

School of Accountancy

***Web Assisted Teaching: An Undergraduate
Experience***

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Discussion Paper Series 212

September 2002

MASSEY UNIVERSITY
SCHOOL OF ACCOUNTANCY
DISCUSSION PAPER SERIES

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***Web Assisted Teaching: An Undergraduate
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Abstract

The emergence of the Internet has created a number of claims as to the future of education and the possibility of dramatically changing the way in which education is delivered. Much of the attention has focussed on the adoption of teaching methods that are solely web-based. We set out to incorporate web-based teaching as support for more traditional teaching methods to improve the learning outcomes for students. This first step into web-based teaching was developed to harness the benefits of web-based teaching tools without supplanting traditional teaching methods.

The aim of this paper is to report our experience with web-assisted teaching in two undergraduate courses, Accounting Information Systems and Management Accounting Services, during 2000. The paper evaluates the approach taken and proposes a tentative framework for developing future web-assisted teaching applications.

We believe that web-assisted and web-based teaching are inevitable outcomes of the telecommunications and computer revolution and that academics cannot afford to become isolated from the on-line world. A considered approach is needed to ensure the integration of web-based features into the overall structure of a course. The components of the course material and the learning experiences students are exposed to need to be structured and delivered in a way that ensures they support student learning rather than replacing one form of learning with another. Therefore a careful consideration of the structure, content, level of detail and time of delivery needs to be integrated to create a course structure that provides a range of student learning experiences that are complimentary rather than competing.

The feedback was positive from both extramural (distance) and internal students, demonstrating to us that web sites can be used as an effective teaching tool in support of more traditional teaching methods as well as a tool for distance education. The ability to harness the positives of the web in conjunction with more traditional teaching modes is one that should not be overlooked in the move to adopt web based instruction methods. Web-based teaching need not be seen as an all or nothing divide but can be used as a useful way of improving the range and type of learning experiences open to students.

The Web challenges traditional methods and thinking but it also provides tools to develop innovative solutions to both distance and on campus learning. Further research is needed to determine how we can best meet the needs of our students while maintaining high quality learning outcomes.

1. Introduction

The emergence of the Internet has created a number of claims as to the future of education and the possibility of dramatically changing the way in which education is delivered. Much of the attention has focussed on the adoption of teaching methods that are solely web-based. We set out to incorporate web-based teaching as support for more traditional teaching methods to improve the learning outcomes for students, and as a first step into web-based teaching initiatives. This paper reports our experience and is largely descriptive and of an exploratory nature.

This paper does not debate whether or not technology facilitates effective learning. It accepts that technology will have an inevitable impact on learning. Technological advances have always impacted on education (Elliott, 1992; O'Donnell, 1995). The development of the world wide web (www) and the telecommunications revolution has lead to an online world (Kalakota and Whinston, 1996; Kelly, 1997) where world wide almost instantaneous communication is common. It provides another platform for the delivery and communication of knowledge, just as the printing press did several centuries ago and will impact on universities, academics and their students.

Although Massey University uses both distance and face-to-face education, this paper does not consider the merits of distance versus face-to-face education. There is, however, a large body of literature dealing with this. For example, Russell (1997) notes that a "no significance difference phenomenon" has already been reported in 248 research reports, summaries and papers. The main finding of the no significance difference phenomenon is that distance education courses are no less effective than face-to-face courses. However, other researchers including Phipps and Merisotis (1999), question the results of this research. Although we acknowledge that this is an important issue that may also impact on web-based teaching, it is not the purpose of this paper to address it.

The literature discusses effective university teaching. Chickering and Gamson (1987) identified seven principles of good practice in undergraduate education. These principles are that "good practice": encourages contact between students and faculty; develops reciprocity and co-operation among students; uses active learning techniques; gives prompt feedback; emphasises time on task; communicates high expectations; and respects diverse talents and ways of learning. Mehlenbacher, Miller, Covington and Larsen (2000, p.187) argue that "much of what is considered good practice in higher education is based on the assumption that active learning is more effective than passive learning, and that interaction between the instructor and the student, among students, and between students and course material is a critical part of active learning." Although some writers question whether technology can facilitate effective learning (for example Noam, 1995), Chickering and Ehrhmann (1998)

illustrate how technology can be used to implement the seven principles of good practice in undergraduate education.

