between Germany and America. Learners were then invited to present the results of their discussions in the form of MOO-based presentations to their peers (Donaldson and Kotter 1999:70). In order to foster learners` metacognitive skills, the project organizers provided learners with log files (transcripts of their conversations in the MOO) after each session and learners were required to edit, annotate and submit a number of these files as part of their grade. (Donaldson and Kotter 1999:75). In a further element of the assessment process, participants were required to undertake assignments describing their experiences in the MOO. The authors of this study concluded that the above tasks appeared to foster learner motivation, autonomy, exploratory learning and the development of a target language community. (Donaldson and Kotter 1999:74-76).

A recent MOO project conducted at Vassar college (Von DerEmde et al., 2001), mirrored many of the findings of the above study. In this project, ESL students based in Germany and native speaker students studying German in the US were brought together in a semester long collaborative learning project. The organizers of this project divided the semester into two parts. In the first seven weeks, learners were given opportunities to thoroughly familiarize themselves with the MOO environment. After this initial orientation period, learners were then encouraged to jointly create virtual rooms in which they discussed various readings and issues. During this stage of the project, learners also developed their online identities. These tasks took place within the context of an intensive text-based grammar review. Participants also took part in assignments designed to develop study goals, self-assessment skills and an understanding of the dynamics of online collaborative learning (Von DerEmde et al., 2001: 212). In the second stage of the project, learners in both countries worked in small groups to develop and later present joint research projects within the MOO. These projects involved extensive interaction and peer teaching between participants. The content of these collaborative projects was decided by the students themselves and mainly focused on the cultural differences between Germany and America. Topics of leaner projects included educational systems in Germany and America, immigration polices, music culture and national stereotypes. As a requirement of the course students maintained portfolios of their work in the MOO. These portfolios were utilized by students and teachers to evaluate performance (Von DerEmde et al., 2001: 213).

The authors of the above study note that participation in this project appeared to have positive effects on leaner motivation. Many learners also appeared to develop autonomous learning behaviors during the project. This project was further characterized by a high degree of learner negotiation and exploratory learning (Von DerEmde et al., 2001: 215). The organizers of this project appear to have successfully exploited the potential inherent in MOO environments. The combination of network-based interaction and task-based pedagogy utilized in this project highlights the ways in which MOOs may be used to bring together geographically diverse learner groups for communication, and the creation through collaboration of personally meaningful artifacts. Moreover the object-orientated nature of MOOs provides learners with the chance to create a dynamic TL community based on meaningful interaction (Von DerEmde et al., 2001: 221-223).

A taxonomy of MOO collaborative learning tasks

The findings of the studies outlined above indicate that the use of the following tasks appear to maximize the educational potential of MOO environments:

- Student presentations
- Discussions of readings and issues
- Peer review and evaluation of partners writing
- Creation of theme-based rooms and joint web sites
- Study of log files
- Role-playing activities
- Cross cultural exchange
- Creation of portfolios of MOO-based work

Conclusion

Preliminary studies have indicated that MOO environments when integrated with task-based pedagogies, offer new opportunities to engage learners in the process of L2 acquisition. By bringing together diverse learner groups in dynamic target language communities, MOOs appear to possess great potential as learning environments. However the use of MOO environments in the language classroom presents new roles and challenges for both teachers and learners. In the future, the successful application of MOO environments in CALL will depend on the ways educators rise to these challenges.

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Context Referral for Authentic Assessment

Introduction

The process of assessing students by subjecting them to authentic tasks and projects in real-world contexts is called *authentic assessment*. Authentic assessment utilizes performance samples and learning activities that encourage students to use higher-order thinking and analytical skills. Such assessment may be a complex undertaking because of the challenges in grading consistently against academic benchmarks and training teachers to adopt new assessment methods. The Authentic Assessment Tool developed through IBM's Reinventing Education program [3] addresses such obstacles; however, this web-based tool is used asynchronously by teachers as they enter student assessments during post-class sessions. Teachers may lose vital contextual information about students and their interactions in class (e.g., did Johnny participate in group activities?) during the transition period from the class to the point when data is entered into the Authentic Assessment Tool. We suggest the use of handheld devices by teachers for synchronously recording their mental notes in class for later referral while conducting authentic assessment. We call this technique *context referral*, in which the teacher is delegating his/her self-reminding cognitive load to the handheld device.

