A FLEXIBLE APPROACH TO ASSESSSMENT
IN e-COMMERCE COURSES

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ABSTRACT

This paper evaluates the effectiveness of introducing flexibility into the assessment strategies for an electronic commerce course in order to determine whether it is appropriate for student learning. The primary purposes for the study are to determine how well the students are learning and how that learning process can be improved. Assessment strategies best suited to a course in electronic commerce were ascertained as part of the study. Outcomes of the study included areas where the assessment strategies could be improved to enhance student-learning outcomes.

INTRODUCTION

Many tertiary institutions are adopting a flexible approach to teaching and learning. Flexible learning is a rather broad concept that assigns precedence to learner control rather than institutional requirements and practices. The shift towards a flexible learning environment from the more traditional approach presents a challenge to course planners. The primary concern is how best to plan for the change to the teaching and learning environment and then to design a course that provides an appropriate level of flexibility, yet still operate within the bounds set by the institution. Flexibility can be incorporated in several aspects of the course design, and may incorporate the use of Internet technologies, as a means of offering a range of educational choices to student. Allowing students some choice within the assessment strategies chosen for the course is one way that flexibility can be incorporated. This paper discuses student performance and reaction to the assessment strategies selected for two e-commerce courses. The first section presents an overview of the types of assessment strategies that can be adopted and the circumstances under which each is most appropriate. The second section describes the assessment strategies employed in the e-commerce courses while the outcomes are presented in the last section.

REVIEW OF LITERATURE ON ASSESSING STUDENT OUTCOMES

This section briefly identifies reasons for undertaking assessment and reviews different assessment strategies available to course planners. Assessment and its various aspects have been the focus of much research. The American Association for Higher Education [1] presents nine principles of good practice for assessing student learning. These include:
1. Assessment of student learning begins with the educational values.
2. Assessment is most effective when it reflects an understanding of learning as being multi-dimensional, integrated, and revealed in performance over time.
3. Assessment works best when the program it seeks to improve has clear, explicitly stated purposes.
4. Assessment requires attention to outcomes as well as to the experiences that lead to those outcomes.
5. Assessment works best when it is ongoing not episodic.
6. Assessment fosters wider improvement when the whole educational community is involved.
7. Assessment makes a difference when it begins with the issues of use and sheds light on questions that people really care about.
8. Assessment is most likely to lead to improvement when it is part of a larger set of conditions that promote change.
9. Through assessment, educators meet responsibilities to students and to the public.

Bearing these and other relevant principles in mind, educators must determine what the purpose of the assessment is before they can select appropriate strategies. Rowntree [5] identified six higher-level purposes for assessment, in addition to the commonly accepted purposes of diagnosis, evaluation and grading. The higher-level purposes are: Selection of candidates by assessment; Maintaining standards from the teacher's and student's perspectives; Motivation of the students; Feedback to the students; Feedback to the teacher; and Preparation for life. Rowntree [5] believes the purposes need to be

balanced and this will be affected by the educator's attitude to assessment. While Biggs [2] identifies many of these purposes, he presents two other important reasons for undertaking assessment, namely formative and summative reasons. Formative assessment occurs during the teaching activities and is used primarily for providing feedback to the student and to the teacher. Summative assessment occurs after the teaching activity and is used in determining grades. Biggs warns that the two should not be mixed because students should feel free to show their confusion and ignorance without fear of penalty. Progressive or continuos assessment may reduce the pressure of final summative examinations, but its use should not combine the formative and summative roles.

The foremost lesson that educators must learn is that the assessment strategies must be aligned with the learning objectives [2] [4] [1]. By aligning the assessment to the objectives, educators are able to test whether the students have learned what they should have with respect to the learning objectives. When teaching and learning activities are also aligned with the objectives and assessment, the course design addresses the same plan and the elements support each other [2]. Biggs also contends that assessment should be based on student learning activities rather than teaching activities. He argues that if the content is reflected in the assessment, the teaching and learning activities are both aimed at the same goal. To extend this argument, Gibbs [4] points out that educators can influence what the student learns through the choice and content of the assessment items. His research focused on using assessment strategically and he describes two tactics that can change student learning behaviour, namely change the assessment method and change the assessment task. The students reap the rewards of altering the assessment using these two tactics, but care must be taken to ensure that a disproportionate amount of time is not taken up in assessment.

