IDEA GROUP PUBLISHING

701 E. Chocolate Avenue, Suite 200, Hershey PA 17033, USA
Tel: 717/533-8845; Fax 717/533-8661; URL-http://www.idea-group.com

ITP4806

On-line Learning, Quality and Student Satisfaction: A Case Study

Paul Darbyshire
School of Information Systems
Victoria University, P.O. Box 14428, Melbourne City MC,
VICTORIA 8001, AUSTRALIA
Tel: 61 3 9688-4393, Fax: 61 3 9688-5024
Paul.Darbyshire@vu.edu.au

ABSTRACT

Although full degree programs have been offered in a virtual classroom environment for some time, it is really only recently that such programs are being developed en masse. As these programs begin to mature, we seem no closer to being able to answer the question as to the quality of such programs. One of the major tools for judging these and indeed many on-ground programs are student-satisfaction surveys. While many believe these unable to address the quality issue, often it is all we have. However, if the on-line programs are designed around 'best practice', and delivered by qualified instructors through accredited institutions, then satisfaction surveys could be indicative of 'quality'. This paper discusses student satisfaction and program quality using an example of an on-line MSc. program as a case study.

INTRODUCTION

There has been concern for some time about the quality of education in many on-line programs, and while some attempts have been made to address this, the questions remain largely unanswered. In fact, there are differing opinions on how to judge the quality of education in general, notwithstanding the extra dimension of on-line education. Such questions are hard to answer in subjects where hybrid teaching methods (combination of on-line and on-ground) are used, it would seem that we need comparisons between identical programs utilizing on-line and on-ground paradigms. There are even questions here as to whether this would deliver the answers we want. In subjects, and entire degree programs taught on-line, student satisfaction surveys are usually conducted, either on a subject-by-subject basis, or on exit from the program.

Again, the questions are often asked, 'are satisfaction surveys indicative of quality' in such programs, or basically a popularity poll. This paper discusses the relationship between student satisfaction and quality perception, and presents some statistics on student satisfaction from an on-line MSc. program taught by K.I.T. eLearning through the University of Liverpool. In the following sections, a brief literature review is presented on student satisfaction and on-line effectiveness, followed by a description of the MSc. program. Some results of student surveys from this program are presented and then discussed in the context of the program itself and the makeup of the student population.

BACKGROUND

The Western model of education has its roots the early religious doctrine schools in the 7th and 8th centuries (Knowles, 1980; Pond, 2002), and in the early Universities to institutionalise the education of the noble classes. The question of quality then was limited to two factors: was the instructor an expert; could learners demonstrate a mastery of the information provided (Pond, 2002). We cannot uniformly judge the quality of education with such simple notions any longer. Since the first degree program offered in a virtual classroom at the UK Open University in 1969 (Yeung, 2002), many universities have been using satisfaction surveys to validate on-line teaching. There have been a number of papers evaluating student satisfaction in Web-based subject trials against the traditional on-ground model. Fredericksen et al. reports favourable results for satisfaction and perceived learning in on-line classes using a number of metrics (Fredericksen, Picket, Shea, Pelz, & Swan, 2000). Interestingly, students which report higher levels of perceived learning and satisfaction are those that embrace the inherent features of an on-line paradigm.

An exploratory study on student perception on the effectiveness of on-line education conducted by Kumar, Kumar and Basu (Kumar, Kumar, & Basu, 2002) reported low levels of interest on on-line education. The survey shows low levels of perception in the adequacy of the student-teacher relationship and classroom effectiveness. However, from the report it seems that unlike (Fredericksen et al., 2000), the students surveyed had not studied in an on-line class. However, Kumar et al. conclude that as the students surveyed were all undergraduate students, the levels of apprehension may exist because of the need for more structure and direction at the undergraduate level. This does have some common ground with Fredericksens findings which report that the 16-25 age group showed less satisfaction that the older groups which would include the general postgraduate population.

Although studies do report on high student satisfaction with on-line classes, this doesn't validate on-line learning as being of equal or greater quality than traditional on-ground classes. Some studies have attempted to measure this by comparing results between separate groups of students taking identical classes in both on-line and on-ground modes. Rivera reports on a study where a large group of students taking a particular subject were divided into three groups and each group instructed via a different paradigm (Rivera & Rice, 2002). The study reports no significant difference in the final outcomes between all groups. In fact as Rivera states, '*remarkably consistent*'. This study also reports slightly lower levels of satisfaction with the on-line class, but explains this in terms of technical difficulties encountered.

