Audience response systems can facilitate communal course feedback

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Abstract

Background: At Queensland University of Technology (QUT), the Bachelor of Radiation Therapy course evaluation has previously suffered from low online survey participation rates. A communal instantaneous feedback event using an audience response system (ARS) was evaluated as a potential solution to this problem. The aims of the project were to determine the extent to which this feedback event could be facilitated by ARS technology and to evaluate the impact the technology made on student satisfaction and engagement.

Methods: Students were invited to a timetabled session to provide feedback on individual study units and the course overall. They provided quantitative Likert-style responses to prompts for each unit and the course using an ARS as well as anonymous typed qualitative comments. Data collection was performed live so students were able to view collective class responses. This prompted further discussion and enabled a prospective action plan to be developed. To inform future ARS use, students were asked for their opinions on the feedback method.

Results: Despite technological difficulties, student evaluation indicated that all responders enjoyed the session and the opportunity to view the combined responses. All students felt that useful feedback was generated and that this method should be used in the future. The student attendance and response rates were high, and it was clear that the session had led to the development of some insightful qualitative feedback comments.

Conclusions: An ARS contributed well to the collection of course feedback in a communal and interactive environment. Students found it enjoyable to use, and it helped to stimulate useful qualitative comments.

Keywords: audience response systems, course feedback, clinical sciences, education.

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ISSN 1442-1100

Introduction

Student evaluative feedback is the essential foundation of good practice in education. A potential barrier to effective evaluative feedback is low participation rates, which are in turn influenced by student apathy with regard to providing feedback. While students can readily perceive the value of assessment feedback, it is often difficult for them to see the immediate value of their feedback to course teams. From an academic perspective, feedback gathered from students is crucial in order to demonstrate quality and ensure continual improvement.

At Queensland University of Technology (QUT), the Bachelor of Radiation Therapy course has regularly used a range of mechanisms to harvest feedback from students, including institution-based online surveys, regular reports from student representatives and an open-door policy. With low online survey participation rates (approximately 40%), the value of this feedback cannot be determined, with participation bias being a significant issue. In order to address poor student response rates, a communal instantaneous feedback event using an audience response system (ARS) was developed and introduced.

Audience response systems have been used for the last 40 years (Karaman, 2011) to capture and display instantaneous feedback from an audience. Common systems comprise a number of input keypads, commonly known as "clickers" (Bruff, 2009) that transmit the user's responses to a central receiver in the form of a radiofrequency pulse. Validation of such devices by Guse and Zobitz (2011) indicated that the system is highly accurate with the only potential problems arising from failed signal transmission. For the QUT study, the Turning Point (Turning Technologies, Youngstown, OH) system was utilised. This has the advantage of identifying and displaying live response rates to help address transmission issues.

ARS have been used successfully in a range of teaching activities, including lectures, practicals and tutorial sessions. They have also played a role in teaching across multiple distinct campuses (Clauson, Alkhateeb, & Singh-Franco, 2012). The instantaneous nature of an ARS lends itself well to engaging audiences and increasing interactive participation. There is a wealth of literature describing these benefits of an ARS (Cain, Black, & Rohr, 2009; Chaudhry, 2011; Lee & Dapremont, 2012; Thalluri & Shepherd, 2010). There are common themes within the papers above relating to user satisfaction and engagement levels. Common uses of the technology include clarification of audience understanding (Weerts, Miller, & Altice, 2009), stimulation of audience discussion (Thalluri & Shepherd, 2010) and improved attention (Cain et al., 2009), with the overall aim of enhancing the learning experience and resultant knowledge transfer (Liu, Getting, & Fjortoft, 2010; Porter & Tousman, 2010). It is clear that ARS have played a major role in increasing student engagement in large (>100) class sizes (Lee & Dapremont, 2012; Preis, Kellar, & Crosby, 2011). Porter and Tousman (2010) reviewed research into ARS and extracted three common themes: student perceptions, assessment outcomes and ease of use. All studies into ARS indicate they have either performed well with regard to these criteria or, at worst, made minimal positive impact. There have been no adverse effects of their use reported.

