# The Introduction and Assessment of Three Teaching Tools (WebCT, Mindtrail, EVE) into a Post Graduate Course

*Kenneth Stevens and Rodger Jamieson*
*University of New South Wales, Sydney, Australia*

k.stevens@unsw.edu.au r.jamieson@unsw.edu.au

## Executive Summary

This paper discusses the use and assessment of three teaching tools (WebCT, Mindtrail, and EVE) in a postgraduate course. Firstly, the postgraduate course is introduced and the reader is provided with an overview of the course, Information Systems Auditing, an explanation of the manner in which the course was delivered, the cohort attending, the staff teaching the course, and the use of information Technology (IT) in the course. The paper then provides an overview of each of the tools used including their description, rationale, deployment and use in the course. Web CT assisted with supporting delivery of the course and class discussions, Mindtrail helped in the marking and assessment of student assignments, while EVE assisted in the identification and control of plagiarism by students in their assignments.

Following descriptions of the use of these tools in the course, an assessment was carried out as to their usefulness, from both an academic staff and student perspective. Students' perspectives were gathered by use of a questionnaire at the end of the course. The overall impression of WebCT was that it was a worthwhile tool to support the course and will be used in future courses. Mindtrail was adopted to improve both the assignment marking quality and the feedback given to students and we found that the explicit construction of the knowledge tree (marking guide) assisted in focusing on the important issues of the assignment and thus provided a more 'objective' marking process. EVE analyses documents for plagiarism and was adopted as a deterrent in the major assignment. The lecturers' believe that its use was most worthwhile and demonstrated the academic staff's seriousness about stopping plagiarism. A number of deficiencies identified with the tools and recommendations for its their improvement are also presented.

An analysis of students' perceptions of the three tools revealed that WebCT was rated greater than 'moderately useful' and those students who had a high WebCT access rate, perceived that WebCT was more useful than students in a lower access rate category. Students also found WebCT easy to use, and improved communications between students and instructors during the course. Similarly, Mindtrail was perceived as greater than 'moderately useful' by the students and contained 'moderately detailed' feedback on their major assignments. EVE similarly was perceived as 'moderately useful' by the students, provided 'moderately detailed' feedback to students, and students believed that is was a good idea to prevent/control plagiarism. Overall both the students and the academic staff perceived the three tools as being useful to the completion and running of the course, and the results provide a solid base for the continued use of these tools.

**Keywords**: WebCT, Mindtrail, Eve, Evaluation.

# Introduction

The introduction and use of information technology in the teaching and administration of class based university courses is a matter of considerable interest (Ash, 2000; Blecha, 1999; Liebowitz & Yaverbaum, 1998). Some studies suggest that many lecturers want to pursue innovative use of technology (Sumer and Hostetler, 1999).

The use of the World Wide Web as a course delivery mechanism has become commonplace within many University faculties (Fredickson, 1997, Ross and Schulz, 1999) and, as teaching staff come to terms with how this facility is best used, a new generation of web-based tools have emerged that promise much in the way of efficiency and effectiveness in both the delivery and management of courses. In addition to these web-based tools, a number of more specific applications that address various specific aspects of the teaching process have also emerged.

In a time in when the luxury of time seems ever diminishing and the demands of students ever increasing, the use of information technology that assists in the teaching process is enticing to the lecturer and Faculty. The time commitment required to select, learn and deploy these new tools, in an efficient and effective manner that is within and reinforces the pedagogical imperatives of the course, is considerable.

This paper relates the experiences of the introduction of three diverse computer-based tools into a postgraduate course and describes the way in which the tools were assessed to determine their usefulness. This paper does not attempt to discuss the content or issues in light of other reported research. It simply provides an insight into the "what" and "how" of introducing new teaching tools to the teaching environment in less than ideal circumstances. The evaluation of the tools is described as it was undertaken, and references to evaluative frameworks are post hoc. The paper should be of interest to those engaged in teaching and development of similar courses.

The three tools dealt with in the case study are WebCT, a web-based course delivery and administration system, Mindtrail, a computerized assignment assessment and marking tool, and EVE, a plagiarism detection tool. The assessment the various tools' usefulness was undertaken to determine whether continued use of the tools was justified.

The paper is divided into four parts. The first part provides an overview of the course into which the tools were introduced. The second part discusses each of the tools and outlines their mode of use and implementation. The third part discusses the way the usefulness of the tools was assessed, from both staff and student perspectives. The final part discusses the results of the assessment and discusses what can be learnt from this particular experience.

# Overview of the Course

The three new teaching tools under review in this paper were introduced into the teaching environment of Information Systems Auditing during the second semester of 2000.

## *The Course*

Information Systems Auditing is a postgraduate course offered by the School of Information Systems in the Faculty of Commerce at the University of New South Wales. The course is an advanced elective within the Masters of Commerce. The course's pre-requisites are such that only students who have completed at least one semester's courses towards their degree undertake the course. The course is very popular, being oversubscribed in each recent offering, despite its reputation as being difficult and demanding. The course is offered in the second semester of each teaching year.

The stated objectives of the course (as stated in the course outline) were:

*"This course aims to review concepts, theory, methodologies and techniques discussed in the Information Systems (IS) Audit literature and current practice. During the course, students will develop and enhance their skills, understanding and experience of IS Auditing."*

The course was delivered as a two-hour seminar and a one-hour lab each week, for fourteen weeks. The assessment comprised a 55% final exam, two major assignments (15% and 20% respectively) and a 10% participation mark. The participation mark was determined from student attendance, use of "on-line" discussion databases, discussion in class and a class presentation. The assignments and presentation were undertaken in groups of four to six students.

### *The Cohort*

One hundred and twenty students undertook the course. Approximately two thirds of the students were from overseas, studying on a full-time basis. These students had little or no employment experience and typically commenced their postgraduate studies immediately following the completion of their undergraduate degrees, the remainder being local students studying on a part-time basis. These students have full-time employment, typically within the IT and related industries. The cohort was organized into three seminar and six laboratory classes.

### *The Staff*

Two lecturers taught the course. Both lecturers had taught the course before and have considerable experience in the delivery of courses that have made significant use of information systems and computer technology in their delivery and administration.

### *Use of IT in the Course*

The use of IT has played a prominent role in the teaching of the course for many years. The nature of the course demands that students be given the opportunity to explore and use the tools and techniques that are commonplace in industry. The use of general and audit specific software tools, "Audit Control Language" (ACL) from ACL Services Limited and the use of the World Wide Web as a reference source for information for assignments and other areas of interest has been integral to the course for quite some time. The course also has a history of "trialing" various software applications, a recent example being the use of IPTV to provide on-line access to videos of the lectures.