A similar study, (Marold, Larsen, & Moreno, 2002) compares six groups of students in three subjects. Each subject having both an on-line group, and an on-ground group. This study also report similar findings in that there is not a significant difference in the overall grade between the two groups of students in 2 of the 3 subjects. In the third subject, the on-line group fared slightly better. This is an interesting anomaly, as Marold, Larsen and Moreno conjecture that the class may have fared better overall because of the demographics of the students it attracted.

Despite these promising comparisons, Joy and Garcia suggest that such findings showing '*No Significant Difference*' be examined further in the light of certain factors (Joy & Garcia, 2000). That is, over zealousness of instructors using the new technologies, lack of proper controls, and other undetermined factors including familiarity of students taking such courses with technology. Robson, (Robson, 2002), also suggests that any framework we use to evaluate the effectiveness of on-line programs take into account the dropout rate that such programs have. However, provided that such on-line programs are provided as an alternative for students to the on-ground programs, and not as a total replacement, then such criticisms may be unearned. They possibly

elude more to the suitability of students for such programs than the programs themselves.

The current trend seems to suggest that we approach the development of on-line learning programs from a Total Quality Management stand, with the students and academic staff as the two key stakeholders (Yeung, 2002). Thus the design of any course needs to pay particular attention to the areas of Institutional Support, Course Development, Teaching / Learning Process, Course Structure, Student Support, Faculty Support, and Evaluation and Assessment procedures. Adrian (Adrian, 2002), argues that to ensure quality, we need to treat the student as the product, and other faculty staff and eventual employers as both internal and external customers.

Despite the lack of definitive metrics for defining quality, we can construct an environment which supports the development of quality on-line programs by using a combination of Total Quality Management and current best practice. The Middle States Commission on Higher Education (MSACHE) identifies five separate areas of institutional activity relevant to distance and on-line education (MSACHE, 2001). These are Institutional Context and Commitment, Curriculum and Instruction, Faculty Support, Student Support, and Evaluation and Assessment. If these areas are adequately addressed and there is a commitment to total quality management, then student satisfaction reports will be an indicator of quality and success.

ON-LINE PROGRAM DESCRIPTION

The University of Liverpool, England offers a fully on-line MSc program via a partnership with K.I.T eLearning in Rotterdam and through its own Department of Computer Science (Devlin, Coenen, & Leng, 2002; Gruengard, Kalman, & Leng, 2000). This graduate program has been designed and operates using best practice criteria as outlined in (MSACHE, 2001), and has been running for approx 3 years with the first graduates beginning to filter through.

The program is designed around a structure of 8 modules and a dissertation. There are two compulsory subjects, the introductory and dissertation modules, and the rest are chosen from two core module groups and a number of electives (KIT, 2002). Each of the modules is taught entirely on-Line and the curriculum is delivered using a combination of lectures, class discussion, personal exercises, and where appropriate group project work. Each module runs for 8 weeks and the on-line academic year is designed around five 10-week terms, with 8 weeks for the modules delivery and assessment and a 2-week rest before the next module. The program is fairly intense and was designed for working professionals with a desire to gain a post graduate qualification, but with a need for flexibility greater than that able to be offered by existing on-ground programs.

The pedagogy used follows a semi-Socratic style approach to education and is constructivist in nature (Devlin et al., 2002). The virtual classroom is achieved using FirstClass[1] software, and the mode of communication is asynchronous. Students are required to attend the class at least 4 times each week and participate in class, and there are minimum levels of participation required, depending on the module and the nature of the material. At the end of each module students are invited to complete satisfaction surveys and to comment further in open-ended style about aspects they were satisfied with, and least satisfied with. A cross section of the results of these surveys is presented in the next section.

The aspects of the MSc program design and operation which address the five major areas of best practice design are as follows:

Institutional Context and Commitment

The degree program is offered through the Computer Science Department of an established reputable University, the University of Liverpool. The University of Liverpool retains full control over all academic aspects of the program (Devlin et al., 2002). The program itself mirrors the academic structure of the universities existing programs, and in fact models many existing on-ground graduate programs. Because of the university control of the academic aspects of the program, accreditation requirements are dealt with by the University.

