



Measuring student satisfaction
with vocational education and
training services ... and getting
it right!

JOHN WARD

CHISHOLM INSTITUTE OF TAFE

NCVER NEW RESEARCHER AWARD RECIPIENT

The views and opinions expressed in this document are those of the author and do not necessarily reflect the views of the Australian Government, state and territory governments or NCVER.

The National Centre for Vocational Education Research (NCVER) New Researcher Award has been created to encourage new researchers (either established researchers new to the vocational education and training [VET] field or new career VET researchers) to present their research at NCVER's 'No Frills' conference. The award also provides new researchers with an opportunity to have their research peer-reviewed and published by NCVER.

In 2007, NCVER awarded seven New Researcher Awards. The recipients were:

- ✧ Bronwyn Robinson, RMIT University
- ✧ Denise Bell, DBOD Consulting
- ✧ John Ward, Chisholm Institute of TAFE
- ✧ Melanie Bowman, Charles Sturt University
- ✧ Ruth Wallace, Charles Darwin University
- ✧ Sarah Sutcliffe, Canberra Institute of Technology
- ✧ Toni-Maree Pettigrew, Department of Education, Training and the Arts, Queensland

© National Centre for Vocational Education Research, 2008

The views and opinions expressed in this document are those of the author and do not necessarily reflect the views of the Australian Government, state and territory governments or NCVER.

This work has been produced by the author, who received an NCVER New Researcher Award to present their research. Apart from any use permitted under the *Copyright Act 1968*, no part of this publication may be reproduced by any process without written permission. Requests should be made to NCVER.

ISBN 978 1 921412 33 2 web edition

TD/TNC 92.36

Published by NCVER

ABN 87 007 967 311

Level 11, 33 King William Street, Adelaide SA 5000
PO Box 8288 Station Arcade, Adelaide SA 5000, Australia

ph +61 8 8230 8400 fax +61 8 8212 3436

email ncver@ncver.edu.au

<<http://www.ncver.edu.au>>

<<http://www.ncver.edu.au/publications/2008.html>>

Measuring student satisfaction with vocational education and training services ... and getting it right! by John Ward

One of the objectives of the National Centre for Vocational Education Research (NCVER) is to build the research capacity of the vocational education and training (VET) sector. To this end, NCVER sponsored seven new researchers to attend NCVER's 2007 'No Frills' conference. One of these awards went to John Ward. This paper is based on his presentation at the conference.

Registered training organisations are currently required to collect and report information about learner satisfaction as part of their compliance with the Australian Quality Training Framework (AQTF). However, this information can also provide benefits to training providers themselves by helping them identify areas where they can improve their services and measure how well they are meeting their students' needs.

Measuring student satisfaction with VET services ... and getting it right! examines ways of accurately measuring student satisfaction with VET. The paper highlights the importance of using good-quality survey instruments to collect data about student satisfaction. The author notes that, currently, the quality of this information tends to vary across the VET sector. The paper discusses the challenges involved in collecting good-quality student satisfaction data and describes a range of methodological issues that relate to measuring student satisfaction. A structural equation model is used to demonstrate a possible means of designing and collecting quality survey data.

The key point in this paper—that registered training organisations need a good-quality survey tool to improve the validity of learner satisfaction surveys across the VET sector—has been borne out by recent developments in the VET sector. A national survey instrument is currently being developed by the Australian Council for Educational Research to facilitate the collection of data for learner satisfaction by registered training organisations and, from June 2008, all registered training organisations will be required to use this survey to measure and report their students' satisfaction with their training.

Key messages

- ❖ Consistent and good-quality survey tools are essential for collecting reliable data about learner satisfaction.
- ❖ The majority of registered training organisations tend to measure levels of student satisfaction with their services; however, the definitions of learner satisfaction used by training organisations are not uniform and the elements of satisfaction they measure can vary.
- ❖ Greater uniformity in the fundamentals of survey design would assist in comparative analysis of registered training organisation performance.
- ❖ Improved learner satisfaction tools will provide information that registered training organisations can use to guide decisions aimed to improve the quality of their services.

Contents

Tables and figures	6
Introduction	7
Literature review	8
Structural equation modelling of student satisfaction	10
Survey design and data collection	10
The structural equation model	11
Measuring satisfaction	15
Limitations of this study	17
Conclusion	18
References	19
Appendix: Survey questions	20

Tables and figures

Tables

- | | | |
|---|---|----|
| 1 | Dimensions of student satisfaction and their possible observable manifestations | 17 |
|---|---|----|

Figures

- | | | |
|---|--|----|
| 1 | Dimensions of student satisfaction and items that measure these dimensions | 12 |
| 2 | Fitted SEM of student satisfaction with VET services | 12 |
| 3 | Nomological Network—a theoretical perspective | 16 |

Introduction

The advent of the Australian Quality Training Framework 2007 (Department of Education, Science and Training 2007) highlights the importance placed by the Australian Government on the measurement of student satisfaction with vocational education and training (VET) services. All registered training organisations, no matter what size, are now required to measure, report on, and undertake strategies to improve satisfaction amongst their students (Department of Education, Science and Training 2007, pp.9, 22). While the vast majority of registered training organisations use some type of survey instrument to gauge levels of satisfaction with various educational services, evidence presented in this paper strongly suggests a lack of consensus amongst registered training organisations in defining ‘student satisfaction’ with VET services.