## Three New Teaching Tools

Three new tools were introduced to the course during the 2nd semester of 2000, these were WebCT (WebCT, Inc., Six Kimball Lane, Suite 310, Lynnfield, Massachusetts, 01940, USA, http://www.webct.com), a web-based course delivery and administration system, Mindtrail (Mindtrail Software Pty Ltd, P.O. Box 93 Indooroopilly, Qld, Australia), a computerized assignment-marking assistant, and EVE (CaNexus.com, http://www.canexus.com), a plagiarism detection tool.

The following provides an overview of each of the tools, a discussion of the rationale for using the tool, a discussion of its deployment and use, and an outline of the difficulties encountered in its deployment and use.

### *WebCT*

#### Description

WebCT (version 3.0) is web-based university course administration system that provides students with controlled access to various information resources and functions, and provides lecturers with the ability

to administer the resources and functions. Students gain access to the system via an individual account code and password. Access to the system is via the Internet, using a conventional web browser.

WebCT has a number of wide range of functions that can be utilized in the teaching and administration of a course. The main functions are:

- A course materials repository mechanism that allows students to access and download documents, such as lecture slides and readings.
- A number of communication mechanisms such as a passive announcements page and an internal e-mail-like messaging mechanism that allows messages to be sent to individuals or groups. Access to external e-mail mechanisms is also provided. Other communication mechanisms include discussion databases, whereby the students and staff can access and place comments into a database in an interactive manner
- Students and assignment groups "homepages".
- Administration functions, such as a group mechanism, which allows students to be placed into groups, a mark recording mechanism which allows marks to be entered against individual students and an assignment submission facility which permits students to upload files to WebCT.
- A mechanism for setting and marking tests.

WebCT is very flexible and the designers of the course have considerable control over the functions used in a course.

## Rationale for Use

While preparing the course for Session Two, 2000 a series of problems were encountered with existing administration tool, Lotus Learning Space (Lotus, 1999). These problems ultimately proved insurmountable and attempts to get Learning Space operational were finally abandoned in Week 3 of the course. A static webpage was used as an interim measure to provide students with access to lecture notes, course administration notices and the like. Specific interactive features offered by Learning Space (such as on-line discussion databases) had been integrated into the course. As retreat from these features would entail considerable changes to assessment and administration and a return to a less effective delivery mode, it was necessary to find an alternative system.

WebCT had recently been introduced to the University and was in limited use in a few courses across various faculties. A small specialized support unit had been established to promote the use of the system and to provide training and assistance with implementation and operation. A demonstration of the system and subsequent discussion with the support unit staff established WebCT as a viable alternative to Lotus Learning Space and within two weeks of the decision to go ahead with WebCT, a "barebones" facility for the course had been established. The material from the interim website was transferred across and the student records imported and the students were introduced to WebCT in Week 5.

The decision to use interactive electronic course administration and delivery mechanisms was pragmatic, in that providing on-line access to course materials removed the need to manually distribute them and also meet with students' current expectations about access to materials. It was also envisaged that an on-line system would allow more flexibility in terms of course delivery, especially in regard to access to reading materials, announcements and the like. The opportunity to use interactive mechanisms, such as electronic submission of assignments, discussion databases and the maintenance of groups was also a factor.

## Deployment and Use

The intention of the staff involved in the course was to make the WebCT site the principal information resource of the course from which all lecture notes, announcements, assignment questions and the like

would be distributed. Interactive use, such as student participation in on-line discussions and the organization and submission of group work assignments, was another aim. From the outset it was evident that an incremental approach to the roll out of the various facilities was required, as the staff needed time to learn how to design and set up the mechanisms required and then instruct the students their use.

While no particular strategy regarding the deployment of the systems was adopted, it was accepted that the roll-out would be performed on an "as needs require" basis, where those functions which were needed the most would be set-up first and students trained on those functions in the following computer laboratory. The first step after the initial creation of the WebCT pages for the course, which was undertaken by the support unit, was the creation of student accounts. The next priority was to transfer the information and files (lecture slides and readings) from the existing static webpage. This proved relatively straightforward as WebCT, being HTML based, allowed many of the pages from the website to be copied the new server and linked to the main menu. Student training in the accessing and using WebCT was conducted during the computer laboratory session of Week 5. Students were instructed in login onto the system and navigating the interface and using the basic file down load functions.

An impending due date for the first student assignment necessitated the "presentation group function" to be the next function set up. The presentation group function allows for the creation of groups. The mechanism proved to be straightforward and involved entering the group name and then clicking the checkboxes of the students in that group. The student list used within the presentation group function only lists "unassigned" students. This feature proved to be a useful control over the process of creating groups. Concurrently with the creation of groups, the set-up and testing of the electronic submission mechanism took place. Again this was relatively straightforward as standard mechanisms for both "presentation groups" and electronic assignment submission exist. Student training consisted of demonstrating the location of the mechanism and providing instructions in the system use. The assignments submitted electronically, which were themselves html documents, were added to the website when marked, and were available for perusal by students.

On-line discussion databases were then set up. The standard facility available within WebCT was used to create three discussion questions. Students were encouraged to complete the questions as well as respond to other student responses. The discussion databases were constructed without much difficulty, the students were shown how to use the databases within their weekly laboratory section. Participation in the on-line databases formed part of a student's participation mark. The student training in this area consisted of the students being walked through the process of adding entries to a test discussion database.

The above mechanisms formed the necessary components to achieve the aims of using the WebCT systems. These components were in place by week 9. Once these had been established, the staff then experimented with a number of other facilities, including the placement of student photographs on the site (downloaded from student records), the creation of a "student only discussion zone", and access to a videos of the lectures via a streaming video facility IPTV. Student training in each of these functions involved a brief hands-on session at the start of each computer laboratory.

Maintenance of the informational pages was undertaken weekly and typically involved uploading the lecture slides and updating various pages. The Announcements page was modified on an as needed basis and involved downloading the existing page, adjusting as required, uploading the page and then "publishing" the page. Additional pages, such as assignment information, were added as required. The ongoing changes and modification to the site were demonstrated to students in their weekly computer laboratory sessions.

One of the staff involved in the course attended a number of WebCT training sessions during the semester and also sought advice from the university WebCT support unit on a number of occasions.

At the end of the semester the system was used to assist in the assessment of the students' "participation mark". The entries in the discussion databases were sorted by "student_id" and each student's entries were pursued. The ability to sort was of considerable aid in this process, despite the rather involved process of sorting.

