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Making sense of student feedback using text analysis - adapting and expanding a common lexicon

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Abstract

Purpose – This paper aims to report the findings of a study into the automated text analysis of student feedback comments to assist in investigating a high volume of qualitative information at various levels in an Australian university. It includes the drawbacks and advantages of using selected applications and established lexicons. There has been an emphasis on the analysis of the statistical data collected using student surveys of learning and teaching, while the qualitative comments provided by students are often not systematically scrutinised. Student comments are important, as they provide a level of detail and insight that are imperative to quality assurance practices.

Design/methodology/approach – The paper outlines the process by which the institution researched, developed and implemented the automated analysis of student qualitative comments in surveys of units and teaching.

Findings – The findings indicated that there are great benefits in implementing this automated process, particularly in the analysis of evaluation data for units with large enrolments. The analysis improved efficiency in the interpretation of student comments. However, a degree of human intervention is still required in creating reports that are meaningful and relevant to the context.

Originality/value – This paper is unique in its examination of one institution's journey in developing a process to support academics staff in interpreting and understanding student comments provided in surveys of units and teaching.

Keywords Evaluation, Quality assurance, Surveys, Student feedback, Text analysis, Qualitative data

Paper type Case study

Introduction

The collection of student feedback undertaken by universities is now a ubiquitous quality assurance practice. It is generally accepted that despite limitations, surveys of the student experience provide valuable insights relating to learning and teaching practices (Alderman *et al.*, 2012; Harvey, 2011; Kinash *et al.*, 2015; Palmer, 2012). There has been an emphasis on the collation of quantitative data as a performance indicator, impelled by the requirements of government agencies and the increasing marketisation and globalisation of the tertiary education sector, which has generated increased competition for students (Jones, 2003; Palmer, 2012). While it is acknowledged that student feedback forms just one aspect of the information needed to assess learning and teaching quality, it is also recognised that the student evaluation process can enable an active form of institutional accountability (Crews and Curtis, 2010).

Concomitantly, there has been an increasing move towards using the "student voice" as a means of marketing universities, geared at attracting future students and retaining current students. This has prompted increasing interest in closing the evaluation feedback loop,

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which entails, in part, ensuring students are kept informed of the outcomes of their feedback (Harvey, 2011; Watson, 2003). This strategy can lead to increased student engagement in the survey process and improve institutional transparency. Watson (2003) argues that when students believe their opinions are of little consequence to their lecturers and the broader university, they are disinclined to complete surveys.

Despite the ubiquity in the use of student surveys to evaluate teaching in the higher education sector, little research has been undertaken into the content of the free-form comments students write in their responses in these surveys (Alhija and Fresko, 2009; Brockx *et al.*, 2012). Recent scholarship relating to the qualitative comments from students indicates that such rich but underutilised feedback is critical to assessing the quality of the educational process and outcomes, whether at the level of a subject or unit (which is generally referred to as a "course" in the North American context) or the degree programme (Gonyea and Gangi, 2012; Hendry *et al.*, 2007; Hoon *et al.*, 2015; Wongsurawat, 2011). While quantitative data can provide a general statistical guide as to the best aspects of a unit and what needs to be improved, the qualitative remarks students provide can offer a level of detail and insight that assists lecturers and university management in understanding what actually is working or not working (Brockx *et al.*, 2012). This information is required in order to improve the quality of learning and teaching.

The practice of interpreting student comments can be complex, time-consuming and burdensome, particularly in units with large student enrolments and therefore potentially a large amount of qualitative information requiring analysis. Consequently, the effective interpretation of data can take up valuable time and resources, adding to the often substantial academic workload. Moreover, research shows that when reading student feedback, academics are more likely to focus on negative comments, giving less attention to positive comments and possibly skewing their overall appraisal of the data (Moore and Kuol, 2005). Some Australian universities are adopting the use of automated text analysis software to undertake the examination of student comments to better understand what students are saying and assist academics in grappling with this valuable information (Grebennikov and Shah, 2013; Shah, 2013; Tucker, 2013).

This paper focuses on the journey of an Australian university in the implementation of a suitable strategy for the text analysis of student comments collected in standardised unit and teaching surveys and the attempts to automate the process as much as possible.