This situation throws into question the construct validity of those instruments currently used to measure student satisfaction throughout the Australian VET system. If, as an industry, VET providers do not have a clear and detailed understanding of student satisfaction with VET services, how do VET providers know whether they are measuring the construct that they purport to measure? It therefore follows that, if VET practitioners cannot be sure whether they are accurately measuring student satisfaction, they cannot be sure whether strategies based upon the results of these measures will have a positive impact upon the actual level of student satisfaction with VET services.

The aim of this paper is to begin the process of closing gaps in our knowledge and understanding of student satisfaction with VET services. In so doing, student satisfaction will be explored through the use of structural equation modelling, whereby the hypothesised dimensions of student satisfaction will be tested and the inter-relationship between these dimensions will be outlined. It will be shown that student satisfaction with VET educational services is both a complex and multi-dimensional construct, encompassing issues central to the learning experience (for example, teaching effectiveness), as well as issues that support the learning experience (for example, campus services). It will be further argued that the structural equation modelling presented here can be used by registered training organisations as a template for the development of student satisfaction surveys that display, at very least, an acceptable degree of adherence to the requirements of construct validity. Note that the research outlined here was conducted as part of Chisholm Institute of TAFE’s strategic planning process, and as such has provided Chisholm with a solid methodological approach towards the collection of student satisfaction data.

This paper will be organised into three distinct parts. They are:

- ✧ literature review
- ✧ structural equation modelling of student satisfaction with VET services—its development is explained and interpreted
- ✧ the measurement of satisfaction—the possible use of structural equation modelling as a template for student satisfaction surveys is outlined.

Literature review

Australian research into student satisfaction in the VET sector has been somewhat scant; however, research of particular note is the annual Student Outcomes Survey conducted by NCVET. The Student Outcomes Survey gathers quantitative information on student satisfaction as an overall measure and also for different aspects of the training and facilities. In addition, respondents are given the opportunity to provide up to three suggestions for overall improvement in VET services. These comments are then collated by NCVET and provided to the relevant technical and further education (TAFE) institutes around Australia.

While there is a lack of quantitative research on satisfaction in VET within Australia, mirrored at an international level, there is a fairly substantive body of literature that undertakes quantitative research into satisfaction with university and college education. While it is acknowledged that the issue of satisfaction with university educational services will be somewhat different from that of satisfaction with vocational education services, an examination of the latter group of publications can provide an interesting insight into the methodological issues at the core of measuring a construct such as student satisfaction.

At this point, it might serve us well to briefly dwell upon the concept of 'satisfaction' per se and what satisfaction might mean within an educational context. There have been numerous attempts by researchers in the field of industrial psychology to provide some broad definition of the concept of 'satisfaction'. Most of these definitions view satisfaction as a final state within a psychological process (Giese & Cote 1999); that is, a summative response to the experience of acquiring and/or consuming goods and services. In the context of post-secondary education, student satisfaction with educational services is a psychological state achieved through the evaluation of the range of the educational services offered by an educational provider.

Given that student satisfaction is achieved through a summative process, research into this phenomenon has focused upon understanding how students tend to bundle or reduce the gamut of educational services on offer into coherent dimensions. This research task is usually undertaken through the application of factor analysis to survey data collected from students (for a brief description of factor analysis, see section below entitled "Structural equation modelling of student satisfaction with VET services"). Unfortunately, there is a distinct lack of consensus among researchers in this field regarding the number of dimensions that make up student satisfaction with university services. At one end of the spectrum, Elliot and Healy (2001) argue that the construct of student satisfaction consists of ten dimensions: campus climate, campus life, campus support services, concern for the individual, teaching effectiveness, recruitments and financial aid effectiveness, registration effectiveness, campus safety and security, service excellence, and student acknowledgement. At the other end, Marzo-Navarro, Pedraja-Iglesias and Rivera-Torres (2005) arrived at only three dimensions: teaching staff, enrolment, and organisation. The number of dimensions in other studies range between these two extremes (Aldridge & Rowley 1998; Hill 1995; Kwan & Ng 1999; Oldfield & Baron 2000).

While the above group of researchers attempt to dimensionalise student satisfaction on the basis of the entire range of student services on offer, there is a distinct sub-group of studies that limit their examination solely to issues concerning teaching and learning. This group exhibits a similar lack of consensus regarding the composite dimensions of student satisfaction. Owlia and Aspinwall (1998),

for example, arrived at a four-dimensional construct of satisfaction with the learning experience: attitude toward teaching, course content, academic resources, and teaching competence. Joseph and Joseph (1997), on the other hand, identified six dimensions: course schedules, academic reputation, career opportunities, course location, length of course, and cost/value.

Of the studies cited above, one originated from Hong Kong (Kwan & Ng 1999), one from Spain (Marzo-Navarro, Pedraja-Iglesias & Rivera-Torres 2005), one from the United Kingdom (Oldfield & Baron 2000), and the remainder originated from the United States. It is interesting to note the diversity of findings amongst these studies. One might speculate that this level of diversity results from an attempt to analyse a psychological construct that adapts and changes in response to changing social, economic and even geographic contexts. For example, one would assume that the socioeconomic background of fee-paying law students at an American Ivy League college will be distinctly different from the socioeconomic background of apprentice plumbing students enrolled in an Australian VET program. One would therefore expect these differences to impact upon these students' respective interpretations of the educational experience, which may, in turn, impact upon the process by which the students reduce the totality of educational services into coherent groupings. While this supposition highlights the need to conduct research within the Australian context, it also highlights the possible diversity of results that might be obtained even within the Australian context.

