The Evaluation of Courses in Information Systems

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The Evaluation of Courses in Information Systems

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Abstract

This paper presents a process for evaluating an e-commerce course in order to determine whether the structure and design is appropriate for student learning. Evaluation is important in determining what aspects of the program or course require improvement. The evaluation of any course must be planned for at the design/redesign stage and conducted throughout the duration of the course. The primary purposes for the evaluation are to determine how well the students are learning and how that learning process can be improved. The evaluation process identified several changes to the course that would enhance student-learning outcomes.

Keywords: Evaluation, IS Education, Design Methodologies.

1 INTRODUCTION

Quality has become a high priority item for most Universities, particularly with respect to the quality of teaching and learning. Universities have varying ways of determining whether the material presented to students is of sufficient quality. Quality becomes an even more important issue when Internet technologies are used in courses to increase the level of flexibility, that is, the range of choices available to students. These choices include times for classes; location; assessment; completion dates; course content; the amount of communication needed; and selecting assignments relevant to the student's workplace (Collis 1998).

The shift towards a flexible learning environment from the more traditional approach will test course planners. The best way to plan for the change to the teaching and learning environment and then to design a course that is supported by Internet technologies and which provides a requisite level of flexibility is a concern for planners. However, the primary concern is whether the course actually enhances the learning outcomes for students. This paper presents a process for evaluating a course to determine whether its structure and design actually enhances student leaning outcomes. The first section overviews a design framework that has been designed especially for Information Systems (IS) courses. The next section reviews relevant literature to determine the relevant aspects for evaluation. The evaluation process is discussed in the third section. The final section describes an application of the evaluation process to an e-commerce course.

2 FRAMEWORKS FOR COURSE DESIGN

Bryant (2003) presented a framework for designing Information Systems courses. This framework consisted of two distinct levels: the higher order cyclical framework illustrated in Figure 1, and the lower level design/ redesign framework shown as Figure 2.