Example of Context Referral

One of the performance samples in authentic assessment is testing a student's ability to work collaboratively in groups and to apply skills for solving complex problems. As part of a scenario-based design approach [2], consider the following situation:

Mr. Jackson's grade 1 students are working in groups to arrange models of planets according to their size. He visits each group and notices their progress. Mr. Jackson notes that Tamara is taking notes on the group's activity but is primarily just observing her group partners do the work. He writes a brief reminder ("observer/scribe") on his PDA alongside Tamara's name and encourages her to work with other peers. After school, he accesses his comments for the day and fills out the authentic assessment form in light of his observations in class.

Traditionally, without the handheld device, Mr. Jackson might have merely encouraged Tamara to work collaboratively with the likelihood of forgetting his assessment of her during class while recording the detailed authentic assessment results later (note that in this scenario, Tamara is only one such student per group in one class among the many Mr. Jackson could be teaching on a given day). By having access to a storage medium (PDA), Mr. Jackson captured the context of his interaction with the student synchronously (i.e., Tamara was observing her group and taking notes), and later referred to it asynchronously when the assessment was made to correctly reflect Tamara's ability to work in groups. Contrasting this technique to conventional *paper and pencil*, the handheld device facilitates data entry, provides organizational capabilities, allows pre-storage of names, and pre-configuration of observational notes (that could also be downloaded from previous desktop storage) to save writing time in class.

Context Capturing and Referral

This scenario presents interesting usability challenges for the developer of such a handheld application. Our requirements gathering from three teachers reveals that in highly interactive class sessions where the teacher coordinates activities at a personal/group level (as in above scenario), the system should not interrupt the teacher's participation in class. In the above scenario, Mr. Jackson's solution of writing out his observation freehand on the PDA would not scale up to many students, given time constraints and class management issues. Our initial task analysis suggests that the handheld application should provide a list of student names and pre-defined entries for possible observations so that a minimal number of input steps (e.g., matching name against observation) are required by the teacher to jot down mental notes. Naturally, these names and observations are entered or downloaded by the teacher beforehand and would be customizable.

An ideal context capturing and referral application would integrate seamlessly into existing authentic assessment tools. In the above scenario, the context referral process could be automated by sending handheld data to the web-based Authentic Assessment Tool (e.g., via wireless Internet connection), thereby avoiding the extra cognitive load of accessing/assimilating information from two different form factors.

We are also exploring the possibility of providing *rubrics* [1] (assessment criteria) on handheld devices so teachers could record student assessments while interacting with the class. Moreover, while the teacher is capturing context on the handheld device for a particular student, the application could also list previous observations made for that student, which would further enrich the contextual situation and potentially create ground for identifying *student performance patterns*.

Conclusion

We are currently finalizing our requirements specification to move onto rapid prototype development with formative and summative system evaluations. Authentic assessment is becoming an increasingly accepted way to motivate and assess students analytically. Facilitating such an asynchronous model by synchronously capturing context and referring to it during the assessment process will hopefully improve assessment validity and reliability for teachers.

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Informal Learning in Mobile Community Networks

Community networks are created to facilitate the development and management of information and activity in a proximate community. They also create opportunities for informal learning. Porting community networks to different hardware platforms, like handheld devices, will afford universal channels of accessibility and enhanced opportunities for collaboration. We argue that mobile community networks support local community growth and build social capital through informal learning during synchronous modes of interactions.

Vision

Cyberspace guru Howard Rheingold predicts that during the first decade of the 21st century, the combination of the unique characteristics of virtual communities and mobile communications will spawn powerful hybrids, just as the merger of the PC with the telephone network created a wholly new medium, the Internet [4]. He foresees mobile virtual communities being used to coordinate actions of groups in geographic space and be social arenas, business tools, and political weapons. The result is that participants in online communities will remain in continuous contact over multiple platforms and use their context to build knowledge.