Beyond the issue of diversity in research findings, the body of research outlined above fails to investigate possible inter-relationships and correlations between the various dimensions of satisfaction. Does the rise or fall in the level of satisfaction with one dimension impact upon the level of satisfaction with other dimensions? Alternatively, are these dimensions independent (orthogonal) from one another, in that a rise or fall in one dimension has no impact upon other dimensions? Further to the summative process, do students give equal weighting to each dimension, or are some dimensions more important to their overall level of satisfaction than other dimensions? These questions are of crucial importance to educational planners and policy-makers, who are required to allocate scarce resources in an attempt to improve student satisfaction with educational services. Knowledge of the dynamics amongst and between the various dimensions of student satisfaction allows for the prioritisation of scarce resources to those areas known to have a greater impact upon students' overall summative position.

Methodologically speaking, factor analysis allows for the reduction of student satisfaction data into meaningful dimensions. Factor analysis cannot, however, specify the linkages between these dimensions of student satisfaction, nor can it provide information about the process through which students summarise their experiences into an overall concept of satisfaction. For information about this process, structural equation modelling of student satisfaction needs to be undertaken.

Structural equation modelling of student satisfaction

Structural equation modelling (SEM) is an analytical technique that utilises a number of well-known statistical tools (factor analysis, path analysis and regression modelling). The focus of this technique is on the measurement of latent variables—or what we have so far referred to as ‘dimensions’.

Latent variables are abstract psychological variables that cannot be directly measured, but rather are measured with reference to observable variables. For example, a dimension entitled ‘satisfaction with the academic environment’ might be measured by three observable variables: 1) student ratings of course difficulty; 2) the pass or failure rate of the course; and 3) the course drop-out rate. Factor analysis is used to identify latent variables, regression modelling is used to measure latent variables, and path analysis outlines the relationships between latent variables. As such, structural equation modelling has the ability to highlight interactions between latent variables, thus allowing analysts to make causal inferences about how certain psychological states are reached. While structural equation modelling has its origins in the field of psychology, it is now being used extensively in all areas of social and biological research. Of particular interest is the use of this technique in the field of market research, where it is being used to understand the process of brand loyalty, consumer purchasing decisions, and customer satisfaction.

The development of the structural equation modelling of student satisfaction with VET services was undertaken in two distinct phases:

- ✧ survey design and data collection, including construct development, item design, and data collection
- ✧ creation of the structural equation model, including model development, fit statistics, and model description.

Survey design and data collection

All data used in this research were collected at Chisholm Institute of TAFE (Melbourne). Chisholm Institute of TAFE is one of Australia’s largest providers of VET, with five campuses situated throughout Melbourne’s south-eastern suburbs, as well as two regional campuses (at Bass Coast and Rosebud). Chisholm has a total of 36 000 students studying across 300 course areas. Chisholm employs around 1200 teaching staff, in a total staff of around 1900.

The survey instrument used for the collection of data was designed specifically for the purposes of this study. It consisted of 38 items pertaining to various aspects of student satisfaction (independent variables), one overall satisfaction item (dependent variable), and a series of demographic questions designed to capture a respondent’s gender, age, mode of study, work commitments, course, campus, and length of time at Chisholm. Respondents were also encouraged to write qualitative comments about their experience at Chisholm. The sample frame consisted of all full-time and part-time students studying on campus. Because of organisational difficulties, off-campus and workplace training students were omitted from the sample frame. A cluster sampling strategy was pursued, wherein the sample was drawn from 57 randomly selected classes, covering 21 fields of study, across all six of Chisholm’s campuses. The data collection process yielded a total sample of $N = 615$. All data were collected in August 2006.

Survey items were designed around nine hypothesised latent variables, which were intuitively derived from: 1) a series of focus groups initiated amongst Chisholm students prior to the development of the survey instrument, and 2) knowledge gained from an extensive literature review (see section above). Once data were collected, attempts to verify these dimensions through the application of factor analysis were undertaken. However, this process indicated that only eight latent variables could be successfully extracted from the survey data. These eight latent variables were: teaching and learning (issues regarding teaching and learning); enrolment (issues regarding the process of enrolment); course organisation (issues regarding the organisation of the course); learning facilities (issues regarding facilities that directly impact upon learning); campus facilities (issues regarding other facilities around the various campuses); library (issues regarding the library); social environment (issues regarding social activities); and ancillary support (issues regarding support services). During the survey design, items relating to teaching and learning were assumed to be two distinct latent variables. Statistical analysis, however, indicated that these two dimensions were actually one.

The internal reliability of this survey instrument, as measured by Cronbach's Alpha, was $\alpha = 0.94$. This is a relatively high score, suggesting a very good level of internal consistency in responses. Similarly, results obtained through the application of Guttman's Split Half coefficient (0.71) and Spearman Brown's Split Half Coefficient (0.716 for both equal and unequal lengths) also suggest good consistency of responses.

