

GLOBAL NETWORKING: PROBLEMS AND SOLUTIONS IN BRANCHING TO ELECTRONIC COMMERCE

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ABSTRACT

Along with other electronic technologies, the Internet is now widely used not only for business-to-business transactions but to conduct consumer-to-business interaction and reach customers in targeted segments such as geographically remote locations, or customers who are seen to be otherwise unreachable (Kalakota and Whinston, 1996). New information-based processes for reaching and interacting with customers are evolving to define a modern business methodology known as electronic commerce (e-commerce).

In this paper we shall discuss some of the teaching and learning methods adopted for the delivery of a course which focuses on the design and management of IT infrastructure to support the e-commerce needs of a small- to medium-sized business.

In (Stevens, 1998) the author concludes that “the Internet clearly holds much promise for businesses that choose to embrace this new medium. ... However the rapid commercialisation of the Internet has brought new pitfalls and perils for businesses seeking to capitalise on the opportunities”. Throughout the module we have tried to relate the pitfalls and perils as well as the benefits of e-commerce to the important issues of IT infrastructure requirements and network risk and security.

Keywords

E-commerce, security, information technology, networking infrastructure

1. INTRODUCTION

Experts predict that online consumer spending will exceed US\$7 billion as early as 2000. The projected growth rate in electronic commerce (e-commerce, sometimes also called I-commerce) transactions is well above 50 percent a year and what is more, online selling has the potential for even more explosive growth (Jamison et al, 1997). As the authors point out, “no entrepreneur or corporate executive can safely ignore this immensely powerful change in the ground rules by which business will be conducted in the coming century”.

Branching to electronic commerce is not as smooth as many business organisations would like it to be. Even though some estimates show that the number of people capable of accessing the Internet is more than 100 million, making a cost-effective decision to start an e-commerce operation requires both a careful marketing analysis and an even more careful approach to investigating the hardware and software options that can support the new or modified business processes and the resulting risk and security management strategies.

The module under consideration – 406003 “Information Infrastructure Design and Management” was offered for the second time in Semester 1, 1999 at AIT. It is a compulsory paper for the Information Technology (IT) major in the Bachelor of Business Degree at the Faculty of Business. Our experiences with the paper in Semester 1, 1998 were summarised and presented in (Adamson and Petrova, 1998). It was suggested in the conclusion that a major factor for successful delivery would be the amount and the type of inter- and intra- teamwork involved in group assignments.

The module was structured around two major content areas – IT infrastructure design and strategic planning for risk

and security. We felt that this would help to focus our teaching on the main issues of designing and implementing an e-commerce solution.

We shall describe first the setting of the learning and teaching environment, then the processes involved in the actual delivery of the module and will finally conclude with recommendations for further course development.

2. TEACHING - LEARNING ENVIRONMENT

At the very beginning of the semester, students were asked to form teams and to start work on their first assignment, which included a group component. We used a small questionnaire to study student backgrounds and preferences and to help them form teams. Students were introduced to the idea of using the classroom for teamwork – as opposed to working for group projects in their own time only.

2.1 Teams and the Classroom

The setting of the group-work environment was that of small groups (3 to 5 members, with one larger group of 6 students). The role of the teacher would be that of a facilitate of knowledge acquisition, while students would be given the opportunity to learn from primary sources as well as through a process of shared knowledge-building in a co-operative learning mode.

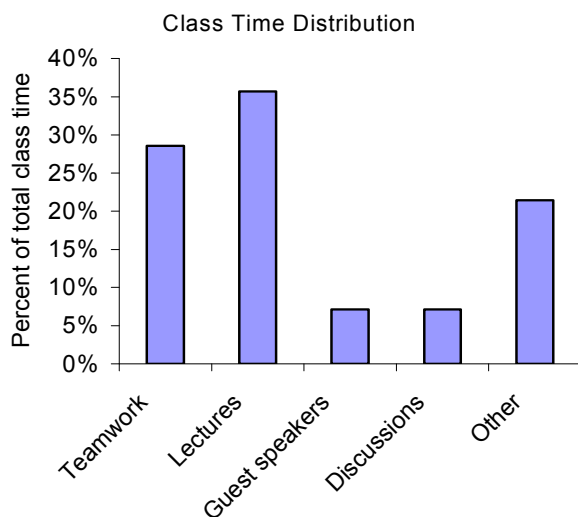


Figure 1

Discussing the advantages of co-operative work Watson in (Watson, 1997) suggests the use of the classroom as an equivalent of workplace; group work occurs during class time, emulating real world experience. We followed this principle and tried to provide students with meaningful and productive group environment. A significant portion of the

overall contact hours was devoted to group-work in class (around thirty percent), sometimes “spreading” the class in several classrooms. The distribution of class time is shown in Figure 1.

