AN EVALUATION OF ON-LINE ASSIGNMENT SUBMISSION, MARKING, AND RETURN

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ABSTRACT

Technology has made a significant impact on assessment, including its use to automate assignment submission. On-line assignment submission, marking, and return were introduced into a fourth-year engineering management unit for the first time, and a formal evaluation was undertaken to assess student perceptions of this new development. Nearly all respondents understood how to submit their assignments on-line. More than 80% of respondents understood how to retrieve their assignment marks on-line, but only just over half that proportion understood how to get their assignment comments/feedback. More than 80% of respondents felt that their assignments were returned faster on-line. Respondents rated the ease of use of the on-line assignment submission system highly. Speed, timeliness, and convenience of operation were reported as positive aspects. The most commonly reported negative aspects related to an arbitrary assignment submission file size limitation that forced some students to reconsider their use of large graphic images.

INTRODUCTION

The Internet and on-line technologies have influenced higher education, including offering the prospect of improved assessment turnaround times through the on-line submission of assignments. In semester two of 2004, on-line assignment submission, marking, and return were introduced into a fourth-year engineering management unit for the first time. This article reports on a formal evaluation to assess student perceptions of this new development.
ON-LINE ASSESSMENT IN HIGHER EDUCATION

It is noted that technology has made a significant impact on assessment, and, in some universities, it is used to automate assignment submission and grade retrieval [1]. As more university programs include on-line elements, it is not surprising that assessment, and in particular assignment submission and return, are to be found moving on-line. In addition to being part of the general move toward on-line delivery of education, a key reason cited for adopting on-line submission and return of assignments is the decrease in the assessment turn-around time leading to the more timely provision of feedback to students [2-4]. Other benefits noted for the on-line handling of assignment submissions include: facilitating more frequent smaller assignments, rather than few larger assignments [5]; assignments can be marked anywhere the marker has Internet access [3, 5]; students can view assignment progress [3]; assignment tracking/auditing information is automatically produced [3, 4]; the reduction in paper use; and the creation of a permanent electronic archive of student assignment submissions [4].

Once the use of on-line assignment management has been decided upon, those implementing the system can choose between a commercially available system or a custom-developed in-house solution. Arguments can be made for both options; if a centrally maintained course management system (CMS) that supports assignment submission is already in place, then there may be benefits in using the existing system with which students are already familiar, rather than making students learn and use yet another special system [6]; however, custom-built systems are able to provide specifically required functions and be modified in response to unique local conditions [3].

The adoption of on-line submission and return of assignments opens up the possibility of automated marking of assignments. For simple multi-choice tests, it is feasible to use completely automated submission, marking, and return. For highly structured types of student problems, such as computer programming exercises, partial automatic marking is possible [7]. For more complex assessment types, such as essays and projects, where expert assessor judgment is required, the marking phase must still be performed manually [8], although, if the student work is submitted in electronic form, it may be possible to use computer-based tools to annotate a student’s submission and return to them a marked copy of their file incorporating feedback [4].

ON-LINE ASSIGNMENT SUBMISSION IN AN ENGINEERING MANAGEMENT UNIT

The School of Engineering and Technology at Deakin University in Australia offers a three-year Bachelor of Technology (BTech) and a four-year Bachelor of Engineering (BE) at undergraduate level. The programs are delivered on-campus, off-campus, and off-shore in Singapore and Malaysia (through twinning partner
The author has academic responsibility for the fourth-year engineering management study unit SEB421 Strategic Issues in Engineering. This unit is taken only by BE students and consists of three modules:

1. Technological Forecasting and Assessment;
2. Policy Design in Engineering Organizations; and
3. Issues in Productivity Improvement.

The Technological Forecasting and Assessment module discusses methods for long-term forecasting, factors in technological innovations, and the impact of technological changes on business and society. The topics in the Policy Design in Engineering Organizations module are policy structure, designing organizational structure to support policy, and modeling and analysis of policy alternatives. The Issues in the Productivity Improvement module focuses on labor and management productivity, productivity improvement techniques, benchmarking, and the changing nature of work practices.