In traditional web-based community information, reading is asocial, invisible, and passive [1]. This is certainly true for users accessing information from desktop computers, isolated from the world inside their homes. Reading about local community activities might evoke a reaction on the reader's part; however, the most that can be achieved by sitting at home is to post an opinion on a web page and/or remember the issue for bringing it up for discussion in the later presence of others' company. Community networks are all about the community, its people, events, places, etc. Local people like the person across your street, events like a community fund-raiser, and places like a popular coffee shop in town engender an interactive, integrated, and educational community network.

A mobile community network liberates users from confinement to places where desktop computers are required to access community networks. Users should not have to move to a specific place to access community networks—this simply binds them to a pure online interaction medium. An enriched communication medium for knowledge building would be a combination of both online (through the Internet) and offline (through physical meetings) interactions. Community networks should not put the user in their pocket and lock them from the outside physical world; rather, the user should be able to put a community network in his/her pocket, and interact with it anytime and anywhere in co-presence of physical factors such as people, events, and places.

Scenario

Take the example of a local coffee shop that acts as a social hub, where issues such as politics may be discussed by the same group of people in the same corner every Sunday afternoon. Consider the following scenario:

Eddie, while sitting at the coffee shop with his friends, starts discussing the water shortage problem in the town and the Mayor's request to drastically conserve water to avoid a drought. Cedric retaliates by claiming that his plants need regular watering and he cannot conform to the request, which leads to a debate amongst the local crowd. Eddie, observing the havoc over the water conservation issue, takes out his PDA, browses the local community network, and clicks on the "Water Shortage" link. He ends up finding pointers to conserving water and how to use dehumidifiers for watering plants. Eddie informs his friends who then follow his lead and read over the details.

This scenario demonstrates how a local mobile community network leads to a positive discussion towards achieving a common community-oriented goal of informal learning among the people. If the community network was inaccessible from mobile devices, chances are that the debate would have remained unresolved, relationships between people would have weakened, and perhaps the recurring meeting between this group of people over a cup of coffee would have not taken place, thereby hampering the social capital and knowledge-building workflow that was being built by this informal setting. Having access to the mobile community network anytime and anywhere facilitated the debate in a positive manner, resolved the issue at hand, and promoted the shared communitarian goal of conserving water.

Conclusion

Mobile education encourages distributed peer collaboration over mobile devices and desktop computers to create opportunities for discovery and education in the field and community. Farooq et al. [3] explore the use of mobile community networks to facilitate informal learning in synchronous and asynchronous situations between teachers, students, and peers through collaboration in a distributed environment.

We believe that incorporating mobility into community network infrastructures can make unique contributions to *social capital formation* and *informal learning*. People often have constructive, community-oriented thoughts as they confront and respond to social situations in the course of daily life; hence, we need to explore possible synergy between these thought-provoking moments and supportive technology, namely mobile community networks. We have developed an architecture and prototype for a mobile community network [2] and are currently exploring scenarios of the type mentioned in this article.

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Just-in-time Improving and Delivering Teaching Material

Abstract: As long as teachers bear in mind that their teaching material needs to be continually improved, it would be always possible to build up a computer system to support them. This project proposes a just-in-time distributed learning environment which co-operates learning and teaching to be supportive to each other.

Introduction

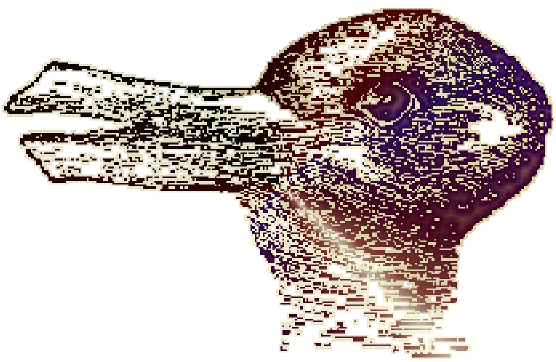
Naturally, teacher and students would like to do their best in teaching and learning. As a good teacher, she has prepared good teaching material and deliver it in a proper sequence, and also, as a good students, she is supposed to be ready to learn and get more knowledge which is classified into various types such as conceptual knowledge, factual knowledge, representational knowledge, or strategic knowledge. [Dufresne 1995]

However, a pedagogical challenge is combining what the teacher and students should do in order to match each of their requirements. If educators place students as their first priority, they will focus on how to engage students in a learning system. Self-regulated learning (SRL) which was introduced in the 1980's focuses on autonomous learning, such as awareness of thinking, use of strategies, and sustained motivation. [Winograd 2001]

It means that students know what they want to learn and then take their own responsibility to achieve their goals. Therefore, the teacher's job is to provide teaching material which cover most of knowledge expected to be required by students.

