Practically and productively analysing Course Experience Questionnaire student comment data

Stuart Palmer and Malcolm Campbell
Faculty of Science, Engineering and Built Environment, Deakin University
Corresponding Author Email: spalm@deakin.edu.au

Structured abstract

BACKGROUND
The course experience questionnaire (CEQ) has been included in the Graduate Careers Council of Australia national survey of graduates from 1993 onward. In addition to quantitative items, the CEQ also includes an invitation to respondents to write open-ended comments on the best aspects (BA) of their university course experience and those most needing improvement (NI). These responses provide a rich source additional information that can help in understanding what students had in mind when agreeing or disagreeing with the CEQ response items. Based on more than 160,000 comments from students graduating from 14 Australian universities over the period 2001-2004, Scott (2006) developed a five domain model (Outcomes, Staff, Course design, Assessment and Support) for the classification of CEQ comments, as well as a software package (CEQuery) to automate the analysis of CEQ BA and NI comment data. While computer automated comment analysis is convenient, there are a number of known limitations to this approach, and where the number of student comments is not large, manual coding/classification is a viable, and arguably superior, approach.

PURPOSE
This paper reports on a research project seeking to validate the 2012 CEQ comment data set for the Deakin University Faculty of Science, Engineering and Built Environment against Scott's five domain model. It also seeks to identify how to best use this data, at the individual-program-level, as part of the wider use of student evaluation of teaching data for the improvement of teaching and learning.

DESIGN/METHOD
An annual set of CEQ student comment data was manually coded using the NVivo software package into the five principal domains identified by Scott. The representativeness of the resultant information was considered at the individual program-level. The factor structure of the data was compared, at the overall-Faculty-level, to the five domain model as proposed by Scott, and also with reference to Scott's finding of statistically significant relationships between certain student demographic characteristics and the likelihood of a student making a BA comment in the five domains.

RESULTS
We find that, while some programs receive substantial numbers of CEQ comments, many programs receive only a small number. We find that, overall, the Faculty CEQ comment data supports Scott's previously proposed five domain model for factor structure, and also find support for the significant associations between certain student demographic characteristics and their comments observed by Scott. The 'Course design' domain attracts the largest number of comments for both BA and NI, and in each case one third or more of these comments relate to the 'practical' components of programs.

CONCLUSIONS
The agreement with the CEQ comment factor structure previously proposed by Scott observed here suggests that the Faculty CEQ comment data is capturing meaningful information. Manual coding of the comments against the five factor model is both feasible, and achieves a superior coding rate compared to the automated CEQuery program. A clear message emerging from the 'student voice' embodied in the CEQ comment data is that students both value and desire their programs having strong practical components – reaffirming the relevance of the 2013 AAEE conference theme.

KEYWORDS
Course experience questionnaire; CEQuery; student comment analysis

Introduction

Work by Ramsden and Entwistle in Britain in the early 1980s with a Course Perception Questionnaire established a link between students' perception of their learning environment and the quality of their learning (Ramsden & Entwistle, 1981). Subsequent work in Australia during the 1980s led to the development of a 'Course Experience Questionnaire' (CEQ), including a 1990 national survey of students which confirmed the reliability and validity of the CEQ (Ramsden, 1991). Further work was done that confirmed the value of the CEQ (Byrne & Flood, 2003; Wilson, Lissio, & Ramsden, 1997). A version of this instrument has been included in the Graduate Careers Council of Australia (GCCA) national survey of graduates from 1993 onward. Since its initial development and use in the GCCA national student survey, the number of CEQ-related items has increased to 49, though individual institutions are only required to report results for 13 'core' items. For all CEQ items, respondents are asked to express their degree of agreement or disagreement using a five-point response measure, which is currently labelled as 'strongly disagree', 'disagree', 'neither agree nor disagree', 'agree' and 'strongly agree'. The response data are aggregated to form a series of 'scales' for reporting. In addition to the 'quantitative' response items noted above, the CEQ also includes an invitation to respondents to write open-ended comments on the best aspects (BA) of their university course experience and those aspects most needing improvement (NI). These responses provide a rich source additional information that can help in understanding what students had in mind when agreeing or disagreeing with the CEQ response items.

