Student Satisfaction: A Method for Exploring Quality Factors within

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ABSTRACT

Student satisfaction is being presented as an important quality factor in educational settings. A key element in defining quality is the capacity to show that the outcome from the process (teaching) is meeting user/client needs. Measures of satisfaction have been shown to be efficient indicators of short term outcomes. The research reported here has taken a general model of student satisfaction and evaluated a variety of subject-based components against rated satisfaction. Many of these components were generated through interviews with students. The outcomes of this study show that student satisfaction is a multi-dimensional outcome behaviour with important contributions to overall satisfaction coming from a mixture of functional and educational components in the subject being studied. What is of pedagogical interest is the way in which key computing educational initiatives have not appeared as influencing student satisfaction, although initiatives which attempt to facilitate general learning do impact on satisfaction.

KEYWORDS

Student satisfaction, quality assurance, computing education

1. INTRODUCTION

The current concern in education to measure quality in the learning environment has lead to various approaches to defining quality and quality assurance within the educational context. Much of this has followed the general trend within ISO quality thinking, which places most emphasis upon establishing quality in the production process and tends to de-emphasise the outcome variables such as user or customer satisfaction. The way to highlight the issue here is to think in terms of the production of a consumer appliance that meets all ISO-type quality assurance standards but which fails to meet user standards. The question of consumer quality needs has not been dealt with in defining process or production quality.

Within education there has been a concern with teacher performance within the context of pedagogical theories about good and bad teaching practice. This approach readily fits into the quality assurance thinking and clearly has problems when thinking about outcome measures.

The projects being reported here is a part of the development of a wider program within Monash University's Faculty of Technology, through its Computing Education Research Group, to investigate structured approaches to subject evaluation and the relationship with quality issues. Some work has also been carried out on another subject (Markham & Hagan, 1999) while there are other studies yet to be reported on comparisons of subjects and on student motivation and satisfaction.

1.2 Quality Assurance and Higher Education

Quality has become an issue in education for a variety of reasons, some of which are practical while others are political. From the point of view of those teaching in education, there is little value in getting involved in the politics of education because that becomes a full time task. What the teacher can do is look towards measures of quality, which reflect a realist set of possibilities within the particular educational environment.

The current governmental approaches to quality assurance in education can be seen in the work of the Quality Assurance Agency for Higher Education in the UK (see the reports and publications links at www.qaa.ac.uk) where extensive work has been done generating competencies and benchmarks for educational content. Within Information Technology they have produced academic standards for subjects in the area of computing. We find it difficult to make a direct evaluation of these standards against what is being done in Monash University's IT Faculty. Our general feeling is that they might act as guidelines but are significantly lacking as objective standards for computing education. For example, they make little mention of the communication skills that are now seen as being essential for effective graduates in applied computing.

The Australian Department of Education Training and Youth Affairs (DETYA) has generated a number of reports, which explore the broad area of Quality Assurance in Education (see the Publications link at www.detya.gov.au/highered). The core of the approach is accreditation with individual universities taking responsibility for the implementation of a quality assurance approach.

The practical world of teaching students is likely to be impacted upon by the quality assurance drive in the area of outcomes from teaching, and the way in which this will be approached is through evaluation of teaching effectiveness. There is a general trend in the evaluation of teaching research to incorporate some comments on quality issues (e.g. Guolla, 1999) but specific searches for papers specifically addressing the combination of 'quality' and 'teaching evaluation' or 'teaching effectiveness' have proved to be unproductive.

We are following the general approach to customer satisfaction and quality assurance which emphases the relationship between the customers expectations of a service or product and their actual ratings of their satisfaction with that product or services (Wittingslow & Markham, 1999). In other words we are moving away from the static models, which do not incorporate a model of customer behaviour. Another component in the model underlying the work to be reported here are the outcomes of satisfaction, namely the likelihood that a satisfied customer will recommend and reuse the product or service. This is not utilised in the current research.

