The South African Institute for Computer Scientists and Information Technologists

ANNUAL RESEARCH AND DEVELOPMENT SYMPOSIUM

23-24 NOVEMBER 1998
CAPE TOWN
Van Riebeeck Hotel in Gordons Bay

Hosted by the University of Cape Town in association with the CSSA,
Forchestrated University for CHE and
The University of Natal

PROCEEDINGS

EDITED BY
D. PETKOV AND L. VENTER

SPONSORED BY

ABSA Group
The South African Institute for Computer Scientists and Information Technologists

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GENERAL CHAIR: PROF G. HATTINGH, PU CHE
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PROCEEDINGS

EDITED BY
D. PETKOV AND L. VENTER

SYMPOSIUM THEME:
Development of a quality academic CS/IS infrastructure in South Africa

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FOREWORD

The South African Institute for Computer Scientists and Information Technologists (SAICSIT) promotes the cooperation of academics and industry in the area of research and development in Computer Science, Information Systems and Technology and Software Engineering. The culmination of its activities throughout the year is the annual research symposium. This book is a collection of papers presented at the 1998 such event taking place on the 23rd and 24th of November in Gordons Bay, Cape Town. The Conference is hosted by the Department of Information Systems, University of Cape Town in cooperation with the Department of Computer Science, Potchefstroom University for CHE and and Department of Computer Science and Information Systems of the University of Natal, Pietermaritzburg.

There are a total of 46 papers. The speakers represent practitioners and academics from all the major Universities and Technikons in the country. The number of industry based authors has increased compared to previous years.

We would like to express our gratitude to the referees and the paper contributors for their hard work on the papers included in this volume. The Organising and Programme Committees would like to thank the keynote speaker, Prof M.C Jackson, Dean, University of Lincolnshire and Humberside, United Kingdom, President of the International Federation for Systems Research as well as the Computer Society of South Africa and The University of Cape Town for the cooperation as well as the management and staff of the Potchefstroom University for CHE and the University of Natal for their support and for making this event a success.

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PRACTICAL EXPERIENCE IN RUNNING A VIRTUAL CLASS TO FACILITATE ON-CAMPUS UNDERGRADUATE TEACHING

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ABSTRACT

This paper discusses the current use of an Internet Education Support Program (IESP). This software package uses Internet-based tools which allows the educator to use collaborative learning techniques in both face-to-face and distance learning classes. The software was created for the South African classroom and is currently being run online between three campuses at the Port Elizabeth Technikon. This technology allows the lecturer to properly facilitate group work. Ensuring full participation of all group members and allowing students to improve social and communication skills, research abilities, personal responsibility and Information Technology skills.

1 Introduction

Students seek to enter tertiary institutions with very diverse backgrounds. The challenge for the educator and institution is to give each student individual learning while moving the student group towards a common goal. The student who comes from a tertiary institution has a variety of needs. Academic success is not only affected by a syllabus and subject lecturer, but is also dependent on a student being able to become integrated into an academic community [Bauman M, 1996]. The larger the classes the more complex this task becomes. Many educators have turned to cooperative education or collaborative learning, to achieve expected levels of success.

While there are many advantages to using collaborative learning techniques within the classroom there are also many obstacles that face the educator. In a traditional classroom environment, proper collaborative education is often difficult to achieve. Classes have fixed start and ending times, students stay far away from one another and some students tend to do all the work while others tag on. Technology allows educators to solve some of these problems. The computer extends the traditional face-to-face classroom to include a virtual classroom. It is from this viewpoint that I began running online projects in conjunction with face-to-face classroom sessions.

2 Information Systems I – The Subject

The Subject

The subject that is currently using the “virtual” classroom is called Information Systems I. It is a first year level subject that introduces the student to the basic concepts of computers and computerisation. Initially the subject is used to teach basic computer literacy concepts, but as the year continues more complex concepts are approached.

This subject is used to prepare the students for their future years of study. As a result it becomes more important to teach the students basic learning skills as well as subject content. The most important skills that need to be taught include: Research, Communication, Language skills, Writing of documents, and Problem solving.

It is the responsibility of the lecturers in contact with first years to incorporate the learning of these skills into their course structure.
**The Students**

The Information Systems 1 (IS1) subject is given to approximately 300 students. Unlike the large classes of a university, the Technikon relies on small class groups of approximately forty students per group. The existence of four campuses further frustrates the situation. The students who take the IS1 subject differ greatly with regard to cultural background, computer exposure and level of academic competency.