Though the teams were largely self-selected, we managed to establish a good balance between motivation, responsibilities and student learning skills, and once formed, the teams did not suffer from any “disintegration”. Using in-class time for teamwork helped members to share the workload and to work concurrently as each member studied, researched and collected material which would then be brought to class for further reference.

Although co-operative teamwork in class was directed and guided by the lecturer, students were involved in planning their own activities and the lecturer’s role was more that of a team-member rather than an external influence. The learning strategy adopted was of self-directed learning (Knowles, 1984) and focused on a cumulative case study. Assuming that learning in an active mode is more effective than passively receiving information (Matthews et al, 1997), we tried to create an environment where a meaningful balance could be achieved between lecture and small-group activities and teaching and learning could evolve as shared experiences between teacher and students.

Students were encouraged to accept responsibility for learning as individuals and as members of a group and develop social and team skills through the “give and take” of consensus-building processes involved in the case study.

Due to various organisational constraints, students could not be given the opportunity to participate in class Internet sessions; they were allocated student Internet accounts with the AIT intranet to facilitate Internet based fact-finding.

2.2 Student Background

Typically, students enrolled in this course come equipped with a varying amount of computer skills and knowledge, as demonstrated in Figure 2 (data collected through self-evaluation).

Most of the students have sufficient skills in text-processing and working with spreadsheets but do not have knowledge about any more advanced software products – such as tools for information systems development.

As approximately seventy percent of the students are mature learners with work experience, we studied the distribution of their experience in IT-related areas (Figure 3). It can be seen that about half of the students has no IT-related work experience while only seventeen percent have IT-related experience at a high-level (data collected through self-evaluation).

Student Background - Skills and Knowledge

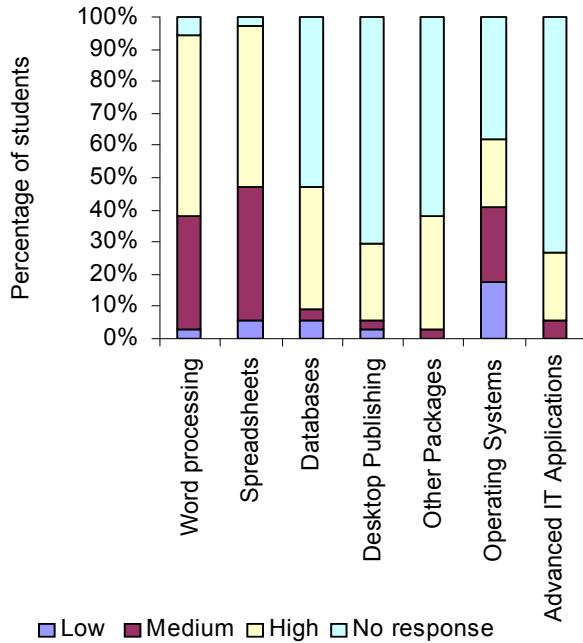


Figure 2

“telecommunications revolution, driven by liberalisation and the Internet” (Cairncross, 1977). This brings an important change to the learning environment – it moves closer to the realities of the business world, imposing new demands on the skills and the expertise of the teacher.

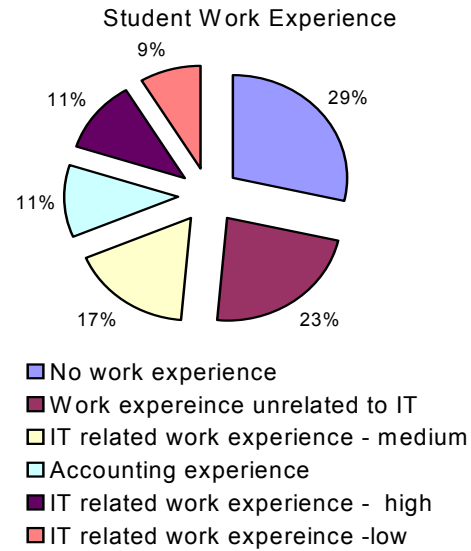


Figure 3

2.3 Module Content and Assessment

Some declare that the “electronic commerce is here to stay” and further argue that “despite the many unknowns in this rapidly changing area, e-commerce stands poised to make a momentous contribution to the way government, business, and individuals conduct business” (Kalakota and Whinston, 1996). Some point out that the “new tools provided by computer and engineering sciences are now wreaking havoc with conventional economic theories” (Choi and Whinston, 1999). Terrile in (Terrile, 1999) warns that the long-term implications of the process of change which companies involved in e-commerce are undergoing, are still not clear.