Although the collection of textual data in large-scale surveys is commonplace, historically these data have been underutilised due to the lack of tools to exploit such data efficiently (Bolden & Moscarola, 2000). One of the first large-scale investigations of student open-ended comments from a national evaluation survey was an analysis of the comments provided by Australian students in the CEQ. More than 160,000 comments from students graduating from 14 Australian universities over the period 2001-2004 were analysed to identify common themes that were reported by students. As part of this project a software package called CEQuery was developed to automate the analysis of the large volume of BA and NI student comments provided by the CEQ (Scott, 2006). The software package is available for all higher education institutions to use, and comes with a dictionary of keywords classified into five principal domains (Outcomes, Staff, Course design, Assessment and Support) and 26 sub-domains that are used to automatically code/classify student comments to identify the frequency of student responses in all sub-domains. Table 1 gives the details of the CEQuery domains and sub-domains.

Table 1: CEQuery domains and sub-domains

Outcomes	Staff	Course design	Assessment	Support
Intellectual	Teaching skills	Practical-theory links	Relevance	Library
Work application/ career	Accessibility and responsiveness	Methods of learning & teaching	Marking	Learning resources
Further learning	Quality and attitude	Flexibility/ responsiveness	Expectations	Infrastructure/ environment
Personal	Practical experience(current)	Relevance (to work/life/discipline)	Feedback/return	Student administration
Interpersonal		Structure and expectations	Standards	Student services
Knowledge/skills				Social affinity/support

Each student comment may contain a reference to more than one sub-domain, so a 'hit' is recorded for each reference. Although CEQuery is now somewhat dated, it is still in use at some Australian universities (Grebennikov & Shah, 2013). The five principal domains used in CEQuery have found support in other factor analysis of CEQ comments (Richardson, 2003), and there are significant statistical associations between the five principal domains in CEQuery and almost all of the CEQ scales (Scott, 2006). So, it can be concluded that the five factor comment data model is valid, and that the frequencies of CEQ comments coded into this model provide data that are complementary to the quantitative CEQ numerical scale data. Scott found that the domain with the largest proportion of BA hits was Course design, and of those, the largest grouping of comments related to 'practice-orientated' learning methods. This was one of the headline findings by Scott, and he recommended the use of practice-oriented learning methods to foster productive student engagement in learning.

While automatic computer-based analysis of CEQ comment data is an attractive alternative to manual coding of comments, some limitations of this approach are noted. A fixed dictionary of classification terms cannot deal perfectly with the variation in natural written language, including spelling errors, metaphors and colloquialisms, and there is value in a set of human eyes with knowledge of the local institutional context reading and interpreting the students' comments (Symons, 2004). The developers of CEQuery reported that about 20% of comments were unable to be allocated with the dictionary developed (Scott, 2006). Each of the five principal CEQuery domains contains a catch-all sub-domain entitled 'unspecified', into which some comment hits are allocated because the precise meaning of the comment cannot be determined using the dictionary. The developers of CEQuery found an additional 1.5% of allocated comment hits were classed as unspecified (Scott, 2006). One longitudinal study of CEQuery results observed a gradual increase in the proportions of hits classified as unspecified over time, and the authors posited that this was due to the original CEQuery dictionary contents being defined in 2005, and that some more recent developments in university teaching and learning since that time are not being recognised by the original CEQuery dictionary (Grebennikov & Shah, 2013).

This paper reports on a research investigation to develop a method to practically and productively analyse the CEQ comment data received by the Faculty of Science, Engineering and Built Environment at Deakin University. Specifically:

- we seek to validate the 2012 annual Faculty CEQ comment data set against the five domain model proposed previously by Scott (2006); and
- following validation, we examine the Faculty comment data set to identify how to best use this data, in practice, at the individual-program-level as part of the wider use of student evaluation of teaching (SET) data for the improvement of teaching and learning.