2. PREVIOUS RESEARCH

Guolla (1999) has described the application of a customer satisfaction model to student evaluation of teacher performance. He has established a link between student evaluation and student satisfaction. The research to be reported here was derived from exactly the same conceptual source, as was Guolla's work, namely the customer satisfaction modelling based upon the University of Michigan (see Wittingslow & Markham, 1999). The general thinking being utilised here is similar to that explored by Malley (1998) in his extensive review of student satisfaction definition and measurement within the Vocational Education and Training sector.

2.1 General Evaluation and Teacher Effectiveness Research

Within educational research the history of the evaluation of course and teaching has emphasised the process of teaching delivery. The work of Marsh (e.g.1991) has focused upon measuring various aspects of teaching performance using standard

psychometric methodologies. A recent paper (Jackson, Teal, Raines, Nansel, Force & Burdsal, 1999) illustrates the thinking that drives this type of approach. Their concern is to have as stable a device as possible to measure student perceptions of teaching effectiveness with no stated use of outcome or criterion measures against which to interpret the impact of effectiveness on student performance. The interest is in the abstract act of students perceiving teacher effectiveness; perceptions which may or may not have some relationship to performance.

Reid and Johnston (1999) have given an interesting perspective on the area as seen from a phenomenological position. They note the formalised methodology of the research carried out through ratings and suggest that work taking a more qualitative approach may be of more use, although they note a shortage of papers on the student's perceptions within this paradigm.

Reid and Johnston point out that, during the period when student evaluation of teacher performance was at its zenith, Kulik and McKeachie (1975) reviewed the literature and found no evidence to support feedback as a way of improving teaching.

This is supported by the research reviewed by Snare (2000) where he reports research emphasising the role of group dynamics and college culture influencing evaluation. He also points to research that questions the student's ability to make assessments about teacher performance when he/she is not trained to assess.

Snare might be seen as taking a somewhat jaundiced view of the area:

Professors often are frustrated as there is little, if any, connection between changes in teaching (such as incorporating critical thinking exercises or assigning superior readings) and the ensuring ratings. However, instructors can improve their scores by engaging in superficial behaviors and gestures, dress casually, flattering the political biases of students, bribing them by canceling some of their classes, or teaching undemanding courses (p823).

2.2 Student Behaviour and Teacher Evaluation

There appears to be little in the published research into student evaluation of teaching that develops an approach to student evaluation, which uses distinct model of student behaviour. It seems that the students evaluate teaching within a behavioural vacuum. For example, a key behavioural question would ask about those things that actually motivate students to want to learn. If teacher performance is going to be effective it must be tapping into behaviours (expectations, goals etc.), which relate to student learning.

In what follows we will be implicitly using the expectancy-value type of position (Gordon, 1995) in the overall structure of the methodology and in the assumptions underlying the interpretation of the evaluation modelling.

3. RESEARCH

3.1 Subject Context

Information Technology Project Management (CSE2203) introduces the fundamental principles, tools and techniques of software project management. The conceptual material presented in lectures is reinforced by practical application within the context of a software development project. Students work in project teams with roles allocated to each group member. The project is defined against a set process model. Project definition, estimation, and tracking and reporting techniques presented in lectures are employed during the course of the project. Real-life problems are injected into the project in the form of changes to user requirements, budget and time-lines. Emphasis is placed on the ability to provide up-to-date management information on the actual state of the project against established milestones: reports are requested on an ad-hoc basis. A project review phase is used to analyze and report on project estimates against actual time, cost and resource expenditure.

Students' teams are assigned a small software development project that incorporates a graphical user interface that reflects a real life simulation where developers need to source their own solutions to problems. With this focus, student assessment is

higher on project management skills than on product produced. To encourage well-designed and quality products, a competitive element is introduced. At the conclusion of the semester, best products are peer selected from each tutorial. These are presented at the final lecture for students to view other ideas and see what their peers have produced. They then vote on the best product for the semester, and the winners are presented with certificates and a small prize. This competition is well received and encourages effort to produce a good product.