The unique partnership with KIT eLearning, who provide the virtual learning environment and are responsible for recruitment, marketing and administration, ensures there is an extremely strong commitment to the student. KIT eLearning has a number of 'Program Managers' (PM), and upon entry, each student is assigned a PM who becomes their personal contact throughout their academic studies. Through this commercial arm of the partnership, students have 24-hour access to technical staff to help with any problems in accessing and using the technology of the virtual class.

Curriculum and Instruction

Control and close monitoring of the academic program by the University of Liverpool ensures that collegiate level outcomes are met, and the program contains appropriate levels of rigor expected of an MSc. Although KIT eLearning recruits academic staff for teaching into the program, the University partner is responsible for verifying and recognizing the academic qualifications of teaching staff. On-line instructors are recognized as instructors of the University of Liverpool.

All modules in the program are designed around high levels of interaction of the students with both the instructor and other class members.

Faculty Support

On-line faculty staff are supported by both KIT eLearning and the University of Liverpool. Monitoring of staff load is performed by KIT eLearning, and staff are provided with valuable support: at the student level with PM's; and at the technical level with a range of technical staff providing the virtual environment; with academic support from the MSc. on-line head of Department and head of Faculty, as well as direct support from the University of Liverpool if required.

The University provides academic recognition and standing for all its on-line instructors. Staff are provided with orientation training before teaching in the on-line environment begins.

Student Support

The commercial partnership ensures a continuing commitment to both the students and the program. Students are admitted to the program after extensive consultation, verification of previous academic qualifications and a two-week orientation period where the student uses the virtual environment in a 'simulation run' of their impending first class. Students are monitored closely during the first module to make sure they stay on track, and their academic commitments are being met. The students PM continues the monitoring process through the students academic studies.

Evaluation and Assessment

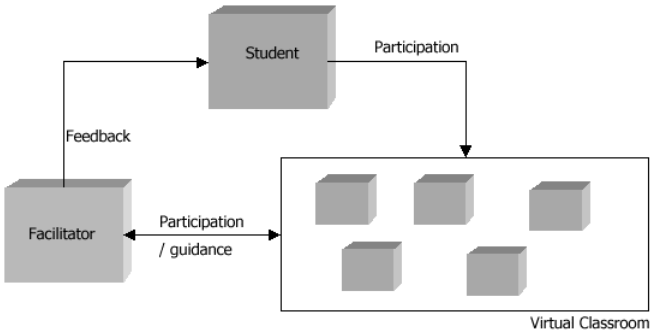
Students are clearly informed of assessment procedures at the beginning of each module, and these are well documented. As all classes are on-line, all work, assessment, discussions etc. are archived fully so extensive documentation is available for verification of work and grading. The University of Liverpool in conjunction with the on-line instructors continually monitor classes (as far as possible) to ensure the integrity of students work, and hence the program.

The structure of the modules and the assessment procedures place each student in the middle of a continual feedback loop during each of the standard modules the student undertakes. This is depicted in Figure 1. This helps in a TQM approach, as during the course of a module, the continual feedback allows a student to modify participation and work standards if necessary to allow improvement as the module progresses. This gives the student the maximum opportunity to achieve the desired outcomes for the module, and hence the course overall.

Student Satisfaction Surveys

As each student completes a module, they are invited to contribute to an end-of-module survey which allows the module designers to gauge any negative aspect of the subject which might result in lower learning rates. All end-of-module surveys contain 16 closed questions, which are answered by choosing a Likert scale response from (1) … (5). With (1)

Figure 1 Student assessment feedback loop



being the poorest possible response to the question, and (5) being the best possible response. The 16 questions are grouped into five categories, with the questions in each category designed to elicit feedback in a particular areas relating to the instructors materials and participation, the virtual classroom software, response to personal and technical issues, how the module meets its goals and fulfils their learning requirements, and overall satisfaction

1. The instructor's involvement in the discussion was beneficial
2. The instructor's replies to my questions were helpful
3. The instructor's lectures and notes provided additional value, beyond the textbook, to my understanding of the module
4. The assignments contributed to my understanding of the module
5. The educational delivery application was convenient to use
6. The educational delivery application helpdesk was helpful
7. The program manager was helpful in assisting me with technical issues I encountered during this module
8. The program manager was helpful in assisting me with personal issues I encountered during this module
9. The progression of the module was consistent with what was described in the syllabus
10. The textbook provided a good introduction to the subject material
11. The online discussions were fruitful
12. The module's demands provided me with the flexibility I needed for my other pursuits
13. The module achieved its aim as described in the syllabus.
14. Participating in this module contributed to my professional knowledge
15. I am satisfied with the instructor's performance.
16. I am satisfied with the module overall

