Collaborative learning : a new direction in educational computing

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A New Direction In Educational Computing**

By

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Abstract

In early 1994, an electronic classroom was designed in the Multimedia Training Laboratory at Ngee Ann Polytechnic to support collaborative strategies for learning. The classroom features a network of twenty multimedia personal computers. Text, graphics, sound, animation, and digital video are shared on the network, thereby enabling instructors to distribute class notes, homework, assignments, and assessments. The electronic classroom provides an unusual opportunity to investigate the application of hypermedia-based courseware and collaborative groupware. This paper discusses the pilot project currently undertaken by Ngee Ann Polytechnic. Twenty students are participating in this project and the subject chosen is Multimedia Design and Development, a subject which receives a lot of publicity in Singapore. The paper will also discuss current and future information technology to implement collaborative learning.

Introduction

Knowledge has become the most important economic resource and will increasingly be the basis of international competitiveness. With the integration of computer, media, and telecommunication technologies, learning and teaching will enter a new era. Obtaining and organising information will become the dominant skill for the students. They must learn to be resourceful and learn in a collaborative environment to maximise the full potential of information revolution.

Collaborative learning differs from the traditional style of education in that the students are involved in the development of their own learning experience. With the integration of computers into local area network, opportunities for collaboration will increase. The computer network provides a shared computing environment or application that facilitates communication and teamwork among groups of people.

Students will take on different roles in the classroom of the future. Teaching will move from conventional classroom-based to active and participatory-based learning. Students will no longer be passive recipients of information. Instead, they are encouraged to participate in the learning process, and play a more proactive role in the learning process. They need to look for information and make sense out of it.

On-line access also allows students to learn remotely. With new technology such as Integrated Service Digital Networks (ISDN) and Asynchronous Transfer Mode (ATM), students can gain access to rich multimedia databases from their homes. The ability to access vast information resources anywhere at anytime is becoming the hallmark of the communicating age.

Pilot Project

The course chosen in the collaborative learning project is Certificate in Multimedia Design and Development. This is an elective course, offered to second year students, selected from the various departments. Twenty students are to be used in the test bed. The course is developed using a hypermedia authoring system. The courseware is accessed from the network and is integrated with a teacher-student management software and an electronic mail system.

Hypermedia is suitable for implementing collaborative learning because its documents are dynamic; not only because of links but also the contents can be changed as they are read using the annotation facility. Such a multi-user environment allows teams of a group of people to work together and share ideas.

Hypermedia systems have two important features: the first is the ability to remove rapidly from one part of a document to another by means of an associate link. The sequential pattern of reading so familiar from the print world is replaced by a truly interactive format.

The second is its strength in sharing of information across different machines and systems. Hypermedia builds upon the advances made in client server networking to provide transparent access to data regardless of where it is located. In short, hypermedia is about connectivity, within and across databases.

In addition to non-sequential jumps, features included in the courseware are: indexing, full-text search, annotation, history, bookmark, copy and print. Multimedia elements such as sound and video are also supported. Figures 1, 2, and 3 show some of the features supported by the courseware. The hypermedia courseware is currently being prototyped using Microsoft Viewer 2.0 to create on a computer network what had previously been in notebooks, on the blackboard, and in textbooks.

Figure 1

Figure 2

Figure 3

Electronic Mail

Email is one of the facilities available in the electronic classroom to support collaborative learning. Email is basically a communication tool which allows the user to send and receive electronic messages. Messages are not necessarily confined to textual information, other media such as graphics, sound, and even video can also be included in the mail as shown in figure 4.

Email can be used in a variety of ways. Students can exchange information and ideas with fellow students electronically, thus encouraging teamwork. Educators can establish contact with students, helping them in their works.

Email also enables groups of students sharing the same interests to form a discussion group. When a student in the group sends a message, everyone in the group gets a copy. As a member of the discussion group, the student could pose a question, give views on a topic, or help answer a particular question. With email, collaboration between educators and their students becomes possible. Students can now participate in projects involving exchange of information or pooling of data. Multimedia is an excellent subject to test this concept of learning because the subject involves interdisciplinary skills.

Real-time teleconferencing between the teacher and the student is possible with the use of Electronic Chat which is provided by the Microsoft Windows operating system. Video conferencing is also possible when it becomes affordable. This mode of learning can be very tiring but helps train the students to be disciplined and confident.

Figure 4

Strategies for Coordinating Collaborative Learning

Two strategies for coordinating collaborative learning are implemented as shown in figure 5:

- ☐ Sequential working
- ☐ Parallel working

Sequential working is where the students divide up the task amongst the partners so that the output from one stage is passed to the next student.

Parallel working divides the work into sub-tasks which can be accomplished in parallel. The students all work simultaneously and send their products to each other.

Figure 5

Current Technology

Currently, the collaborative learning environment is created in a classroom which features a network of twenty multimedia personal computers. These computers are connected in an ethernet configuration and served by a multimedia file server. Each computer is running Microsoft Windows for Workgroups. The workgroup computing strategy is to provide a solutions-based, open, and evolutionary approach to making it easier for people to work together. Windows for Workgroups is an enhanced version of the popular Windows operating system version 3.1 which includes built-in file and printer sharing capabilities to make it easier for groups of people to share information and ideas. In addition, it includes electronic mail facility so that users can immediately begin exchanging messages for collaborative learning.

Future Technology

The technology is now available for people to access multimedia databases remotely using Integrated Services Digital Networks (ISDN) lines as shown in figure 6. Ngee Ann Polytechnic is connected to a number of schools using ISDN lines. Lectures, presentations and training sessions can be offered electronically to people outside the campus.

Figure 6

The National Computer Board (NCB) has initiated the National Information Infrastructure (NII). The central idea of NII is to build an information superhighway to link up the whole country using high-speed fiber optics cables. The idea of developing NII was introduced in 1991 by NCB as an integral part of its IT2000 masterplan.

Conclusion

The use of telecommunication networks in the delivery of lessons has become an effective, stimulating, character-building educational medium by incorporating the collaborative learning strategy. The availability of new telecommunication information superhighway and instructional technologies is enabling electronic classroom to deliver a wider and deeper range of skills and greater opportunities for students to communicate and interact than traditional classrooms.

Collaborative learning can expand the student's learning experience and capability from individual insight to collective intelligence. It can enhance the student's intellectual development and academic performance.

To gain from close collaboration, each student has to offer ideas and experiences and be willing to compromise with the group. The growth of interdisciplinary studies has made collaborative learning an important area of educational research. In our case, Multimedia is a interdisciplinary subject, offered to students from various departments in the campus.

A National Information Infrastructure has been planned in Singapore to maximise the potential of information technology. The use of information technology in learning is also in line with our government's plan of making Singapore a knowledge economy in the 21st century.