3.2 Project Description

3.2.1 Research Questions

The primary research question being investigated here was based upon the assumption that a particular model of satisfaction could be applied to student evaluation of teaching. In parallel with this was the assumption that the type of data generated from this approach would be applicable to quality assurance in a higher educational setting.

3.2.2 Research Design

The general design for researching satisfaction, within the framework outlined by WittingIsow & Markham (1999), has these steps:

i Collect information from the population under study on what is seen as the main parameters associated with being satisfied.
ii Develop a questionnaire based upon this information and include any other questions associated with satisfaction. Include at least a general open-ended section to obtain user comments.
iii Administer the questionnaire.
iv Analyse the quantitative data using regression modeling.
v check the quantitative results against the qualitative ones. See if anything was missed from the questionnaire and note it for further studies.

Steps (i) to (iv) of this process were implemented in the subject Information Technology Project Management (CSE2203). In the first step, a small sample of students were asked to write down the important factors in being satisfied and dissatisfied with the subject. A questionnaire was then developed which incorporated the students' comments and included other material of interest to the lecturer. It also included two open-ended questions, the data from which is not reported here.

The questionnaire was administered on-line through a Web form. All subject tutors were asked to inform students of the URL for the survey and to allocate some time for its completion.

3.3 Questionnaire

The questionnaire can be seen at:

http://www.csse.monash.edu.au/~smarkham/research/Cse2203.htm

It had 8 demographic and subject interaction questions, followed by 5 questions on structural elements (clarity of objectives, rate of introduction of concepts etc.), 11 questions on doing the subject (kept up, confidence in doing tasks etc.) and 11 questions on the actual teaching activities (lectures, lecturer, Web site etc.). There was 1 question measuring stated satisfaction and another measuring stated enjoyment.

4. RESULTS

4.1 Biographical Data

Of the possible 200 students there were 110 useable responses. This is far below what was expected but it was noteworthy that a number of tutorial groups had very poor responses. This point will be discussed later.

The demographic variables showed that 32% of students were female (which is commensurate with the general pattern for the course) and 79% were Full Fee Paying Students (which is higher than the course average). They claimed to attend most lectures with a median of 10 from a total possible 13. The tutorial attendance was even more skewed with 60% claiming to have attended all 13.

4.2 Satisfaction Data

The following results are based upon the analysis of the data collected in stage (iv) of the process defined above in Section 3.2.2.

The scales used to assess overall satisfaction with the subject produced the following results:

"My satisfaction with this subject" received a mean rating of 3.18 (all ratings were on a 5 point scale) with a standard deviation of 1.2. A one sample t-test, against an hypothesised mean of 2.5, gave t=6.07 (108) which is significant at the 0.05 level. This shows that the mean response from the students was significantly greater than mid-point of the scale and we can assume that the students are saying that they are quite satisfied with CSE2203.

"I enjoyed this subject" had a mean of 2.87 and a standard deviation of 1.2. The one sample t-test for Enjoy gave t=3.154 (108) which is significant at 0.05. Again the mean for the responses is significantly greater than the mid-point of the scale, indicating enjoyment of the subject.

What is also important at the behavioural level is that the mean rating of Satisfaction is higher than that for Enjoy and that the difference is statistically significant (t=2.2 df=216 p<=0.05). Added to this is a correlation of 0.75 between them indicating that students rate satisfaction and enjoyment in a similar way but it may be the case that satisfaction is not premised upon enjoyment because the correlation coefficient is accounting for only 56% of the variance common to both measures. This is shown in the Regression section where Satisfaction produces more comprehensive models than does Enjoy. Satisfaction would appear to be a more complex behaviour than enjoyment.

4.3 Regression Modeling

The questionnaire can be seen as having three functional sections: structural questions, those on doing the subject and those about delivery of the subject. Each block was used as a set of independent variables, which were regressed on Satisfaction as the dependent variable. This was repeated with Enjoy as the dependent variable.

The data in Table 1 indicates that only Objectives (The objectives of this subject are... Clear/Unclear) contributed significantly to the regression model. This is an extremely pragmatic aspect of the student expectations of a subject. It can be seen as saying 'I am satisfied because I know where the course is going'.