The student satisfaction surveys for a particular module, *Programming the Internet*, were tracked for a period of 1.5 years, from the first time the module ran in Nov 2000, to its third running in Mar 2002. The following 3 tables display the data obtained for the Nov 2000, Jun 2001, and Mar 2002 classes. In the 2000 and 2001 classes, the percentage breakdowns for the responses to each of the 5 Likert scale values are presented in the body of the table. The bottom of these tables displays the mean Likert score for each of the 16 questions detailed above. These are shown in tables Table 1 and Table 2.

Table 1 Survey, Nov 2000 class

	Programming the Internet November 2000: 17/19 responses															
	Questions															
Likert scale	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	5.9	5.9	5.9	5.9	0	0	0	0	0	5.9	0	12.5	0	0	5.9	0
2	0	0	0	0	5.9	0	10	0	5.9	11.8	11.8	6.2	5.9	5.9	0	5.9
3	11.8	23.5	5.9	11.8	29.4	50	10	18.2	5.9	23.5	17.6	18.8	23.5	17.6	5.9	11.8
4	41.2	41.2	35.3	41.2	58.8	25	60	36.4	70.6	41.2	58.8	50	64.7	29.4	47.1	76.5
5	41.2	29.4	52.9	41.2	5.9	25	20	45.5	17.6	17.6	11.8	12.5	5.9	47.1	41.2	5.9
mean	**4.12**	**3.88**	**4.29**	**4.12**	**3.65**	**3.75**	**3.9**	**4.27**	**4**	**3.53**	**3.71**	**3.44**	**3.71**	**4.18**	**4.18**	**3.82**

Table 2 Survey, Jun 2001 class

	Programming the Internet June 2000: 21/51 responses															
	Questions															
Likert scale	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	0	0	0	0	0	0	0	0	0	0	0	11.1	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	11.1	44.4	11.1	0	0	0
3	0	0	11.1	11.1	22.2	42.2	40	14.3	11.1	22.2	11.1	22.2	11.1	0	0	11.1
4	33.3	37.5	33.3	11.1	55.6	28.6	40	42.9	55.6	33.3	44.4	22.2	44.4	33.3	33.3	44.4
5	66.7	62.5	55.6	77.8	22.2	28.6	20	42.9	33.3	44.4	33.3	0	33.3	66.7	66.7	44.4
mean	**4.67**	**4.62**	**4.44**	**4.67**	**4**	**3.86**	**3.8**	**4.29**	**4.22**	**4.22**	**4**	**2.56**	**4**	**4.67**	**4.67**	**4.33**

In the March 2002 term, there were four separate classes for this module running concurrently with different instructors. The figures for this term have been presented in summary mode only. Table 3 shows the mean Likert score for each of the 16 questions above, for each of the four different classes. The response rates to these individual surveys per class are indicated in the top row of the table with figures like 1 (10/14) indicating 10 responses out of a possible 14 for class one.

Finally, some overall mean Likert values are supplied for the same 16 questions detailed above. The data shown in Table 4, represent the mean Likert values for the 16 questions averaged for all responses for all modules taught, broken down into yearly quarters, from the 2nd quarter 2000 to the 1st quarter 2002. No details are yet available on the number of responses that this represents per quarter.

DISCUSSION

While the figures relating to the averaged Likert scaled responses for the 'Programming the Internet' module are not perfect, they do show a high overall satisfaction with the module. Table 1 represent the