Almost daily new publications about electronic commerce spring to life, and there seems to be a consensus about the future of e-commerce. KPMG statistics (Bland, 1999) predict that in two years’ time, almost half of the top 3000 Australian and 1000 New Zealand companies will build an extranet, 30 percent will engage in electronic data interchange (EDI), and 32 percent will implement electronic signatures.

The way we discuss e-commerce in class and teach about the information technology infrastructure necessary for its implementation is influenced by the ongoing

2.3.1 Module content

After analysing the experiences of the collaborative effort of 1998 in light of the desired learning outcomes and capabilities, we revised both the content and the assessment structure of the module.

The module is designed to equip business analysts with information technology skills, which can range from basic understanding of local- and wide- area networking, to designing business connectivity solutions through Internet protocols. It is worth noting that while “the main users of the former wide-area networks were large companies, an increasing number of small- and medium-size enterprises utilise the Internet nowadays”. Business servers, search engines and electronic market places show that the majority of companies listed are of small or intermediate size” (Kurbel, 1998). Business analysts are therefore expected to acquire knowledge and skills about client-server architecture and World Wide Web structure which would enable them to design and implement a total IT solution to an e-commerce business problem – including investigating and evaluating options in strategic planning for branching to e-commerce, acquiring IT infrastructure, managing risk and security, Internet advertising and marketing and incorporating reliable electronic payment subsystems.

Following the outlined objectives we structured the content to cover four main topics:

- IT infrastructure design (networking technologies and protocols for global communication)
- IT infrastructure management (network management, security and risk management)
- IT infrastructure procurement (acquisition planning, request for proposal, proposal evaluation and negotiation); cost/benefit analysis
- E-commerce technologies (electronic payment, electronic data interchange, Internet marketing and advertising, intelligent software agents, multimedia); legal and ethical issues

Special emphasis was given throughout the course on the relevance of privacy and data security to e-commerce. Kovacich (Kovacich, 1998) points out that two of the main issues holding up the widespread adoption of e-commerce are consumers' misgivings on the privacy of their personal details, and the danger of their credit card numbers being used fraudulently. Businesses, on the other hand, are wary of media-glamorised 'hackers'. "In the past, drivers took for granted the possibility of being thrown against the dashboard in the event of a collision... Likewise today, [insecure networks] are considered normal." (Ranum, 1997). The coming generation of business professionals will need to address security issues -both technically, and in the eyes of consumers- in order to achieve e-commerce's true potential.

All four topics were allocated the same amount of lecture-tutorial time and we tried to design suitable assessment instruments for them.

2.3.2 Module assessment

We are often faced with the opinion that "real", "working" knowledge about the IT industry can only be gained through practical work experience rather than through instruction in class (Sparling, 1999). In an attempt to overcome this perceived deficiency, a strong practical component was incorporated in the course assessment tasks. We tried to increase the relative weight of student-centred learning through cumulative case study work: seventy percent of the overall module marks are distributed evenly between the two stages of the cumulative case study (Table 1), while the final examination comprises the remaining thirty percent.

Our further discussion will look into some aspects of the learning process that took place throughout the stages of the coursework assessment

3. LEARNING OUTCOMES

The cumulative case study was designed to meet two major educational objectives:

- To provide a framework for acquiring problem solving experience in the area of design/implementation of IT, and
- To provide a simulated "real-world" environment for developing skills in IT infrastructure procurement.

3.1 Acquiring Experience in Problem Solving

The first step in the process of 'branching to e-commerce' was to determine the business requirements. These were identified in the acquisition planning reports, which provided the basis for the next two steps – the RFPs and the vendor proposals.

The RFP required a significant amount of research; it involved Internet search and information discovery. Student effort focused mostly on using the WWW for marketing purposes: direct sale of products, methods of on-line payment (secure credit card payment, use of clearinghouses) and customer service (general information about products, use of EDI for on-line catalogues). Some students ventured further - exploring the technical and financial feasibility of a Web fashion shows, for instance. Another area of student research was the integration of existing information systems with on-line ordering, inventory control and invoicing.