As the principal lecturer in this subject I am faced with four general student types. The most advanced students tend to study the more technical flavour of the National Diploma in Information Technology (N.Dip.IT), these students have above average academic records and most have had some experience in using computers. The N.Dip.IT also provides for a foundation or bridging year, these students have not gained acceptance into the first year but need to complete certain first year and bridging subjects in order to gain acceptance the following year. The IS1 subject is one of the prerequisites, most of these students have never worked on a computer before.

To even out these two extremes there is a commercial group, who make up the bulk of the subject’s student population, these students have good academic records with a great variation in their computer experience. The final group has the hardest adjustment to make. They are in fact financial students who take Information Systems and a Software Development course in parallel with their finance-orientated subjects. These students do not intend to follow Information Systems as a career, do not have a great amount of computer-based exposure throughout the year and are situated on a campus separate from their lecturer.

The one common denominator amongst all these students is the need to pass the IS1 course and although the final goal of each group may be different the skills that need to be taught are global.

This task has become more daunting as each year passes. It was for this reason that I began looking at how I could better facilitate the learning needs of these diverse students. Further investigation into the technology available to support face-to-face classrooms highlighted the use of computer mediated communication and the facilities provided by the Internet. “Educators who have latched onto the practice of teaching classes through the Internet are learning that this computer-facilitated methodology is promoting the effectiveness of teaching as well as the overall long term effectiveness of student learning and retention” [Sawyer & Will, 1996]

**Computer Mediated Communication**

*In the words of Dick Davies, “Computer-mediated communication systems (CMC) are real and non-real time technologies that employ telecommunications and computer technology to enable interaction over distance and time.”* [Davies, 1996].

CMC allows for communication on a student to student basis and also a students to lecturer basis. This can be achieved either synchronously or asynchronously by means of electronic conferences, electronic mail (e-mail) and small group computer conferencing

The main objective of this case study was to determine the usefulness of the Internet software (IESP) to facilitate groupwork amongst students large student groups, in preparation for research to be conducted in 1999.

**Internet Education Support Program**

As Arun K. Tripathi says, “The Information Superhighway is transporting teachers and students beyond the walls of their classrooms by providing access to people around the world and to vast amounts of information.” [Tripathi, A., 1997].

After evaluating different methods of teaching the needed skills to my students and trying to incorporate collaborative learning within each classroom environment a promising educational site was discovered in
1997. The software was called Internet Classroom Assistant (ICA). The ICA was used to facilitate cooperative learning groups where the students worked together to create a final project.

Unfortunately ICA was unable to cater for all the needs of the students. Having it on a remote server meant that we could not request changes or attempt to administer controls in the way that we felt we needed to. There were also technical problems, e.g., the Internet connection to the host server was very slow and communication within groups could take hours, also there seemed to be security glitches that allowed students to log onto each other's accounts.

At this time a particularly bright first-year student, Bruce Smith, began playing with the idea of creating an in-house version of the software. He taught himself PERL and had a pilot program running by the end of 1997. We worked together to create a system that could be tested by the beginning of the following year.

The first criterion was to create a product that could be used easily thus reducing the initial learning curve to a minimum. The need was for a software tool to allow the facilitation of collaborative learning utilizing a new technology. The result was the Internet Education Support Program (IESP) which is designed to provide workgroup facilities on the Port Elizabeth Technikon own server.

The software was designed to facilitate collaborative group work and was created to allow multiple groups to work simultaneously without being aware of, or having access to any other groups' data or communication.

**Communication using IESP**

Communication is the primary need of such a system. The students need to discuss subject issues, gain clarification, ask for help and just socialise. However, there are many times that certain types of communication are meant for only a few workgroup participants and other times that questions or issues are dealt with by the entire group. These two needs are met by providing a mail system as well as a group discussion function.

- **List of Members**
  A group member can check the name and basic particulars of all fellow participants at any time during their session on IESP.

- **Mail**
  This system works much the same as e-mail. The user may, however, only mail other users within that workgroup. The user can choose to send mail to everyone or only select a few users. Upon receiving mail a user can delete, respond or archive the mail messages. The mailing is achieved in a very simple environment making it easy to understand for a first-time user.