This article will propose encouraging pedagogy in self-regulation in a synchronous distributed learning environment which is part of a Ph.D. Project in computer science. Work in progress will also be included.

Teaching material can be misunderstood



Duck or Rabbit ?

The above picture is ambiguous in the sense that it can be interpreted to be either a duck or a rabbit [Ambiguous Inllusions]. The teaching material also can be misunderstood by students. Although teaching material has been well prepared, the teacher should bear in mind it should be improved at all time in both content and delivery sequence.

The synchronous distributed learning system not only allows students to communicate to other students and the teacher in real time (chating), but also allows them to ask for help and wait for the answer from the teacher who is online standing by to help them. Moreover, students should be allowed to contributed to the new key word once they can not get the anwer from the system. Then, the system will collect and propose the suggestion to the teacher so that she can adjust her teaching material as soon as possible.

In other words, the synchronous system supports the teacher to improve teaching material and deliver it in time as it is wanted by students, and also encourage them to be self-regulated.

The Pilot System

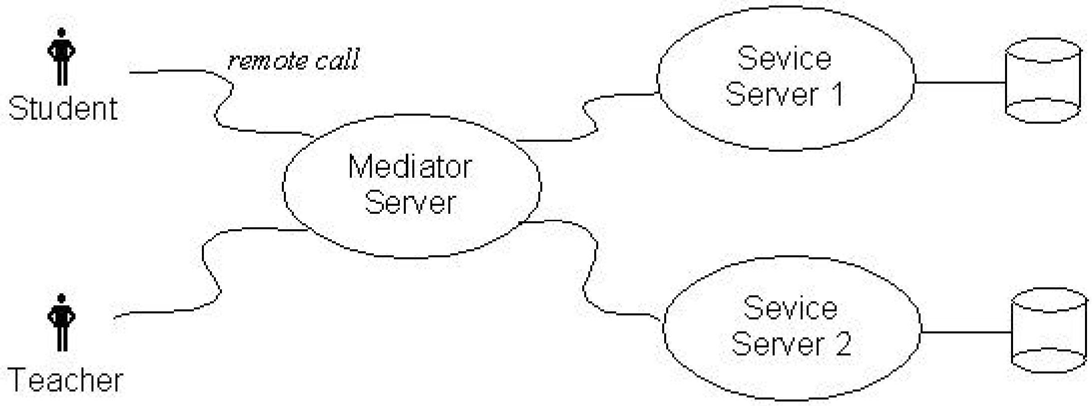
The project just simply shows the hierarchy of teaching material and students can easily pick up any lesson in any sequence (self-pacing). The system also provides a text area in each lesson so that students can type in their opinion, problem, or suggestion, and then keeps records of studying events for generating several useful reports for teachers such as statistics, drawing up a frequence pie chart, ploting a studying track of a subject of a group of students or individuals.

These reports are supposed to be useful for teachers to revise their teaching material. After considering what should be improved, teachers can simply update, add, or delete each lesson in the lesson tree which termed "Learner-based Content Adaptibility", because the content of a subject is adapted by using information contributed by learners. Therefore, the scope of a subject has no border and unlimited expansion.

This idea might support ingredients of excellent teaching [Ideas on Teaching] which is supposed to cause learners to acquire new types of problems and be able to learn and think independently.