To be able to support the required business functions with relevant software and hardware, the student teams had to gather up-to-date data on the technical characteristics and capabilities of data communication devices (data lines, modems, routers), disk storage and memory, devices used in backup and recovery procedures and high-end processors; they had to investigate the issues of Internet service provision, hosting Web pages and firewall protection of Web sites.

It is recognised that the lack of public confidence and trust in the "information society" is a serious impediment to the takeup rate of consumer e-commerce and the unwillingness of consumers to transact electronically needs to be addressed (Clarke, 1999). Both in RFPs and in proposals the students addressed problems of networking security and personal information privacy: the RFPs requested methods for secure electronic payment and protection of consumer data. The vendor responses included solutions using encryption, credit card payments through a clearinghouse, and secure database transactions.

Cumulative Case Study

Background, Student Tasks and the Business Objective	Outcomes, Type of Assessment and Feedback Process
<p><u>Stage 1: “Defining the problem - business branching to e-commerce”</u></p> <ul style="list-style-type: none"> ▪ Background Students are given the description of a small-to-medium size business (fashion clothing retailer) and documentation about the business’s expansion and IT acquisition in the previous year. The documentation was collated on the basis of portfolios produced by students in the 1998 class. ▪ Tasks To study the documentation provided and based on research and co-operative team work to produce <ul style="list-style-type: none"> – An acquisition planning report and – A request for proposal (RFP) for further acquisition of IT infrastructure. ▪ Business objective To start the process of creating a virtual retailing branch for secure on-line ordering and payment, with facilities for advertising and marketing and integrated inventory control, with in-built scalability and planned integration with existing IT infrastructure. 	<ul style="list-style-type: none"> ▪ Acquisition Planning Report <ul style="list-style-type: none"> – Weight: 15 % – Type: individual – Feedback and processes: <ul style="list-style-type: none"> a) class discussion on main areas of the report b) informal presentation of reports ▪ Request for proposal <ul style="list-style-type: none"> – Weight: 20% – Type: teamwork – Feedback and processes: <ul style="list-style-type: none"> a) RFPs considered by parallel class b) One RFP is selected for the work in Stage 2 of the case study and c) Informal evaluation of RFPs
<p><u>Stage 2: “Looking for e-commerce solutions”</u></p> <ul style="list-style-type: none"> ▪ Background The two classes running in parallel produced a set of RFPs as an outcome of Stage 1. Each class was given an RFP from the parallel class to continue with Stage 2 (the identity of the RFPs authors were not revealed) ▪ Tasks To study the RFP and <ul style="list-style-type: none"> – Prepare a vendor’s response (proposal), based on independent research on e-commerce solutions and co-operative work, – Study all vendor’s proposals created by other teams in the class and evaluate them based on a set of evaluation criteria, – Write an evaluation report on the shortlisted proposals, and – Present formally the evaluation report. ▪ Business objective To start e-commerce retailing activities with secure on-line ordering and payment, with facilities for advertising, marketing and integrated inventory control; to implement a financially viable and scalable solution, integrated with the existing IT infrastructure. 	<ul style="list-style-type: none"> ▪ Vendor’s proposal <ul style="list-style-type: none"> – Weight: 10 % – Type: teamwork – Feedback and process: <ul style="list-style-type: none"> a) Individual research on e-commerce options b) Class work on putting together a proposal c) Exchange of ideas between teams in class to reach a consensus on the proposal framework and focal points d) Formal peer evaluation of proposals (all proposals submitted under a team name) ▪ Evaluation report <ul style="list-style-type: none"> – Weight: 25% – Type: teamwork/individual – Feedback and process: <ul style="list-style-type: none"> a) Team shortlists vendor proposals and agrees on main areas for further evaluation b) Team members prepare individual reports based on a set of criteria relevant to the area assigned c) Evaluation reports formally presented in front of class and invited guests.

Table 1

3.2 Developing Skills in IT infrastructure procurement

To develop the RFP, the teams were given a description of the business and documentation on previous procurement – obtained from the case study portfolios created by the 1998 class. Thus the teams were able to build up a picture of the clothing retailer business operating in continuity for a period of two years under different market conditions. The business has undergone one IT development cycle in 1998 and is preparing for another in 1999.