Table 3 Survey, Mar 2002 4 classes summary

	Programming the Internet Mar 2002: responses: 1 (10/14): 2 (9/13): 3 (8/12): 4 (8/10)															
	Questions															
Class	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	**4.1**	**4.6**	**4.6**	**4.4**	**3.9**	**4.3**	**4.1**	**4.5**	**4.3**	**4.0**	**4.2**	**4.2**	**4.5**	**4.5**	**4.7**	**4.6**
2	**3.7**	**3.8**	**4.1**	**4.1**	**4.0**	**3.8**	**4.0**	**4.0**	**4.1**	**4.2**	**3.8**	**3.3**	**3.9**	**4.1**	**3.6**	**3.8**
3	**3.5**	**4.2**	**4.5**	**4.9**	**3.8**	**4.2**	**4.0**	**4.4**	**4.3**	**4.5**	**4.1**	**3.0**	**4.1**	**4.4**	**4.0**	**4.1**
4	**4.4**	**4.6**	**4.8**	**4.5**	**4.1**	**4.5**	**4.0**	**4.4**	**3.9**	**4.1**	**4.0**	**3.8**	**4.4**	**4.4**	**4.6**	**4.3**

Table 4 Overall averaged scored per quater

	Quaterly Periods							
Question	2000 Q2	2000 Q3	2000 Q4	2001 Q1	2001 Q2	2001 Q3	2001 Q4	2002 Q1
1	3.8	4.0	4.4	4.0	4.1	4.0	4.0	4.0
2	4.0	4.2	4.5	4.2	4.2	4.2	4.1	4.1
3	4.0	4.2	4.0	4.2	4.2	4.2	4.1	4.0
4	4.3	4.4	3.9	4.3	4.3	4.4	4.3	4.3
5	3.1	3.1	3.2	4.0	4.0	3.8	3.9	4.0
6	3.9		3.9	4.2	4.1	4.0	3.7	3.9
7	3.9	4.3	4.2	4.2	4.2	3.8	4.0	4.1
8	4.4	4.6	4.3	4.3	4.3	4.0	4.0	4.2
9	4.1	3.4	3.9	4.2	4.2	4.1	4.1	4.2
10	4.3	4.2	4.1	4.1	4.3	4.2	4.1	4.2
11	4.1	3.3	3.6	4.2	4.2	4.3	4.2	4.2
12	3.8	3.0	3.1	3.9	3.5	3.3	3.4	3.5
13	4.1	4.2	4.1	4.1	4.2	4.1	4.1	4.2
14	4.1	4.2	4.1	4.3	4.3	4.3	4.3	4.3
15	4.3	3.7	4.3	4.2	4.3	4.2	4.1	4.1
16	4.1	3.5	3.9	4.2	4.2	4.1	4.0	4.1

first time the module ran, so the results from the student survey were used as feedback into the module to try and fine-tune the material and delivery aspects. Table 2 data represents the second time the module ran, and as can be seen shows an improvement in most of the questions. In Table 3, the data is presented in summary mode for 4 parallel classes.

While each individual class had its issues and problems, the values indicate consistently high satisfaction levels with most aspects of the on-line module. Over the 1.5 years of survey reports, there does not seem to be a trend one way or the other, except for the initial improvement between the first and second classes. This can be explained by experience in the delivery and modules requirements.

It is difficult to extrapolate high satisfaction in one class to that of an entire program. However, the data in Table 4 provides the mean Likert scores for the same surveys gathered over all modules and for a period of 2 years, and presented in quarterly breakdown. Again, this data indicates fairly high satisfaction rates, and is representative of all modules in the program. One of the lesser scoring aspects which should be discussed is the data for question 12 in appearing in all tables.

This question represents the students' perception as to the flexibility of the modules in the on-line program. In many cases there seems to be a misunderstanding of the term flexibility. Initially there seems to be some indications that 'flexibility' means easier but this myth is quickly dispelled, as the demands of the modules can be quite high although this varies from module to module. The term 'flexibility' is used to indicate that students can participate 'when' they want, not 'how often they want'. There is a minimum participation rate of at least 4 days per week. As the mode is asynchronous, the 'when' is flexible, but students find that they do need to log on and participate regularly so as to not get behind.

The nature of the demographics of the student population means that most are busy working professionals, many in managerial positions, and their time is valuable. Sometimes, having to squeeze the extra time into their schedule does get challenging. The students understand the situation, but this point will by its very nature score lower than many.