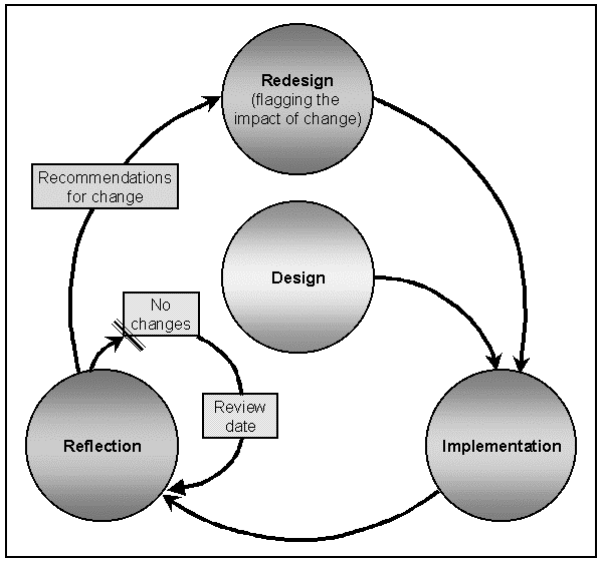

Figure 1: Course design cycle
Source: Bryant, 2003, page 160

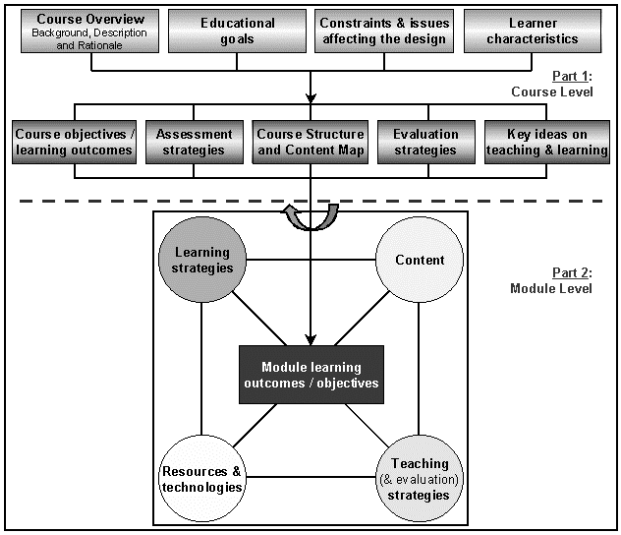

Figure 2: Course design/redesign framework
Source: Bryant, 2003, page 161

The lower-level course design/redesign framework provides a detailed view of the "Design" and "Redesign" elements of the Course Design Cycle. It represents a generic two-part framework that can be applied to and/or modified to suit each IS course requiring design or redesign. Common aspects between this framework and others presented in the literature, for example see Print (1993) and Gibbs (1999a), include learner characteristics, assessment, instructional strategies; learning and teaching activities, objectives, content and resources. Of particular import to this study is the "evaluation" element. Rowntree (1992) considers evaluation to be a very important stage in designing and developing courses. Evaluation is part of the Design/Redesign Framework and is included in the Course level elements. Positioning at this level would ensure that evaluation is considered right at the outset of course design. Evaluation strategies need to be planned for from the start and conducted throughout the duration of the course.

3 LITERATURE REVIEW

The importance of evaluation has been the subject of much discussion in the literature. Evaluation is important in determining what aspects of the program or course require improvement. A persuasive argument for undertaking evaluation is that change is a desired process in learning and, consequently, evaluating a course is the best way to improve on that change process. Reeves (1997), provides support for this view as he considers education requires change, deep change; making evaluation important for understanding how improvements can be incorporated into the course design and implementation.

Several aspects of evaluation are discussed in this section. Draper (1997) states that posing the right question to ask and drawing up a plan that keeps evaluation in a prominent position, are important elements of the evaluation process. While Rowntree (1992) focuses on open and distance learning, in defining evaluation, he makes three pertinent points: Evaluation is not a synonym of assessment, it is concerned with what happens and not just what was meant to happen; and it must be planned, systematic and discussed openly by all involved. He also identifies several reasons for undertaking an evaluation and who may be interested in it and its outcome. In identifying what to evaluate, Rowntree states that different stakeholders will want the data for different purposes. He warns that while information can be collected on a range of things, educators should be selective about what data they do collect. The primary purpose of an evaluation is to improve the course or program through changes to design, teaching and learning activities, assessment strategies and so on (Rowntree, 1992).

Draper (1997) identifies four types of evaluation used to appraise teaching/learning materials and resources: formative, summative, illuminative and integrative. Summative evaluation helps educators to choose between products and select the one that best suits their purpose. Formative evaluation is designed to improve the materials and resources. Illuminative evaluation helps in uncovering unexpected outcomes from the use of the materials and resources. Integrative evaluation helps educators to make the best possible use of their materials and resources. Several simple approaches to evaluation are overviewed including the checklist approach; what participants feel, by addressing the whole situation; and using an experiment. One comprehensive approach discussed was Laurillard's evaluation programme, which encompasses design, development and implementation. While Draper identifies several useful approaches to evaluation and provokes thought on the importance of evaluation, his research provides a starting point for planning an effective evaluation strategy.

Rowntree (1992) presents data collection techniques, such as review of documentation; review of assessment results; questionnaires and learning logs. He also distinguishes between formative and summative evaluation. Formative evaluation requires the collection of data to change the course while it is in progress whereas summative evaluation is used to sum up after the course has been completed. Evaluation should be planned for during the design phase of the course and conducted throughout the duration of the course. Once the data has been collected, it must be analysed and the results interpreted. The whole purpose of an evaluation is to improve the course or program through changes to design, teaching and learning activities, assessment strategies and so on.

Gibbs (1999b) discusses sources of evidence that can be used for evaluation purposes including observations and reflective diaries; student feedback questionnaires; focus groups and interviews and student logs. Gibbs considers that assessment data and student learning outcomes as a means of evaluating the effectiveness of a course. He distinguishes between three data sets. Classroom assessment is performed to find out what students have learned and include techniques such as short explanations of a topic, listing the three most important things in the lesson; and short sets of multiple choice questions. Coursework assignments can be used to provide feed back to students as well as teaching staff by publishing average scores and short comments on what was done well and not so well. Exam results are also useful for evaluation purposes. He argues that average marks and the distribution of the marks can provide supporting information but should not be used in isolation. Results must be interpreted carefully because several explanations, both negative and positive, can be offered. Learning outcomes and performance can be combined in an evaluation to provide meaning to the marks.