Literature review

Scholars have raised concerns regarding the lack of attention paid to the qualitative information provided by students in their written comments in teaching and unit evaluations and that this is a rich, untapped source of data (Gonyea and Gangi, 2012; Grebennikov and Shah, 2013; Harvey, 2011; Palmer and Campbell, 2013; Pan *et al.*, 2009; Scott *et al.*, 2008; Stupans *et al.*, 2015). Stupans *et al.* (2015) assert that qualitative open-ended questions in such surveys allow students to prioritise what they believe to be of importance over the institutional needs expressed in standardised Likert scale survey questions. Alhija and Fresko (2009) undertook one of the earliest analyses of qualitative survey data using a manual coding process, finding that more research is needed into the content of student comments. Hoon *et al.* (2015) also recently used a manual coding process to analyse qualitative feedback. It is critical that data be systematically categorised in a meaningful way for academics to be able to make sense and apply the information appropriately (Alhija and Fresko, 2009). Brockx *et al.* (2012) used grounded theory methodology to undertake

manual coding to carry out research into students' comments finding that students make value contributions when commenting about their learning experiences.

Harvey (2011) argues that the generalised questions posited in unit surveys, what he likens to "blunt" instruments, are too broad and consequently offer little insight into actual teaching practice. The information gleaned from responses to Likert scale questions can be superficial and limited in scope (Harvey, 2011). On the contrary, qualitative responses provide more nuanced and valuable information that is required to make improvements in teaching and related practices.

Like Harvey (2011), Jones (2003) argues that the emphasis on the collection of quantitative data by university management can distort what students are really saying. It is therefore imperative that reports based on collated data from student surveys are inclusive of both the statistical and qualitative information. Reports need to be clear, comprehensible and aimed at providing information in a meaningful way that supports the aim of quality learning and teaching (Harvey, 2011).

There is limited research available into the effective application of text analysis software in analysing student comments in unit surveys. Tucker *et al.* (2012) briefly discuss the use of text analysis of qualitative feedback in their work on connections between student evaluations and outcomes for first-year undergraduate students. Using *IBM® SPSS® Text Analytics for Surveys 4.0*, the researchers found that automated analysis provided a deeper level of understanding of possible reasons for differing patterns in feedback in relation to outcomes (Tucker *et al.*, 2012).

Grebennikov and Shah (2013) discuss the use of the *CEQuery* tool to analyse a large amount of student comments (78,000), over a period of several years (2001-2011), in survey data collected at a large multi-campus Australian university, to identify key trends. *CEQuery* was an initiative funded by the Australian Federal Government, and it was developed to analyse the nationally administered Course Experience Questionnaire (CEQ) and Graduation Destination Survey (Scott, 2006). The CEQ survey was used to evaluate the graduates' experiences in courses/programmes. In 2012, these surveys were then superseded by the University Experience Survey (Radloff *et al.*, 2012). The results are made publicly available through the government's Quality Indicators for Learning and Teaching website.

Grebennikov and Shah's (2013) analysis allowed their university to examine strategies implemented over the period to ascertain their success and if any adjustments were needed. Shah (2013) used *CEQuery* in a similar analysis of the feedback of arts, education and social science students at another Australian university, with comparable findings. Likewise, Tucker (2013) describes the use of *CEQuery* at Curtain University in the analysis of student feedback. However, Tucker (2013) states that *SPSS Text Analysis for Surveys* was also used within each *CEQuery* subdomain to explore not only what themes students commented on most frequently but also what they actually said. This indicates that the use of *CEQuery* alone to appraise what students are saying in comments may be problematic.

Aim

The aim of the study was to investigate available tools, develop reporting processes at the institutional level and implement an application that enables the effective analysis of student comments. The main purpose of the initiative was to support quality learning and teaching by enabling the interpretation of the qualitative data in a more effective, timely and thorough manner.

Context

The study took place in a publicly funded university with campuses in a number of Australian states and territories. The services related to the collation and distribution of student feedback on units are provided by a central area of the university. In recent years, the university identified a need to fully use the rich feedback students provide in standardised unit surveys by implementing an automated process to systematically evaluate this information. While units with small student enrolments generate a limited number of written comments that can be easily assessed, those with large numbers of students, often taught across multiple campuses and through varying learning modes, can be more difficult to evaluate. The institution where this study was conducted trialled the use of text analysis tool to summarise student comments for selected units with very large student enrolments.