Another issue considered in the literature is the extent flexibility can be incorporated into assessment strategies. Freeman [4] addresses flexibility and provides several examples of how it can be built into the assessment task. Freeman provides examples of how flexibility can be incorporated into course assessment strategies within a specific context as well as considering other relevant issues such as the use of peer assessment and working in groups. The type of assessment items chosen is important as each kind tests different kinds of learning. Biggs [2] categorised assessment items under four headings, namely, "*Extended prose, Essay-type, Objective test, Performance assessment, and Rapid assessments*" (p 200). Biggs also relates the types of assessment to level of understanding and the learning objectives.

Much of the research literature reiterates the same basic concepts, that assessment must be aligned to the learning objectives and good assessment engenders a deeper level of learning. Assessment within Information Systems courses and consequently e-Commerce courses, must address two separate types of learning. The first relates to the understanding and application of the discipline concepts, while the second relates to their knowledge of software tools and their skill in using them. Personal experience in teaching the courses has shown that students have a better grasp of the content if the assessment items are constructively aligned to the learning objectives and if assessment items are submitted continuously throughout the semester. While summative assessment needs to be the primary focus for testing student learning, formative assessment should also have a role.

ASSESSMENT STRATEGIES FOR ELECTRONIC COMMERCE COURSES

The types of assessment best suited to the e-Commerce courses will test basic levels of understanding as well as deeper levels of learning. Three types of assessment items are appropriate to assess the knowledge and skills required of second and third year students. These include: Concept Tests consisting of a mix of multiple-choice, true/false and fill-in-the-blank type questions; Workshop Exercises that require problem solving and Progressive Projects that require problem recognition, creative solutions and analysis and design skills. Concept Tests are an appropriate means of testing comprehension and recognition of concepts, Workshop Exercises to test application in specific situations and Progressive Projects to test creativity, problem solving skills, application and skills required in a working environment. The assessment items should be designed to build on previous material learned by the students. The assessments strategy facilitate students proceeding beyond elementary comprehension that is tested via the Concept Tests and somewhat deeper level of understanding required for the Workshop Exercises, to the analysis and synthesis of material tested via the Progressive Project.

Flexibility can be built into the assessment strategies. Students undertaking second year courses can choose when to undertake the Concept Tests provided they do so within a specified time frame, for example a few days or a week. The Concept Tests could be made available online so students can take a test at a time most convenient to them and from a location of the student's choice – Uni, home, work, etc. They should be advised of their score on completing the test, or alternatively within 24 hours if the test is not marked by the system. At the third-year level, Workshop Exercises would replace the concept tests since the student's would be expected to demonstrate a deeper level of learning. Workshop exercises can be devised to reflect this deeper level of learning.

The Progressive Project in both courses require induction, creativity and independent thinking in order to design an Internet-based solution to an actual business problem. At the second year level, students can be presented with actual business problem and they were asked to develop an appropriate e-commerce solution. They can choose from any of the technologies that they have studied provided the technology results in a viable option and solved, at least in part, the business problem. Students can be given a greater level of flexibility in third year courses and permitted to choose a problem that they were interested in and devise an Internet-based solution to that problem. The Progressive Projects should be constructed so that there are at least two parts to allow feedback to be given on the earlier submissions before submitting subsequent parts. Projects can be designed to test the student's ability to recognise problems where computer support is feasible, apply information technology in a way that provides them with an effective and robust support tool and integrate that tool into their managerial work environment. This should encourage the students to appreciate the importance of exploiting the information technologies available to them to solve decision-making problems they may face in a real world situation. The Progressive Project can require the students to build a prototype application using the skills they had developed in previous courses if relevant.

CASE: ASSESSEMENT IN SECOND YEAR e-COMMERCE COURSE

This section focuses on presenting a brief description of a new second year undergraduate course called, *Fundamentals of e-Commerce*. The research question of import is:

> *Will flexibility applied to assessment strategies for courses enhance the learning for students studying in e-commerce?*

This research will focus on student perceptions of the assessment strategy that was applied to the e-commerce course. An overview of the course, assessment strategy and student perceptions follow.

Course Description

The course, *Fundamentals of e-Commerce*, is the first of six courses in the e-commerce major and was intended as an introduction to the theory, concepts and applications of Internet-based solutions for business problems. The general aim of the course was to expose students the range of e-commerce strategies that are available to managers for expanding their business opportunities, the issues that relate to the adoption of the Internet and its associated technologies. The learning outcomes devised were: On completing the course, students will have

- A thorough grounding in electronic commerce, the Internet and the new technologies that are important to electronic business;
- Attained knowledge of the rapid changes taking place in electronic commerce as well as any contemporary issues;
- Knowledge of the stakeholders in electronic commerce and their capabilities and limitations in the strategic convergence of technology and business.
- Knowledge of managerial, legal and ethical issues allied with using the Internet to conduct business.
- Developed a basic presence on the WWW and an understanding the Web as a business channel.