- **Group Discussions / Conferencing**
  This is a conferencing system. It works very much like a newsgroup. The group leader or one of the group members can raise an issue, all other members of that workgroup have access to this information and can respond to the discussion thread or directly to the author. Such discussion can be carried over a period of time (day, week, and month). The users do not have to be sitting at the computer throughout the discussion but can access the discussion periodically to follow it or add their comments. More than one discussion thread can be active within each group. In this manner students can participate at any time and place that is convenient for them. The screen capture below shows a group's main conferencing topics.
Sharing of Information

While running a class group the group leader often needs to leave important information or a path with which the group members can find more valuable information. The group members themselves may need to share information or hand in documents. To facilitate this need IESP contains areas where documents and Internet links can easily be shared.

Documentation

When a group member has a text based document that they would like to make available to other group members, they can go to the document sharing function. Here the member can leave a basic text based document or an HTML document for viewing. Once the document is posted only the group leader and the creator (optional) of that document have editing rights.

Internet Links

Often though there are a vast number of existing Internet sites that the may be of relevance to group members these can very easily be added into a special link sharing function. This function also allows the group member to write a short paragraph explaining the relevance or content of this site.

Group Projects

Many group projects require a small number of students to work together to create final document. Typically, the group divides the work up amongst themselves. Because most projects are completed outside of class time, it becomes difficult to arrange meetings, exchange information, get feedback, track progress and construct the final product. IESP is run on the Internet utilizing all the advantages associated with the Internet. This allows the group to sign on 24 hours a day, from any Internet connection that they might have access to.
Control

Finally the group leader should be allowed to exercise a degree of control over the workgroup. There are many basic capabilities that allow the group leader to add or delete members, change passwords and check how active a particular group member has been within the group.

➢ Group Functionality

The most important function is that the each workgroup is completely dynamic and customisable. This means that the group leader can decide on the status needed for each individual group created. Also important is that each group is completely private and entrance to the group can be completely controlled by the group leader. As a result the group leader is given the option to: leave the group OPEN and provide the logon code to any user interested; in the MODERATED mode users can only join with the explicit permission of the group leader; and finally the LOCKED mode prevents any user from accessing the group. In this way the group leader can decide when a certain workgroup area is available to users.

➢ Login Controls

Login control is handled by requiring users to provide a unique user name and password. The password is stored in an encrypted format. In this manner each group member only has access to his own account and any communication that takes place is accredited directly to that person. (This also helps with statistical analysis).

If group members do not logout, the system will automatically log them out and thus eliminate the chance of one member accidentally accessing another member account.

➢ Statistics

Once information or Internet links have been provided to the group members it aids the group leader to see not only how many but who has accessed this information. IESP allows only the group leader the ability to check on and archive which students have accessed the information and at what time.

Further statistical information is available with regard to the number of users currently active the amount of logons to the system etc.

Planned Changes

➢ Concept Mapping

A visual representation of subject content can be very helpful to a workgroup. We are currently busy creating a tool that allows any/all group members to participate real time in a concept mapping session. In this manner members can plan group work and iron out difficulties while each sitting at there own personal computer.

➢ Document Holder

This is a proposed area where documents from any application can be stored and retrieved by any group members.

➢ User Interface

A more Icon centered user interface to make the workgroup environment more readily understandable.

➢ Database

The inclusion of databases to collect information in order to allow more statistical analysis of communication and participation. Also, to keep better group member information and lists.
3 The Collaborative Project

As a result of the problems experienced teaching so many diverse students and having the IESP software available it was decided to conduct a project including as many of the classes who take the IS1 course as possible. The project ran for the duration of the second semester.

The students were given the first semester to become familiar with the Internet, Email and the use of the IESP software. Discussions were held using IESP and course notes were provided to students, in an attempt to encourage the use of this product.

Aims

The project had the following aims:

➢ To gain a better understanding of the cooperative learning environment
➢ To promote collaboration where time or place does not restrict the learning environment.
➢ To improve the communication and writing skills of all students.
➢ Students need to learn not only how to find information on a topic but also how to put this together as one coherent whole
➢ It is important the student learn to take individual responsibility while working in a group environment.
➢ Teach students how to communicate with people who come from diverse cultures, perceptions and academic understanding.

Project Design

➢ Student Groups

In deciding on which student groups to include I relied on the experiences of a similar project run the previous year with ICA software. It had become clear from the 1997 project groups, that the foundation or bridging group were intimidated by the other students within a group and often were unable to participate or learn anything meaningful. I therefore decided to allow them to work together with another foundation group on their own assignments.

This then left three class groups on the Summerstrand campus in Port Elizabeth, one group studying from the College Campus in Port Elizabeth and one group studying on the Saasveld campus in George.

From these students I created 20 heterogeneous groups each containing approximately 9 students. Each group had members from all five classes and members varied in the academic abilities.