Assessment tasks for this unit include:

- a weekly reflective journal;
- a written case study report on technological innovation sourced from the literature;
- a computer-marked multi-choice test on the content of the first two modules; and
- a major written report and oral presentation covering the semester’s unit content and based on an interview with an engineering manager [9].

Prior to 2003, all assignment submissions in SEB421 were made in hardcopy, with off-campus students making their submission via post, and marked off-campus items being returned the same way. Deakin University uses the WebCT Vista on-line CMS to provide some level of on-line support for all undergraduate study units. In 2003, the SEB421 weekly reflective journal was moved from hardcopy entries to submission into an on-line discussion area (essentially an asynchronous bulletin board to which all class members have read and write access) [10].

In semester two of 2004, SEB421 student numbers had increased significantly. A computer-marked multi-choice test was introduced to vary the range of assessment types without adding to the marking burden. Additionally, on-line submission, marking, and return of the written reports was introduced to streamline the administration of large numbers of student assignments, and to reduce the assignment turn-around time, especially for off-campus students used to significant postal transportation delays. The WebCT Vista CMS provided dedicated tools for the management of on-line assignment submission, so, for consistency with the existing on-line support provided at Deakin University, it was decided to also use the Vista system for on-line assignment submission. As the written assignment submissions were reports on individual topics chosen by the students,
manual marking of each assignment was still required. But, as students were required to submit their reports as a Microsoft Word document, it was possible to make any corrections or comments using the “reviewing/change tracking” function provided in Word, and return the marked up file with feedback to the students on-line, via the CMS. Additional benefits of the on-line submission process included the automatic management of student grades in the CMS, and easier application of electronic plagiarism testing procedures, if student plagiarism was suspected.

As this was the first time that on-line assignment submission, marking, and return had been used in this unit, it was decided to undertake a formal evaluation at the completion of semester two of 2004 to assess student perceptions of this new development.

METHOD

The evaluation took the form of a written questionnaire. At the end of the semester, the questionnaire was mailed to all enrolled students. All students were provided with a “reply-paid” envelope, so their completed questionnaire could be returned at no cost to the student. As required by the Deakin University Human Research Ethics Committee, participation in the survey was anonymous and voluntary. The questionnaire sought responses under the following categories:

1. Demographic information (age, gender, course of study, and location of study)
2. Using the on-line submission system:
   • have you used on-line assignment submission and return before?;
   • did you clearly understand how to submit your assignment on-line?;
   • did you clearly understand how to get your assignment marks on-line?;
   • did you clearly understand how to get your assignment feedback on-line?; and
   • compared to hardcopy submission, was the time taken to get your assignment back on-line quicker, the same or slower?
3. Usefulness of the on-line system:
   • how would you rate the ease of use of the on-line assignment submission system?; and
   • how would you rate the value of the assignment feedback/comments you received?
4. General:
   • what aspects of on-line assignment submission did you find most useful?; and
   • what aspects of on-line assignment submission did you find least useful?
RESULTS AND DISCUSSION

Demographic Information

Twenty-seven valid questionnaire responses were obtained from a total class enrollment at the time of the questionnaire of 183 students, giving a response rate of 14.8%. The following respondent age statistics were collected from the questionnaire: mean age, 26.9 years; standard deviation, 7.8 years; age range, 20 to 46 years; and median age, 23 years. The following respondent gender statistics were collected: female 14.8%; and male 85.2%. The following respondent course of study statistics were collected: Bachelor of Engineering, 96.2%; and Other (coursework Masters students), 3.8%. The following respondent study location statistics were collected: on-campus, 51.9%; and off-campus, 48.1%.

The gender, course of study, and study location characteristics of the entire class group where known, permitting a comparison of the of the population and respondent sample groups. The proportion of females in the population was 9.3%, which was not significantly different from the respondent group ($\chi^2 = 0.798$, $p > 0.37$). The proportion of BE students in the population was 98.9% and the proportion of Other students in the population was 1.1%, which was not significantly different from the respondent group ($\chi^2 = 1.22$, $p > 0.26$). The proportion of on-campus students in the population was 29.5% and the proportion of off-campus students in the population was 70.5%, which was at the borderline of being significantly different from the respondent group at the 2% level ($\chi^2 = 5.365$, $p = 0.02$).