The first outcomes of the teamwork were the RFPs produced by a total of fourteen teams in two classes. The RFPs were evaluated by the lecturers and discussed with students in class. One RFP from each class was selected to be the basis of the next step in the procurement process and the selected RFPs were exchanged between the classes.

Two criteria were applied to the process of selecting an RFP:

- The RFP should be detailed enough to provide a good starting point for the proposal without being restrictive and
- The RFP should cover all business needs identified in the acquisition planning reports.

The next step involved writing proposals to the RFP. All proposal created in the class were circulated among the teams to be studied and evaluated. The purpose of the first round of evaluations is to shortlist three proposals for further evaluation.

The results of the first evaluation were discussed in class. A set of evaluation areas was identified – to be used during the second round of evaluation.

While the first evaluation was done by the teams, for the second one teams had to assign each member to an evaluation area and each student had to focus into that area, develop a suitable evaluation matrix, and prepare individually an expert evaluation report comparing the shortlisted proposals and recommending a strategy for further action.

The individual reports were presented in class in ten to fifteen minute presentations. The members of each team presented their findings within the team setting, building on complementing each other's work. Invited guests (lecturers) were present at two of the four sessions.

Six of the eight proposals were shortlisted at least once while three proposals were shortlisted more than three times. The presentations gave the teams an excellent opportunity to compare their own work with the work of other teams and to "fill in the gaps" in their understanding

as one students put it. The evaluation criteria used by the teams covered functionality, matching the requirements of the RFP, financial feasibility, maintenance, support, training and documentation, software and hardware integration, security and back up and recovery provisions, timeframe for implementation, scalability, hardware and data communications configuration.

Quite a few of the student evaluations recommended further negotiation with the vendors.

4. CONCLUSION

Student feedback on the module is quite encouraging. Formal feedback was received through the standard module appraisal procedure, and a comparison between the results from the 1998 and 1999 appraisals is shown on Figure 4.

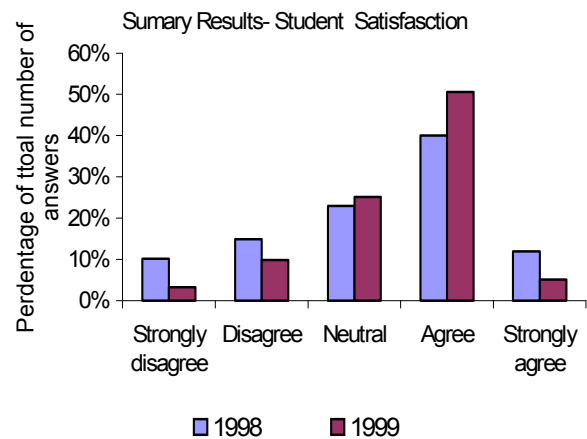


Figure 4

From the abundant amount of informal feedback I would like to quote a student whose team proposal was ranked first in three of the shortlists: "We did not know much about it at the beginning, and tried to cover all ... Now we have seen what we have missed."

Two possible areas of improvement can be identified at this stage: module content and case study work.

Feedback indicates that module content is well-balanced; however, areas which might merit more in-depth study might be the design of global Internet exposure through software agents and brokers and the integration of business processes affected by the introduction of e-commerce. The business processes for e-commerce should be an integral part of the overall business model and well incorporated into the systems operating within the business. Legal and ethical matters concerning in e-commerce would need more course time as well, especially the evolving issue of trust and fair information practices (Benassi, 1999).

In the case study of 1998, the student teams participated in a full negotiation cycle ending with a contract, while in 1999 no negotiation was included in the case study; this was perceived by some students as a deficiency and we might need to re-introduce some kind of negotiation in the case study. This could be done within the framework of a suitable collaborative environment (Lotus Notes). The same vehicle can be used to fine-tune the RFP before the start of Stage 2.

We hope that in the next semester we shall be able to create a learning environment which supports both class collaboration and co-operative teamwork and encourages creative teaching and learning strategies.

5. ACKNOWLEDGEMENTS

It should be mentioned here that the module described above was taught (in 1999) by a team of lecturers, with Nurul Sarkar and the author having two parallel classes in the same framework of content and assessment and Nurul and I worked together to create the co-operative and learning environment we aimed at. I would also like to acknowledge the value of the contributions made by the students in 1998 and again in 1999 – their work on the case study portfolio, the RFPs and the proposals were used in class as resource material.

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