The aim of this paper is to report our experience with web-assisted teaching in two undergraduate courses at Massey University during 2000. The paper, being of an exploratory nature, uses a descriptive approach in addition to an analysis of the use of the resources provided on the website. While reporting our perception of students' reaction to the use of web-based materials to support traditional teaching methods, we relate our experience to the effective learning literature to determine if the web-assisted approach facilitated effective learning and to identify areas requiring further investigation or development. We also propose a tentative framework for developing future web-assisted teaching applications.

The next section of the paper provides background information on the courses and the web pages created. The remainder of the paper outlines our methodology, presents our findings, relates our experience to effective teaching, proposes a tentative framework for developing web-based teaching, and presents our conclusions.

2. Background

Massey University has been involved in both distance (extramural) and internal learning for many years, and has recently expanded by developing new satellite campuses in other centres, and by combining with other tertiary institutes, including teacher training, and polytechnics. It now has three main campuses, one in Wellington, the capital city, one in Auckland and the main campus in Palmerston North, and has smaller centres in other locations. The University maintains a policy of equivalence, which requires students enrolling in the same course to experience programs that are as similar as is possible regardless of the location or mode they use to study. A very high proportion of our extramural (distance) and internal students have access to the internet (web or world wide web) and through it to our website, either from their own computers or from the campus computer laboratories. The majority of those without web access have facsimile or e-mail. Thus the web is a commonly available resource for all our student groups and forms an additional tool available to facilitate student learning.

2.1 *The papers(courses) and their delivery*

The two papers used in this research were selected because they were papers that the authors were involved with and they were also some of the first papers to use web-assisted teaching in the School of Accountancy.

- Accounting Information Systems is a second year undergraduate paper within the Bachelor of Business Studies (BBS) program at Massey University and forms an integral part of the Accountancy major. However other majors, including science and

information systems students, also enrol in the paper. It is taught internally at two¹ campuses and extramurally. Extramural students are drawn from throughout New Zealand and, to a lesser extent, the world. In 2000 distance students formed the majority (45%) of enrolments, followed by the main campus (31%) and the Albany campus (24%). Internal students have two hours of lectures and one hour of workshops per week, with computer laboratories to help them with their computer based assignments (the general ledger program MYOB² and the database program Microsoft Access). Lecture notes and workshop solutions are placed in the libraries on both campuses at the end of each week.

- Management Accounting Services is a third year undergraduate paper in the BBS program. The paper is one of four third year elective papers that accountancy majors can choose as an area of advanced study. It is taught internally at the Palmerston North campus and extramurally. In 2000, the majority (71%) of students were enrolled extramurally, with the remaining 29% enrolled internally at the main campus. Internal students have a two-hour lecture and a one-hour tutorial per week. Lecture notes and solutions were made available at the end of each week only via the course web pages during 2000. This material was not available in any other format.

Distance students enrolled in Accounting Information Systems work largely on their own, although they can contact the lecturers for advice by mail, e-mail or telephone, and face to face if visiting the campus. They are provided with study material and solutions to the internal workshops. A one-day on-campus course, providing an overview of the topic, condensed lectures and an opportunity to network and take part in workshops, is also offered. However, only a minority of extramural students attend (30% in 2000) due to time, distance and cost constraints.

Distance students enrolled in Management Accounting Services follow a similar program to the Accounting Information Systems course, with a two-day contact course being offered. All students are set weekly problems to complete with solutions being made available at the end of the week. The contact course provides an opportunity to discuss course material collectively with the lecturers and to solve problems in a small group setting. The contact course achieved an attendance rate of 50% with the remaining students not attending due to various constraints.

¹ The paper was not presented at the Wellington campus at the time of this research.

² MYOB Accounting Plus is a complete accounting and business management solution for the Microsoft Windows and MacOS operating systems. It combines nominal ledger, chequebook, sales, purchasing, stock control, payroll and card file functions into a fully integrated, double-entry accounting program for businesses in the small to mid-size. Supplied in New Zealand by Datatech. Website: <http://www.datatech.co.nz>.

Maintaining equivalence between modes of delivery is essential as they lead to the same qualification. Students are assessed through a combination of computer and written assignments, and formal examinations. In 2000 a website was developed for both papers for the first time, providing an opportunity to deliver aspects of the papers using a medium that can be accessed by both internal and distance students, thus narrowing the gap between the two modes in order to improve equivalence.

2.2 The Website

Massey University has an extensive website (www.massey.ac.nz) with access to a wealth of information about the university, student administration and study, and the academic, research, and community activities of its Colleges and Schools and online access to its library. It also enables authorised persons to gain password-protected access to relevant administrative, financial and academic information. The university teaching development centre encourages staff to update their skills to take advantage of technology, including multi-media and the internet in developing and delivering learning outcomes for the students. Individual courses/papers throughout the university maintain their own sites within the overall framework, in some cases using WebCT³.