The structural equation model

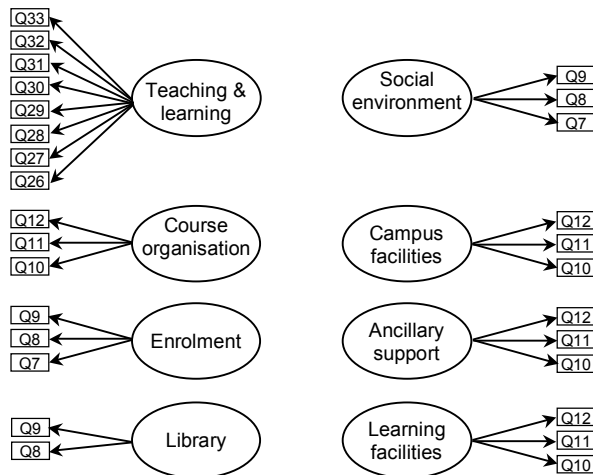
Having collected student satisfaction data that were shown to contain eight latent variables of satisfaction, the remaining task was the construction of a structural equation model. Given the complexity of this task, it will be presented in three sections:

- ✧ structural equation modelling methodology
- ✧ adequacy of the model (fit statistics)
- ✧ analysis and interpretation of the model.

Structural equation modelling methodology

The model was calculated on AMOS 6.0 (Arbuckle 2005). The previously identified eight factors within the data structure provided eight possible latent variables for the model. Using the methodology suggested by Anderson and Gerbing (1988), a confirmatory factor analysis was conducted prior to undertaking the structural equation modelling. Not only did the confirmatory factor analysis confirm the general applicability of the eight latent variables, it also provided an indication of the extent to which individual survey items contributed to the measure of the latent variables; that is, the extent to which our observable measures actually measured our latent variable. Those that contributed little to the measure of latent variables were excluded from our final model. A total of 27 survey items were eventually used in the model, plus the dependent overall satisfaction item. A diagrammatical depiction of the latent variables and their observable measures are provided in figure 1.

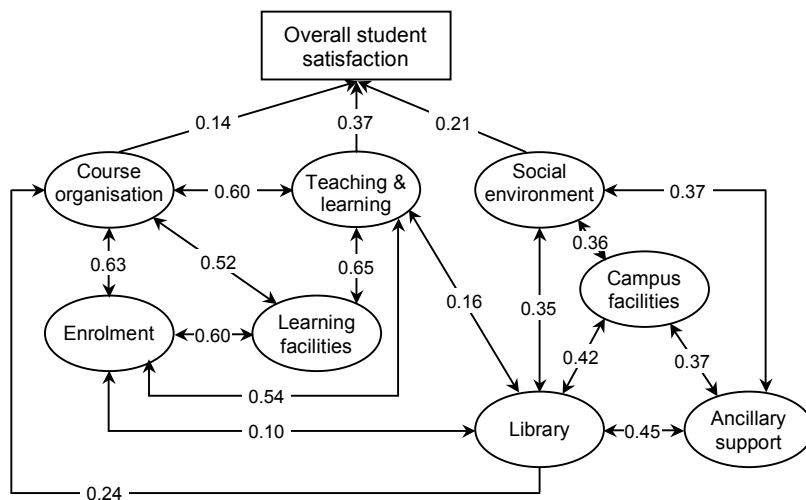
Figure 1 Dimensions of student satisfaction and items that measure these dimensions



Note: All survey items used in the measure of these dimensions are reproduced in the appendix to this paper.

Because of the lack of a theoretical model upon which to base the structural equation model, its development employed an exploratory methodology. In so doing, links between latent variables were determined by two processes: 1) intuitive appeal, and 2) comparing fit statistics between competing models. Thus, after a process of trial and error, the final model is diagrammatically displayed in figure 2.

Figure 2 Fitted SEM of student satisfaction with VET services



Adequacy of the structural equation model (fit statistics)

Fit statistics for structural equation models inform us as to whether or not a particular model is an adequate representation of the data collected. While there is literally a plethora of different statistics available to assist in determining the adequacy of the fit of a structural equation model, we have determined that the most appropriate for our task are:

- ✧ chi-square fit statistic
- ✧ baseline comparison statistics
- ✧ root mean square error of approximation (RSMEA).

Let us take a look at these in turn.

Initial examination of the chi-square fit statistic ($\chi^2 = 724.351$, $df = 351$, $p = 0.00$) suggests that the student satisfaction model presented above might be a less-than-adequate fit for the data. This result, however, must be viewed with considerable caution, given the demonstrably strong relationship between sample size and the results of a chi-square goodness-of-fit test. There exists a considerable body of literature that has repeatedly confirmed the propensity for the chi-square test to indicate statistical significance when sample size is small, while also showing a propensity for chi-square tests to be not significant when the sample size is large (Arbuckle 2005; Bentler & Bonnet 1980; Cochran 1952). To overcome this problem, Wheaton et al. (1977) suggest the calculation of a relative chi-square ratio. This is done by dividing the chi-square value by the degrees of freedom (df). Wheaton et al. (1977) recommend that, if this ratio is less than 5, then the model provides an adequate fit for the data. For our student satisfaction model, the relative chi-square ratio is 2.3—well within the acceptable level prescribed by Wheaton et al. (1977). Please note, however, that there is some disagreement amongst experts over what this acceptable level might be (Carmines & McIver 1981), some suggesting that anything above a relative chi-square ratio of 2 is evidence of an unacceptable fit (Arbuckle 2005). It is therefore clear that the chi-square statistic cannot provide us with a definitive answer to whether or not our model provides an adequate fit for the data.