The learning objectives provided the focus of the course design to ensure constructive alignment of the assessment strategies, course content, and teaching and learning strategies.

Assessment was used for two purposes: a means of providing feedback to the student and the teaching staff (formative assessment) as well as in determining grades (summative assessment). The assessment items formed a progressive learning mechanism so students gradually achieved the course objectives.

Student learning and understanding of the course material was assessed using two items: concept tests and an e-commerce project.

The type of learning assessed via the concept tests was recognition, strategy, comprehension and coverage of the course concepts [2]. The Concept Tests were individual submissions and tested all but the last of the learning objectives listed above. Their purpose was to assess the student's knowledge and understanding of the course rudiments under controlled conditions and minimise the stress of one or two large examinations. The Concept Tests also provided ongoing evaluation of the student's understanding of the concepts covered in the course. This enabled students to monitor their own performance during the semester and take necessary the corrective measures. Concept Tests took the form of three separate sets of multiple choice, true/false and fill-in-the-blank questions. Tests were undertaken one week after completing the first two modules, the third module, and the fourth module. An element of flexibility was permitted, as students were able to take the test online, wherever and whenever they desired within the five-day test period. Further, the tests were timed and the student was penalised if they went over the specified time allowed.

The e-Commerce Project was a group effort and provided assessment of the student's understanding of e-Commerce in a real world environment. The project assessed the students' ability to apply their knowledge and develop professional skills. That is, it was designed to test all of the learning objectives listed above using an e-commerce case study for which the students were required to analyse a business problem and design an e-commerce solution for improving that business. The project provided assessment and comments on the students' understanding of essential e-commerce issues within an organisational context. It also required students to demonstrate their ability to develop a prototype Web site that would support the recommended e-commerce solution.

The structure and content of the e-Commerce course was designed so that each module built on the next. The course was designed to use a conceptual framework that organised the knowledge and skills needed by business students into four modules - Foundations of e-Commerce, Web Architecture, Tools and Design, e-Commerce Applications, and e-Commerce Management Issues. Students were exposed to real world problems and the concepts were related to familiar ideas during classes. Being able to extract the primary ideas and concepts helped students to focus on the significant aspects of the course for use in their e-commerce project. A concept map was devised to confirm that the relevant content had been identified and to help students grasp the interrelationships between the modules. Assessment items were included on the map to demonstrate the relationship between the content and the assessment strategies.

CASE: ASSESSEMENT IN SECOND YEAR e-COMMERCE COURSE

The following section explains the procedures used along with the measurement instruments. Characteristics of the students participating in the study are also presented along with the results of the evaluation into the effectiveness of the assessment strategies. A discussion of the analyses follows.

Students who had enrolled in the second year course participated in the study. All students had undertaken at least one year of study within the Commerce and Management Faculty. All of the students had been exposed to flexible format of delivery during the first year of their degree programme. Participation in the survey was entirely voluntary on the part of the student. In total, 112 students volunteered for participation. However, only 93 elected to identify themselves by providing their student number. The gender breakdown was 49 males and 44 females. While other demographic data was requested, the majority of students chose not to include it.

Results

Students were asked their opinions of the assessment strategies used in the course. To this end, students were asked to a complete a questionnaire for each of the Concept Tests, one week after its conclusion. The number of questionnaires returned varied for each test; 87 were returned for the first Concept Test, 48 for the second and only three for the third test. The last test was held in the last week of the semester so distribution of questionnaires in class was not possible. Students were asked to download the

questionnaire from the course Web site or to pick one up from the course convenor. Given the small number of questionnaires returned for the third test, the data was not included in the analyses. Overall, student opinions on the Concept Test were not statistically different from the first test to the second except for three questions. These questions asked whether students had difficulty in remembering they had to take the test; if they could complete the test within the specified time and whether they had observed other students receiving help. The responses to the open-ended question indicated that students either liked the online test format or that they preferred in class paper test. The one issue students did have with the online tests was the performance of the system on which the tests were run.