## *Mindtrail*

### Description

Mindtrail would best be described as a computerized assignment marking assistant. It allows the marker to construct a detailed marking *proforma* or "knowledge tree," complete with marking scales, check boxes and comment fields. Individual assignments are evaluated via the marking guide, producing a mark of that assignment and an individual marking report. The application allows for considerable flexibility when constructing the marking guide. Multiple levels can be constructed with multiple marking criteria per level.

The following example of the use of Mindtrail to mark a major assignment illustrates the systems capacity. The large group assignment consisted of three major parts and within Mindtrail a guide was constructed with 5 major sections. The section 1 provided identification information (such as group name and class), section 2 addressed Part 1 of the assignment. Section 2 consisted of five subsections of which only the last subsection (overall mark for Part 1) carried marks. The first four subsections each had a five-point or seven-point scale. These scales were qualitative and allowed the marker to select an appropriate level for the aspect of the area under consideration, e.g. the "quality of argument" subsection used a scale ranging from 'Poor' to 'Excellent'. The last subsection of Section 2 carried the marking scale for section 2. This subsection consisted of a seven point scalar list ranging from 'Poor' (with a low mark) to 'Excellent' (with a high mark). Each subsection also included various preset comments, which could be added by "ticking the box", and freeform comments boxes into which additional comments could be typed as required.

Once the knowledge tree is constructed the marking can commence. Each assignment is entered as a new assessment in the system and a "notebook" interface for each section of the marking guide is present. The marker selects the appropriate levels on the scales, ticks the comment boxes required and adds comments in the freeform comments field as need be. Each assessment is automatically saved and can be edited at any time. The structure of the knowledge tree can be modified on the fly with all marked assignments being updated for any changes. Mindtrail collates and formats all of these items into a report which can saved as a text file or be printed out and given to the students.

The software is available from the software vendors via download from the web or on CD. Its installation is straightforward and it includes an on-line tutorial to assist the user learn the operation of the system.

### Rationale for Use

The assignments set in the course have typically been very involved with a reasonable amount of student discretion regarding focus. This has resulted in submissions that were long, with considerable variation across the cohort. Marking the assignments had taken an inordinate amount of time and consistency was difficult to achieve. The lecturers had sought numerous ways to improve the marking process, particularly in terms of marking schema and feedback provided to students. Mindtrail appeared to offer a means to achieve these objectives. It was decided that the tool would be 'trialed' during the course.

### Deployment

Mindtrail was used in the marking of the two major assignments undertaken in the course groups. The students received an electronic copy (as a Microsoft Word document) of the marking report for the as-

signments. Basic familiarization with Mindtrail was undertaken prior to marking the assignments, and an in-depth understanding of the product was developed while setting up the marking criteria for the first assignment mark.

## *EVE*

### Description

EVE is an application that analyses documents for plagiarism. The application searches a series of web pages (the developers claim up to 1,000) for similarities with sections of the document that is being checked. The application is simple to use, and involves converting the documents requiring analysis to plain text, identifying the documents within EVE, selecting the level of scan required (ranging from full, medium and quick) and starting the analysis. For each text document scanned, EVE produces an individual report. Each report is a copy of the analyzed document, with those parts considered as plagiarism highlighted (the text is turned red). EVE inserts its own text at the beginning of report in which the percentage plagiarism is given and a list of websites on which the plagiarized text was found.

EVE is available from the vendors via web down load. A shareware version is available for trial. It is very straightforward to load (CaNexus, 2001).

### Rationale for Use

EVE was adopted as a "deterrent" against the plagiarism in the major assignment. The assignment involved an investigation of various aspects of computer forensics, for which the students would have to make substantial use the WWW in their research. The lecturers were concerned that some students may be tempted to simply "cut and paste" material from these sources rather than properly analyze and assimilate the material into their assignments. It was hoped that use of such a tool would deter students from such action.

### Deployment

EVE was used to analyze one of the major group assignments. The assignments were submitted as both a web-based report and a document-based report. The lecturer converted each of the document-based reports into a rich text format (RTF). EVE was then started, and the documents to be scanned identified, the "full" option selected and the scan commenced. All twenty-four assignments were scanned this way and took approximately four hours per assignment to complete (about four days in total). The resulting reports were scrutinized by the lecturers for the percentage plagiarized and then e-mailed to the students. For those assignments that EVE rated as in excess of 15% plagiarized, the groups were required provide some explanation why this was the case. Students were informed that a new "anti-plagiarism" tool was going to be used to analyze their assignments when the assignment details were initially released.

# Analysis of the Usefulness of the New Tools

As stated in the introduction, the each of these new tools was adopted on a "trial basis" and would only be considered for use again if considered useful.

From the staff's perspective, usefulness was considered in terms of the benefits of using the tool outweighing the difficulties in using the tool. To determine the usefulness from this point of view, a qualitative review of each lecturer's experiences during the semester was undertaken. This review sought to identify and articulate the difficulties encountered and the benefits perceived and then make an overall qualitative judgment as to whether the benefits outweighed the difficulties. This review is subjective and is based on the lecturers' intuition and experiences, however, as both lecturers are very experienced in both their teaching and use of computerized tools both for teaching and administering courses, the review of this nature is considered relevant and useful.

From the students perspective usefulness was seen to be measurable by asking the students questions about their experiences and perceptions of the tools during the course. A survey instrument was developed and then administered during the last week of the course. The survey sought both quantitative data regarding rating of various key aspects about the tools and qualitative data in terms of free form comments that the students were encouraged include.

The rationale for using the two-pronged approach was that it was thought that both perceptions were of equal merit in regard to usefulness. It was also considered that the predominately quantitative nature of the student survey would balance against the qualitative nature of the lecturer's analysis. The main concerns about the qualitative analysis by the lecturers is a perceived tendency to over-react to the difficulties of use, given the newness of the tool and misinterpret there frustration with familiarization with overall easy of use

The subsequent analysis of the success of the tools is broken into two parts. The first part outlines the analysis of the lecturer's experiences using the tools in terms of the problems encountered and the benefits realized. The second section presents the results of the student survey.

## *Analysis of Lecturers Perceptions*

### WebCT

**Difficulties and Problems.** A number of difficulties were encounter with the implementation of WebCT. The key problem was the lecturers' lack of prior experience with the system. This resulted in a number of instances where mechanisms were not correctly set up, requiring "on-the-fly" changes, which concerned some students. Most problems were address quickly with changes demonstrated to students in weekly computer laboratories.

The WebCT support unit staff using a comma-delimited file supplied by the lecturers undertook the initial importation of the student data. This process also proved problematic. A number of mistakes in that file meant that some students could not logon to the system at the initial training session. This problem was quickly remedied from within WebCT by changing the student name attached to the student ID. Where the student id was not in the system, the WebCT staff added each student, which the lecturer then attached to the course. It should be noted that WebCT was subsequently linked to the University's enrolment system, automating the above process and allowing automatic updates throughout the semester.