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Many of the students currently undertaking tertiary education courses are highly active users of web technology and are now being referred to as the "Net Generation". An awareness of these students' needs is essential for ensuring the effectiveness of teaching activities (Jones, 2010; Kennedy et al., 2009). Anonymity, in particular, is highly valued by these students (Skiba & Barton, 2006), and this aspect of ARS has been linked with empowerment and subsequent participation of students who would otherwise remain silent (Bode, Drane, Kolikant, & Schuller, 2009; Kazley & Annan-Coultas, 2012; Preis et al., 2011). Although there are a variety of methods used to collect communal responses from students' own web-enabled devices, such as "GoSoapBox", use of externally provided handsets mean that students can be sure that their identity is confidential.

In addition to the proven benefits for students, studies have also reported that instructors perceive great value in audience feedback during teaching activities. Cain et al. (2009) reported that student feedback measured audience understanding and enabled instructors to address problems immediately, ensuring time was not wasted on unnecessary explanation. This has subsequently been corroborated by several authors, including Mastoridis and Kladidis (2010) and Jensen, Ostengaard and Faxholt (2011).

Given the proven value of ARS during teaching for gathering student feedback in order to enhance the learning experience, it is perhaps surprising that a recent review (Laxman, 2011) found no published studies using ARS to gather formal unit or course evaluative feedback. Although a study by Turban (2011) suggested that ARS have been used for course feedback and evaluation, this paper remained focused on instantaneous feedback related to individual lectures. The proven benefits of ARS include high engagement levels, reliable data collection and anonymity. These are the three vital cornerstones of successful evaluation, so it would seem that ARS have a potential role to play in this process too.

This project investigated the use of an ARS to gather feedback related to all aspects of unit and course organisation, content, resources, teaching and learning. This feedback aimed to inform future unit and course development. This is a different use of ARS than reported in the literature, which documents ARS use exclusively within the context of teaching activities. This paper presents an overview of the development of this initiative as well as student evaluation of the feedback process.

Methods

Although the gathering of student feedback for unit and course evaluation is standard practice, institutional ethics review committee approval was obtained for this study in order to publish the findings. All participation was voluntary and all responses were anonymous. Although some authors have advocated students purchasing their own handsets (Cain et al., 2009; Liu et al., 2010), this was not felt to be appropriate for short feedback sessions. Existing Turning Point ARS handsets, receiver and software were utilised to eliminate any financial impact on students. Mobile-phone-based systems were not utilised to safeguard anonymity.

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The aim of the project was to determine the extent to which a timetabled incentive-driven communal feedback event could be facilitated by ARS technology and evaluate the impact the technology made on student satisfaction and engagement with the process.

It was important to maximize student response rates, so incentives were provided via seed funding through a University evaluation project's pilot scheme initiative. It was felt that students might be more inclined to provide feedback if it was in a timetabled session facilitated by a member of the teaching team instead of relying on them to make time themselves for feedback provision. Each year group was invited to their own feedback session, and these timetabled feedback sessions were planned for days when all students were on campus. Students were told that participation was voluntary but that the event would be an opportunity for communal feedback and social interaction. As an added incentive, academic staff challenged the students to participate in a cake-baking competition.

During the session, students were asked to provide quantitative Likert-style responses to prompts related to each unit for the semester as well as the course. These responses were collated using the Turning Point software and ARS handsets. Students used the handsets (or clickers) to submit their response to a series of statements provided on a PowerPoint presentation. During submission of responses, the only data displayed was the number of respondents. After all students submitted their responses, a histogram appeared with a summary. This was performed live, so students were able to view the collective class responses to each question in turn. Discussion of the responses was encouraged where relevant. The final questions solicited students' opinions on the ARS feedback method for gathering quantitative data. This data helped address the second aim of the study.

In addition to the ARS-based quantitative data, students were asked to provide anonymous written paper-based qualitative comments relating to units, the course and the feedback method. These asked students to provide their opinion on both perceived positive aspects ("What are the best things about the course/this feedback session?") and suggestions for improvement ("What improvements would you recommend for the course/this feedback session?") via open-ended questions. These were collected at the end of the session after the quantitative data had prompted further discussion. A combination of Likert responses and the resulting discussion points were used to develop a "live" prospective action plan in collaboration with the students. After the feedback session, the qualitative comments were collated, divided into themes and used to further develop an action plan for agreement with student representatives at the annual course management meeting.

Results

Both quantitative and qualitative feedback relating to units and the course were successfully gathered from all three student year groups. Unfortunately, there were some technological issues that caused difficulty with the ARS. This caused the ARS to be abandoned before the evaluation of the software could be collated for one year

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group; therefore, quantitative student feedback was only collated from a total of 28 students instead of the full 53. Qualitative data were collected via an anonymous paper-based system and elicited a total of 53 responses (100%) from across all three year groups attending.