Methodology

The study adopted a descriptive approach which assisted in understanding contextual issues, identifying key elements and to trial processes aimed at addressing the challenges *in situ* (Bickman and Rog, 2009; Krathwohl, 2009). Thus, the paper describes: the initial investigation of a number of computer-aided programs to assist in the analysis of large data sets of qualitative information, the attempts to adapt or expand an existing lexicon and the current process to identify main themes in student feedback.

The manual analysis of comments by academics can cause unbalanced appraisals owing to the process of selecting and reading random comments without using a systematic approach (Stupans *et al.*, 2015). Hence, themes can possibly be overlooked and feedback taken out of context. Computerised text analysis allows qualitative data to be automatically categorised, with the option of using an already established dictionary, to identify the frequency of terms, enabling the classification of comments. This classification of data produces a statistical summary that shows how many comments are associated with particular categories, making it much easier for academics to understand this information.

The paper also discusses the issues that were encountered during the institutional journey and identifies possible directions for the future. It is anticipated that the objective analysis of student comments may help to counteract the scepticism many academics hold towards student feedback surveys, in particular the type of surveys that are commonly referred to as teaching evaluations.

Findings

Standard surveys to collect student feedback

As of 2012, coursework units at this particular institution are surveyed using an online survey tool. All coursework units, with student enrolments of ten or more are surveyed using this tool as stipulated in the university's policy and procedures relating to evaluations. Many of these units are taught across the institution's seven campuses. Surveys are generated for each study period throughout the year, including summer and winter semesters. Face-to-face, online and multi-modes of unit delivery are surveyed.

In addition to the nine Likert scale questions, students are invited to respond to four open-ended questions in relation to the best aspects of learning and teaching and the aspects of teaching and the unit that may require improvement. It is these questions that are the focus of the text analysis process discussed here.

Once the student feedback is collected, summary reports for various organisational levels (i.e. school, faculty and university) are generated for distribution. When the survey period closes, the central learning and teaching department is responsible for collating, reviewing

and refining the data. Interim reports are prepared and distributed to individual academics before the final reports are generated.

Tools and lexicon for text analysis

Along with the university-wide implementation of a standardised online survey in 2012, a project to determine which text analytics software would best suit the needs of the university was undertaken. Several software packages were investigated in this process, including *QSR Nvivo 10*, *WordStat*, *IBM SPSS Text Analytics for Surveys* and *Leximancer*. It was found that: some of the applications had better logic built into them and were able to recognise words or phrases, as well as the "sentiment" (positive or negative) associated with the terms to some extent. However, there were limitations in the type of outputs from these applications with higher logic, including the type of graphical representation available in the tool and the portability of reports generated by the tool. It was also quickly apparent that a more common application (e.g. *QSR Nvivo*) had significantly higher support material available for the end users than the tools with more analytic capability (e.g. *IBM SPSS Text Analytics*), but the common tool required more manual input or it was not capable of handling a large number of data efficiently. *WordStat*, provided by *Provalis*, is the current preferred tool used to appraise the survey data because of its capacity to be incorporated with the application used in the institution for the regular collection and reporting of internal surveys.

It was agreed that the dictionary used in the software called *CEQuery* would be adapted for this study (Scott, 2006). The reasoning behind this strategy is that key stakeholders at the management level were already familiar with the thematic summary of student comments used in *CEQuery*, and consequently, consistency in the analysis of data across various surveys will be achieved. *CEQuery* had been used by many Australian universities to analyse the results of national surveys for benchmarking degree programmes (Grebennikov and Shah, 2013).

CEQuery identified the following main domains or categories: assessment, course design, outcomes, staff and support (Scott, 2006). These are categorised under two broad themes, namely, best aspects (BA) and needs improvement (NI). Separate reports are generated for each of these themes.

The refinement of the subdomains was undertaken in this study, to provide further meaning and context to analyses. Therefore, the subdomains within each of the domains were expanded to reflect more details in relation to student comments. The nuanced reports provided a more contextualised feedback summary to key stakeholders who were responsible for the quality enhancement of learning and teaching at the institution.