Method

As required by institutional ethics processes, exemption from ethics approval was obtained for the use of the de-identified 2012 CEQ comment data for the Deakin University Faculty of Science, Engineering and Built Environment. These data were manually coded against the five principal domains from CEQuery using the NVivo qualitative analysis package, using the schema presented in Table 1 as a guide. The overall hit counts for each Faculty program were tabulated. The overall hit count proportions for the five principal CEQuery domains, for both BA and NI, were tabulated and compared to the proportions found by Scott in his prior large-scale analysis of CEQ comments. The overall BA hit count proportions for the five principal CEQuery domains were disaggregated by School and gender, and compared to the relative likelihood of receiving a BA hit found by Scott for these demographic divisions. The proportions of BA and NI hit counts relating to 'practice-orientated' aspects in the Course design domain were tallied. These findings are discussed in the context of most practically and productively using the Faculty's CEQ student comment data.

Results and discussion

A total of 482 BA and 458 NI comments were recorded from 513 respondents across 55 separate programs in the Faculty of Science, Engineering and Built Environment using the 2012 AGS data. Following manual coding of these comments against the five principal domains from CEQuery, Figure 1 shows the overall comment hit counts for all domains, for each separately identified program, for both BA and NI, with programs sorted in order of reducing total BA+NI hits. Note that some student comments actually refer to multiple issues, and these are coded separately, hence the total BA and NI hits are larger than the respective numbers of comments. The purpose of Figure 1 is not to identify the hit counts for individual programs, but to highlight that many programs have a relatively low total hit count.

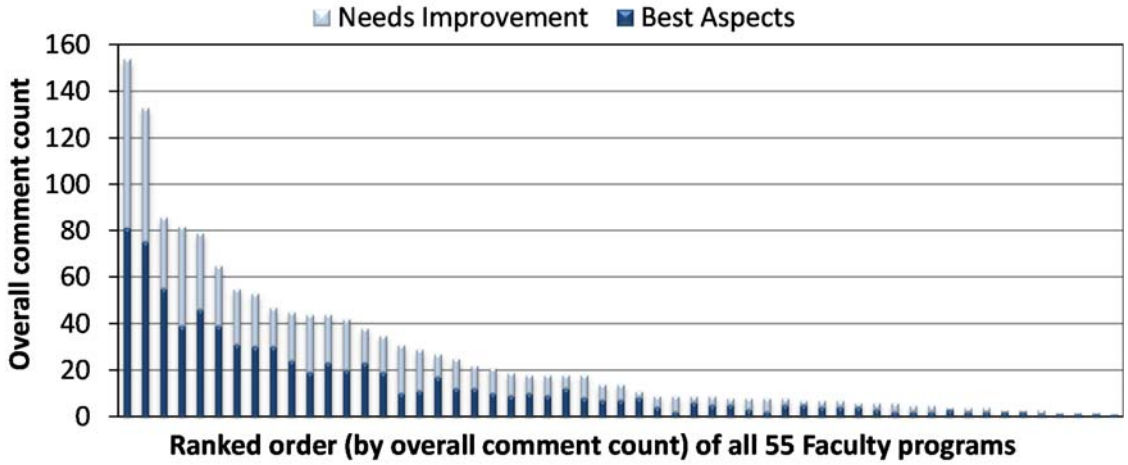

Figure 1: Ranked overall comment hit counts by Faculty Program

The total number of BA hits is 770, the average number of BA hits for a program is 14.24, the median number of BA hits for a program is 7.5, and the modal number of BA hits for a program is 2. The total number of NI hits is 662, the average number of NI hits for a program is 12.26, the median number of NI hits for a program is 7, and the modal number of NI hits for a program is 3. While a number of programs have a substantive quantity of comments/hits, many have only a handful. CEQ response rates at the whole-of-institution-level have historically been relatively low (45-50%) (Carroll, 2011), and, as observed here, this can lead to individual programs having very little useful data (Patrick, 2003).