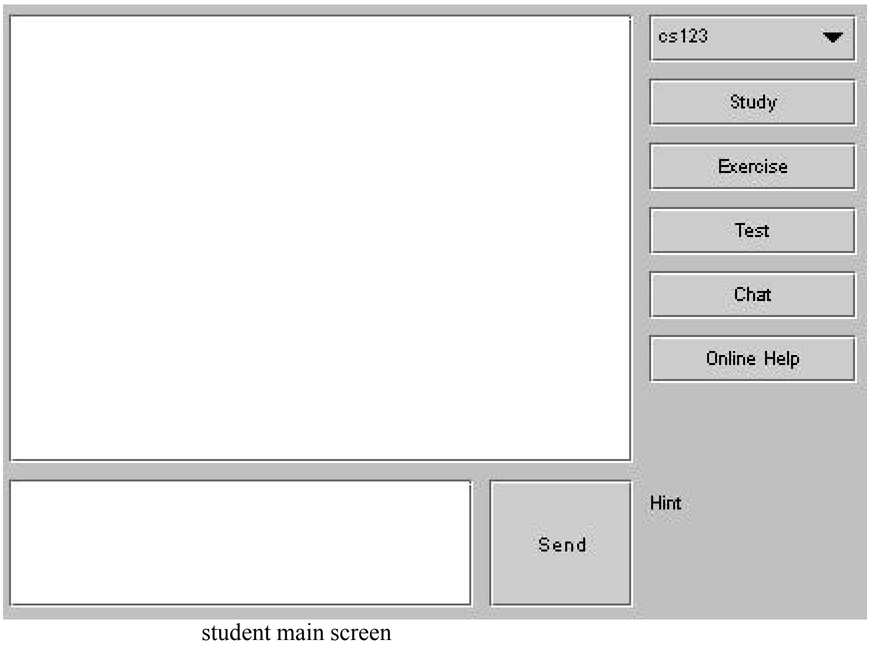
Work in Progress

In order to provide a simple system component so that other programmers can easily understand the system and add more functions into it, the system is design to be a distributed computer system (3-tier architecture) and separated the user interface modules, mediator module, and service modules apart from each other. The mediator module can communicate to other modules as application-to-application communication using Java RMI. Some JSP code has to be used so that web page generation is more flexible. Java compiler, Java graphic user interface tool, Apache Tomcat and MySQL were downloaded free of charge.



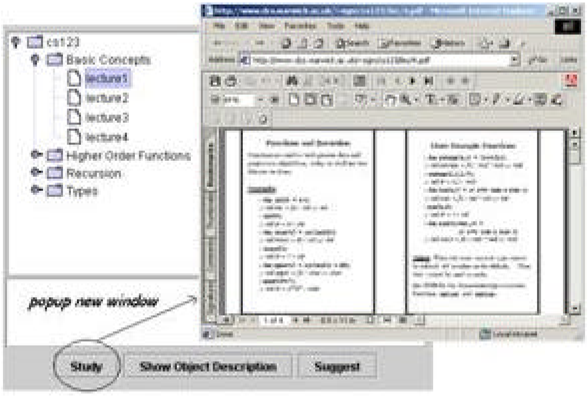
System Diagram

In the student interface, there is a main control screen consists of display text area, input text area, and command buttons, as a picture below.

