

## Student response systems: enabler of active learning in a large class

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### **Abstract**

*This paper presents students opinions on the benefits they gained from using Vevox – a student response system (SRS), in a 2022-23 Semester I, final-year undergraduate module with 56 students in an Irish University. The students were surveyed to assess what benefits, if any, they believed they had obtained from using the SRS in the module. The key benefit identified by 41% of the students was that using the SRS contributed to them engaging with the lectures – both in terms of the material being taught and with their classmates. The second most important benefit identified was that the questions posed via the SRS enabled the students to reflect on their learning while in the lecture. The research contributes to the literature by showing that posing open-ended questions via SRS leads to active engagement and learning by students.*

**Keywords:** *Student response system; audience response system; active learning; large class teaching; Vevox.*

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## **1. Introduction**

The ability to use computer technology to enable students to ‘vote’ emerged in 2005 when physical clicking devices in the possession of students could be connected via a radio-frequency to a receiver. These devices normally had 4 buttons from which students could choose to answer a multiple-choice question posed by the lecturer. Even with such limited capabilities research found that using them resulted in significantly increased student engagement and improved satisfaction with their learning experience (Chou, Chang, & Lin, 2017; Nikou & Economides, 2016; Pimmer, Mateescu, & Gröhbiel, 2016).

In recent years, such ‘clickers’ have been replaced by mobile phone apps that allow student responses. There are currently 80+ such app systems, with the most popular being Kahoot, Polleverywhere, Vevox, QuestionMark and TurningPoint. These new student response systems have significantly improved functionality – allowing different question types, including open questions where the response is a typed answer. In addition, because they run on mobile phones – which are ubiquitous among the student population – and can communicate via either wifi or mobile network, they can be used by all students easily and do not suffer the technical connection issues that was common among radio-frequency clicker systems. (Bogdanović, Barać, Jovanić, Popović, & Radenković, 2014).

The general availability of these technically reliable student response systems (SRS) which are now available for purchase via Institutional software site licences, provides the possibility of widespread adoption. In addition, these systems now facilitate various assessment functionality via the variety of question formats that they allow. Which, makes them an ideal technology to enable technologically based assessment as part of the live teaching environment. While traditionally such assessments in the live teaching environment would have used pen and paper, in large classes this was not practical due to the time required to gather such paper-based responses alongside the need to manually match the individual student responses against a class list. With SRS, the assessment questions are available to all students at the same time and for an equal duration. Student responses are available immediately electronically and the student response system has functionality to amalgamate answers which can immediately be displayed to students – such immediate feedback has consistently been demonstrated to improve learning. From an administrative point of view each students answer is available in the system against their name – so marks awarded are easily recorded.

Research to date on SRS has been predominantly on enabling student participation and enhancing their learning, but little research has focused on using them as an assessment method – even though they have been identified as a technology that could enhance formative assessment in the 21st century (Spector et al., 2016). An early systematic review on student response systems undertaken by (Kay & LeSage, 2009) suggested that research need to be

carried out with respect to the impact of specific types of questions in enabling improved learning environments. A recent systematic review on SRS (Wood & Shirazi, 2020) and the student experience found that the most widely discussed theme within the articles identified was student engagement. Echoing the research call of (Kay & LeSage, 2009) who also identified the area of assessment – specifically ‘question design’ as a critical element in the use of SRS, and acknowledge that it is an area that requires further study, and more specifically the use of SRS to pose open-ended questions to students. This research seeks to answer this call for research.

## **2. Case Study**

The SRS, Vevox, was used in the final year University under-graduate module: Business Intelligence & Analytics in Semester I, 2022-23 by the author in the University of Galway. 117 students took the module. Vevox was used in each of the eleven 2-hour lectures to ask open-ended questions which together were worth 15% of the overall assessment marks for the module. Forty questions were asked over the duration of the module. The decision to partake in some or all of the 40 questions was a decision each student had to make and importantly they were not deducted marks for not partaking, instead any marks not availed of through answering the in-class questions were instead awarded for their final written exam.

### **2.1. Data Collection method**

At the last lecture in the module, students were asked 3 questions via Vevox, about their experience of using Vevox. In advance of putting up the questions, the lecturer made it clear that these questions would not form part of their in-class assessment mark and so it was entirely voluntary if they wanted to answer them. Also, they were assured that at no stage would the answers they gave be attributed to them individually – i.e. their anonymity was assured. There were 61 students present at the last lecture and 56 of those chose to answer the questions about Vevox. This means that 47% of the students registered for the module partook in the survey. This would have been higher had attendance at the final lecture been higher.

A central part of the pedagogy for using in-class assignments in this module was to ask open-ended questions that required students to think and provide their own answers based on their own individual learning. This ethos was also used in the phrasing of the questions on their experience of using Vevox.

The three questions asked were.

1. What benefits (if any) do you believe you have gotten from using Vevox polling software in this module?

2. In what ways (if any) do you think using Vevox polling in this module has helped your learning?
3. Write down your questions/suggestions as to how the lecturer could use Vevox Polling to better improve your learning?