Figure 2 shows the overall hit count proportions for all programs, for each CEQuery principal domain, for BA comments, for both the current investigation and those found by Scott. Note that two additional comment coding domains are included for the current investigation – 'Everything' for a small number of comments indicating that everything about the program was 'best', and 'Other' for a small number of comments that were otherwise unclassifiable. Figure 3 shows the overall NI comment hit count proportions for all programs, for each CEQuery principal domain, for both the current investigation and those found by Scott. Note that two additional comment coding domains are included for the current investigation – 'None' for a small number of comments indicating that no aspect of the program needed improvement, and 'Other' for a small number of comments that were otherwise unclassifiable.

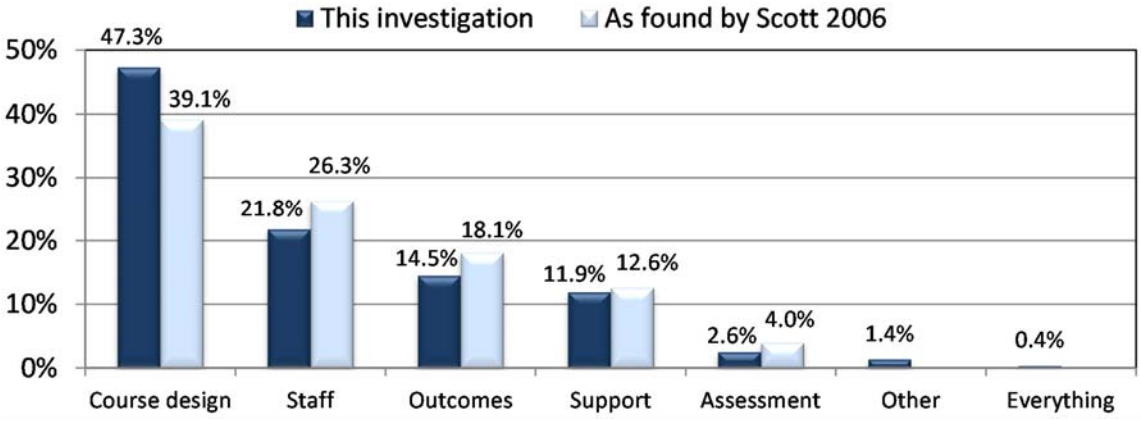

Figure 2: Overall BA comment hit count proportions

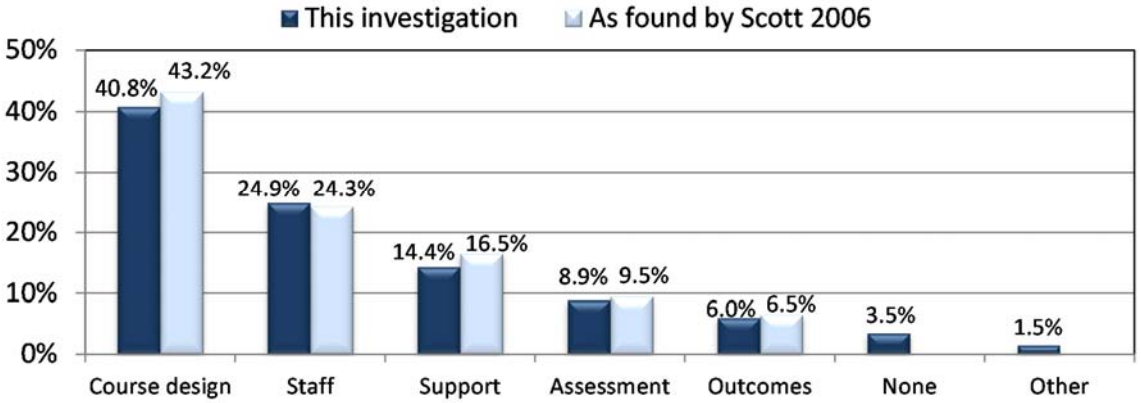

Figure 3: Overall NI comment hit count proportions

Interestingly, the rank ordering of the five CEQuery domains for both BA and NI here match those found during the development of the CEQuery system, based on an analysis of more than 176,000 comments from students from 14 universities across 2001-2004 (Scott, 2006). Additionally, it can be seen that the overall hit count proportions reported by Scott are also close to those found in the current investigation. This finding adds further weight to the validity and reliability of the five factor domain structure proposed by Scott, and suggests that the Faculty CEQ comment data, overall, are in line with expectations, and provide meaningful information. Compared to the approximately 20% of comments reported by Scott that could not be allocated to a domain via the automated CEQuery