As a result, five baseline comparison statistics were applied to the model. These were: the Normed Fit Index (NFI), the Relative Fit Index (RFI), the Incremental Fit Index (IFI), the Tucker-Lewis Index (TLI), and the Comparative Fit Index (CFI). Baseline comparison statistics assess the discrepancy between the actual model (our student satisfaction model) with a comparable independence model (our student satisfaction model, wherein variances attributed to the observed variables are unconstrained and covariances are set at 0) (Arbuckle 2005; Bentler & Bonet 1980; Sobel & Bohrnstedt 1985). Results from these fit statistics are designed to fall between a range of 0 and 1—where 1 is a perfect fit and 0 is a poor fit. Arbuckle (2005) suggests that fit scores below 0.9 indicate that the actual model can be substantially improved. The application of these five baseline comparison statistics to our student satisfaction model obtained the following results: NFI = 0.932, RFI = 0.918, IFI = 0.960, TLI = 0.952, and the CFI = 0.960. As we can see, all these results meet Arbuckle's (2005) minimum level of 0.9, suggesting that the model is an adequate fit for the data.

In support of these baseline comparison statistics, the root mean square error of approximation (RMSEA) was also used to assess the adequacy of our student satisfaction model. This fit statistic uses the population discrepancy function (F) as a measure of model adequacy, but adjusts this function for the effects of model complexity. A perfect fit would see $RMSEA = 0.00$. Browne and Cudeck (1989) suggest that a RMSEA of 0.05 or less indicates a close fit, while a RMSEA of between 0.05 and 0.08 is an acceptable error of approximation. These authors would not recommend the use of a model with a RMSEA of greater than 0.1 (see also Arbuckle 2005). In the student satisfaction model, the $RMSEA = 0.046$ (with a confidence interval of 0.050 and 0.042). These results indicate that the model is a close fit for the data, confirming the adequacy of the model, as expressed by the baseline comparative statistics, and the relative chi-square ratio.

Given these fit statistics, it would seem that the model presented above is a good fit for the data collected, and thus provides a valid representation of the dynamics inherent to student satisfaction with TAFE educational services.

Analysis and interpretation of structural equation model

The final model informs us that the dependent variable (overall student satisfaction) can be predicted by only three of our eight latent variables. Of these three latent variables, the learning experience ($\beta = 0.37$) proves to be the best predictor, followed by the social environment ($\beta = 0.21$) and course organisation ($\beta = 0.14$). Note that, while students' ratings of the learning experience and the social environment are independent from one another, there is a relatively high

correlation between the learning experience and course organisation (corr = 0.60). This relationship between the learning experience and course organisation makes intuitive sense, in that there is an obvious connection between the two latent variables. If timetables or classrooms are ill defined or subject to regular or random change, then continuity in learning is interrupted.

The latent variable of teaching and learning is also correlated with the latent variables of enrolment (corr = 0.60) and learning facilities (corr = 0.65). Similarly, course organisation is correlated with the latent variables of enrolment (corr = 0.63) and learning facilities (corr = 0.52), while enrolment and learning facilities are also correlated (corr = 0.60). The moderate to high levels of inter-correlation between these four latent variables suggest the possible existence of a higher order latent variable—one that combines all four attributes into a single variable, capturing in a much broader sense the learning experience. Attempts to fit this higher-order model met with poor results, thus leading to the conclusion that if such a latent variable exists, it cannot be substantiated with the data collected as part of this research. This result, nevertheless, does not detract from the strong inter-correlation between these four latent variables, suggesting that, at very least, there exists a cluster of inter-related dimensions. The totality of these dimensions describes facets of VET services that feed into students' overall level of satisfaction, primarily via their perception of teaching quality and knowledge learned, but also via the efficiency and effectiveness with which their courses are organised.

According to our model, the social environment is independent of both course organisation and teaching and learning. Again, this makes intuitive sense, in that it is conceivable that a student has a very positive learning experience within a course that is well organised, yet that same student might feel socially isolated from her/his fellow students. Conversely, it is also possible that a student finds the social environment positive, yet regards the learning experience as less than satisfactory. The social environment is correlated with campus facilities (corr = 0.36), ancillary support (corr = 0.37), and the library (corr = 0.35). Similarly, campus facilities is correlated with ancillary support (corr = 0.37) and the library (corr = 0.42), while ancillary support is also moderately correlated with library (corr = 0.45). These moderate levels of inter-correlation between these four latent variables once again suggest the existence of a higher-order latent variable—one that combines all four attributes into a single variable, capturing in a much broader sense those elements of student life that support the learning experience. Unfortunately, an attempt to fit a higher-order latent variable to this cluster met with poor results.