The School of Accountancy maintains its own site (www-accountancy.massey.ac.nz), with an overall framework developed with the assistance of the School's computer consultant, rather than by individual lecturers acting on their own. This ensures that the various course pages and their development are well documented and consistent and enables students to find their way quickly within each paper's web pages. The School of Accountancy's site also conforms to design and "look" criteria set by the College of Business, which improves the consistency of web pages across the College as a whole. The School's site, while currently (2000) lacking some of the features available through WebCT, has a more professional and consistent interface.

2.3 The Course web sites

The original web page content for both papers was developed by the course lecturers and, shortly prior to the beginning of the course, posted on the website with the assistance of the Schools' computer consultant. For the Accounting Information Systems course, material from the two hard-copy administration guides (one for all internal students, the other for extramural students) formed the basis of the original structure of the site. Posting the material on the web enabled us to combine the common elements of each administration guide, give students a logical view of the data, point students to key information, and direct them to the information that differed between modes of delivery. The Management Accounting Services web page

³ WebCT has a range of products and services that provide the resources to create a pedagogically effective web-based educational environment. WebCT software can be used to create entire courses online or to complement a classroom-based course. Website: <http://www.webct.com>.

content was taken directly from the combined course administration guide which all students also received in hard copy. Having the administration information on the site had three major advantages. It enabled convenient and timely updating of information, gave students convenient access to data, and enabled links to other sites (e.g. other Massey University sites, including the library and student administration centre, and the textbook publisher's sites).

The Accounting Information Systems course home page (see Appendix A) contained a general welcome to the paper, a link to (dated) urgent messages, and a contents page that linked all pages on the site. Each link had sufficient descriptive information to guide the students in their web searches. Links were also provided to information about key staff and their contact details. Feedback from students, together with our own observations, lead to further development of the website.

The Management Accounting Services course web pages followed the same pattern as part of the design to have a common look and feel for individual course web pages. Links were included to the textbook publisher's web site and to relevant professional bodies as a way of expanding the material available to students.

2.3.1 Lecture notes and Solutions on the website

The Accounting Information Systems course web pages included lecture notes and solutions to workshop exercises. Most lecture notes were PowerPoint presentations and were initially placed on the site following each lecture. Workshop solutions were not posted until after the relevant workshop. Both lecture notes and workshop solutions were converted to Adobe Portable Document Format (PDF). Only students registered for this course could access this password-protected part of the website.

The Management Accounting Services course web pages included PowerPoint presentation slides that gave an outline of the lecture. These were posted to the web pages at the completion of the lecture for each week. Review and tutorial problem solutions were posted to the web pages at the end of each week. Access to both the lecture outlines and solution pages was restricted by password as in the Accounting Information Systems course.

2.3.2 Downloadable programs

As part of the Accounting Information Systems course, students had to do an exercise using an integrated accounting package (MYOB). The internal students could use the MYOB package in computer laboratories at both the main campus and at the Albany campus. Unfortunately the software license did not allow us to make the software available to the extramural students. However, MYOB had a free trial edition of their software, available on

their website and permitted us to post it on our website as well, so that students could download it.

Having the software available on our website had the benefit of directing students to the particular version the assignment was based on. We did not provide a link to the MYOB website as they planned to launch a newer version during the semester. We made provision for several download options including direct installation to PC or MAC as well as the option to copy to floppy disks. In addition we included a disclaimer on the use of the software to protect the University and ourselves from any action as a result of the use of the software. This had to be read and acknowledged before downloading could start. Downloading and installation instructions were also included on the website. The Management Accounting Services course did not include any computer software so this aspect of the web pages was not applicable.

2.3.3 The notice board

Both courses included an electronic notice board as part of their web pages. Notices could be posted and dated and students were informed with flashing messages that there was a new notice. In this way, we could bring important information to the students' attention very quickly; previously we would have had to mail a letter to each student. The notice board was purely for the lecturers' use. Student to student contact or student to lecturer contact was through the discussion forum and e-mail. However, the notice board did not eliminate written communication entirely. As we could not be certain all extramural students had access to the website, key notices were attached to returned assignments whenever possible or mailed separately.