In 2015, the Australian Government Department of Education and Training introduced the Student Experience Survey (SES) (replacing the University Experience Survey), administered by the Social Research Centre for all universities in Australia (Quality Indicators of Learning and Teaching, 2016). A new text analytic tool was introduced along with a new dictionary which was more relevant to the contemporary context in higher education. Unlike the CEQ surveys which were completed by recent graduates, the SESs are aimed at undergraduate students who are currently enrolled in Australian universities. While some thematic areas or domains in the new *SEQuery* tool are essentially the same as in the *CEQuery*, others were a consolidated form or new. This study adopted the dictionary from *SEQuery* tool in 2016, expanded the dictionary significantly and began to use it to analyse student comments collected in internal surveys. *SEQuery* has the following main domains:

- learner engagement;
- learning resources;
- skills development;
- student support; and
- teaching quality.

The "teaching quality" domain in *SEQuery* includes aspects of both "staff" and "assessment" domains of *CEQuery*.

Reporting format for text analysis

Once categorised, the results of the analysis of qualitative comments were manually compiled into a report which summarised the findings. Included in the report were graphs which visually compared the comments by theme for the best aspects of the unit and that needing improvement. The report recognised that some student comments were found to be applicable to multiple subdomains within a main domain. Therefore the total records for a particular main domain may be less than the sum of all records for its subdomains. Furthermore, responses that were neutral comments or invalid were excluded.

The study also investigated the extent of erroneous categorisation of comments and non-categorisation. It found that among all comments relating to unit aspects that were collected in a half year period for a particular discipline area, the initial automated counts were found to be invalid in as much as 9 per cent of BA comments and 20 per cent of NI comments. The invalid comments were:

- neutral phrases (such as "no comment", "N/A", a typographical mark/symbol and the start of a statement without any interpretable meaning);
- "false positive" for BA; and
- "false negative" for NI.

Therefore, additional measures were adopted to reduce the chances of invalid counts.

In compiling the text analytic report, it was agreed that examples of the full student comments would be included in addition to the statistical summaries for each thematic domain. This was to provide further context for the recipient of report, in this instance, senior management. Although there was a degree of familiarity with the thematic domains in the dictionary, the examples were selected as representative of the types of student comments within the specific domain.

Discussion

The study found that, as the literature posits, there is considerable value in using automated text analysis to support the appraisal of comments students have made about their experiences. This particularly applies when the survey data are relatively large, such as in units which have large numbers of students. However, it is essential that the process be as automated as possible to maximise the usage of the text analytics software. The purpose of adopting an automated process is to lessen the workload of the survey service provider, so that timely reports based on the text analysis can be made available to academics and management. This is particularly relevant when managing the text analysis process within the limited resources of a central unit of the university.

Adopting a standardised dictionary to categorise comments can produce reports that use familiar categories; however, it can present information that is broad and lacking context.

An example in relation to the *CEQuery* dictionary may be when considering the *Assessment* domain as NI, with a large number of comments associated with the subdomain *Assessment Tasks*. A lesser subdomain, such as *essay tasks*, can provide further specifics of the comments. It is obvious that assessment tasks may be an area needing attention. However, to ascertain what students are actually saying about the *essay tasks* requires further refinement of the dictionary. Alternatively, it may be necessary to refer back to the actual students' comments to determine this level of detail or in the case of Tucker (2013) use another text analysis system alongside *CEQuery*.

Furthermore, the educational lexicon used by both institutions and students has the tendency to change over time. For example, since the introduction of *CEQuery*, the following terms have become relatively common in academic communication: work-integrated learning, simulation-based learning, blogs and flexible delivery. These terms reflect more contemporary curriculum practices and are excluded from the domains in *CEQuery*. For example, while students could still mention their required readings and manuals, the reliance on printed learning resources may be less relevant in the current context of higher education, in particular with a strong drive towards facilitating the learning process through a tool based on new technology. Likewise, current students' written communication could be impacted by their use of social media, which often uses abbreviations for common words or phrases. Therefore, when using a pre-established dictionary, it is essential to regularly review its currency to ensure its relevance to the contemporary context.