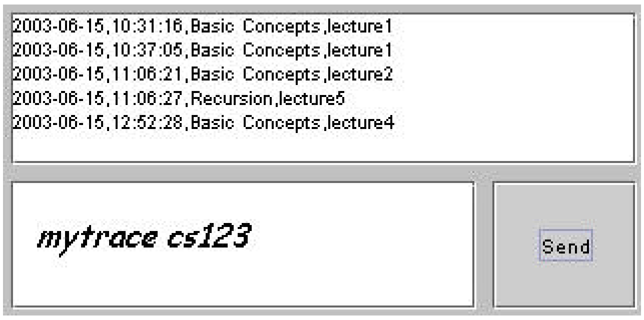


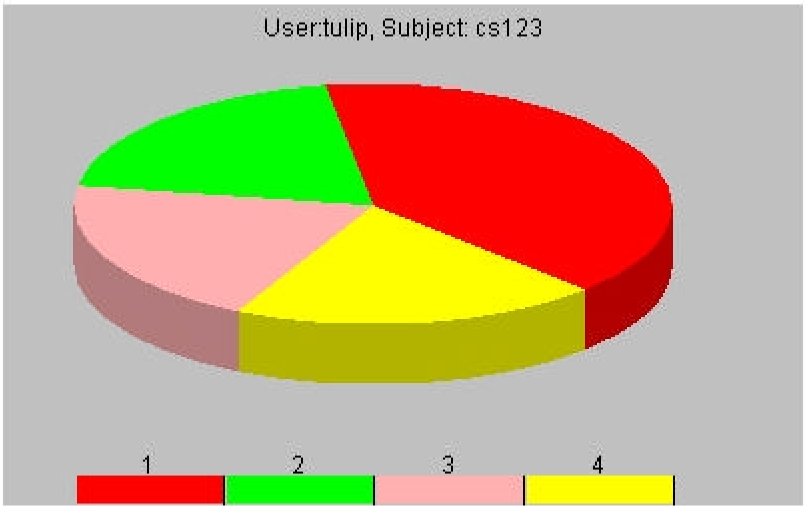
student main screen

Students choose subject from the combobox and then press the study button, the window of the subject will be automatically poped-up.



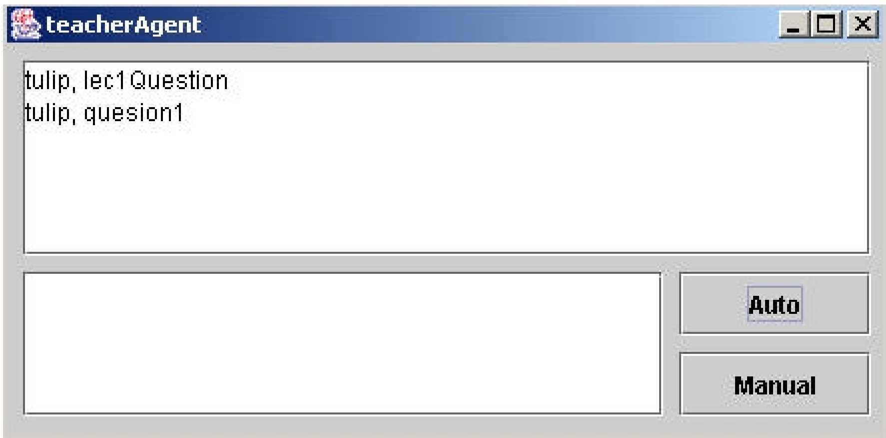
The input text area accepts a single command such as "MYTRACE subject_name", "MYPIECHART subject_name", "SEARCH key_word".





1 = 'Basic Concepts, lecture1, 2 times
2 = Basic Concepts, lecture2, 1 times
3 = Basic Concepts, lecture4, 1 times
4 = Recursion, lecture5, 1 times

Moreover, students can request special help by using a command "REQ request_info". Then, the request information will be displayed in the teacher's screen which is running concurrently.



Conclusion and Further Work

Not only using keywords to find out lessons, but also using them as a glue to combine lessons together should be useful to gather related lessons in any subjects in any deprment so that learners can explore and build up their own knowledge independently. All keywords are kepted in database and retrieved by combination of keywords input by students. Combining keywords together might encourage learners to have more critical thinking.

Tracking charts of individuals would be compared and regenerated using an average value of tracking. So that a general tracking could be used to suggest weak students who are struggling with a current lesson. All suggestion from capable students would also be displayed.

However, all events should be approved by a teacher who has to regularly keep eyes on reports provided by the system. It means that the system does not make teachers have less job they used to but elimated some time-consuming job such as monitoring all students behavior or reorganizing the subject structure.

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Next Generation Learning: Achievement Through Synchronization

Distance education has served as an alternative method for delivering academic work to learners unable to attend traditional classes for many years. The traditional framework of distance educational models has shifted from correspondence courses to technologically based courses utilizing the Internet. As the Internet continues to change the way we live our lives, next generation learning will require new pedagogical approaches, which will include synchronized learning. Contextualizing synchronized curriculum and its relationship to how online learner's associate new information cognitively should be explored and researched before any interaction is fostered between instructor-learner, learner-learner, and/or learner-content. Identifying the correlation between individual learning and online pedagogical methodologies will improve any synchronized learning environment.

As learners are increasingly exposed to dynamic online instructional practices, there is a need to explore, through both quantitative and qualitative research, those elements that influence the quality of online, synchronized knowledge construction. The research will determine the best course of instructional action that will lead to heighten levels of information assimilation. As with all mediums of online education, the development of synchronized instructional strategies should be constructed around a foundation that is research supported by pedagogical, instructional, and learner-centric components such as content development, technology delivery channels, real-time authentic assessment, and learner metacognition skills.