Draper (1997) discusses the problems associated with opinion, memory and observation. He points out that while student evaluation questionnaires have become standard practice, they are retrospective and rely on memory. Consequently, they are less effective than on-the-spot observations. Further, Draper regards expert

opinions to be less trustworthy that the teacher's since teachers have worked with the students. However, the teacher's opinion is less valuable than that of the learner, which in turn is less valuable than behavioural tests. While, costs and resources are primary drivers of the choice of evaluation method, it is better to use a sample that is representative of learners, test what they have learned and observe them while they are learning. Bain (1999) highlights problems in the research on conducting evaluations. He points out that many project designs did not pay enough "attention to the learning processes and outcomes involved; and the evaluations did not provide meaningful evidence of student learning outcomes, most relying on feedback from students, peers and experts" (p 165). He presents an integrated evaluation framework (pp 168-169) that can accommodate innovation in education in all its various forms.

In summary, the literature deals with several issues or themes that range from the defining and identifying the purpose of the evaluation to the different data collection methods and their associated problems. These themes will be used as the focus for course evaluation.

4 EVALUATION PROCESS

The literature review identified several themes that will be used as the basis of an evaluation process that would be suitable for IS courses. The themes can be considered as a series of questions: the answers to which would be specific to individual courses. The questions/themes are:

- Why Evaluate?
- Who is the evaluation for?
- What is to be evaluated?
- When will evaluation occur?
- How will the data be collected?

The details of each theme are provided below.

4.1.1 Why Evaluate?

Rowntree (1992) considers that evaluation is not a synonym of assessment, it is concerned with what happens and not just what was meant to happen; and further it must be planned, systematic and discussed openly by all involved. Further, Rowntree states that evaluation can be undertaken for several reasons, which he grouped into three broad categories, namely, political, managerial and educational reasons.

- Political reasons: 1) Because it is expected by University/School; 2) Settle the doubts of others; 3) Disarm opposition; 4) Obtain supporting evidence in case of criticism; 5) Obtain additional resources; 6) Justify expenses; 7) Help in marketing the programme; and so on.
- Managerial reasons: 1) Demonstrate acceptable outcomes; 2) Detect any problems that may arise; 3) Monitor staff performance and so on.
- Educational reasons: 1) Assist in developing staff (reflection and review), 2) Help in team building; and 3) Improve the teaching and learning process.

While these reasons are relevant, the primary purposes for evaluation should be to determine how well the students are learning and how that learning process can be improved. Secondary purposes include developing staff skills and demonstrating acceptable outcomes.

4.1.2 Who is the evaluation for?

Rowntree (1992) considers for whom the evaluation is undertaken. This requires identifying the stakeholders and their desires. Stakeholders can include:

- Students: Students want to be able to learn effectively (effective design); Have clear guidance on Teaching and Learning activities and assessment tasks; and Assessment tasks that are relevant to their workplace
- Teaching Team: Quality product; Expertise to learn from, Innovation in design; Avoid repeating the same mistakes; Working as a team
- Colleagues: Expertise to learn from; Innovation in design; Avoiding the same problems; Support and mentoring
- School/Department: Assurance of Quality; Staff performance review; Staff development
- University: Assurance of quality of project; Meeting (and Exceeding) Quality Requirements (Quality Audit); Resources are spent according to budget;
- Industry and Employer groups: Assurance as to relevant content; employability of graduates

Responses to these desires could be obtained through formative and summative evaluation throughout the design and implementation process. The evaluation process would entail the collection and consideration of materials from members of the major stakeholder groups for the assessment of performance and the generation of development plans for the coming year. Ideally, all stakeholder groups should have input. It is, however, only operationally feasible to include feedback from students, peers and the staff member's academic supervisor with respect to an individual course.

4.1.3 What is to be evaluated?

Determining what is to be evaluated will depend on the reason for the evaluation and who the stakeholders are.