2.3.4 E-mail contacts and discussion forum

Student to student contact and student to lecturer contact was through the discussion forum and by e-mail for both courses. The site gave students instructions on how to join a discussion forum set up specifically for the classes' use. The Privacy Act 1993 meant that we were unable to automatically enrol students in the forum. Students had to individually register for the forum and supply their e-mail details if they wished to join. To aid the process, links were provided to lead the students through the registration. The site also provided links to e-mail addresses of key staff.

2.4 Differences with previous approach

For both papers the website enabled students to download material at their own convenience, and gave wider access to lecture notes than was previously the case. For the Accounting Information Systems course, it also enabled a different method of delivering the computer files required to complete their assignments.

The Accounting Information Systems course altered the timing of the delivery of lecture notes following feedback from internal students. They were posted on the site prior to lectures so that students could print them out and use them in lectures to highlight and add additional points.

3. Methodology

The methodology followed in this paper is mainly descriptive and of an exploratory nature. This is complemented by statistics of actual use of the features on the website. The study was designed to tell us more about the experience of both the lecturers (authors) and the students of the first time application of a web-based approach to teaching. The experience of the students was evidenced by:

- their use of the websites;
- informal feedback (comments and queries) given to the lecturers;
- comparisons to previous experience relating to the level and nature of queries raised by students.

The use of the Accounting Information Systems website was tracked using Webtrends⁴, a program used by the Computer Services Department at Massey to track the use of the Massey websites. Webtrends gives statistics of use for each page of the website. These statistics were summarised in tables and analysed according to frequency of use and time spent on each area of the website. The use of Webtrends restricted the analysis that could be done for the Management Accounting Services paper, as only the top 50 and bottom 20 pages are reported. The smaller size of the Management Accounting Services paper lead to usage figures that caused the pages to fall between these two extremes, but the most commonly used pages were identified as they did feature to a partial extent in the Webtrends statistics. This is described in the next section.

4. Findings

4.1 *Statistics of website use for the papers*

The use made of the website was analysed using Webtrends. An analysis of the use of the website indicates which resources on the web pages were used most during the semester. Table 1 summarises the 15 most used resources of the Accounting Information Systems course web pages determined by the number of visits to the particular page for the whole semester. It also indicates the average time spent visiting these pages.

The most used page was the Homepage. The brief time spent there (which lessened as the year progressed) indicates that students used this as their entry point into the web pages and

⁴ Webtrends is software used for the analysis and reporting of website traffic, supplied by Webtrends as an E-business Management Solution. Website: <http://www.webtrends.com>.

moved on to other pages. Some returned to this page again before moving on, as indicated by the difference between the number of views and number of visitors to this page of the website. The short time spend here indicates a fast page opening time and a good design which gave visitors rapid access to where they wanted to go.

Table 1
Web Statistics for the whole semester for Accounting Information Systems

Sorted by visits			
Page	Views	Visitors	Avg Time
1 Home page	2338	2057	00:57
2 Notice Board	1169	1092	03:55
3 Lecture Notes	1299	1027	05:48
4 Lecture Information	377	366	01:36
5 MYOB Disclaimer	366	342	00:39
6 MYOB Download	378	336	09:19
7 Assessment Information	248	234	01:29
8 Final Examination	191	179	01:39
9 MYOB Installation instructions	181	164	04:33
10 E-mail discussion forum	134	127	01:58
11 Course Information	103	101	02:11
12 Calendar	94	91	02:18
13 Assigned work extramural	74	71	01:16
14 Assigned work Internal	65	64	01:48
15 Resources	35	35	01:11

4.2 The notice board

The notice board for Accounting Information Systems where important notices were placed received the second highest visits. Whenever new information was put on the notice board, students were notified at prominent places on the website that there were new notices on the notice board. It would appear that they heeded these notifications and visited the notice board regularly, spending just under four minutes there. Notices were always short, or had links to relevant areas on the site. This concept worked well. Using the website, we could bring important information to students' attention quickly. The web therefore enabled faster and more consistent communication.

4.3 Lecture notes

The third most visited area of the Accounting Information Systems website was the lecture notes page. The number of visitors indicates that either students did not visit this area of the website on a weekly basis or that a smaller number of students visited the area on a weekly basis. Our perception from comments and queries from students is that many internal students downloaded the material after attending the lectures. The pattern, therefore, seems to be that students downloaded the lecture notes on a regular basis. The average time spent

here was about six minutes, which indicates the time needed to download the material. For the Management Accounting Services course the Lecture notes web pages were the second most used resource. The level of queries received if material was posted later than the norm to the web page indicated many students regularly downloaded the lecture notes directly after the lecture.