All members in a group had received training in using Word Perfect, the Internet, Email and the IESP software. Most of the students had received some training (in another subject) in the use of HTML. The first task of the group was to select a coordinator who would facilitate the communication (between members, to the lecturer) and be responsible for the project deliverables.

➢ Topics

In following with the aims of the project topics were chosen that would force the students to consolidate large amount of information into one coherent document. Therefore the topics were based on common computer related concepts eg. Intranets, Virtual reality.

The final document had to be an HTML document that was based on an introduction to the concept of that particular topic. The students were also informed that a word-processed document would need to be handed in one week earlier for evaluation. (As the group was large this would not only make it easier to divide up responsibilities but also ensure that all research was completed in time).
Mentors

At a later date, mentors were assigned to each group; these individuals were selected according to their expertise in the specific topic area. Most of these mentors were in fact fellow lecturers in the Computer Studies department.

The job of the mentor was to be a silent observer. They were given strict instructions to help students only when they were completely confused. The students were made aware of their existence and allowed to ask mentors specific questions, if needed. The mentor was also asked to give their opinion of the final project document.

Communication

The students were each given a list that contained the names and student numbers of their fellow students. Each project group was given its own workgroup space on IESP that only the group members could access. This allowed them to exchange information, get feedback, discuss project needs and create and share the final document.

All students also had individual email accounts and often used this to communicate with one another. Many of the students organised meetings of the whole group or relevant members. Some students used their lecturer (me) as a courier to pass on printed materials.

Management of the Project

In order for the project to run successfully there was the need for a software administrator. This individual would need to solve any technical problems that might arise throughout the running of the project. The ideal person was the creator of the software, Bruce Smith.

Soon after the commencement of the project it became apparent that there was a need for a further administrator. This person had to delete aborted logon attempts, change forgotten passwords and continually educate the students on the correct use of the IESP facilities. This was done by the lecturer.

Assessment

This project was run as a pilot test for the research project to be run in 1999. Not only was the software to be beta tested but also the structure of the project itself was tested. For this reason the assessment refers to the assessment of the students' work both as a group and as individuals within the group and the evaluation refers to the evaluation of the software and the manner in which the project was conducted.

Group Assessment

This evaluation is the most obvious. The group is assessed on the HTML document that has been created. The group was expected to hand in a document of intent which described the work that they intended to do; how the project was divided up; and a timetable specifying their intended completion dates of each task. Every four weeks the group was expected to hand in a document of performance, mentioning any problems and updating the original timetable. The group was given a mark for the complete and timely handing in of these documents. Criteria for evaluation of the actual project include:

- Depth of the research
- Accuracy of presented information
- Referencing of sources
- Dynamic HTML document, I required a minimum of four links leading to related and informative sites. I also explained the difference between a static and dynamic HTML document.
- User Interface
- Level of understanding
- Group participation
Individual Assessment

The assessment of each individual member of the group is more important than the assessment of the final product. With any group project there are always the student(s) that works extremely hard, these students often carries the straggler(s) who does the very least amount of work.

The individual assessment plays the dominant role in the final mark for each student. One week after the submission of the group document of intent, each student was required to hand in a similar document describing their individual role within the group, the manner in which they were going to achieve this goal and the time frame of this role.

Once the project had been handed in, each group member was given an evaluation form. The first part of the form required an assessment of all their fellow group members. Each question required the student to assign a value from one to five with regard to the student’s performance. Questions dealt with the student’s willingness to communicate, take responsibility, complete required tasks and respond to other group members.

The lecturer removed the highest and lowest scores given to each student and totaled an average from the remaining marks. This, together with the lecturer’s assessment of the student’s performance (taking the document of intent and actual performance into account), was used to calculate each student’s individual mark.

Evaluation

The evaluation of the project and the software was incorporated into the document used for the evaluation of individual students. As the evaluation is to be used as a guide to the research project for 1999 most of the questions that were asked were open ended in nature.

These forms would have been returned and documented by the time of the SAICIT conference and will be discussed there.

4 Conclusion

By using the Internet, as a tool, in a classroom situation the educator can monitor the progress of individual students and act accordingly. However, it is important to realise that the use of the Internet in a classroom is merely a facilitation or support tool. The educator is responsible for setting the objectives of the course, ensuring that learning takes place and setting adequate assessment strategies.

To merely place content on the Internet and force students to work together in groups does not achieve the required learning aims. The educator needs to involve the students in the whole process. This fosters interdependence within each group, while giving students individual accountability and ensuring that they take responsibility for their own learning.

References

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