While there was a good match between the gender and course of study demographic characteristics of the respondent and population groups, the respondent group was skewed toward on-campus students. However, given that the principal theme of the questionnaire relates to the on-line assignment submission system, which applied equally to all students equally regardless of their study mode, it was expected that the influence of mode of study would be minimized. While the response rate was relatively low, the good match between gender and course of study demographic characteristics of the respondent sample and population group suggests that valid conclusions about the population group can be inferred from the respondent group.

A statistically significant correlation was observed between age of respondent and mode of study ($F_1 = 15.53$, $p < 0.0006$); the mean age of on-campus students was 22.4 years; the mean age of off-campus students was 31.8 years. This result was expected, and consistent with previous surveys of Deakin University engineering students, as many off-campus students are also mature-age students; electing to study in the off-campus mode so as to be able to combine their work, study, family and/or other commitments.
Using the On-Line Submission System

Respondents were asked to indicate (Yes or No) whether they had used on-line assignment submission and return previously: 92.6% of respondents indicated “Yes.” On-line assignment submission is employed elsewhere in Deakin University’s engineering programs, and most students would encounter it at some time in their studies prior to enrolling in SEB421. Respondents were asked to indicate (Yes or No) whether they had clearly understood how to submit their assignment on-line: 96.3% of respondents indicated “Yes.” Written instructions on the procedure for on-line assignment submission were available to all students, and these were supplemented with instructions displayed on-screen during the on-line submission process. Respondents were asked to indicate (Yes or No) whether they had understood how to get their assignment marks on-line: 81.5% of respondents indicated “Yes.”

Respondents were asked to indicate (Yes or No) whether they had understood how to get their assignment comments/feedback on-line: only 44.4% of respondents indicated “Yes.” So, even though most students clearly understood how to submit their assignment and get their assignment mark, less than half clearly understood how to find their assignment feedback. This may be due to the fact that the WebCT Vista system provides a “My Grades” function that allows students to query their assignment marks independently of the assignment submission/return function. Additionally, to find their written feedback, students had to navigate to the assignment area, select the assignment item, locate the returned Word file attachment, and open it. In some cases, the immediate interest of the student may have been their numerical mark, rather than the written feedback on their assignment submission. In other cases, the process for locating the written feedback may not have been clearly communicated. In the future, it is planned that additional instructions on the process of retrieving the written assignment feedback will be provided to students.

Respondents were asked to indicate whether the time taken to get their marked assignment back on-line was quicker, the same, or slower than compared to hardcopy submission: 84.6% of respondents indicated that on-line return was quicker than hardcopy; 15.4% of respondents indicated that on-line return was the same as hardcopy; and no respondents indicated that on-line return was slower than hardcopy. These results suggest that at least one of the original aims of on-line assignment submission—to speed up the assignment marking turn-around time—was achieved for a majority of students. Interestingly, there was no significant difference here in response rates of the two different study modes: while it might have been expected that off-campus students would experience a significantly improved assignment turnaround time with the removal of postal delays, a majority of on-campus students also felt that the return of the marked assignments was quicker on-line than with hardcopy submission.
Usefulness of the On-Line System

Respondents were asked to indicate on a scale of 1 to 5 (1 = very difficult; 5 = extremely easy), how they rated the ease of use of the on-line assignment submission system. The mean response was 4.1 (with a standard deviation of 0.7) and the median response was 4. These results suggest that most students found the on-line assignment submission system easy to use. Respondents were asked to indicate on a scale of 1 to 5 (1 = not valuable at all; 5 = extremely valuable), how they rated the ease of use of the value of the assignment feedback they received. The mean response was 3.4 (with a standard deviation of 1.1) and the median response was 4. A statistically significant correlation was observed between the rating given here and whether a respondent had indicated that they clearly understood how to get their assignment feedback (F₁ = 16.19, p < 0.00065): the mean rating for those that understood how to get their assignment feedback was 4.2; the mean rating for those that did not understand how to get their assignment feedback was 2.9. These results confirm the importance of making it as clear as possible to students how to locate their written feedback/comments, in addition to their numerical mark for an assignment.