Of particular interest is the latent variable of the library. The library is moderately correlated with those latent variables within the social cluster—social experience (corr = 0.35), campus facilities (corr = 0.42), and ancillary support (corr = 0.45). The library also displays a low level of correlation with those latent variables within the learning experience cluster—course organisation (corr = 0.24), teaching and learning (corr = 0.16), and enrolment (corr = 0.24). It would therefore seem that the library has a stronger relationship with those dimensions that support the learning experience, rather than those dimensions of the learning experience itself. These results confirm a long-term strategy of Chisholm's library, wherein it has established itself not only as a collector and disseminator of learning resources, but also as a central communication hub. In particular, the library provides computer and internet access to all students, as well as facilities for students to undertake group assignments. Indeed, library staff claim that the library is becoming an important meeting place for students, and envisage the future of their service as incorporated with the campus cafeteria and other information services.

In summary, our structural equation model of student satisfaction with VET educational services is both complex and multi-dimensional, encompassing issues that are central to the learning experience, as well as issues that contribute to supporting that learning experience. Having thus provided a picture of the construct of student satisfaction, the task now at hand is to use this construct to improve the way in which we measure student satisfaction with VET services.

Measuring satisfaction

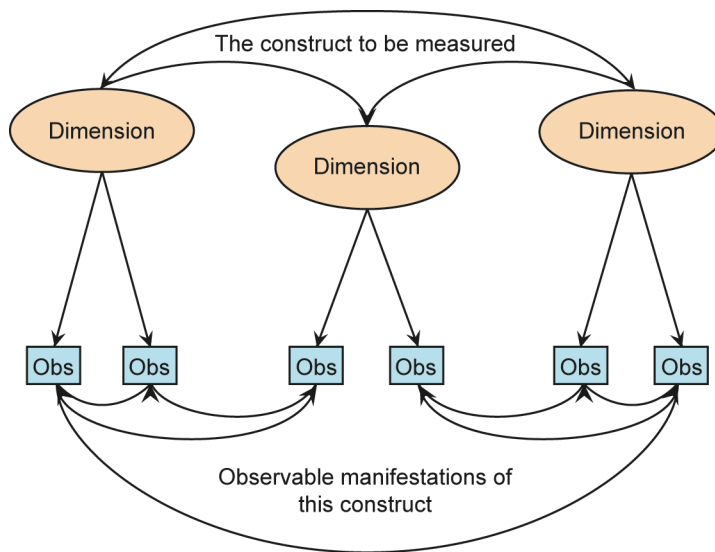
There are no firm indicators of the extent to which registered training organisations across Australia measure levels of student satisfaction. However, anecdotal evidence indicates that many (if not most) VET providers disseminate short surveys at the end of a subject and/or course. The personal experience of this author suggests that such surveys range in quality from very good to very poor—with a strong bias towards very poor. Qualitative examinations of a range of student satisfaction surveys used across a number of TAFE institutions highlight two features that significantly diminish their overall construct validity. The first concerns the way in which satisfaction surveys are designed to collect information that teachers, trainers, and educational administrators want to know, rather than to collect information that is firmly linked to a student's summative appraisal of satisfaction with VET services. Given the great diversity of information collected in these surveys, it would seem that educationalists do not necessarily agree on the issues central to student satisfaction. Surveys developed without adequate student consultation tend to be more a measure of what educationalists believe is the construct of student satisfaction with VET services, rather than the students' view of satisfaction with VET services. Thus, such surveys do not necessarily measure the construct they purport to measure.

The second issue concerns the narrow focus of questions in these surveys. Because most are disseminated at the end of a module or subject, the vast majority of these instruments are restricted to the collection of information directly related to classroom issues. In the overwhelming majority of cases, information collected by these surveys is limited to one or two dimensions of the learning experience—usually that of teaching and learning (was the subject interesting?) and classroom facilities (was the room temperature adequate for your needs?). Students are rarely surveyed about their attitudes towards the social environment, ancillary support, or the enrolment procedures. In this sense, the information collected provides an incomplete perspective of the construct of student satisfaction. Once again, such surveys do not measure the construct that they purport to measure.

If we are to accept that, in a large number of cases, satisfaction surveys across registered training organisations suffer from deficiencies in construct validity, the question that now needs to be answered is how the research findings presented herein might be used to improve the construct validity of student satisfaction surveys.

A suitable starting point for this investigation is the theoretical work of Cronbach and Meehl (1955), who, as part of the American Psychological Association's efforts to develop standards for psychological testing, argued that the construct validity of an instrument can be ensured through adherence to a 'nomological network'. These authors saw the concept of a nomological network as the link between the theoretical realm of the construct that one wished to measure and the observation used to predict this theoretical realm. Essentially, this network has three distinct facets: 1) the theoretical framework that one is trying to measure, 2) the observable manifestation of this theoretical framework that will be measured, and 3) the specification of linkages among and between the theoretical and observable frameworks (see figure 3 for a diagrammatical explanation). While this nomological network does not provide a quantitative tool to measure the level of construct validity in a survey instrument, it does provide a template that, if used during the design of an instrument, ensures an acceptable degree of adherence to the concept of construct validity.