4.1.4 When will evaluation occur?

Evaluations should be conducted during-semester and at the end-of-semester.

- Evaluations conducted throughout the semester are formative in nature and require the collection of data so as to change the course while it is in progress.
- Evaluations conducted near or at the end of semester are summative and are used to sum up after the course has been completed

Ongoing evaluations are important so participants can recognise the importance and value of their feedback.

4.1.5 How will the data be collected?

Selection of technique(s) that may be used will depend on the purpose and form of the evaluation. Convenors can choose to use paper-based and/or Web-based evaluations. Many techniques are available (Gibbs,

1999b, Compton, 1996) and include but are not limited to the following:

- Assessment Data (individual items linked to learning outcomes)
- Questionnaires (questions using Likert type scale with or without a mid point, open-ended questions and other question forms)
- Interviews (semi-structured or structured)
- Focus groups (larger groups such as tutorials and workshops, and smaller groups)
- Observations (by teaching team or external persons)
- External Reviewers (eg Industry representatives, employers)
- Peer Reviews (Colleagues and Part-time Tutors)
- Pre-tests and Post-tests (must have appropriate internal and external validity)
- Learning checklists (completed by students)
- Student Profiles (to gauge experience and attitudes of students as well as providing a baseline for future reference)
- Student Learning Logs (completed by students and reviewed by teaching team)
- Confidence Logs (completed by students to indicate their confidence on particular area, topic, or resources but do not provide any concrete evidence of learning)
- Review of course documentation (Detailed Course Outlines, Study Guide, Lecture Notes, Learning Activities, Assessment and so on).

The selection of evaluation technique(s) must be driven by the purpose of the evaluation, that is, what is being evaluated, and why. Each technique has its advantages and disadvantages, and these must be considered in the selection decision.

4.1.6 In Summary

These questions form the basis of the process used in the course evaluation. An application of this process is described in the following section.

5 EVALUATION PROCESS APPLICATION

As with any course, the evaluation of IS courses must be planned for from the beginning, and it should be conducted throughout the course. An evaluation, using the process identified above, of an e-commerce course called *Fundamentals of e-Commerce* is described. The Course Planning Team considered the evaluation strategy from the outset of the course design process.

5.1 Why Evaluate?

The primary purpose of this evaluation is Educational, that is, to determine how well the students are learning and how that learning process can be improved. A secondary purpose has a managerial focus in that it will be used by the Head of School to demonstrate acceptable outcomes and access whether academic staff members need to undertake skills development. The learning objectives or outcomes for the course are identified first. On completing the course, students will have achieved the following learning outcomes:

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

The evaluation will be undertaken with due consideration being given to these learning outcomes.

5.2 Who is the evaluation for?

The primary stakeholders are the course convenor; teaching team and the students. The progressive evaluations are to be formative in nature: their purpose being to improve the course and learning outcomes as well as self-development of teaching team. These formative evaluations were not used for other purposes.

5.3 What is to be evaluated?

The course convenor decided on the form and frequency the evaluations were to take. Course content, teaching strategies, learning outcomes and learning resources were all evaluated. These evaluations were considered formative in nature. The distribution of assessment data was also reviewed (summative) and student opinions on the Concept Tests were sought (formative). An independent formal evaluation of the course was also undertaken. This formal evaluation was designed to be summative so Management could determine quality of the learning outcomes.

5.4 When will evaluation occur?

Three distinct evaluations covering Course content, Teaching strategies and Learning resources were taken at different points during the semester; typically the week after the Content Module was completed. The Concept Test evaluations were conducted the week after the test was taken. The formal evaluation of the course was sought in the last week of semester.

5.5 How will the data be collected?

Techniques that were used included: informal student feedback; questionnaires; student learning outcomes and review of course documentation.

5.6 In Summary

The primary purposes for the evaluation were to determine how well the students were learning and how that learning process can be improved. The teaching team were the primary users of the evaluation, but it will also be made available to other interested parties including students, colleagues and academic supervisors.