The regression of these items on Enjoy produced a similar pattern but with lower standardised betas.

Table 2 shows that there were three statistically significant contributions to Satisfaction from amongst the 11 'doing' items. 'The extent to which concepts covered in lectures were reinforced in tutorials' has a standardised beta of 0.229. The standardised beta for 'My project reflection reports' is 0.204 and for 'Defining and evaluating Team Roles and Goals' it is 0.242. The last two questions covered learning activities, which are designed to reinforce student self-directed behaviour. It is noteworthy that these two contribute significantly to Satisfaction within a subject designed along basic constructivist lines.

	B	Std. Error	Beta	t	Sig.
(Constant)	4.126	0.631		6.543	0.000
Objectives	0.574	0.099	0.503	-5.811	0.000
Prac work	0.169	0.105	0.134	1.618	0.109
Concepts	0.146	0.120	0.117	1.220	0.225
Rate Introduced	0.00	0.116	0.018	0.217	0.829
Amount Introduced	-0.133	0.130	-0.098	-1.026	0.307

Dependent Variable: Satisfaction
R=0.55 R^2=0.302

Regression Analysis of Variance F=8.831 (5/97) p<0.05.

Table 1: Regression of 'functional' items on Satisfaction

	B	Std. Error	Beta	t	Sig.
(Constant)	-0.406	0.362		-1.122	0.265
Kept up	0.105	0.091	0.108	1.156	0.251
Compare difficulty	0.0	0.088	-0.022	-0.287	0.775
Skills increase	0.0	0.114	0.069	0.652	0.516
Lectures & tutes	0.265	0.125	0.229	2.121	0.037
Lectures & pracs	0.0	0.110	0.043	0.427	0.671
Using CVS	-0.106	0.089	-0.106	-1.192	0.237
Estimation confidence	0.251	0.130	0.223	1.929	0.057
Tracking confidence	-0.110	0.151	-0.092	-0.726	0.470
Reflection reports	0.229	0.110	0.204	2.086	0.040
Group dynamics	0.0	0.104	0.074	0.746	0.458
Team roles	0.242	0.085	0.252	2.851	0.005

Dependent Variable: Satisfaction
$R=0.773 R^2=0.598$
ANOVA $F=11.75$ (11/87) $p<0.05$

Table 2: Regression of 'doing' items on Satisfaction

	B	Std. Error	Beta	t	Sig.
(Constant)	0.133	0.334		0.398	0.692
Lectures	0.477	0.121	0.474	3.956	0.000
Tutorials	0.316	0.108	0.323	2.933	0.004
Lecture Notes	0.0	0.124	0.079	0.667	0.507
Text Book	0.0	0.073	-0.089	-1.143	0.256
Tutorial exercises	-0.162	0.127	-0.160	-1.278	0.204
Assignments	0.103	0.107	0.106	0.969	0.335
Class mates	0.0	0.088	-0.016	-0.169	0.866
Tutor	0.0	0.107	0.068	0.614	0.541
Lecturer	0.0	0.130	-0.064	-0.439	0.662
Web site	0.0	0.111	0.060	0.567	0.572
Feedback	0.107	0.079	0.126	1.359	0.177

Dependent Variable: Satisfaction
$R=0.777$ $R^2=0.604$
ANOVA 12.347 (11/89) $p<0.05$

Table 3: Regression of 'delivery' items on Satisfaction

The regression of the items in Table 2 on Enjoy produced only one significant standardised beta. That was for 'Estimation confidence'.

The results in Table 3 reflect on the quality of the teaching where the two significant contributors to Satisfaction were lectures and tutorials. Any teacher is happy when the students see that the primary delivery tools are prime contributors to their satisfaction. This pattern is partly reinforced by the significant standardised beta for 'Lectures & tutes' (The extent to which concepts covered in lectures were reinforced through tutorials).

The only significant standardised beta for the regression of the above variables on Enjoy was 'Lectures'.