A number of functions within WebCT proved quite difficult to use. The mechanism for updating the sites web pages was cumbersome as files requiring changes needed to be downloaded, changed, reloaded, and "published". The inability to upload more than one file at a time exacerbated this problem. The number of steps involved in the process meant that the staff often forgot to "publish" a new page.

The group presentation facility also provide cumbersome to use. While the set-up of the groups themselves was relatively straightforward, facilities such as the group mail function were difficult to use, especially where a file needed to be attached to the email (this process involves over four steps to identify the file, select it, then attach it), small issues such as a defaulting file format of "html" for an email attachment (which seems a rather odd file format to presume for an email attached) made the mechanism difficult to use and error prone.

Similar problems were experienced with the submission mechanism for assignments. Some groups had trouble submitting their assignment due to a misunderstanding of the cumbersome "file upload" mechanism.

The mechanism for recording marks within the system was not used at the time as it was simply too slow and tedious to use, when compared to the existing spreadsheet. This was especially the case in regard to group assignments, as despite the presentation groups being assigned within the system, no

mechanism could be found that allowed a single mark to be entered for the group and then updated to each student. The lecturers subsequently learnt about the import function, which allows marks to be directly imported into WebCT from external files, such as spreadsheets.

Many of the problems found with the use of WebCT can be attributed to the lack of an underlying database. The limitations of html documents are quite evident in regard to the slow and cumbersome mechanisms employed in management the student list.

**Perceived Benefits.** WebCT was deployed to continue the efficiency gains provided by the previously used on-line system and to provide a more interactive environment for students.

The efficiency gains provided by WebCT were realized, as far less time was spend photocopying materials and the like and while some problems were encountered, the provision of course materials via WebCT did, for the most part, proceed smoothly.

The regard to enhancing the students learning experience, the lecturers feel that the tool provided a reasonably successful trial of the on-line databases and that the problems regarding this and the assignment submission mechanism did not detract from their usefulness in terms of learning experiences. Analysis of the student's perceptions of WebCT concurs with this assessment.

**Overall Perceptions.** Most of the problems regarding WebCT relate to its deployment, which are one-off. A number of misgivings exist about some of complicated procedures and limitations imposed by the lack of an underlying data base, however these are considered avoidable as the function in question is not key to the use of the system, or surmountable via appropriate training. Given the generally positive experience of the lecturers, the overall impression of the tool is that the tool proved worthwhile during the session and will be used in the future.

## Mindtrail

**Difficulties Encountered.** The major difficulty encountered in the use of Mindtrail was the construction of the knowledge tree. This proved to be a laborious task, taking over four hours to prepare for each of the two major assignments. The "knowledge tree" is cumbersome to create as no provision is made to "automate" or replicate the construction of the various components of the tree. For example, in constructing a scalar list, each item in the list must be individually created with a specific mark, where as some mechanism to automate this process, say by creating a set number of items with set mark differences between them would greatly assist. The system also does not allow items to be copied from one part of the knowledge tree to another. Where considerable use is made of similar lists, rewriting the list each time it has to be added to the scheme seems to be somewhat of an oversight on the developers behalf.

The appropriateness of the knowledge tree to the assignment question cannot be overstated. Where answers are outside the responses anticipated in the knowledge tree, the determination of marks can become difficult. The system does cater for such situations by allowing the knowledge tree to be constructed with alternative subsections. For a complicated assignment, where the students have had considerable latitude, construction of an appropriate knowledge tree could be difficult task.

**Perceived Benefits.** Mindtrail was adopted to improve the quality of both the marking process and the feedback given to students. Both lecturers found that explicit construction of the marking guide assisted in focusing on the important issues of the assignment and hence provided for a more "objective" marking process. The way in which Mindtrail is used to mark was also seen to force the marker to focus on the point at hand, thus reducing the influence of other items outside that point, such poor grammar and spelling or "flashy" presentation. Both lecturers also believed that the time spent marking the each assignment was lower than if the assignment had been marked by hand, with hand written comments.

In terms of providing more detailed and useful feedback to the students about their performance both lecturers found that they were able to make considerable use of standard comments and could add new comments as required. It was also found that the capacity to change the marks and comments as required meant that students do not receive feedback with scribbled out marks and comments, a common cause of complaint from students. Noticeably fewer queries regarding the assignment results than for similar assignments in previous years provide some corroboration of improvements in marking.

**Overall Perception.** Whilst both lecturers did not find the construction of the assignment within Mindtrail a particularly easy or enjoyable process, both believe that the improvements in both marking consistency and quality of feedback outweigh the time consuming process. It is also believed that with a greater understanding of the product that the set up times will decrease with addition familiarization.

## EVE

**Difficulties and Problems.** Firstly, EVE requires a basic text file, such as Rich Text Format (RTF) to analyze. Providing such a file provide problematic where the student submissions were in the form of webpages and the lectures had not taken this requirement into account when setting the assignment. A number of submissions required substantial additional work to render a useful text file from a series of webpages, and, as such drew a reasonable amount of complaint.

Secondly, EVE does not (or cannot) discriminate between material which has been properly cited and that which has not. A number of groups had made reasonable use of quotations from various papers and articles and were upset to find that, despite following proper academic standards, they had been 'accused' of plagiarism. Others found that EVE had marked up Tables of Contents, headings and the like as being plagiarized.

Thirdly, a number of problems were experienced in running EVE. Three attempts were required for EVE to work its way through all of the assignments. On the first two occasions the program stalled after only two of the twenty-four assignments had been analyzed. Prior to the third attempt, all documents were recreated and transferred to a more powerful PC. The third run was successful but took more than four days.

Finally, EVE is mysteriousness. A"% completed bar" is the only feedback on progress available (apart from checking which report files have been created). No other indication is given and it is particularly difficult to tell whether it is still running, or has stalled. It is also somewhat of a mystery as to what it actually does, in that the users are totally reliant on the developers of the system in terms of the sources that are checked and the way in which those sources are checked. While the ease of implementation is a bonus, it must raise some question marks as to whether what is found to be plagiarism is in fact plagiarism. A detailed analysis of the reports provide by the system would perhaps go some way to answering this.

**Perceived Benefits.** The primary reason for trailing EVE was to deter plagiarism. Whether the tool achieved this objective is difficult to determine. As the level of plagiarism in the course had not been measured initially, it is difficult to assess whether the use of the tools actually lowered the incidence of plagiarism. The lecturers felt however that the tool's important contribution was to demonstrate the academic staff's seriousness about stopping plagiarism.