Figure 3 Nomological network—a theoretical perspective



The structural equation model presented herein can and does provide a theoretical foundation for the development of a nomological network. All that is needed to complete the process is to define the observable manifestations to be measured. For example, observable manifestations of the dimension of the social environment might include the extent to which social relationships are forged amongst course participants, the level of support a student might receive from those in the same course, or the level of social comfort that is felt when in the presence of fellow students. Similarly, observable manifestations of the dimension of the enrolment might include the ease with which a student went through the enrolment process, the level of perceived bureaucracy in the enrolment process, or the perception of the effective use of technology in the enrolment process.

Because no two registered training organisations are the same, the observable manifestations of student satisfaction may differ significantly across registered training organisations. Nevertheless, the following list outlines some probable observations that might provide measures of various dimensions of student satisfaction.

Most (if not all) student satisfaction survey designers will have an intuitive understanding of the links between a student's summative appraisal of satisfaction with VET services and the four learning experience dimensions (teaching and learning, enrolment, course organisation, and learning facilities). However, they may be somewhat confused over the applicability of the learning support dimensions (social environment, campus facilities, ancillary support, and library) to their specific situations. In such cases, dimensions might be contextualised to suit the specific needs of a registered training organisation, or alternatively they might be omitted altogether from the nomological network. For example, a registered training organisation might not possess library facilities, but they might possess an extensive range of educational resources. In that case, the dimension of library might be changed to that of educational resources. Similarly, registered training organisations may not offer ancillary support services. In that case, ancillary support services might be omitted. There is no hard and fast rule about whether a dimension needs to be contextualised or omitted. Such a decision will be a judgement call on the part of the survey designer.

Table 1 Dimensions of student satisfaction and their possible observable manifestations

Dimensions of student satisfaction	Possible observable manifestation (measurable)
Teaching and learning	Teacher–student relationships Subject delivery Assessment Course content
Course organisation	Timetabling Provision of booklists Provision of subject/module outlines Induction
Enrolment	Ease of enrolment Bureaucracy Use of technology
Learning facilities	Desks Whiteboards Data projectors Video screens
Social environment	Clubs and societies Support from fellow students Sense of community/friendships Collegiate atmosphere in and around the campus
Campus facilities	The canteen Student lounges Outdoor meeting and recreational areas Sports facilities Personal safety
Ancillary support	Career counselling Personal counselling
Library	Academic issues Social issues

Limitations of this study

There are two distinct limitations to this study. Firstly, data collection was conducted at only one TAFE institute (Chisholm Institute of TAFE), located primarily in the south-eastern suburbs of Melbourne. As has been outlined above, it would seem logical that social, economic, and even geographic conditions will impact upon students' summative process when determining their level of satisfaction with VET services. As such, the notion of student satisfaction as expressed by respondents to this survey might be strongly influenced by the socioeconomic and geographical conditions inherent to the south-eastern suburbs of Melbourne, in contrast to a 'universal' notion of student satisfaction with the VET system. Indeed, rural and outback VET students might have totally differing educational priorities, as might students located in major urban centres in other states of Australia. Unfortunately, we cannot know the relative impact of local conditions, as opposed to universal expectation, upon student satisfaction unless further research is undertaken around the country.

The second limitation to this study concerns our sample population's predominant mode of study. It will be recalled that the sample frame used in the study did not include off-campus and workplace training students. Rather, our sample frame was limited to on-campus students. Off-campus and workplace training students represent a sizable proportion of the total student enrolment in VET programs, and their proportion of total students is expected to grow considerably. Given the diverse ways in which off-campus and workplace training students engage with VET programs, it would not be unreasonable to assume that these groups of students may demonstrate totally different perspectives on student satisfaction. The inability to include these groups in our sample frame renders the findings of this research applicable only to classroom-based education and highlights the need to undertake further research to complete our understanding of student satisfaction with VET services.

Conclusion

The research findings outlined in this paper indicate that the construct of student satisfaction with VET services comprises eight distinct dimensions, of which only three (course organisation, teaching and learning, and social environment) have a direct impact upon students' overall summative appraisal. There exists a cluster of four highly correlated dimensions (course organisation, teaching and learning, enrolment, and learning facilities), the totality of which describe facets of VET services that feed into the broad learning experience. Similarly, there also exists a cluster of four moderately correlated dimensions (social environment, campus facilities, ancillary support and library), the totality of which encompass those facets of VET services that support the learning experience.

It was argued that there exists strong evidence to suggest that various instruments currently used to measure student satisfaction suffer from problems with construct validity. The structural equation model outlined in this paper provides student satisfaction survey designers with a theoretical framework for the development of a nomological network. To complete this nomological network, all a designer needs to do is to link the theoretical framework to various observable (and measurable) manifestations of this theoretical framework. Once this is done, they are in possession of a template for a student satisfaction survey that has, at very least, an acceptable degree of adherence to the concept of construct validity.

The Australian Quality Training Framework 2007 explicitly requires registered training organisations to collect, analyse and act upon information related to student satisfaction. However, unless registered training organisations possess good knowledge of the construct of student satisfaction, their efforts to collect and analyse such information will be significantly compromised. This, in turn, will limit the impact of strategies based upon the interpretation of such information. This paper has investigated the construct of student satisfaction with VET services. In so doing, it has begun to close a significant gap in our knowledge, and thus provides registered training organisations with some guidelines for improving the quality of student satisfaction data, which in turn will improve the impact of strategies designed to improve student satisfaction.