analysis, only 1.4% of BA comments and 1.5% if NA comments (1.46% of comments overall) could not be allocated here. This result suggests that, where the number of comments to be analysed is not too large, manual coding of the comments produces a more complete analysis of the comment data than CEQuery.

The quantitative CEQ scale ratings exhibit systematic differences between discipline areas (Patrick, 2003; Wilson et al., 1997) and these differences have been observed over many years; whereas gender has been shown to account for only a very small proportion of the variability in CEQ scale ratings (Graduate Careers Australia, 2006). Similarly for CEQ qualitative comment data, Scott showed that the likelihood of receiving a BA hit and not a NI hit for all of the five principal CEQuery domains was significantly influenced by broad field of education (BFOE – related to discipline area), and not significantly influenced by gender. BFOE is a categorisation used in CEQ data reporting that includes ‘Natural and Physical Sciences’, ‘Information Technology’, ‘Engineering and Related Technologies’ and ‘Architecture and Building’ as four of 12 separate discipline areas – so highly relevant to the

Faculty of Science, Engineering and Built Environment. Figure 4 shows the hit count proportions for each CEQuery principal domain, plus 'Other' and 'Everything', for BA comments, disaggregated by the four Schools that make up the Faculty of Science, Engineering and Built Environment. Note that the purpose of Figure 4 is not to specifically identify the relative ranking of the four Schools across the comment domains; rather it is to confirm that variations in comment hit count proportions are observed between Schools. Figure 5 shows the hit count proportions for each CEQuery principal domain, plus 'Other' and 'Everything', for BA comments, disaggregated by gender.