Both formative and summative evaluations were employed. Formative evaluation of the learning process will help determine if the improvements are functional and useful to the students. Formative monitoring will determine whether the improvements are impacting on the learning process. Summative evaluation will determine if the improvements are as intended. Once the data is collected and analysed, measures that respond to the feedback need to be implemented as soon as possible.

6 EVALUATION RESULTS

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. A discussion of the analyses follows.

6.1 Survey Instruments

The effectiveness of the design/redesign framework was evaluated several ways. Informal feedback sessions were held with the students so they could identify areas that they believed were relevant or not as they pertained to their learning.

Students were also asked to fill out surveys to indicate their use of the learning resources and their opinions as to the effectiveness of the teaching strategies and learning resources available to them. To this end, the students were asked to a complete a questionnaire for each of the course modules, one week after its conclusion. A survey instrument containing seven separate items was created. The first item asked the frequency of their use of the Web Site overall and its individual sections. Course content was listed under the second item and students were required to rank order their preferences for the topics contained in the module. The third item asked students to identify other topics they would find useful and should be included in the module. Students were asked in the fourth element to rate the effectiveness of the teaching strategies and learning resources for their learning. The remaining three elements asked students to identify what they liked most in the module, what they liked least and how they would improve the module, respectively. The questionnaire for each module was the same except for the second element covering the content of the module.

The evaluation strategy also required a review of the distribution of assessment data. Assessment in the course consisted of three Concept Tests (60%) and a Group Project (40%). A graph displaying the distribution of final results and the averages of student scores on all of the assessment items was reviewed as a means of determining whether the desired learning outcomes were achieved. Student opinions about the Concept Tests were sought via a questionnaire, which was administered in the week after a Concept Test.

The formal independent evaluation also used a 'standard' questionnaire. Management designed the questionnaire so that across course evaluations could take place. Unfortunately, this generic design meant that several of the questions were not relevant for many of the courses, including the e-commerce course, offered by the School. Further, questions relating to flexible learning teaching strategies and resources could not be included.

6.2 Subjects

Students who had enrolled in the 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. A total of 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.

6.3 Results

This section reports the results of data analyses. Students were asked to indicate their preference for the teaching strategies and learning resources using a seven point Likert-type scale where 1 was considered least effective and 7 most effective. Students were able to indicate when they didn't undertake the teaching activity or when they didn't use the learning resource. Table 1a shows the means, standard deviations (SD), range of scores and ranking of the teaching strategies and learning resources. Since Module 1 was only two weeks in duration, it was evaluated in conjunction with Module 2. There were 100 usable questionnaires returned for Modules 1 & 2, while 56 were collected for Module 3. Module 4 is not included in the analysis as only one questionnaire was returned. Table 1b shows the details of the summary information provided in Table 1a.

With respect to the teaching activities, Table 1a indicates that the Workshop (overall) was considered the most effective teaching strategy for Modules 1 & 2, however, the students perceived it to be of lesser value for the next module. Workshop Class Discussions were rated as being most effective as the course progressed; it was ranked third for the first modules, but advanced to first position by the end of Module 3. The Seminar (lecture) was ranked second initially but dropped to third at the end of Module 3. The lowest ranked teaching strategy for all modules was the Workshop Computer Exercises.

Student perceptions of the effectiveness for four of the nine learning resources varied from Modules 1 and 2 to Module 3. The Seminar (Lecture) notes was the highest ranked learning resource for all modules, whereas the lowest ranking learning resources were Supplementary notes, Essential Readings, Self-assessment quizzes and Learning Objectives checklist, respectively. Chapter summaries were regarded as more important in Module 3 – ranked at 2 – than the previous ranking of 5. Both the Textbook and the Web site (overall) slipped in ranking by two places, while perception of the Course handouts was raised by one place at the end of Module 3.