The Internet represents a turning point in our culture that is as profound as fire or the wheel. The success of the Internet has synergized groups and populations across the globe and has encouraged the gathering and sharing of ideas. Increasing collaboration via synchronized telecommunications only increase the importance of information and knowledge. The ability to share ideas, concepts, ideologies, and knowledge is a powerful learning element and the Internet enables instructors to overcome productivity issues and problems through synchronize collaboration.

At its most basic level, distance education takes place when the learner and instructor are separated by physical distance and technology bridges the instructional gap. This established separation and lack of face-to-face connection between learner and instructor is a contributing element to the inconsistencies in online education. Synchronized learning can and will help over come the inconsistencies that are evident today. Distance education does offer students and educators the flexibility of learning and teaching anytime and anywhere, but with new educational approaches, new shifts in pedagogical philosophies. Therefore, new educational paradigms exist and should be addressed. The following characteristics identify possible elements of a synchronized learning environment:

- Clearly defined performance objectives,
- Real-time knowledge construction,
- Instance learning rewards,
- Self-directed learning augmentation,
- Heterogeneous collaboration, and
- Instructors available at regular, stated hours.

The possibility of extending learning beyond current and traditional frameworks is real. Two words can be used to identify those synchronized learning initiatives that will experience success and those that will not experience success. Those words are imaginative research. Research designs that focus on synchronized learning in dynamic online learning environments will provide meaningful conclusions that can share the dos and don’ts of synchronized learning. The power of next generation learning cannot be determined without the support of research.

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Holistic Quality of Service Models: The Missing Link in Synchronous Communication Based Education Systems

Towards the end of my courses on Networked Multimedia I have often asked my students (in Australia, Sweden and USA) that if they could attend the same lecture via videoconference, which would they prefer? Most students said that they prefer the real teacher. Then, in one class a student answered my question by asking a counter-question, 'What is the cost difference?' Immediately, I carried out a straw poll. It turned out that if the cost of the virtual lecture were more than half of that of the real lecture, most students preferred the real teacher. But, if the cost of the virtual lecture were to drop significantly, then many more would opt for synchronous communication based education by the virtual teacher.

This makes one ponder – from a student's perspective – what is the difference between a real teacher and a virtual one? Intuitively we know that it is the sense of presence. Thus, if one could create a virtual teacher whose sense of presence is indistinguishable from that of the real one, and that too at a much lower cost, then the students would prefer the virtual teacher. Such a virtual teacher could only be generated by Star Trek like teleporting, a technology still in the realm of science fiction. The best available alternative is videoconferencing. But videoconferencing is unable to provide the sense of presence exuded by a real teacher. Nonetheless, analog videoconferencing has been used for distance education quite successfully for a few decades. Digital videoconferencing has been around for over a decade. Then why hasn't it been used widely for distance learning? The short answer is Quality of Service (QoS), or the lack of it.

Quality of Service

Many communications protocols cater for what they consider QoS; but fall short of user expectations. Because, most current QoS protocols focus on transmission aspects and largely ignore the application and the user perspectives. All multimedia is for human consumption. While computers and communication channels work with factors such as bandwidth, delay, jitter, skew, and error rate, human beings view their manifestation in terms of shaky picture, interrupted transmission, blocking artefacts etc.

User perception is subjective, and changes with time; as computers become more powerful we expect smoother multimedia presentations. Additionally, quality expectations change depending upon the application. The video quality required for watching a movie as video-on-demand is not necessary for distance education. However, if required, high quality videoconference can be conducted by leasing a high-speed digital service. But, can the students afford it?

The Quality, Cost, Time Triangle

An important issue for the provision of QoS is the relationship between quality, cost, and time. In general, every user wants to get the best quality at the lowest cost with the least possible delay. However, if the user tries to obtain the ‘more desirable’ values for two of these aspects, then the third aspect must suffer. For example, if you want a tailor-made tuxedo, stitched overnight by a high-grade tailor, you will have to pay a higher price for the same. But if you are ready to go to a lower-grade tailor, or wait for a week, the price will come down.