5. DISCUSSION

5.1 Mean Trends and Satisfaction

We have not presented the mean trends across the items in the questionnaire, but most were significantly different from the mid-point of the scale and skewed towards a positive response. This is not unusual in evaluation and satisfaction research. If we were simply left with mean trends and their intercorrelations we would find very little to explore in this subject.

The regression analysis, through having asked about Satisfaction, has given a more effective diagnostic picture for the lecturer. She is able to see teaching methods she has introduced have contributed significantly to the level of satisfaction with that course. This may have contributed to the more general value placed on the general teaching techniques. But none of this could have been gleaned from a simple univariate or bivariate analysis. As was pointed out above, the means for the items were consistently above the scale mid-point and this is usually taken to indicate that the aspect of educational delivery the item is measuring is acceptable. This cannot lead to any diagnostic data, which is comparable to that we have been able to extract from the student satisfaction approach.

5.2 Implications for Subject Improvement

The study has indicated a number of interesting issues in looking at the subject in question. There is no doubt that the relationship between educational, behavioural and satisfaction variables is complex but the nature of the interactions found points to the importance of the student variable rather than the delivery or functional educational variables. That is, the regression analyses weighed heavily in favour of the key variables influencing satisfaction being variables that measured student attitudes to the course and experiences of the course.

The data from the comments section of the survey is not reported here but proved to provide important information, which complemented the quantitative data. They also provide some slightly contradictory information. Some tutorial groups had very poor responses, indicative of the fact that they had problems experienced with their tutors during the semester. These tutors didn't seem to have the experience for the subject and didn't appear to provide sufficient subject support. With large student numbers and intakes from different courses, it is imperative to have suitably experienced qualified tutoring staff.

Students should have entered the subject having familiarity with the development environment that they have chosen; however it appeared many did not. A number of students mentioned that they only knew Visual Basic, as they came into the course from a different background. These students were encouraged to join in with other teams who had the pre-requisite knowledge, but they usually chose to stay within their own social circle. This adaptive orientation on the part of the lecturer would help explain the importance placed upon the lectures and tutorials and the interaction between them in the satisfaction analysis.

It has already been noted that the results from teacher effectiveness and teaching evaluation studies do not necessarily lead to change. We would suggest that using the student satisfaction model will enhance the likelihood that the teacher will explore the results and attempt to develop his/her skills through this. The simple fact that the teacher, in using the model that has been outlined here, will be extracting data from a questionnaire which is somewhat tailored to meet his/her particular situation, will increase the ownership of the whole process.

5.3 Quality Assurance and Flexible Models

The quality assurance movement began in manufacturing industry where the essential components of the final product can be clearly defined and processed through one of the many quality systems. Quality assurance in education is faced with a different set of problems because the components needed to produce a graduate are not always easy to define. Included in this scenario are the support staff needed to run effective subjects.

In the case of CSE2203, the issue lies in finding enough tutors who have the experience to support a project, real-world oriented pedagogy. A more pervasive issue for Information Technology subjects

is the rapidly changing knowledge and technology base. Staff are often teaching at the leading edge of intellectual and functional activities. Any approach to quality assurance in IT education has to be able to deal with the dynamic nature of the area. We feel that the student satisfaction model, and similar models, are much better suited to this task than are competency or static 'head count' effectiveness questionnaires.

In the broader education context, practitioners are to take seriously any quality assurance process we have to have a process that is not restricted to static, well-defined competencies; to the status quo rather than to growth and development in the area of learning.

6. CONCLUSION

The results from the CSE2203 study indicate the potential complexity of a behavioural approach to subject evaluation and quality definitions. We believe that this is appropriate because the teaching/learning milieu is behaviourally complex. As was noted in the Discussion, the study has indicated that quality assurance in education cannot be seen within the same framework as that used in the manufacturing industry. Not only is the process different, but the process often involves the application of research and development while that research and development is being carried out; where the student is being presented with the very latest ideas in the area.

By using a methodology that focuses upon the student and his/her perceptions of effectiveness, we are able to have a strong model of quality while maintaining the dynamics of a future oriented education system. This is particularly important in IT education given its inherently dynamic nature.

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