**Overall Perception.** EVE proved to be a very powerful tool that was, for the most part, very easy to use. Given its minimal cost, in terms of time and effort to use, and the fact that it presents a tangible outcome accessible to the students, the lecturers believe that its use was most worthwhile and will seek to use it in the future.

## *Analysis of Student's Perceptions*

From the 116 students who completed the course the overall response rates for the survey by respondents were WebCT 90 (78%), Mindtrail 85 (73%), and EVE 73 (63%).

### WebCT

To understand the overall usefulness of WebCT to students, four key student perceptions were sought: usefulness, ease of use; improvement in communication with other students, and improvement in communication with IS staff.

To understand the relationship between these perceptions and the use of the system, additional analysis was undertaken using student access data taken from WebCT itself.

Overall statistics for the variable captured in this research are set out in Table 1.

| GROUP | No. | Mean | Standard Deviation | Standard Error | 95% Confidence Interval: Mean ± (2x Std Error) |
|---|---|---|---|---|---|
| WebCT Accesses | 90 | 2.78 | .92 | .097 | 2.58 - 2.97 |
| WebCT Usefulness | 90 | 3.800 | .851 | .089 | 3.62 - 3.98 |
| WebCT Ease of Use | 90 | 3.789 | .963 | .101 | 3.59 - 3.99 |
| WebCT Group Communications | 89 | 2.612 | 1.013 | .107 | 2.40 - 2.83 |
| WebCT Staff Communications | 89 | 3.298 | .996 | .106 | 3.09 - 3.50 |

**Table 1: Overall WebCT Statistics**

Course participants were asked, on average, how many times a week did you access the course web site, in order to determine usage patterns. Categories included never, 1-2, 3-5, 6-10, and 10+ times per week. There were no students in the *'never'* category, and the last two categories were combined to then form three groups of low moderate and high usage which were used in subsequent analyses. (See Figures 1 and 2.) From Table 1, the mean for WebCT access is 2.78 times which indicates on average students accessed the WebCT site 2-3 times per week.

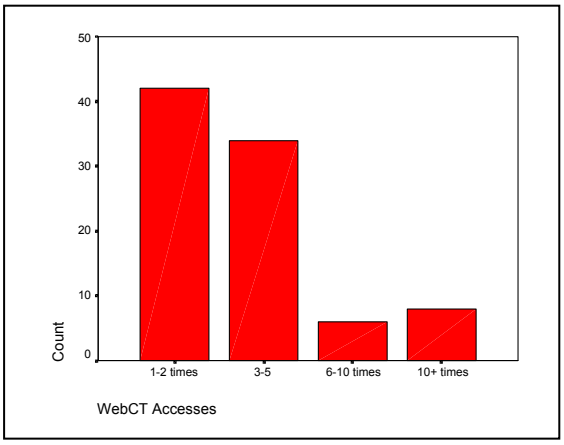


**Figure 1: WebCT Accesses Original Categories**

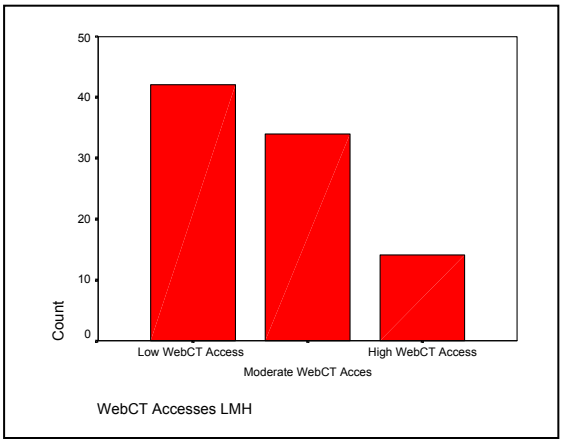


**Figure 2: WebCT Accesses - Low Moderate High Groups**

**WebCT Usefulness.** Usefulness was measured on a 5 point continuous scale with the extremities labeled *'not useful at all'* (1) to *'very useful'* (5), with the mid-point (3) labeled *'moderately useful'*. The aim is to see whether course participants perceived that WebCT was useful to them in undertaking this course, and this is expressed in the following hypothesis.

*H1: Course participants perceive that WebCT is useful.*

WebCT $\xi_{\text{(total usefulness)}} > 2$ (slightly useful)

| GROUP | No. | Mean of WebCT usefulness | Standard Deviation | Standard Error | 95% Confidence Interval: Mean ± (2x Std Error) |
|---|---|---|---|---|---|
| Low | 42 | 3.5 | .83 | .129 | 3.26 - 3.78 |
| Moderate | 34 | 3.9 | .89 | .153 | 3.63 - 4.25 |
| High | 14 | 4.3 | .42 | .114 | 4.04 - 4.53 |
| Total | 90 | 3.8 | .85 | .089 | 3.62 - 3.98 |

**Table 2: Groups ratings of WebCT Usefulness**

From Table 2 we can see that respondents rated overall usefulness of WebCT as greater than 'moderately useful' with a mean of 3.8 and the lower end of the confidence interval being 3.62 (p=.05). As this result is greater than the midpoint of the rating scale (where the 2 = slightly useful and 3 = moderately useful), we can accept the hypothesis that course participants perceive WebCT as a useful tool in their course.

We are also interested to discover whether those students who used WebCT more than others perceive WebCT to be more useful to them. As there were no previous research findings to guide us we have used the following null hypothesis.

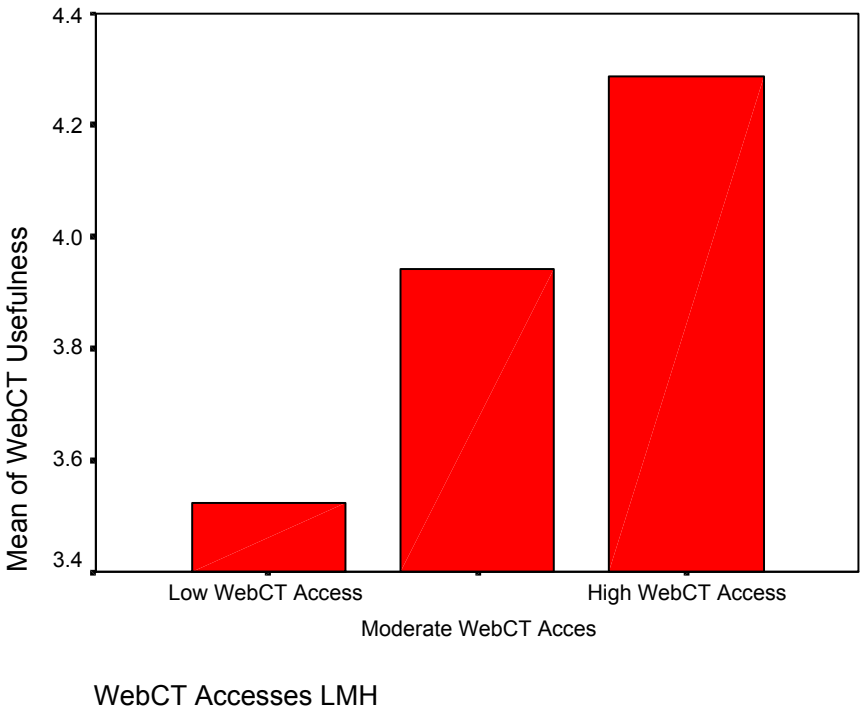


**Figure 3: WebCT Usefulness by Access Group**

*$H_0$2: There is no difference in the perceptions of usefulness between low, moderate and high access groups.*