A formal independent evaluation of the course, also using a 'standard' questionnaire, was undertaken at the end of the semester. Management designed the questionnaire so that across course evaluations could take place. Unfortunately, this generic design meant that only a three of the questions related to the assessment strategy. The pertinent questions, means and standard deviations are reported in Table 1. A five-point Likert-type scale, where 1 represented a strongly agree response while 7 corresponded to strongly disagree, was employed for the questions. Completed surveys were received from 38 students. The marks, means, standard deviations and ranges for all of the assessment items are shown in Table 2. The mean for each of the Concept Tests is above the Credit level and near to the Distinction level for Concept Test 2 and 3. However this is not the case for the Group Project, where the mean is just above 50% or a Pass level. The distribution of total marks represented a reasonable bell curve, however it stops short at 85%.

Table 1: Student Evaluation of the Assessment Strategies

Question	Mean	SD
The Concept Tests helped me to consolidate what I learned.	2.34	0.84
The e-Commerce Project was a valuable learning experience.	2.11	0.72
The use of Web-based Concept Tests added to the flexibility in this course.	1.95	0.89
Overall, I am satisfied with the quality of this course.	2.24	0.74

Table 2: Average Marks for Assessment Items

Assessment Item	Mark	Mean	SD	Range
Concept Test 1	20	13.47	2.46	6.5 - 19.0
Concept Test 2	30	22.09	2.90	9.5 - 28.5
Concept Test 3	10	7.42	1.22	5.5 - 9.5
Group Project	40	21.26	6.73	7.0 - 33.5
Total	100	62.67	13.26	6.5 - 85.0

Discussion

The purpose of the research was to assess the effectiveness of the assessment strategies. The results presented in the previous section provide some support for the achievement of the learning outcome and success of the assessment strategy. A discussion of these results follows.

The results presented in Table 1 provide some evidence that the students were satisfied with the Assessment strategies chosen and the level of flexibility offered in the Concept Tests. Evidence of satisfaction with the Assessment strategies is evident in the first two questions while the third indicates the level of satisfaction with the online environment that included more than just basic information. The majority of the students regarded the Concept Tests and the e-Commerce Project as positive learning experiences; this is what they were designed for.

The distribution of total marks and the means of the assessment items indicate that the learning outcomes were achieved. The Concept Tests were designed to test all but the last of the learning outcomes. The contention is supported as the mean scores are above the Credit level; the only students who actually failed this item were those who withdrew from the course. The Group Project was designed to test all of the learning outcomes. Given that the average mark was just above a Pass (50%),

achievement of the learning outcomes is not as clear as with the Concept Tests. It is apparent from the assignments that many students failed to grasp the applied nature of the Group Project and opted instead to regurgitate theory. Students sought answers in textbooks rather than applying the theory to the business problem to reach an appropriate solution. Several of the assessment criteria were also badly handled - Risk Analysis, Survival Strategies and Development & Implementation. The implications of this finding are that more emphasis could be placed on practical examples, which may form the basis of workshop exercises. Alternatively, the applied nature of the course could be made more explicit in the wording of the case problem. Open-ended comments on the formal questionnaire indicated that students felt they did not receive enough advice on what was required. Many believed that an overview of what was being proposed should have been reviewed or even form part of the assessment strategy.

Modifications to the Assessment Strategy

Based on the surveys, changes to the delivery of the Concept Tests were implemented immediately. Students requested a clock be added to the window in which the Concept Test was placed. A clock was implemented at the top of the window for the second and third tests. The size of the window was also increased. A change to the assessment strategy was subsequently made for the 2003 offering of the course. An additional assessment item, a case study will be introduced as a precursor to the Group Project. The Case Study and the Group Project will be connected to the same business problem. The Case Study is intended to provide feedback to the students on suggested solutions to the business case problem prior to Group Project being completed and submitted. Several learning resources were well received by the students and consequently will be repeated for the 2003 offering including: Use of the Discussion forum for General Feedback on Assessment Items and Feedback on individual basis (Concept Tests and Group Project) will continue. However, one element of the course that students wanted to exclude was actually kept - Working in a group. Group work was considered an essential Graduate skill. Further, graduates are expected by the Information Systems industry to have teamwork skills. Consequently, group work will be continued.

IN CONCLUSION

This paper has examined the assessment strategies employed in an e-commerce course, which was designed for the flexible learning mode of delivery. The research process was designed to determine whether flexibility within assessment strategies could enhance student learning. To this end, the investigation process involved surveying student's opinions of the assessment strategies and the level of flexibility introduced. There appears to be a positive attitude to the level of flexibility provided in the Concept Tests. However, the outcome is not as clear for the Progressive Project. Further analyses are being conducted to clarify the results. Several changes were made to the course design based on the outcome of the evaluation process. The course will be re-evaluated to determine the success of the changes and whether any additional changes will be required.

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