Similarly for multimedia transmission, quality, cost, and time form a triangular relationship [1] in which only two aspects can have the ‘more desirable’ values: high quality, low cost or low delay. Full-duplex synchronous communication requires low delay. If we also demand high quality, then the cost must go up. On the other hand, if we need to reduce the cost, then we must compromise on quality. And this low quality video will not exude the sense of presence students expect.

The solution is to provide a compromise between quality, cost and delay. This requires communications infrastructure and protocols capable of providing such a compromise.

The Solution

The ability to broadcast and multicast lectures is an important requirement for making synchronous distance learning popular, and thus economically viable. Multicasting is not easy to implement on circuit-switched services, and broadcasting is impossible. Some form of circuit-switched multicasting can be performed by using multiple point-to-point links, but only at a rather high cost. Whereas, multicasting can be performed easily on packet switching networks, such as the Internet or its restrictive cousins similar to Internet2. Therefore, these are suitable for synchronous education.

However, there is a need for holistic QoS models that cater for QoS negotiations between the user, the application, and the transmission service. We have proposed one such model called the Three Layer Quality of Service model (TRAQS) [2]. The TRAQS model, shown in figure 1, caters for end-to-end QoS provision via user, application and transmission perspective layers. The User Perspective Layer negotiates with the system to obtain the right compromise between quality and cost. The Application Perspective Layer can modify the system behaviour based on the requirements of the application. The Transmission Perspective Layer gets the required service from the network. Thus, the TRAQS model can carry out negations required for providing affordable synchronous education using videoconferencing and other course material.

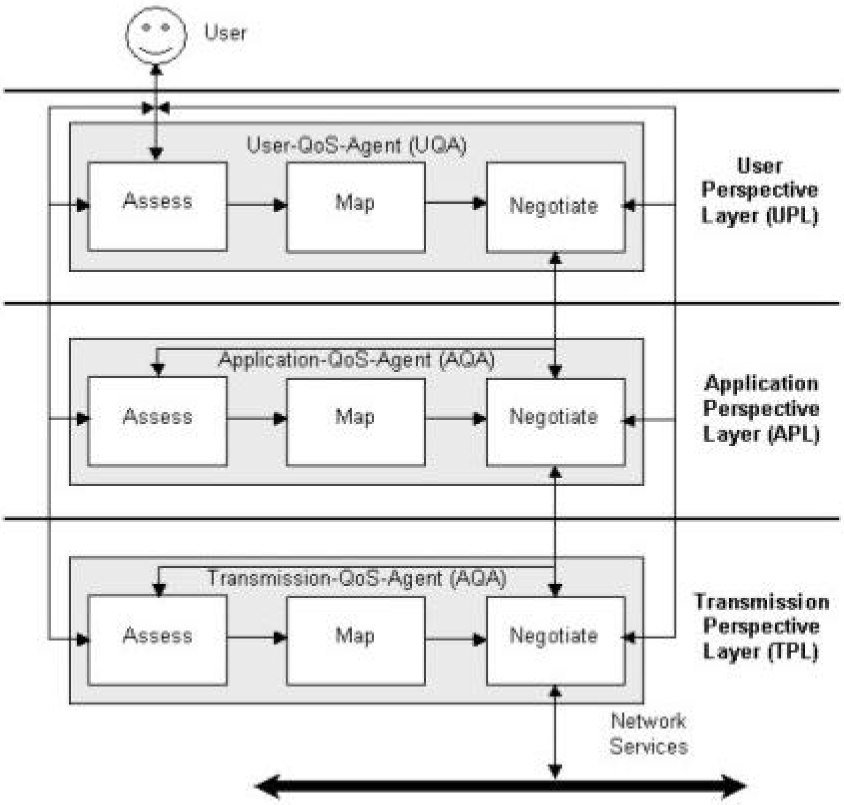

Figure 1: Three Layer Quality of Service model

Conclusion

Digital videoconferencing based synchronous education requires packet switching network services with multicasting capability. The quality, cost, time triangle predicates the need for a compromise between these three factors. Such a compromise can be achieved with holistic QoS models. TRAQS is one such model under development at VictoriaUniversity, Melbourne, Australia.

References

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