$$\text{WebCT } \xi_{\text{(low usefulness)}} = \xi_{\text{(moderate usefulness)}} = \xi_{\text{(high usefulness)}}$$

The graph in Figure 3 depicts the different ratings of WebCT usefulness between low, moderate and high access groups.

A one-way ANOVA was run to test if there was any difference in the ratings of usefulness between the three access groups. The ANOVA revealed that there was a significant difference ($F = 3.833$, $p<.05$), and post-hoc contrast testing was used to isolate the differences. Post hoc contrast testing of differences between groups using Scheffe's test revealed a significant difference between the high ($\xi = 4.3$) and the low ($\xi = 3.5$) access groups ($p<.01$), and a near significant difference between the moderate ($\xi = 3.9$) and the low ($\xi = 3.5$) access groups ($p=.09$). The null hypothesis can therefore be rejected, as there is a significant difference between groups.

An important question is whether there is a relationship between perceived WebCT usefulness and the level of accesses to the WebCT web site. As there is no previous empirical evidence on this area, this is expressed in the following null hypothesis.

*$H_0$3: There is no relationship between greater levels of perceived WebCT usefulness and the levels of access to the course web site.*

This hypothesis was tested by the use of Pearson's correlation coefficient, which revealed an $r = +.33$ ($p<.01$) indicating that there is a significant positive relationship between the Number of accesses and perceived WebCT usefulness, thus the hypothesis is rejected. In other words the course participants who had increasing levels of accesses to the site also had perceived increasing levels usefulness of WebCT.

Stepwise regression was run to determine if there is any predictive relationship between the variables captured and WebCT usefulness. Table 3 reveals that WebCT usefulness is predicted by the following equation:

Web CT usefulness = .89 + .41(ease of use) + .24(accesses) + .21(staff comms) with a model Adj. $R^2$ of .457 ($p<.01$).

| Dependent Variable | Regression Equation with B | Standard Error | Beta | Adj. $R^2$ | t | p < | VIF |
|---|---|---|---|---|---|---|---|
| WebCT Use-fulness | .89 + | .345 | | | 2.59 | .05 | |
| | .41 (Ease of Use) | .076 | .47 | .335 | 5.45 | .001 | 1.2 |
| | .24 (Accesses) | .073 | .26 | .413 | 3.28 | .01 | 1.0 |
| | .21 (Staff Comms) | .074 | .24 | .457 | 2.81 | .01 | 1.2 |

**Table 3: Regression of WebCT Usefulness**

**Ease of Use.** Ease of use was measured on a 5 point continuous Likert scale with the extremities labeled *'very difficult to use'* (1) to *'very easy to use'* (5), with the mid-point (3) labeled *'moderately easy to use'*. The aim is to see whether course participants perceived that WebCT was easy to use, and this is expressed in the following hypothesis.

*H4: Course participants perceive that WebCT is easy to use.*

$$\text{WebCT } \xi_{\text{(Ease of Use)}} > 2 \text{ (slightly easy to use)}$$

From Table 1 we can see that respondents rated overall ease of use of WebCT as greater than 'moderately easy to use' with a mean of 3.8 and the lower end of the confidence interval being 3.59 (p=.05). As this result is greater than the rating of 2 (slightly easy to use) then we can accept the hypothesis that course participants perceive WebCT as an easy to use tool in their course.

**Course Communications.** Communications on the course involved both email/web interactions between group members and also between individual course participants and the instructors. Of interest was whether WebCT improved communications in these two areas. Communications was measured on a 5-point continuous scale with the extremities labeled *'no improvement'* (1) to *'considerable improvement'* (5), with the mid-point (3) labeled *'moderate improvement'*. This research interest was expressed in the following two hypotheses.

*H5a: Course participants perceive that WebCT improved communications between group members.*

$$\text{WebCT } \xi_{\text{(Group communications)}} > 2 \text{ (improved communications slightly)}$$

From Table 1 we can see that respondents rated overall group communications in WebCT as greater than 'moderate improvement' with a mean of 2.6 and the lower end of the confidence interval being 2.4 (p=.05). As this result is greater than the rating of 2 (slightly improvement) then we can accept the hypothesis that course participants perceive WebCT as improving group communications during their course.

*H5b: Course participants perceive that WebCT improved communications between individual participants and instructors.*

$$\text{WebCT } \xi_{\text{(Individual/Instructor communications)}} > 2 \text{ (improved communications slightly)}$$

From Table 1 we can see that respondents rated overall communications with instructors (staff) in WebCT as greater than 'moderate improvement' with a mean of 3.2 and the lower end of the confidence interval being 3.1 (p=.05). As this result is greater than the rating of 2 (slightly improvement) then we can accept the hypothesis that course participants perceive WebCT as improving communications between individuals and instructors during their course.

**Discussion of Results of Analysis.** WebCT was the main tool used in the IS Auditing course and was used on average 2-3times a week by students and staff as a means to disseminate information, share ideas, facilitate online discussion and help communication, foster group work and provide a knowledge repository on course topics. Overall we see that WebCT has been assessed as useful to the students undertaking the course, and those students who made greater use of the WebCT facilities also perceived higher usefulness than those with lower levels of use.

## Mindtrail

Key student perceptions were sought regarding Mindtrail: the overall perceived usefulness, the perceived usefulness of assignment comments they received, and the perceived impact of the markers use of Mindtrail on the quality of the marking process. The latter two factors were sought to help clarify what is being perceived as useful for a tool of which the students only saw the end products, a mark and report detailing the that mark.

**Usefulness.** Usefulness was measured on a 5 point continuous scale with the extremities labeled *'not useful at all'* (1) to *'very useful'* (5), with the mid-point (3) labeled *'moderately useful'*. The aim is to see whether course participants perceived that Mindtrail was useful to them in undertaking this course, and this is expressed in the following hypothesis.