Extramural (distance) students benefited from the availability of lecture notes for both courses on the site, as it gave them access to additional study materials. However, the Accounting Information Systems course experienced a drop in attendance at lectures, as internal students had an alternative to access lecture notes that did not involve visiting the campus to attend lectures or photocopying notes from the library. This was foreseen by Hiles (1999) in his paper on using a website for teaching art history. Those students who attended lectures preferred to have the notes in advance to use as a framework for note taking during the lecture. The drop in lecture attendance by internal students in the Accounting Information Systems paper was not experienced in the Management Accounting Services course. The drop in attendance by internal students experienced when students faced pressure from assessment deadlines did appear to be greater than past experience, but the drop in attendance was always short lived.

The lecture notes provided to students in the management accounting course were a lecture outline of the key points of each topic, with the detail being provided during the presentation of the lecture. This may have influenced the level of attendance.

4.4 Downloading programs and files from the website

This aspect of the web pages applied to the Accounting Information Systems course only. Downloading the MYOB software (336 visitors downloaded the software, some more than once); reading the disclaimer regarding the use of the software (342); and visiting the installation instructions (164); were the next most visited areas. These numbers indicate that most of the students, both internal and extramural, downloaded the software. The average time for the download was just over 9 minutes. Although it is possible that other users might have downloaded the software from our site, it is unlikely as it was also available free of charge from the software supplier's website.

This process worked very well. In the past either the software supplier or the university mailed the program out to students. There were often disk problems that had to be followed up and faulty disks replaced which placed a huge demand on the time of everybody involved. We found that students downloaded and installed the program with relative ease onto their own computers. We had an e-mail help facility and encouraged students to use that rather than the telephone. However, we received very few requests for assistance in this regard and have to assume that the download process was successful on the whole. Downloading also gave

the students the choice of what version of the program they wished to use (PC/Mac etc), which was not possible when sending out disks.

Students were also required to work on Access files, which were mailed to them as part of their course material pack. Unfortunately this turned out to be problematic as there were many problems with corrupt files and the files were apparently created in a very old version of Access that did not easily convert to the newest version. In future we will place these files on our website and allow students the choice of which version they wish to download. The contrast between the easy administration of the MYOB distribution and the supply of the Access files highlights the benefits of the flexibility and stability of a web based dissemination of information and materials.

4.5 Other

The rest of the information accessed by visits to the web pages (lecture information (when and where), assessment information, exam format, calendar, course information, assigned work and resources available) were also given to students in printed form at the beginning of the semester for both courses. It is surprising how many accessed this information through the website despite having hard copies. The fact that this information was readily available on the website reduced the number of queries we had in this regard (for example queries on when and where lectures were taking place etc.)

However, as the statistics do not reveal who accessed these areas, some visitors may have been prospective students trying to find out what the course entails. The monthly analysis, for the Accounting Information Systems course, of resources used (see Appendix B) indicates that most of these were visited at the start of the course in July while the exam page was primarily accessed towards the end of the course in October. Students may have been searching for updated exam information. A past exam for Accounting Information Systems (not included in their study material) was posted on this page in October and was also on the notice board. Lecture information, assessment information (how the course is assessed) and the calendar were visited consistently throughout the term.

4.6 E-mail discussion forum

The only other web page for the Accounting Information Systems course that received significant visits was the registration for the e-mail discussion forum. It would appear that 127 students registered for this forum. Although it is possible that many were passive participants, very few students actively participated. Those that did mainly discussed problems with assignments, effectively forming an on-line study group. The e-mail discussion forum was not actively promoted in the Management Accounting Service course although the facility existed. The e-mail discussion forum was created for the Management Accounting Services course as part of the common look and feel design of the School of Accountancy's website.

4.7 Monthly analysis

The monthly analysis of use of the Accounting Information Systems web pages (Appendix B) supports the summary for the semester as a whole. The level of visits to the home page, the lecture notes and the notice board consistently exceeded 100 visits per month, as did the MYOB download during the first months.

4.8 Analysis by time spent

In Table 2 the 15 most used resources from the Accounting Information Systems course web pages was sorted by the average time spent on visiting each page of the website. Table 2 indicates that most time was spent downloading the software and downloading the lecture notes, followed by the instructions for downloading the software page, and the notice board. Apart from these pages, students spent, on average, less than two minutes per page viewing material.