References

- Aldridge, S & Rowley, J 1998, 'Measuring customer satisfaction in higher education', *Quality Assurance in Education*, 6, pp.197–204.
- Anderson, JC & Gerbing, DW 1988, 'Structural equation modeling in practice: A review and recommended two-step approach', *Psychological Bulletin*, 103, pp.411–23.
- Arbuckle, JL 2005, *Amos 6.0 user's guide*, Amos Development Corporation, Spring House, Pennsylvania.
- Bentler, PM & Bonnet, DG 1980, 'Significance tests and goodness of fit in the analysis of covariance structures', *Psychological Bulletin*, 88, pp.588–606.
- Browne, MW & Cudeck, R 1989, 'Single sample cross-validation indices for covariance structures', *Multivariate Behavioral Research*, 24, pp.445–55.
- Carmines, EG & McIver, JP 1981, 'Analyzing models with unobserved variables', in GW Bohrnstedt & EF Borgatta (eds), *Social measurement: Current issues*, Sage Publications, Beverly Hills.
- Cochran, WG 1952, 'The chi-square test of goodness of fit', *Annals of Mathematical Statistics*, 23, pp.315–45.
- Cronbach, L & Meehl, P 1955, 'Construct validity in psychological tests', *Psychological Bulletin*, 52, pp.281–302.
- Department of Education, Science and Training 2007, *AQTF 2007: Essential standards for registration 2007*, DEST, Canberra.
- Elliot, KM & Healy, MA 2001, 'Key factors influencing student satisfaction related to recruitment and retention', *Journal of Marketing for Higher Education*, 10, pp.1–11.
- Giese, JL & Cote, JA 1999, 'Defining customer satisfaction', *Academy of Marketing Science Review*, 2000, pp.1–34.
- Hill, FM 1995, 'Managing service quality in higher education: The role of student as primary consumer', *Quality Assurance in Education*, 3, pp.10–21.
- Joseph, M & Joseph, B 1997, 'Service quality in education: The role of student as primary consumer', *Quality Assurance in Education*, 5, pp.15–21.
- Kwan, PYK & Ng, PWK 1999, 'Quality indicators in higher education—comparing Hong Kong and China's students', *Managerial Auditing Journal*, 14, pp.20–27.
- Marzo-Navarro, M, Pedraja-Iglesias, M & Rivera-Torres, MP 2005, 'Measuring customer satisfaction with summer courses', *Quality Assurance in Education*, 13, pp.53–65.
- Oldfield, BM & Baron, S 2000, 'Student perceptions of service quality in a UK university business and management faculty', *Quality Assurance in Education*, 8, pp.85–95.
- Owila, MS & Aspinwall, EM 1998, 'A framework for measuring quality in engineering education', *Journal of Retailing*, 67, pp.420–50.
- Sobel, ME & Bohrnstedt, GW 1985, 'Use of null models in evaluating the fit of covariance structure models', in NB Tuma (ed.), *Sociological methodology*, Jossey-Bass, San Francisco.
- Wheaton, B, Muthen, B, Alwin, DF & Summers, GF 1977, 'Assessing reliability and stability in panel models', in: DR Heise (ed.), *Sociological methodology*, Jossey-Bass, San Francisco.

Appendix: Survey questions

Information about Chisholm's courses should have helped you choose the course you wanted to do. Tell us about the following information sources:

Chisholm's pamphlets and brochures

Chisholm's website

The VTAC guide

Discussions with Chisholm staff

Your employer

Enrolment procedures should be quick and simple. Tell us about the following enrolment procedures:

Enrolment forms

Enrolment payments

Taking photos and obtaining a student card

At the start of the year/semester, it is important that students get accurate and timely information about the organisation of their course. Tell us about the following organisational issues:

Timetables

Subject/module outlines

Booklists

Orientation day/activities

Learning facilities should be adequate for your needs. Tell us about the following learning facilities:

The size of the classrooms

Standard classroom facilities (audio-visual/ overhead projectors/etc)

The atmosphere in the classroom (heating/cooling/lighting)

Other learning facilities (computers/lathes/oven/ machinery/etc)

Campus facilities should enhance your learning experience. Tell us about the following campus facilities:

The canteen (food and drinks)

Student lounges and indoor recreational areas

Outdoor meeting and recreational areas

Sports facilities

Parking

Personal safety and security around campus

The library should support student's learning needs. Tell us about the library:

Library facilities (books/computers/DVDs)

Library opening hours

Student's learning experience should provide students with the skills needed to fulfil their future ambitions. Tell us about your learning experience:

Lessons are interesting and enjoyable

Assessment requirements are provided at the beginning of each subject/module

Students receive adequate and timely feedback on their progress

Students are learning the skills for their chosen career

Chisholm's staff should support student's learning experience. Tell us about your experience with staff at Chisholm:

Chisholm staff treat students with respect

Chisholm staff are friendly and helpful

Chisholm staff enrich my learning experience

Chisholm staff have relevant industry experience

Social activities are an important part of your learning experience. Tell us about your social activities at Chisholm:

Participation in social clubs or sporting activities

My fellow students support me in my studies

My fellow students give me personal support

Professional support for students outside the classroom is an important function of Chisholm. Tell us about the following support functions:

Study support outside the classroom

Career counselling

Personal counselling