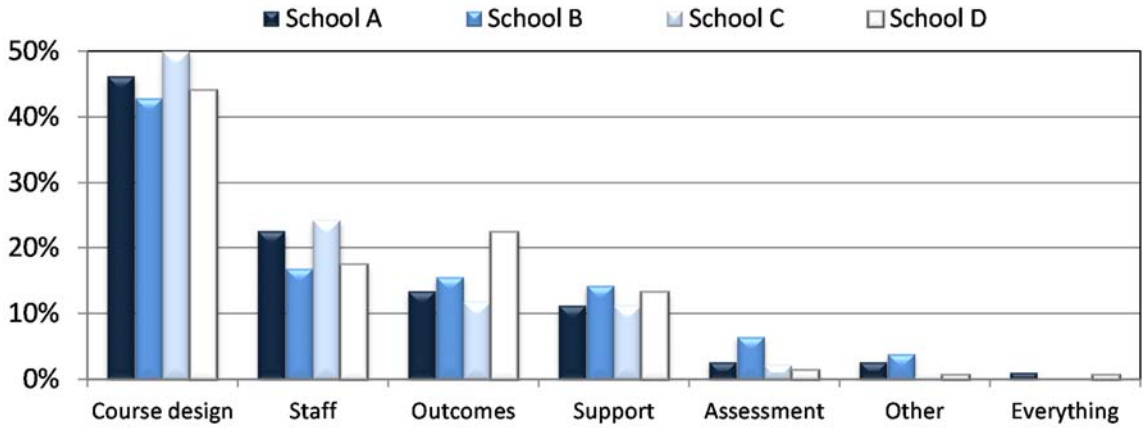

Figure 4: Overall BA comment hit count proportions disaggregated by School

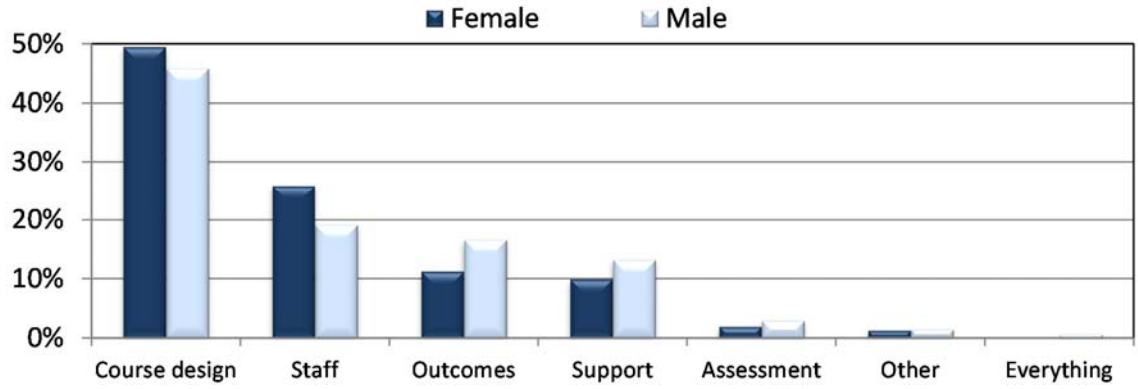

Figure 5: Overall BA comment hit count proportions disaggregated by gender

Scott's analysis was based on a logistic regression of whether a respondent gave a BA comment and not a NI comment in a CEQuery principal domain versus a range of respondent demographic characteristics including BFOE and gender (Scott, 2006). Such an analysis is complicated by the fact that responses that contain both a BA and NI hit (typically the majority of responses) must be excluded, but the large number of responses (more than 160,000) that Scott was working with meant that the analysis was still based on a large number of cases. It is not possible to repeat Scott's analysis here, as the exclusion requirement would reduce the number of eligible respondents from 513 to 55, significantly limiting the power of a logistic regression. However, Figures 4 and 5 show results generally in line with Scott's logistic regression results. Figure 4 shows relatively large differences between the highest and lowest proportions between Schools for most domains. Figure 5 shows generally lesser differences between male and female respondents across all

domains. Again, we find some support in the Faculty CEQ comment data for Scott's previous findings relating to CEQ open-ended comments.

Scott found that 'practice-orientated' learning methods attracted by far the largest number of BA hits in the Course design domain. Again, while not able to replicate Scott's original analysis exactly, we found that 35.4% of BA student hits in the Course design domain related to practical aspects of their program. We also found that 32.1% of NI student hits in the Course design domain related to practical aspects of their program. We concur with Scott's headline report finding that students consider practice-oriented learning methods to be valuable. Further, a significant NI hit count suggests that many students would like to see this aspect of the studies enhanced.

At the Faculty-level, Figure 3, which presents the overall proportions of NI hits, indicates that the Course design and Staff domains account for approximately two thirds of all students comments relating to aspects of their university experience that they would wish to see improved, with Course design attracting the most NI hits by far. While each School and discipline area within the Faculty must respond to their individual circumstances, Faculty-level policy should take account of the relative importance of student concerns in prioritising resources to specific areas for teaching and learning improvement. Of course Assessment is important; however the CEQ comment data here suggest that fundamental issues related to Course design are significantly more important to students. Interestingly, while recent graduates might be acutely aware of the issues relating to Outcomes from their university studies, they are far more likely to comment on the characteristics of the teaching Staff that they interacted with during their studies. Figure 2 indicates that the Course design and Staff domains account for nearly 70% of all BA hits, reinforcing the relative importance of these two domains to the students' experience of university. These findings suggest the two priority areas for action and resources to improve the quality of teaching and learning.