Table 1
Student Quantitative Feedback on Use of ARS for Unit and Course Feedback

Comment	SA (%)	A (%)	N (%)	D (%)	SD (%)
I enjoyed the feedback session.	50	43	3.5	0	3.5
Some useful feedback was generated.	53.5	43	3.5	0	0
It was good to see everyone's combined response.	82	18	0	0	0
The feedback session was quicker than the usual method.	25	39	21.5	14.5	0
I think this method of feedback should be used in the future.	53.5	46.5	0	0	0

Note: SA = strongly agree, A = agree, N = neither, D = disagree, SD = strongly disagree

Table 2
Student Qualitative Feedback on Use of ARS for Unit and Course Feedback

Theme	Tally	Typical comments
Positive aspects of the feedback process		
Incentives (cake)	32	• Cake
Communal and social nature	20	• Good to see what everyone thought • Allowed us to see how other people found the course • Great idea to formalise session as many people don't do [previous University system] • Getting together • Social in nature
Easy and fun to use	15	• Entertaining • Fun • Very easy instead of writing • No pressure
Fast	12	• Immediate feedback to lecturers • Easy to answer quick questions
Well timed (after final exam)	5	• Feedback after exams • At a good time when we are all together
Negative aspects of the feedback process		
Technical issues with equipment	32	• Should work better • More efficient equipment; great aside from glitches
Time consuming	7	• A little too long
No drinks provided	3	• Beverages
No individual lecturer comments	1	• Don't really get an opportunity to talk about which particular lecturers could improve

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Table 1 illustrates the results of the quantitative feedback regarding the feedback method. In general, student evaluated the feedback method as highly positive, although it was clear that the technological issues had slightly diminished student enjoyment. Despite this, it was apparent that students supported the use of ARS for unit and course feedback.

Thematic analysis of the 53 paper-based qualitative responses was conducted via coding of responses and collation into emergent themes. These themes are summarised in Table 2 along with some typical comments from participants. In general, the range of themes was similar across the year groups, with a few exceptions that are addressed in the discussion section. The emerging themes included incentives, communality and the ARS technology speed and enjoyment.

Discussion

Student preferences

When compared to other studies, it is clear that the quantitative results seen in Table 1 confirm the general finding that students prefer the ARS system, with 100% indicating that ARS should be used to collect feedback in the future. This result echoed medical student preferences for ARS in lectures (Turban, 2011) but was particularly interesting in this case, given the technological difficulties experienced. The qualitative data (which was unprompted) provided insight into the factors that potentially impact on this finding. It is interesting that the feedback sessions were viewed as an enjoyable social activity rather than a chore (see comments in Table 2).

The finding that using ARS can be fun is echoed in the literature describing their use in teaching activities (Keogh & Wang 2010; Lymm & Mostyn, 2010). The evident ability to rebrand feedback provision as "fun" is seen as one of the major benefits of using this technology for gathering unit and course-level student feedback. Indeed, a recent review by Laxman (2011) suggested that ARS provided a "cool" factor and increased "buzz" levels in classes. The unprompted qualitative feedback revealed that 15 of the 53 students felt the session was enjoyable. It remains to be seen to what extent this is due to the novelty of the technology, as suggested by Karaman (2011), although three students did state that they enjoyed using the technology specifically. Further insight can be provided by Turban (2011), who demonstrated that previous use of ARS had no statistical impact on student preference. It could be inferred from this finding that the novelty aspect was not a contributing factor. Future longitudinal studies are needed for confirmation.

Student participation

Participation rates were high, despite the voluntary nature of the event. It is difficult to determine whether this was due to the desire to participate in communal feedback or due to the attraction of a cake-baking competition. Certainly the qualitative comments did include plenty of appreciation for the incentive. When comparing this approach to the previous university-wide feedback system, which also featured incentives, it was apparent

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that participation rates were considerably improved, from an average of 40% to over 90%. This echoed findings from a 2006 study by Herreid suggesting that introduction of ARS into lectures "dramatically" improved attendance to over 80%. Feedback from students indicated that providing a communal feedback session had contributed to participation. To ensure a balanced perspective is gained, high participation rates are an essential aspect of useful feedback provision. Although ARS is unlikely to be the main factor in persuading students to provide feedback, the communal and interactive nature of this event was clearly attractive to them. This finding was one of the key outcomes of this study and is likely to lead to a recommendation that a booked communal ARS-based feedback session be more widely implemented in the Faculty.