General

Respondents were given the opportunity to provide an open-ended written response to the question, “What aspects of on-line assignment submission did you find most useful?” Table 1 provides the categorized responses to this question and the frequency with which they were reported. Speed, timeliness, and convenience of operation were reported as positive aspects by many respondents, suggesting that one of the principal aims of on-line assignment processing was achieved. Prior to the introduction of on-line assignment submission, off-campus students were advised to submit their work several days prior to the official due date, allowing enough time to account for the delay in postal transportation. With on-line submission, all students, regardless of their location, experienced virtually instantaneous electronic submission. So, where students might have previously had questions about the due date for an assignment, many now queried the precise time by which they had to make their submission on the due date! Additionally, where off-campus students were located internationally, differences in time zones were previously subsumed into the postal transportation delay. With instantaneous on-line submission, students located in a different time zone now had to take into account that the published closing time for assignment submissions was Australian Eastern Time. Initially, there was confusion for some off-campus students, who had for a number of years previously only submitted hardcopy assignments in the post, and either continued to make hardcopy submissions only, or submitted on-line and also made a duplicate hardcopy submission.
Respondents were given the opportunity to provide an open-ended written response to the question, “What aspects of on-line assignment submission did you find least useful?” Table 2 provides the categorized responses to this question and the frequency with which they were reported. Significantly, a number of students reported no problems with on-line submission. A commonly reported “least useful” aspect of on-line submission was a limit on the file size of assignment submissions. Students were requested to limit the size of their file submissions to 200 Kilobytes. This was not a system limitation, rather a request that students try to keep the size of their submissions small enough to permit a marker to retrieve, mark and return their submissions over a dial-up Internet connection [8]. The file size restriction meant that students had to manage the inclusion of graphics in their submissions, reducing the resolution of large images. Two students reported not being sure whether their assignment submission had been successful. The lack of a clear acknowledgment of successful receipt of an on-line submission was a recognized “limitation” of version 2 of the Vista system used in the trial documented here. This problem that has been addressed in version 3 of Vista now in use at Deakin University. Some students noted problems associated with their Internet service; while the causes of these problems were beyond the control of the university, they still need to be considered, as they have an impact on
students’ ability to successfully use on-line systems. Some students noted problems relating to difficulty in locating their assignment results and/or feedback. These comments reinforce the previous observation that it is important to ensure that it is as easy as possible for students to locate their assignment marks and feedback.

The major assignment in SEB421 required students to make a ten minute oral presentation. On-campus students did this presentation in-person in class. Off-campus students made a video recording of their presentation and, historically, would submit a VHS video tape to be marked. Although many off-campus students now make digital recordings of their oral presentation, the limitations of even broadband Internet mean that they currently still submit a video tape or CD via the post for this element of assessment. In the future, it is conceivable that students will be able to use widely available increased bandwidth to easily submit video files of their oral presentations on-line.

**CONCLUSIONS**

An evaluation was undertaken to determine student perceptions of the introduction of on-line submission, marking, and return of assignments in a fourth-year engineering management unit. Nearly all respondents had previously experienced
on-line assignment submission, and indicated that they understood how to submit their assignments on-line. More than 80% of respondents indicated that they understood how to retrieve their assignment marks on-line, but only just over half that proportion indicated that they understood how to get their assignment comments/feedback. As assignment feedback is an important element of the formative assessment process to improve student performance, it is important that students are able to easily retrieve any written feedback on their assignment submissions. More than 80% of respondents felt that their assignments were returned faster on-line than via hardcopy submission, and this result was irrespective of whether students studied in the on- or off-campus mode. Respondents rated the ease of use of the on-line assignment submission system highly, but those respondents who had indicated difficulty in retrieving their assignment comments also rated the value of the assignment feedback received significantly lower than those respondents who were able to easily locate their assignment feedback. Speed, timeliness, and convenience of operation were reported as positive aspects by many respondents. Many respondents reported no negative aspects. The most commonly reported negative aspects related to an imposed assignment submission file size limitation that forced some students to reconsider their use of large graphic images in their reports. The file size limit was set to make it feasible to access and mark the assignments over a dial-up modem Internet connection; increasing access to broadband Internet will remove this limitation, and further in the future may permit the on-line submission of digital video files.

REFERENCES


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