Using CEQ comment data at the program-level

Generally, we have found broad agreement between the Faculty-level CEQ comment data and the national characteristics of CEQ comment data historically reported by Scott. This provides some evidence that the overall Faculty sample conforms to expected parameters and that it provides useful information. In the original development of CEQuery, Scott found that many of the 26 CEQuery detailed sub-domains recorded very low proportions of the total comment hits – 11 of the 26 sub-domains had less than 2% each of the total hits. While Scott had more than 160,000 comments to analyse, at the Faculty-level the total CEQ comment count is much lower. Given the validated factor structure of the five principal CEQuery domains, one approach, and the one we use here, is not to disaggregate the coding of comments beyond the five factor schema.

As its name suggests, the CEQ is a program-level evaluation instrument (Patrick, 2003; Wilson et al., 1997). Figure 1 identifies that, for many separately identified Faculty programs, there are low numbers of comments/hits. There are a number of possible options for programs with low numbers of comments. While comments were received for 55 Faculty programs, some of these individual programs are actually closely aligned. For example, combined programs are reported separately from their base programs, honours programs separate from their base programs, specifically appellated versions of programs are separate from their base programs, etc. Where separately reported programs have a significant degree of commonality, the comment data for those programs could be consolidated to form a larger pool. For example, in our data the Bachelor of IT (Games Design & Development) program recorded only 18 hits. While these comments should be inspected for feedback that relates specifically to the Games Design & Development major, there is also likely to be additional valuable student evaluation feedback gained by combining the 18 hits with the 79 hits received for the general Bachelor of IT program.

In addition, where the number of CEQ responses is low, it has been suggested that data from more than one year can be pooled to form a more useful data set (Aungles & Karmel,

2000). However, this would reduce the currency of the already significantly lagged CEQ data, and further caution would be required if important characteristics of the program had changed during the period of the pooled data. The individual Schools that make up the Faculty each host a range of programs that are, in many cases, closely related. On this basis, there is likely to be value in at least a family-of-program-level of consideration of the CEQ comments, and in some cases, a whole-of-School-level could also be appropriate.

Apart from automatically coding comments into 26 sub-domains, CEQuery also computes two numerical measures for each domain/sub-domain. The 'overall hits' is the total number of BA and NI hits in a given domain, and is taken as a measure of the relative 'importance' of that domain. The 'odds ratio' is the ratio of BA hits to NA hits in a given domain, and is taken as a measure of the 'quality' of that domain – a domain that scores more BA hits relative to NI hits achieves a higher odds ratio. These numerical measures are suggested as a basis for identifying areas for action to improve CEQ results. However, when the numbers of comments/hits are relatively low, the value of these numerical measures is reduced; the odds ratio in particular can be significantly affected by a small change in the number of hits when the overall number of comments is small. At a whole-of-institution-level, the number of hits and odds ratio might be usefully computed for all 26 sub-domains. At the Faculty-level, the number of hits and odds ratio might be usefully computed for the five principal CEQuery domains. At lower levels of CEQ comment aggregation, the value in computing these measures is likely to decline dramatically with reducing numbers of recorded comments. At the School- or program-level, it is feasible to simply pass on the 'raw' CEQ comments directly to the relevant program leadership for consideration as part of the review and evaluation process for their program.

The 'first rule' of advice from one of the developers of the CEQ was that CEQ data should not be considered in isolation from other sources of information, such as other SET surveys, benchmarking with relevant university partners, surveys of employers and graduates, and advice from accreditation bodies (Ramsden, 2003). Likewise, the developer of CEQuery recommends that the CEQ is a useful part of a larger SET picture for universities (Scott, Grebennikov, & Shah, 2008). Similarly, the use of CEQuery results should be taken as indicative for more detailed investigation (Scott, 2006), and complemented/triangulated with other relevant sources of SET data, such as student focus groups (Grebennikov & Shah, 2013). The CEQ open-ended comment data, and their summary representation as distilled via CEQuery, can be a valuable aid in understanding the reasons why students provide the numerical CEQ ratings that they do (Scott et al., 2008).