A limitation with using words or phrases, although they do have their place, is that they may not apply contextually to a particular dictionary domain. A feature of *WordStat* that provides an enhanced contextual framework for analysing student comments is "rules" which can be manually added to the dictionary that targets words or phrases and their proximity to other words or phrases. The target words have been linked where appropriate (e.g. the terms "lecture" and "good" in the BA dictionary) if the words are within five words of one another in the same sentence. The purpose of using rules rather than only words or phrases is to improve the accuracy of capturing BA and NI terms in the dictionaries in their appropriate context. This process of linking words that are apart has the potential pitfall of "false positive" and "false negative" outcomes. In the above example, the word "good" may be in a phrase not associated with the "lecturer".

The dictionary based on *SEQuery* has mitigated some of the above concerns. This updated dictionary uses terminology that is more relevant and specific to the experiences of contemporary students. The *CEQuery* subdomain included *library*, *learning resources*, *infrastructure/environment*, *student administration* and *student services*. The updated subdomains include *academic, careers, administrative and learning advisors available/helpful*, *received/offered relevant support*, *efficient enrolment and admissions processes* and *administration*. Despite the improved lexicon of the new tool, the *SEQuery* is still aimed at the analysis of data that relates to the whole student experience at the institution rather than at the unit level. Therefore, further expansion and/or refinement becomes necessary for effective use of the lexicon at the unit level.

The ultimate goal of most practitioners in the evaluation field is to support the use of both qualitative and quantitative information collected through surveys in conjunction with information retrieved from other sources. The additional sources could be incorporated in a learning analytic system at the institution and associated with a dashboard to provide timely and relevant contextual data, in particular to senior academic staff responsible for reviewing and/or planning various initiatives of the institution.

At this stage, text analysis reports are produced on a needs basis rather than for all units surveyed using the standard survey tool. This is owing to the identification of the necessity

for further refinement of the report. To date, the reports generated require a relatively high level of manual input, making it unsustainable to create reports for all coursework units. The main goal is still an almost automated system for generating reports of qualitative data that can be distributed to teaching staff along with related quantitative data. This will provide academics with both a statistical summary of responses to the Likert scale questions and a textual analysis of student comments, thus a more complete picture of what students are saying about their experiences of learning and teaching in units. There will be need for resource development and other forms of support for staff, so that the risk of reaching false conclusions is minimised.

Further investigation and consultation are necessary to provide a more holistic view of the evidences collected as indicators of quality in an institution.

Conclusion

This study has found that the despite some limitations, the use of a software for text analysis can contribute to a fuller, more nuanced picture of students' experiences of learning and students' suggestions for improving teaching practices. Such information is essential for quality assurance purposes both at the individual unit or subject level and programme level, as well as at various organisational levels at the institution. With a deeper level of understanding, the institution or an area within the institution is able to plan appropriate strategies to address particular issues and implement the strategies where needed.

Anecdotal feedback from recipients of the reports, containing the results of a process that used text analysis tool, indicates that the data provided contextual information for understanding the quantitative data collected through the surveys, and this enhanced comprehension was useful in the review and planning processes. Further investigation is necessary to determine the usefulness of such reports to the stakeholders of the institution and the extent to which the reports are used in the quality assurance or quality enhancement processes.

While the value of the automated analysis of student comments is acknowledged, the study found that there are many factors that can affect the usefulness of such a process. There are benefits in using an established dictionary, but a considerable amount of time and effort are required to adapt it for specific purposes which are different to the context of its initial development. This effort extends to maintaining the currency and relevance of the dictionary. Despite the resources that have been directed into further development, it is impossible that all student comments can be identified appropriately without human intervention. Even with such intervention, the capacity of the human mind to remain focussed while reading through many thousands of statements is doubtful. There is also the reality that the writer may have held a very different meaning to the reader, let alone a computer program that follows an algorithm.

Going forward, it is imperative that to maximise the benefits of investing further resources into implementing text analysis for all surveys at an institution, the information generated through an automated process needs to be presented in a way that is meaningful and does not require too much additional input from the target audience. The organisational area undertaking the analysis of student comments, therefore, needs to direct resources into effectively communicating the output to its stakeholders. Strategies could include the addition of a standardised glossary to the reports, the provision of guidance on understanding themes, as well as the inherent limitations of an automated text analysis tool.

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