Learning Processes	Modules 1 & 2				Module 3			
Teaching Strategies:	**Mean**	**SD**	**Range***	**Rank**	**Mean**	**SD**	**Range***	**Rank**
Seminar (Lecture)	4.48	1.53	0 - 7	2	3.98	1.78	0 - 7	3
Workshop (Overall)	4.65	1.44	0 - 7	1	4.53	1.26	0 - 7	2
Workshop Class Discussions	4.21	1.41	0 - 7	3	4.72	1.51	0 - 7	1
Workshop Computer Exercises	4.20	1.32	0 - 7	4	3.77	1.55	0 - 7	4
Learning Resources:	**Mean**	**SD**	**Range***	**Rank**	**Mean**	**SD**	**Range***	**Rank**
Text Book (Schneider & Perry)	4.74	1.60	0 - 7	3	4.38	1.89	0 - 7	5
Essential Readings	4.20	1.40	0 - 7	7	4.00	1.66	0 - 7	7
Course Handouts	4.71	1.19	0 - 7	4	4.43	1.46	0 - 7	3
Web Site (overall)	4.82	1.16	2 - 7	2	4.42	1.63	2 - 7	4
Seminar (Lecture) Notes	4.95	1.31	0 - 7	1	4.85	1.57	0 - 7	1
Chapter Summaries	4.41	1.50	0 - 7	5	4.62	1.51	0 - 7	2
Supplementary Notes	4.40	1.61	0 - 7	6	4.17	1.87	0 - 7	6
Self Assessment Quizzes	4.05	2.05	0 - 7	8	3.81	1.86	0 - 7	8
Learning Objectives Checklist	3.58	1.66	0 - 7	9	3.32	1.69	0 - 7	9

* 0 indicates the teaching activity not undertaken or the learning resource not used, 1 = least effective and 7 = most effective.

Table 1a: Summary of student's overall perception of teaching strategies / learning resources

Learning Processes	Modules 1 & 2								Module 3							
Teaching Strategies:	**0***	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**0***	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Seminar (Lecture)	3	1	6	9	24	35	13	9	5	1	2	9	12	15	9	2
Workshop (Overall)	1	2	3	7	35	25	15	13	0	1	2	5	22	12	11	3
Workshop Class Discussions	1	1	9	18	35	26	16	4	0	3	6	12	12	12	8	2
Workshop Computer Exercises	1	3	3	17	34	24	14	3	2	1	7	11	19	7	7	2
Learning Resources:	**0***	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**0***	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Text Book (Schneider & Perry)	3	1	7	6	16	33	24	10	2	3	3	7	12	14	4	11
Essential Readings	2	1	7	18	28	25	17	2	2	2	4	12	11	17	3	5
Course Handouts	1	0	1	12	25	35	21	5	1	1	1	10	15	15	8	5
Web Site (overall)	0	0	3	9	25	34	33	6	2	0	4	7	15	17	3	8
Seminar (Lecture) Notes	1	0	3	7	18	37	21	13	2	1	1	2	14	14	16	6
Chapter Summaries	3	1	8	10	19	38	17	4	1	0	4	5	17	10	14	5
Supplementary Notes	4	2	6	11	21	34	15	7	3	1	8	7	7	14	12	4
Self Assessment Quizzes	10	4	5	16	16	22	16	11	4	5	0	8	17	12	4	5
Learning Objectives Checklist	7	7	6	20	30	22	5	3	5	4	6	10	15	12	4	0

* 0 indicates the teaching activity not undertaken or the learning resource not used, 1 = least effective, and 7 = most effective.

Table 1b: Frequency of student's overall perception of teaching strategies / learning resources

# **Question**	Mean	SD
1. The Concept Tests helped me to consolidate what I learned.	2.34	0.84
2. The e-Commerce Project was a valuable learning experience.	2.11	0.72
3. In this course, I was encouraged to take responsibility for my own learning.	1.97	1.01
4. I developed a better understanding of e-commerce and its application to business from this course.	1.84	0.74
5. The Web-based information for this course was well developed and useful.	2.18	0.65
6. The use of Web-based Concept Tests added to the flexibility in this course.	1.95	0.89
7. The level flexibility offered in this course suited my learning style.	2.13	0.96
8. If needed, I could discuss any problems I had with the course with the staff.	1.97	0.67
9. Overall, I am satisfied with the quality of this course.	2.24	0.74
10. How many seminars did you attend? 1=7 (All); 2=5-6; 3=4-3; 4=2-1; 5=0	1.53	0.71
11. How many workshops did you attend? 1=12-13; 2=8-11; 3=4-7; 4=1-3; 5=0	1.84	0.97

Table 2: Evaluation of the Fundamentals of e-Commerce course

An independent third party conducted a second evaluation survey. Only 11 of the 24 original questions were relevant for the e-commerce course. The questions, means and standard deviations are reported in Table 2. A five-point Likert-type scale, where 1 represented strongly agree and 7 strongly disagree, was employed for all but the last two questions. The scales for these questions represented the number of times the student

had attended the seminars and workshops. A total of 38 students completed the survey.