Conclusions

Using the 2012 Course Experience Questionnaire (CEQ) open-ended comment data for the Deakin University Faculty of Science, Engineering and Built Environment, we found support for the five factor domain structure proposed previously by Scott. Given the relatively small number of comments at the Faculty-level, we found that manual coding of the comments against the five factor model is both feasible, and achieves a superior coding rate compared to the automated CEQuery program. As others have observed, we found that some Faculty programs receive relatively few CEQ comments. In the context that the quantitative and qualitative CEQ data complement each other, and are just two sources of student evaluation of teaching (SET) data that program-level evaluation could/should use, we offer some approaches for dealing with low numbers of comments. A clear message emerging from the 'student voice' embodied in the CEQ comment data, at the Faculty-level, is that students both value and desire their programs having strong practical components – reaffirming the relevance of the 2013 Australasian Association for Engineering Education conference theme. We offer here a method for the practical and productive analysis and use of CEQ comment data, as part of a wider use of SET data in the evaluation and improvement of teaching and learning.

References

Aungles, Phil, & Karmel, Tom. (2000, 8-10 November). *Measuring Outcomes in Australia's Higher Education Sector.* Paper presented at the International Conference on Quality Assurance in Higher Education: Standards, Mechanisms and Mutual Recognition, Bangkok.

Bolden, Richard, & Moscarola, Jean. (2000). Bridging the Quantitative-Qualitative Divide: The Lexical Approach to Textual Data Analysis. *Social Science Computer Review, 18*(4), 450-460. doi: 10.1177/089443930001800408

Byrne, Marann, & Flood, Barbara. (2003). Assessing the Teaching Quality of Accounting Programmes: an evaluation of the Course Experience Questionnaire. *Assessment & Evaluation in Higher Education, 28*(2), 135-145.

Carroll, David. (2011). An Analysis of Mode Effects in the 2010 Course Experience Questionnaire *Journal of Institutional Research, 16*(2), 1-12.

Graduate Careers Australia. (2006). Graduate Course Experience 2005 - The Report of the Course Experience Questionnaire. Melbourne: Graduate Careers Australia and Australian Council for Academic Research.

Grebennikov, Leonid, & Shah, Mahsood. (2013). Student voice: using qualitative feedback from students to enhance their university experience. *Teaching in Higher Education*, 1-13. doi: 10.1080/13562517.2013.774353

Patrick, Kate. (2003, 11-13 June). *The Course Experience Questionnaire in Practice: Using the CEQ for Improvement.* Paper presented at the Australian Universities Quality Forum, Melbourne.

Ramsden, Paul. (1991). A Performance Indicator of Teaching Quality in Higher Education: the Course Experience Questionnaire. *Studies in Higher Education, 16*(2), 129-150.

Ramsden, Paul. (2003, 11-13 June). *Student Surveys and Quality Assurance.* Paper presented at the Australian Universities Quality Forum 2003 - National Quality in a Global Context, Melbourne.

Ramsden, Paul, & Entwistle, N.J. (1981). Effects of academic departments on students' approaches to studying. *British Journal of Educational Psychology, 51*(3), 368-383.

Richardson, Alan. (2003, 30 November-3 December). *Qualitative Analysis Of Graduate Comments And The Development Of Course Domains.* Paper presented at the International Education Research Conference AARE - NZARE, Auckland.

Scott, Geoff. (2006). Accessing the Student Voice - Using CEQuery to identify what retains students and promotes engagement in productive learning in Australian higher education. Barton, Australian Capital Territory: Department of Education, Science and Training.

Scott, Geoff, Grebennikov, Leonid, & Shah, Mahsood. (2008, 2-3 October). *Using qualitative data to prove and improve quality in Australian higher education.* Paper presented at the Proceedings of the 2008 Australasian Higher Education Evaluation Forum, Melbourne.

Symons, Rachel. (2004, 24-25 November). *Getting the most out of the SCEQ data: meeting the needs of multiple stakeholders.* Paper presented at the 2004 Evaluation Forum, Melbourne.

Wilson, Keithia L., Lissio, Alf, & Ramsden, Paul. (1997). The development, validation and application of the Course Experience Questionnaire. *Studies in Higher Education, 22*(1), 33-53.

Copyright statement