*H6: Course participants perceive that Mindtrail is useful.*

Mindtrail $\xi_{(usefulness)} > 2$ (slightly useful)

| | N | Mean | Std. Dev | Std. Error | 95% Confidence Interval: Mean ± (2x Std Error) | |
|---|---|---|---|---|---|---|
| | | | | | Lower Bound | Upper Bound |
| Mindtrail Usefulness | 85 | 3.4 | 0.92 | 0.100 | 3.201 | 3.599 |
| Mindtrail Detail | 85 | 3.3 | 0.87 | 0.094 | 3.153 | 3.529 |
| Mindtrail Impact | 84 | 3.5 | 0.85 | 0.093 | 3.346 | 3.714 |

**Table 4: Mindtrail Statistics**

From Table 4 we can see that respondents rated overall usefulness of Mindtrail as greater than 'moderately useful' with a mean of 3.4 and the lower end of the confidence interval being 3.2 (p=.05). As this result is greater than the rating of 2 (slightly useful) then we can accept the hypothesis that course participants perceive Mindtrail as a useful tool in their course.

**Content Feedback.** Content feedback from the Mindtrail reports was measured on a 5 point continuous scale with the extremities labeled *'insufficient detail'* (1) to *'overly detailed'* (5), with the mid-point (3) labeled *'moderately detailed'*. The aim is to see whether course participants perceived that Mindtrail reports provided sufficient feedback to them in their major assignments for this course, and this is expressed in the following hypothesis.

*H7: Course participants perceive that Mindtrail has sufficiently detailed content feedback.*

Mindtrail $\xi_{(content\ feedback)} > 2$ (slightly detailed)

From Table 4 we can see that respondents rated the level of detail of content feedback in the Mindtrail reports as greater than 'moderately detailed' with a mean of 3.3 and the lower end of the confidence interval being 3.1 (p=.05). As this result is greater than the rating of 2 (slightly useful) then we can accept the hypothesis that course participants perceive Mindtrail content feedback as a sufficiently detailed in the feedback to their major assignments.

**Quality of Marking.** The impact of Mindtrail on the quality of marking of the major assignments was measured on a 5 point continuous scale with the extremities labeled *'very detrimental'* (1) to *'greatly improved'* (5), with the mid-point (3) labeled *'no effect'*. The aim is to see whether course participants perceived that Mindtrail impacted on the quality of marking of their major assignments for this course, and this is expressed in the following null hypothesis.

*H8: The use of Mindtrail had no impact on the quality of marking of the major assignments.*

Mindtrail $\xi_{(quality\ of\ marking)} = 3$ (no effect)

From Table 4 we can see that respondents rated the impact of Mindtrail on the quality of marking as greater than *'no effect'* with a mean of 3.5 and the lower end of the confidence interval being 3.35 (p=.05). As this result is greater than the rating of 3 (no effect) then we can reject the null hypothesis that course participants perceive Mindtrail has no impact on the quality of marking of their major assignments. Mindtrail therefore has some slight positive effect on the quality of marking of the major assignments.

**Relationship between the three factors.** A Stepwise regression was run to determine if there is any predictive relationship between the variables captured and Mindtrail usefulness. Table 5 reveals that Mindtrail usefulness is predicted by the following equation:

Mindtrail usefulness = 2.76 + .70(detailed feedback) + .23(impact on marking quality) with a model Adj. $R^2$ of .67 ($p<.001$).

| Dependent Variable | Regression Equation with B | Standard Error | Beta | Adj. $R^2$ | t | p < | VIF |
|---|---|---|---|---|---|---|---|
| Mindtrail Usefulness | 2.76 + | .256 | | | 1.08 | .28 | |
| | .70 (detail feedback) | .102 | .66 | .659 | 6.84 | .001 | 2.3 |
| | .23 (impact on marking quality) | .105 | .21 | .674 | 2.15 | .03 | 2.3 |

**Table 5: Regression of Mindtrail Usefulness**

**Qualitative comments.** Students also provided qualitative comments on the use of Mindtrail in the course. Overall the students believed that use of Mindtrail was good, very good and excellent and provided detail feedback concerning student's work. Suggestions for improvement included:

- Format - some of the comments hard to read and follow in current format
- Statistics - provide averages, highest/lowest marks, average and rank
- Marking - provide marking criteria prior to assignment
- Feedback - provide more specific explanations and grammar checks, and longer comments as brevity often leads to confusion
- Layout - needs to have clearer layout

These comments and suggestions have been taken on board and forwarded to the software developers who have already included many of the lecturers and student's suggestions in the next release of the product.

## EVE

Four factors were sought in regard to EVE: an overall perception of EVE's usefulness, a perception of the quality of the feedback provided, the accuracy of the feedback provided, and the impact of use of EVE on the marking process. Once again the latter factors were sought to understand the nature of the students perception of the "usefulness" of EVE.

**Usefulness.** Usefulness was measured on a 5 point continuous scale with the extremities labeled *'not useful at all'* (1) to *'very useful'* (5), with the mid-point (3) labeled *'moderately useful'*. The aim is to see whether course participants perceived that EVE was useful to them in undertaking this course, and this is expressed in the following hypothesis.

*H9: Course participants perceive that Eve is useful.*

EVE $\xi_{(\text{usefulness})} > 2$ (slightly useful)

| | N | Mean | Std. Dev | Std. Error | 95% Confidence Interval: Mean ± (2x Std Error) | |
|---|---|---|---|---|---|---|
| | | | | | Lower Bound | Upper Bound |
| Eve Usefulness | 76 | 3.1 | 1.05 | 0.121 | 2.88 | 3.36 |
| Eve Content | 75 | 3.0 | 0.94 | 0.109 | 2.82 | 3.25 |
| Eve Accuracy | 73 | 2.9 | 0.92 | 0.107 | 2.66 | 3.09 |
| Eve Impact | 73 | 3.3 | 0.94 | 0.110 | 3.04 | 3.48 |

**Table 6: Eve Statistics**

From Table 6 we can see that respondents rated overall usefulness of EVE as greater than 'moderately useful' with a mean of 3.1 and the lower end of the confidence interval being 2.9 (p=.05). As this result is greater than the rating of 2 (slightly useful) then we can accept the hypothesis that course participants perceive EVE as a useful tool in their course.

**Content Feedback.** Content feedback from the EVE reports was measured on a 5 point continuous scale with the extremities labeled *'insufficient detail'* (1) to *'overly detailed'* (5), with the mid-point (3) labeled *'moderately detailed'*. The aim is to see whether course participants perceived that EVE reports provided sufficient feedback to them on their major course assignments, and this is expressed in the following hypothesis.