Communal and social aspects

As previously stated, it is unclear from the results whether the major attractor was the provision of incentives or the opportunity for social engagement, and this is worthy of further study. It was interesting that the communal and social nature of the event was commonly expressed in the unprompted qualitative responses as a strong positive aspect (second only to provision of cake). The attraction of social interaction for future health professionals is not surprising since by nature the job attracts social individuals who welcome social interaction. In addition, the communal nature of the feedback sessions appeared to be a considerable benefit to the students. This finding should not be confused with the need for useful feedback to be provided. Although the students may enjoy the format of the session, a potential advantage of solo online feedback provision is that students are able to submit their feedback in an unpressured environment. It will be interesting to see how feedback differs between these two formats in our setting.

The benefit of seeing a summary of the responses was confirmed in the quantitative results, where all students agreed that seeing the whole class response was desirable. This is one aspect of live communal feedback collection that ARS can facilitate very effectively. For most students, this feedback merely confirms that they are in agreement with the remainder of the class. However, students who disagree with the majority can particularly benefit from this type of feedback. It can act as a prompt for them to consider why they disagree and provide appropriate qualitative feedback. Occasionally, minority opinions led to stimulating discussions. There is a tendency with quantitative data collection to ignore outliers, yet often the most insightful feedback and suggestions arise from students who have experienced things differently.

Depth of feedback

Comments relating to the course feedback were generally more in-depth and useful than in previous feedback formats. It was encouraging to see that the students in this study had clearly found that the ARS data collection stimulated discussion and reflection. This finding is supported in the literature by several studies, including Morse, Ruggieri and Whelan-Berry (2010), whose comparison study demonstrated higher levels of discussion when clickers were used, albeit with a small sample size. Micheletto (2011) also found that discussion on challenging issues was successfully

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stimulated with ARS and, furthermore, that this had led to student reflection—a key component of effective and honest feedback. When compared to previous levels of qualitative "open question" responses in the traditional setting, it was clear that the ARS responses had triggered discussion and increased reflection. By discussing group responses to prompts, the classes were able to provide a high standard of qualitative feedback, and their responses indicated that the ARS had contributed to this. Mollborn & Hoekstra's (2010) study examined ARS use from a sociological perspective and reported that students felt the technology had increased their feeling of community. In fact, the authors reported that one of the most important strengths of the ARS was that it prompted discussions about course concepts. It is clear that viewing class responses stimulates individuals to question what aspects they agree or disagree with. For a feedback scenario, it is expected that this will result in more detailed and useful qualitative comments. Certainly, the comments received in these feedback sessions were more detailed and insightful than in any previous feedback format. The combination of group dynamics and anonymity both empowered and equipped students to provide honest in-depth feedback. Stowell & Nelson (2007) cited that increased honesty was the most important advantage of ARS feedback. Although this was related to a psychology teaching activity, the study highlighted that the technology reduced the social influence of responses while enabling shy students to contribute. For health professionals, the giving of feedback to trainees is an essential aspect of their role, and any education related to reflection and provision of useful feedback is to be encouraged. Furthermore, feedback provision needs to be seen by students as an opportunity rather than a chore, and it was apparent that the students participating in this study enjoyed the discussion and reflection aspects of the sessions.

Time restrictions

Qualitative feedback suggested that students enjoyed the rapid responsiveness of both the technology and the format. The instant response time allows feedback to be gathered very rapidly (approximately 10 minutes per unit). However, the importance of feedback sessions providing time for emerging issues to be explored as a group was agreed. Subsequently, both ARS summary data and verbal discussion points were used to develop real-time action plans at both unit and course levels. By showing students the value of their feedback, it was hoped that feelings of student ownership of the course would increase. One of the potential challenges of engaging in dialogue in this manner is the potential for lengthy discussions to develop, and it was interesting that one year group had five unprompted responses suggesting that the session was too lengthy, whereas the other two groups had only one respondent in each year group highlighting this as an issue. This may not be due to discussion time directly since the group that experienced the longest session time was the first group to use the ARS for the entirety of the evaluation, and technical difficulties had an impact on the length of the session. Despite this, the quantitative data for this year group revealed that 11 students thought ARS was quicker than other methods, and only one perceived it as slower.