It is reasonable to question whether the high satisfaction indicated does necessarily lead to quality. However, as discussed, the MSc program has been designed using 'best practice', as determined in (MSACHE, 2001), and includes Total Quality Management aspects in both assessment and student retention. As this is a graduate program, the students have already studied at the undergraduate program level, and are well aware of the educational experience and the quality they should be receiving. The demographics of the students also mean that they can, and will be very critical if they think it is warranted. For instance, in each of the module surveys the students can nominate the best and worse thing they liked about a particular module. A sample of 4 negative responses are given below:

> "First of all, I am not too content about the book; the text is not always clear and it contains flaws in programming logic in the example given."
>
> "The technical problems we faced with a server being down and the hassle to connect to the access databases"
>
> "I think we tried to cover too much material in too little time. The e-course was supposed to involve 8-12 hours per week but I've spent on average 15-20 hours per week on this module. Not easy if you're expected to work and have some kind of family life as well."
>
> "The amount of time required to set up the project."

As a consequence of these factors, and the design of the program, I believe that the student satisfaction with the program represents an accurate indication of the programs quality. The demographics of the students may lead towards a biasing of the population to this type of on-line study, but if the experience of the student leads towards a positive outcome that includes satisfying the students' objectives and the educational requirements of the program, then the program has succeeded. This program does not replace an existing on-ground one, but fills a niche for high achieving professionals that would otherwise not get a higher education.

ACKNOWLEDGMENTS

The author would like to thank K.I.T. eLearning for their permission to use the results of the student satisfaction surveys in this paper.

FOOTNOTES

[1] FirstClass is a Trade Mark of SoftArc Inc.

REFERENCES

Adrian, C. M. (2002). Developing a Learning Environment: Applying Technology and TQM to Distance Learning. In M. Khosrow-Pour (Ed.), *Web-Based Instructional Learning* (pp. 43-58). Hershey, PA.: IRM Press.

Devlin, M., Coenen, F., & Leng, P. (2002). *Teaching Java in an On-Line Degree Programme: A Case Study.* Paper presented at the The Sixth Java & the Internet in the Computing Curriculum Conference, University of North London.

Fredericksen, E., Picket, A., Shea, P., Pelz, W., & Swan, K. (2000). Student Satisfaction and Perceived Learning with On-line Courses: Principles and Examples from the SUNY Learning Network. *JALN - Journal of Asynchronous Learning Networks, 4*(2).

Gruengard, E., Kalman, Y., & Leng, P. H. (2000). *University Education via the Internet: a new paradigm for public-private partnership.* Paper presented at the Innovation through Electronic Commerce (Proc IeC 2000), Ceec, Manchester.

Joy, E. H., & Garcia, F. E. (2000). Measuring Learning Effectiveness: A New Look at No-Significant-Difference Findings. *JALN - Journal of Asynchronous Learning Networks, 4*(1).

KIT. (2002). *KIT Campus - MSc in IT*. KIT eLearning. Retrieved 1/10/2002, 2002, from the World Wide Web: http://www.kitcampus.com/programmes/msc.phtml

Knowles, M. (1980). *The modern practice of adult education: From pedagogy to andragogy*: Englewood Cliffs: Prentice Hall.

Kumar, A., Kumar, P., & Basu, S. C. (2002). Student Perceptions of Virtual Education: An Exploratory Study. In M. Khosrow-Pour (Ed.), *Web-Based Instructional Learning* (pp. 132-141). Hershey, PA.: IRM Press.

Marold, K. A., Larsen, G., & Moreno, A. (2002). Web-Based Learning: Is It Working: A Comparison of Student Performance and Achievement in Web-Based Courses and Their In-Classroom Counterparts. In M. Khosrow-Pour (Ed.), *Web-Based Instructional Learning* (pp. 179-189). Hershey, PA.: IRM Press.

MSACHE. (2001). *Best Practices For Electronically Offered Degree and Certificate Programs*: Commission on Higher Education, Middle States Association of Colleges and Schools.

Pond, W. K. (2002). Distributed Education in the 21st Century: Implications for Quality Assurance. *Journal of Distance Learning Administration, 5*(2).

Rivera, J. C., & Rice, M. L. (2002). A Comparison of Student Outcomes & Satisfaction Between Traditional & Web Based Course Offerings. *Journal of Distance Learning Administration, 5*(3).

Robson, J. (2002). *A Framework for Evaluation: Including the Student who Discontinues.* Paper presented at the AUSWEB 02, The Eighth Australian World Wide Web Conference, Sunshine Coast, Queensland, Australia.

Yeung, D. (2002). Toward and Effective Quality Assurance Model of Web-Based Learning: The Perspective of Academic Staff. *Journal of Distance Learning Administration, 5*(2).