Table 2
Web Statistics for the whole semester for Accounting Information Systems

Sorted by time Page	Views	Visitors	Avg Time
1 MYOB Download	378	336	09:19
2 Lecture Notes	1299	1027	05:48
3 MYOB Installation instructions	181	164	04:33
4 Notice Board	1169	1092	03:55
5 Calendar	94	91	02:18
6 Course Information	103	101	02:11
7 E-mail discussion forum	134	127	01:58
8 Assigned work Internal	65	64	01:48
9 Final Examination	191	179	01:39
10 Lecture Information	377	366	01:36
11 Assessment Information	248	234	01:29
12 Assigned work extramural	74	71	01:16
13 Resources	35	35	01:11
14 Home page	2338	2057	00:57
15 MYOB Disclaimer	366	342	00:39

The findings of the analysis by time spent were consistent with the findings of the analysis by visits and did not bring to light any additional areas of importance. The short time spend on many areas of the website is discernible, but will have to be investigated further to fully understand the significance of this observation.

4.9 E-mail contact with students

E-mail contact with students became a preferred mode of communication for both courses. Students would e-mail queries relating to the assignments and the work and normally

expected a quick response. The advantage of this from the lecturers' point of view was that the e-mails could be answered in certain time blocks and were therefore not as intrusive as telephone calls. In addition, the answers to frequent queries could be copied and sent to various students with little effort. For Accounting Information Systems we also developed from the e-mail queries what we called "frequently asked questions and answers". At this stage these were developed manually from the e-mail queries and represent a place on the website where students could go and read the questions and answers that pertain to them. It is anticipated that in future computer-generated answers to student queries can be used, and that only those that cannot be answered satisfactorily by the system (using key phrases to generate an answer) will be routed to the lecturer.

Problems experienced were:

- The students' expectations of a reasonable time to reply to their queries. It was found that they were quite unrealistic and treated e-mails like telephone calls and therefore expected an immediate response. It was not uncommon to receive a follow up e-mail from students enquiring why a response to an e-mail sent earlier the same day had not been answered. We resolved this by answering e-mails in two timeslots, early morning for the previous night and late afternoon for the current day.
- The level of queries also increased quite dramatically before the submission of assignments and it became clear that the e-mails were actually becoming a form of workshop. This placed a huge burden on the lecturers. Ways around this may be to use tutors as first port of call and for them to answer all the queries they can and only refer the rest to the lecturers

5. Relating our experience to effective teaching

It has already been indicated that active learning is regarded as more effective than passive learning. Using a web-based approach, active learning can be reinforced. Students can go through the material at their own pace and when it suits them, material can be linked to other sites or pages that explains it better, students can go through the material until they understand it and web-based quizzes can be used by students to assess their own progress. It is clear that the web-based approach lends itself to being used in a creative way to ensure interaction between the student and the course material.

Student feedback on the course web sites was generally positive, with extramural (distance) students being most satisfied with the improved access to information. The existence of an organised collection of course notes, solutions, and lecture notes provided an up to date focus for students. This may have been a factor in an unusually high pass rate for the Accounting Information Systems paper in 2000. Lecturing staff also perceived a reduction in the level of simple queries about course details and/or lost material. Students could access

these details for themselves regardless of the timing and format of the original dissemination of the notice or information.

The drop in lecture attendance by internal students in the Accounting Information Systems paper does indicate a potential problem with the use of web assisted teaching in that the components of the course must be carefully integrated to support one another. This indicates to the authors that, although the provision of lecture notes to students can improve student learning, they must be carefully designed to ensure the response from students is an improved learning process rather than a substitution of one process for another.

Both courses used the web pages to provide a structured release of feedback to students by posting solutions to the web site. This gave students prompt feedback, without it being available before they attempt questions, without the difficulties of producing paper handouts. One of the difficulties in providing feedback in written form is the level of queries that this creates from students who were absent or subsequently lost the handout material. The web site was a consistent source of this information that students could access as many times as they wished.

E-mail facilities and discussion forums are ways to facilitate the interaction between the instructor and the student and among students. Although we found that students used e-mail to contact us, the interaction between students on the course was not really enhanced by technology. In this regard it is worth noting that the accounting profession is indicating quite strongly that they want graduates with communication and teamwork skills (as well as lateral thinking skills) (AICPA, 1997; Elliott, 1992; ICAEW, 1997; Kirk and Hawkes, 2000; Stowers and White, 1999; Williams, 1993). This presents a challenge to web-assisted teaching.