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ARS limitations

It was clear that the format encouraged students to consider the full range of issues affecting their satisfaction with a unit. This fostered a wider range of qualitative feedback to be provided than anticipated. Despite this, one of the downsides of the ARS format, when compared to the previous online solution, is that individual qualitative feedback is unavailable for specific lectures and staff. This aspect of feedback about specific units is vital and is currently being addressed within the university, with a commitment to the peer review process in addition to the introduction of a wide range of potential evaluation solutions. This study verified that ARS was seen as an important method of gathering general feedback at unit and course level but highlighted the importance of augmenting it with opportunities to provide qualitative feedback and standard lecture evaluations, as outlined by Turban (2011).

Technical issues were the major limitation of the ARS used in this study. The rather outdated ARS equipment has now been replaced with newer equipment, and no technical issues have been experienced to date. Although the disruption caused by the technical difficulties would have been expected to impact on student satisfaction, it is clear from the students' comments that they could see beyond this inconvenience since they still reported a positive experience. It is interesting to note that student satisfaction and feedback about the ARS consistently highlighted its potential value despite the evident issues with the particular equipment used.

Evaluation limitations

It would be interesting to determine the influence of the "presenter" on feedback provision. Although the technology offers anonymity, the extent to which the audience strove to please the presenter must be considered as a potential bias. This is a form of "social desirability" bias (Nederhof, 1985), where the respondents respond positively in order to associate themselves with a more desirable course. This is always a challenge to students' providing open, honest feedback, irrespective of the collection method. In regard to evaluating the finding of this study, open, honest feedback was felt to be less of an issue since the method of data collection rather than the course as a whole was being evaluated.

The Hawthorne effect, which suggests that participants in studies change their behaviour in response to being observed by the person conducting the study, also potentially affected the feedback provided; however, motivating the students to provide feedback was the desired outcome of the feedback session, therefore the behaviour change was a good outcome. The design of the evaluation ensured that the students were unable to distinguish between the data being collected for the study and the data being collected about other aspects of their course. This may have helped to reduce the Hawthorne effect. Whether the Hawthorne effect leads to more positive feedback in a communal setting would make for interesting future investigation but would require a more controlled study.

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A more problematic potential issue was that students enjoyed using the devices and may therefore have been more likely to provide a positive evaluation of their value. In this case, however, an increase in enjoyment is likely to improve participation rates, and thus, the method has intrinsic value. The impact of the incentive and communal nature of the feedback on students' enjoyment are also worthy of future investigation.

Another potential issue associated with the chosen method is Likert scale-related bias. Long-standing work by Bardo and Yeager (1982) has indicated the threat of extreme response avoidance (central tendency bias). It was clear from the results of our study that this was not a problem, however, as 54% of responses were from the extremes.

An additional source of systematic error is acquiescence bias, with respondents preferring to agree with statements (Friborg, Martinussen, & Rosenvinge, 2006). For this study, students were presented with positive statements, but this was unlikely to affect the overall outcome of the evaluation. A more likely issue was the potential influence of the positive Likert statements in the quantitative feedback section on students' qualitative comments. Future iterations could benefit from a range of positive and negative constructs using a semantic method, as described by Friborg et al. (2006).

Conclusion

The pilot study has provided evidence to support the use of communal audience response systems for effective collection of unit and course feedback. It has also demonstrated that high rates of student feedback can be achieved by integrating feedback collection into a social environment. Unit and course feedback provision was seen as an enjoyable activity by students as opposed to an unwelcome chore. This contributed to increased response rates and the provision of insightful qualitative feedback. Although useful feedback data can be collected by ARS alone, it is recommended that it be used to prompt discussion and help stimulate ideas for qualitative data collection. It is postulated that social interaction with peers influences the quantity and quality of feedback, and ongoing work is being undertaken to test this hypothesis.

Student feedback strongly supports continued use of ARS for communal feedback, despite the technological challenges experienced. The main benefit was preservation of anonymity, while offering a forum for group discussion and reflection to inform feedback comments. This combination allowed quantitative feedback to be gathered from all students while prompting meaningful qualitative comments. Feedback from these sessions consistently provided clear direction for future unit and course development. Students particularly enjoyed seeing the whole class responses, and all of them reported enjoying the sessions and expressed a strong preference for ARS use in future feedback events.

The outcomes of this study have led to the ongoing use of ARS for unit and course feedback collection for the Bachelor of Radiation Therapy course. Regular communal feedback sessions are timetabled into the course as ongoing events. Feedback from these sessions forms a vital component of the student input into the course quality review mechanisms.

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