Assessment was also considered as part of the evaluation strategy. The questionnaires seeking student experiences on the Concept Test were administered throughout the semester. The number of questionnaires returned varied for each test; 87 questionnaires 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 did not change from the first test to the second except on three questions. The responses to the first of these questions, which asked whether students had difficulty in remembering they had to take the test, were significantly different at a probability level of less than .006%. The second question asking if they could complete the test within the specified time was significantly different at the .0001% level, while the third asking whether they had observed other students receiving help was significantly different at the .03% level. The responses to the open-ended question indicated that students either liked the online test format or that they preferred an in-class paper test. The one issue students did have with the online tests was the performance of the system, that is, the technology on which the tests were run.

The marks, means, standard deviations and ranges for each of the assessment items are shown in Table 3. 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.

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 1	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

Table 3: Average Marks for Assessment Items

Figure 3 represents the distribution of total marks. The distribution represents a reasonable bell curve, however it stops short at 85%. The cluster of marks on the left side of the curve represents five students who failed the course through non-submission of any assessment item, three students who withdrew from the course after attempting one or two of the Concept Tests and another who attempted all three tests but did not submit the Group Project. Two more students failed the course. They had achieved at least 50% of the marks for the Concept Tests but failed the Group Project. While several other students failed the Project, their score on the Concept Tests made a Passing grade possible.

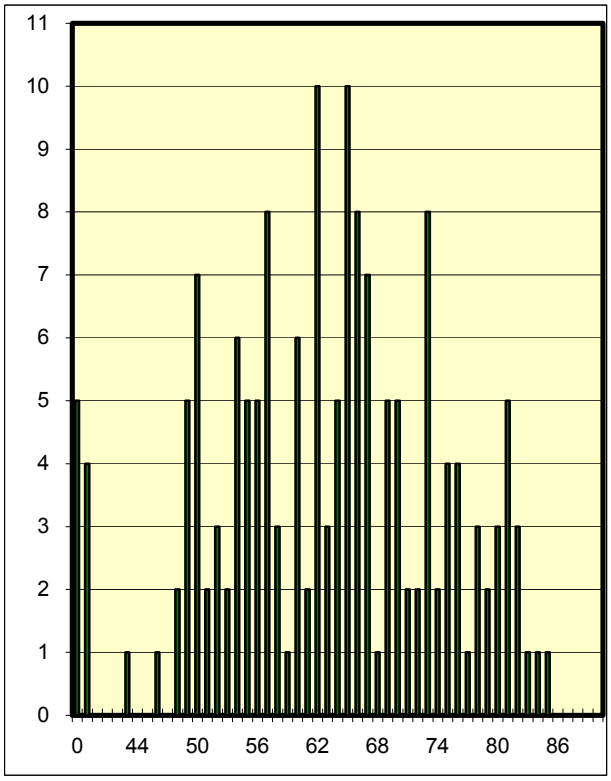

Figure 3: Assessment Distribution

6.3.1 Discussion

The purpose of the research was to evaluate the whether the learning outcomes of a course was achieved. A process developed from the literature was used in this process. The selection of evaluation techniques and data collection approaches was devised specifically for the e-commerce course. While these techniques cannot be considered in anyway specific to the IS discipline, they were selected to suit the needs of the course in question. Further, course evaluation is not the sole province of the IS discipline, rather it is relevant to all courses. The results presented in the previous section provide some support for the achievement of the learning outcome. A discussion of these results follows.