Discussion forums as well as other groups will have to be formed to give students the opportunity to communicate (network) and do group work. The technology provides an opportunity to reduce the isolation that can occur in distance education. However, if not managed well, the technology can in fact increase the isolation of all students, including internal students, by creating the ability to access all course information remotely. To be effective this will require significant input from the lecturer and/or tutors. Experience in other papers indicates that for an e-mail discussion forum to be continually effective several willing and persistent students are needed. Teaching staff can stimulate the start of a discussion, but continuing discussion can only be encouraged and supported by the students themselves. Our experience suggests that a hands-off approach to web-assisted teaching will not result in the interaction between students and the development of the teamwork skills that are needed to meet the demands of their future professional career.

Summary

The high level of use of the websites; our experience during the semester with the students (reduced level of queries, improved performance); and the literature on effective learning, which indicates that some forms of learning are more effective than others, all contribute to the view that the use of the web-based approach was effective and useful.

6. Framework for developing web-assisted teaching applications

Based on our findings we propose the following tentative framework for developing future web-assisted teaching applications:

1. Web-assisted teaching can be used to reinforce active learning and lends itself to present the material in ways that are suited to different learning styles and paces. The possibilities are endless and the lecturer should be prepared to go beyond the conventional and be willing to think creatively while developing the web-assisted approach. An important aspect of the design of any web-based delivery is to carefully consider the level of detail provided in information and its timing. This is to ensure all elements of the course support one another rather than work against one another.
2. The interactive nature of the web-based approach allows students to get immediate feedback through web-based quizzes and links to pages where the problem is explained, as well as computer generated responses to general enquiries. Students can also get quick feedback from lecturers and other students using e-mail and discussion forums.
3. A web-based approach is not hands-off as far as the lecturer is concerned and managing discussion forums and encouraging interaction and teamwork will be very time consuming.
4. The lecturer should be in control of developing a web-based approach and should work with the developers to ensure that the aims of effective teaching are achieved and interaction between students is maintained. This is important in order to ensure that the loss of human interaction will not impact negatively on the students' social skills. The technology carries the possibility of increasing the isolation and distance between lecturing staff and students, therefore the design of material and how it is accessed must be carefully considered when establishing the interface with students to ensure that social interaction and discussion occurs.

Although there is a view that a web-assisted approach will lead to less need for lecturers, we do not concur. The web-based and web-assisted approaches will lead to more flexibility from the students' point of view, but for the foreseeable future lecturers will still play an important part in the process. Education is more than just the transfer of knowledge, it is also about developing the social aspects of individuals.

7. Conclusion

The experience with the web pages for both of the courses was a positive one. The students indicated through their usage of the web pages that they found them useful. We found a very high level of use relative to the number of students registered for the courses. The experience indicated that most students had access to the website so that lack of access was not a restricting factor. In fact the Management Accounting Services course lecture notes and solutions were made available only on the web pages without a single instance of a student indicating they could not get access.

An issue which needs careful consideration is one of group interaction. It was mentioned that the discussion forums did not really take off. We are considering providing some guidance on how to use it and perhaps to initiate early discussions. Awarding marks based on participation is another option, but will require constant monitoring by either the lecturers or tutors appointed for this purpose. We realise that the hands-off approach that we used in this area did not work. As group-work and social interaction are key factors for success in the accountancy profession, this is a very important area to develop.

In our opinion the paper contributes to our understanding of what the students used and found useful on the website, how that relates to the effective learning literature and how that can be applied to develop web assisted teaching sites in the future and inform future research in this area. We believe that web-assisted and web-based teaching are inevitable outcomes of the telecommunications and computer revolution and that academics cannot afford to become isolated from the on-line world. The feedback was positive from both extramural (distance) and internal students, demonstrating to us that web sites can be used as an effective teaching tool in support of more traditional teaching methods as well as a tool for distance education. The ability to harness the positives of the web in conjunction with more traditional teaching modes is one that should not be overlooked in the move to adopt web based instruction methods. The technology need not be used solely as a replacement for current teaching methods; the web and the possibilities it provides can be integrated to gain the best of both to improve the learning outcomes achieved by students.

The Web challenges traditional methods and thinking but it also provides tools to develop innovative solutions to both distance and on campus learning. Further research is needed to determine how we can best meet the needs of our students while maintaining high quality learning outcomes. In this regard it would be interesting to compare the overall performance of web users versus non-web users. It would also be interesting to report on the developments since 2000 and the students' responses to these.