*H10: Course participants perceive that EVE has sufficiently detailed content feedback.*

$$\text{EVE } \xi_{(\text{content feedback})} > 2 \text{ (slightly detailed)}$$

From Table 6 we can see that respondents rated the level of detail of content feedback in the EVE reports as greater than 'moderately detailed' with a mean of 3.0 and the lower end of the confidence interval being 2.8 (p=.05). As this result is greater than the rating of 2 (slightly useful) then we can accept the hypothesis that course participants perceive EVE content feedback as a sufficiently detailed in the feedback provided to them for their major assignments.

**Accuracy.** Accuracy was measured on a 5 point continuous scale with the extremities labeled *'very inaccurate'* (1) to *'very accurate'* (5), with the mid-point (3) labeled *'moderately accurate'*. The aim is to see whether course participants perceived that EVE was accurate in the analysis of plagiarism in their course assignments, and this is expressed in the following hypothesis.

*H11: Course participants perceive that Eve is accurate.*

$$\text{EVE } \xi_{(\text{accuracy})} > 2 \text{ (slightly accurate)}$$

From Table 6 we can see that respondents rated overall accuracy of EVE as greater than 'moderately useful' with a mean of 2.9 and the lower end of the confidence interval being 2.7 (p=.05). As this result is greater than the rating of 2 (slightly accurate) then we can accept the hypothesis that course participants perceive EVE as a useful tool in their course.

**Impact on Quality of Marking.** The impact of EVE on the quality of marking of the major assignments was measured on a 5 point continuous scale with the extremities labeled *'very detrimental'* (1) to *'greatly improved'* (5), with the mid-point (3) labeled *'no effect'*. The aim is to see whether course participants perceived that the EVE plagiarism reports impacted on the quality of marking of their major course assignments, and this is expressed in the following null hypothesis.

*H12: The use of EVE had no impact on the quality of marking of the major assignments.*

$$EVE\ \xi_{(quality\ of\ marking)} = 3 \text{ (no effect)}$$

From Table 6 we can see that respondents rated the impact of Mindtrail on the quality of marking as greater than *'no effect'* with a mean of 3.3 and the lower end of the confidence interval being 3.04 (p=.05). As this result is greater than the rating of 3 (no effect) then we can reject the null hypothesis that course participants perceive Mindtrail has no impact on the quality of marking of their major assignments. Mindtrail therefore has a very slight positive effect on the quality of marking of the major assignments.

**Relationship between the four factors.** A Stepwise regression was run to determine if there is any predictive relationship between the variables captured and EVE usefulness. Table 7 reveals that EVE usefulness is predicted by the following equation:

EVE usefulness = 0.09 + .50(EVE content) + .47(EVE impact on marking quality) with a model Adj. $R^2$ of .60 ($p<.001$).

| Dependent Variable | Regression Equation with B | Standard Error | Beta | Adj. $R^2$ | t | p < | VIF |
|---|---|---|---|---|---|---|---|
| EVE Usefulness | 0.09 + | .303 | | | 0.31 | .755 | |
| | .50 (EVE content) | .109 | .45 | .503 | 4.56 | .000 | 1.72 |
| | .47 (EVE impact on marking quality) | .111 | .41 | .596 | 4.18 | .000 | 1.72 |

**Table 7: Regression of EVE Usefulness**

**Qualitative comments.** Students also provided qualitative comments on the use of EVE in the course. Overall the students believed that use of EVE was a good idea to prevent/control plagiarism, is a good tool, is true and fair and will help the students to create their own work. Some suggested that they did not like the tool and that better software should be found. Suggestions for improvement included:

- Highlighting where words/statements come from on the web with the exact place and copying wording so it can be checked
- Cannot handle special characters and WISIWYG
- More detail on how it operates

These comments and suggestions have been taken on board and will be forwarded to the software developers.

# Conclusion

The adoption of new technology in teaching can be a difficult and time-consuming process. Given the amount of effort involved and the possible impact that any new tool may have on the quality of teaching or the smooth operation of a course, understanding whether the use of these tools is worthwhile, in terms of both the students and staff perceptions.

This case has described the introduction of three very different tools into a postgraduate course and sought to understand the each tool's value by investigating its usefulness. From the staff's point of view, usefulness was cast as the tools impact on the course administration and pedagogy. From the stu-

dent's point of view, usefulness was cast as their perception in terms of ease of use and the extent to which it provided output that was meaningful and useful to them.

In the case of WebCT, the deployment of the system was less than ideal and the staff and students more or less learnt the system as they went along. A number of problems were encountered during the deployment, however, the tool was seen as useful by both staff and students alike.

The deployment of Mindtrail was somewhat more straightforward than WebCT, albeit with a very steep learning curve for the staff. This tool was also seen as useful by staff and students, although it is likely that its usefulness is more apparent to staff, as it is the staff that receive the greater benefit from its use. The fact that students do see the tool as useful could be seen to legitimize its use, in that the students do not object the use of such systems.

The deployment of EVE represented the least effort in regard to staff. It too was considered useful by staff and students, although it is suspected that the staff perception of usefulness may be overly influenced by the tools ease of use. The students seemed to be slightly less impressed with EVE than the other products, but this seems hardly surprising given that EVE is essentially a monitoring tool.

The assessment techniques used appear to have provided a solid basis for the decision about the continued use of each tool, which in this case is positive on all counts. The analysis has the added benefit of providing useful feedback on some aspects of the tools use that may require attention when used again.

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# Biographies

**Kenneth J. Stevens** is a lecturer in the School of Information Systems Technology and Management at the University of NSW where he teaches and researches in the fields of information systems security and audit. He holds a Masters of Commerce from the University of New South Wales – Sydney, and a Bachelor of Financial Administration from the University of New England – Armidale. His special research interest in is software development project risk and is applying risk management theory to this area. He is a Chartered Accountant with a background in IT consulting

**Rodger Jamieson** is director of SEAR (Security E-Business Assurance Research Group) and Associate Professor in the School of Information Systems, Technology and Management at The University of New South Wales. He holds a PhD, a Masters of Commerce (Honours) and Bachelor of Commerce (Honours) from the University of New South Wales – Sydney. He is actively engaged in research, and has published, in areas of IS security, IS auditing, computer forensics, electronic commerce and knowledge-based expert systems. He is a Chartered Accountant, a member of the Australian Computer Society and a member of the Information System Auditor and Control Association (USA). His prior work experience involves IS audit management with Touche Ross & Co. and Coopers & Lybrand.