The most interesting result from the evaluation focused on the Seminar (Lecture) teaching strategy. Given that Module 3 spanned the longest time (five weeks), contained the major elements of the course and only two seminars were presented, the result as reported is not unexpected. However, while Seminar (Lecture) ranking was reduced by one place from Module 1 and 2 to Module 3, the Seminar (Lecture) Notes remained the highest ranked learning resource. It is apparent that the students perceived the notes as being more effective for their learning. This is most likely due to the fact that students could return to the notes at any point during the semester to assist in their learning. The Workshop Class Discussions had a higher ranking at the end of Module 3. One interpretation of this result can be that students saw more relevance in Module 3 for their e-Commerce Project than in Modules 1 and 2. The one rank drop in

the Workshop (Overall) was unexpected as the workshop was the primary teaching strategy chosen.

The higher ranking, from 5 to 2, for the Chapter Summaries is mostly likely due to the fact that students could focus on the important concepts, which were tested via the Concept Tests. Further, students most likely found the chapter summaries more effective for their learning than taking their own notes from the textbook (a ranking drop from 3 to 5). The Web site (overall) fell in the ranking by two places. This outcome is most likely due to the fact that only two seminars held in Module 3 and the majority of student's having chosen an e-marketing application as their e-Commerce Project. One issue that was not expected was that the review tools provided to the students as a self-assessment mechanism were consistently ranked the lowest across the modules. No definitive information was apparent from the open-ended questions on the survey as to the reason for this outcome. One possible explanation was that students did not understand the relevance of these tools or simply did not know how they could help in their learning process.

The results presented in Table 2 provide some evidence that the students were satisfied with the Assessment strategies chosen, the level of flexibility, amount of support provided to the students and Web-based learning resources in the course. Evidence of satisfaction with the Assessment strategies is evident in Questions 1, 2 and 6. Questions 6 and 7 provide support for the level of flexibility offered in the course. However, not all students (34%) were convinced that flexibility as discussed in relation to the Web site learning resource was desirable (Question 5). Recognition of students and their needs was apparent in the responses to Questions 3 and 8. The flexibility of the teaching team in being responsive to the students' learning needs was evident. Question 7 indicated 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 (Questions 1, 2 and 4). The attendance record of the students for seminars and workshops (Q. 10 and 11) provides overall support for student satisfaction with the course. All but two of the students completing the independent evaluation attended five or more of the Seminars while 76% attended eight or more of the Workshops.

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.

7 MODIFICATIONS TO COURSE

Based on the evaluation, some changes 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. There were several readings recommended for students. They requested and were given advice on the importance of each article for their learning. As the course was designed to take a practical rather than theoretical focus, students were required to gain skills in using an application package, namely, IBM *WebSphere* Studio. The package is widely used in business for e-commerce and e-business implementations. A restricted version was available for student use and several CDs of the software were placed in the Library. Additional copies of the *WebSphere* CDs were made available after being requested by the students.

Several changes were subsequently made to the course for its offering in 2003. These changes included a restructuring of some of the materials for example; the coverage of two module topics was collapsed to one week from a week each. The number of additional readings was reduced significantly to maximum of one per week. The remaining readings were classified as 'Postgraduate Only', as the 2003 offering of the course would include Postgraduates. An additional assessment item, a case study (15%) 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 were kept for the 2003 offering including: Use of Noticeboard; a Discussion forum for Questions about the Course and General Feedback on Assessment Items; Feedback on individual basis (Concept Tests and Group Project). 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 was continued.

8 IN CONCLUSION

This paper has developed and applied a process for evaluating IS courses, specifically an e-commerce course. The evaluation process was formulated to determine whether an effective teaching and learning environment could be designed and implemented. For the evaluation process to be considered useful, its application in assessing the design of new courses and the redesign of existing courses must be tested. To this end, the process has been applied to a new e-commerce course, which was designed for the flexible learning mode of delivery. The evaluation of the effectiveness of the teaching and learning environment resulted in positive support for the suggested evaluation process. Further analyses are being conducted to confirm this contention and more research is required to determine whether the outcome can be replicated. 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. Data analyses are currently being undertaken to determine this. Further, while the evaluation process was designed specifically for IS courses; it could conceivably be generic enough to apply to courses in other disciplines. However, further research would be required to determine the appropriateness of the evaluation process.

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