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Appendix A
The Accounting Information Systems Home Page

Massey University
School of Accountancy
Incorporating Business Law

COURSE OUTLINE ASSESSMENT TEXT REQUIREMENTS STAFF
CALENDAR ADDITIONAL HELP NOTICEBOARD FEEDBACK

110.243 Accounting Information Systems
COLLEGE OF BUSINESS

Welcome to 110.243 Accounting Information Systems

[Urgent message to all students!](#)

Posted (9/10/2000)

Contents

- [Welcome](#)
- [Course Calendar](#) Important dates.
- [Staff](#) Course Contact details
- [Course Information](#) Prescription, aim, objectives, learning outcomes and time requirements.
- [Course Assessment](#) Assignments, test and examination.
- [Lectures and Workshops, Notes and Solutions](#) (See noticeboard for [password details](#))
- [Assigned Work](#). [Internal](#) / [Extramural](#)
- [Resources](#) [Texts](#) / [Computer](#)
- [Final Examination](#)
- [Contact Course](#) (Extramural Only)
- [Withdrawal](#) from the course
- [MYOB software](#). [Download trial version](#) , [Installation instructions](#)
- [Additional Help](#)
- [Noticeboard](#) *includes urgent message to all students!*
- Updated 16 October 2000*
- [E-mail Discussion forum](#)

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Appendix B

Monthly analysis of use for Accounting Information Systems

Accounting Information Systems was presented during the 2nd semester of 2000. Lectures started on the 17th of July and ended on the 20th of October. The exam was written on the 6th of November.

July (15th onwards)			
Page	Views	Visitors	Avg Time
1 Home page	421	350	01:14
2 MYOB Disclaimer	200	183	00:48
3 MYOB Download	188	164	10:04
4 Notice Board	133	121	03:29
5 MYOB Installation instructions	85	71	02:50
6 Lecture Information	76	70	01:15
7 Lecture Notes	76	56	04:56
8 Course Information	46	45	02:10
9 E-mail discussion forum	41	37	02:25
10 Resources	35	35	01:11
11 Assigned work extramural	31	29	01:42
12 Final Examination	29	28	01:24
13 Assessment Information			
14 Assigned work Internal			
15 Calender			

August			
Page	Views	Visitors	Avg Time
1 Home page	685	616	00:57
2 Lecture Notes	392	302	06:36
3 Notice Board	297	276	03:13
4 MYOB Download	190	172	08:35
5 MYOB Disclaimer	166	159	00:30
6 Lecture Information	133	130	01:46
7 MYOB Installation instructions	96	93	06:17
8 Assessment Information	82	79	01:51
9 E-mail discussion forum	81	79	02:39
10 Assigned work Internal	53	52	02:18
11 Calender	50	50	03:02
12 Course Information	42	41	01:18
13 Assigned work extramural			
14 Final Examination			
15 Resources			

Appendix B - Continued

September			
Page	Views	Visitors	Avg Time
1 Home page	568	497	00:57
2 Lecture Notes	383	325	08:25
3 Notice Board	334	316	04:29
4 Lecture Information	91	90	02:25
5 Assessment Information	77	71	01:31
6 Assigned work extramural	43	42	00:50
7 Calender	44	41	01:34
8 Assigned work Internal			
9 Course Information			
10 E-mail discussion forum			
11 Final Examination			
12 MYOB Disclaimer			
13 MYOB Download			
14 MYOB Installation instructions			
15 Resources			

October			
Page	Views	Visitors	Avg Time
1 Home page	464	411	00:50
2 Lecture Notes	353	278	06:13
3 Notice Board	281	264	03:47
4 Final Examination	93	87	02:19
5 Lecture Information	59	58	01:10
6 Assessment Information	58	53	01:35
7 Assigned work extramural			
8 Assigned work Internal			
9 Calender			
10 Course Information			
11 E-mail discussion forum			
12 MYOB Disclaimer			
13 MYOB Download			
14 MYOB Installation instructions			
15 Resources			

November (Until the 9th)			
Page	Views	Visitors	Avg Time
1 Home page	200	183	00:49
2 Notice Board	124	115	04:38
3 Lecture Notes	95	66	02:52
4 Final Examination	69	64	01:14
5 Assessment Information	31	31	01:00
6 Lecture Information	18	18	01:27
7 Course Information	15	15	03:07
8 Assigned work Internal	12	12	01:18
9 E-mail discussion forum	12	11	00:50
10 Assigned work extramural			
11 Calender			
12 MYOB Disclaimer			
13 MYOB Download			
14 MYOB Installation instructions			
15 Resources			

School of Accountancy

Massey University

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