### **3. Findings**

The answers given for each of the questions were analysed and categorised at the individual question level and additionally also across the three questions.

Given that submitting the answers via Vevox was the means through which the 15% available for in-class assessment was facilitated, it might reasonably have been expected that this was a benefit that students would self-identify from using the Vevox software. To assess this, the answers across all three questions were analysed. Across the three questions, only 6 students (10% of respondents) mentioned anything about obtaining marks for their answers to questions each week and 3 of these were with respect to suggestions on how to improve things.

The lack of responses that even mentioned the availability of continuous assessment marks, is surprising, especially given this module is a final-year module and as such the marks from the module contribute to the calculation of each students overall degree result.

#### ***3.1. Benefits of using the student response system***

The key benefit identified by 41% of the students was that using the SRS contributed to them engaging with the lectures (Table 1) – both in terms of the material being taught and with their classmates. Examples of responses identifying engagement, were:

- “Engagement in class and improving participation/attendance. Helped me stay focussed. Feel like opinion listened to.”
- “From being forced to be engaged (at the beginning), to really getting engaged into this module, serious thinking, etc.”
- “It has led to me being much more engaged with the lecture as it is more interactive. Without any sort of engagement in lectures I tend to stop paying attention, so I have really enjoyed engaging with the content in real time rather than just in assignments”

**Table 1. Benefits of using student response system.**

<b>Benefits identified by students from using Vevox?</b>	<b>Responses</b>	<b>% of Responses</b>
Engagement in lectures	23	41.07%
Learning Reflection during lectures	16	28.57%
Anonymity	6	10.71%
Critical Thinking	3	5.36%
Active Participation	3	5.36%
Answer Comparison	3	5.36%
Class Participation Marks	2	3.57%
Total	56	100.00%

The second most important benefit identified was that the questions posed enabled the students to reflect on their learning while in the lecture. Some of the answered classified under this benefit are below:

- “It got me to think more deeply during the lectures, it helped me to start a discussion in my own head and listening to other student’s mental models afterwards for me to think differently”
- “It helped me to actually think about the lecture material rather than just listen. So, I do think this type of engagement helped me learn because the info sticks better.”

Six of the respondents identified that the anonymity of the system – the fact that who gave the answer was never identified when answers were shown on-screen in class – was an important benefit for them. One example of a response that specifically cited the benefit of anonymity was:

- “I enjoyed using Vevox, it allowed students to answer questions freely and without having to shout out answers in class which many people would be uncomfortable with.”

A benefit that was identified by 3 students was that the use of SRS to pose questions enabled them to think critically, one example of a response is: “As explained by the lecturer, several polls were given to challenge our thinking and critically discuss several topics.” Three students stated that the SRS enabled them to actively participate in the lectures, e.g. of a response: “It has allowed for active participation and has given me the opportunity to share my views on various topics.” The capability of the system to immediately show on screen other students answers to the question was a benefit directly identified by 3 students. Text of one such response is: “The ability to get an insight into other students’ thoughts & opinions

and to allow me to critically think about certain questions that I would not have thought about before.”

Looking at the totality of the responses from students with respect to the benefits they believed they obtained from the SRS, it should be noted that none answered that they had received no benefit – even though this was allowed for in the question as it started with the words: “What benefits (if any).” The overall picture of what emerges from an overview of the answers is that the students benefited from the system as it enabled them to actively engage in and contribute to their learning while in the lecture and they could do this in a way that respected their answers by maintaining their anonymity.

### **3.2. Benefits to students learning**

The second question asked, was more specific – asking students to reflect on how they believed the system had helped their learning. The answers given were very similar in opinion and focus to the responses to the first question on overall benefits. The similarity of the answers to the two questions strengthens the argument that the students saw the SRS as facilitating and enabling their learning, rather than just something that only had the functional purpose of recording their attendance and assessing them, or just being entertaining.

The categorised responses are shown in Table 2 below. Looking at the responses collectively, what emerges is that the students believed the SRS helped their learning by facilitating them in being active, engaged and reflective learners while being in the lecture hall. The benefit of obtaining continuous assessment marks because of answering the questions posed was only identified by 5% of the students as a way the system had helped their learning.

**Table 2. How students believed the SRS helped their learning.**

<b>How helped Learning?</b>	<b>Responses</b>	<b>% of Responses</b>
Active Learning in lectures	18	34.62%
Active Reflection in lectures	13	25.00%
Engaged learning	9	17.31%
Critical Thinking	6	11.54%
Class Participation Marks	3	5.77%
Other Answers	3	5.77%
Grand Total	52	100.00%

### 3.3. Students suggestions for improvement

The extant literature on the use of SRS talks a lot about the importance of the questions asked in terms of the benefits obtained by students. The third question asked sought to ascertain what ideas the students might have in terms of questions and/or suggestions that would better improve their learning. The categorisation of the answers given is shown in Table 3 below. During the module, the students answered 40 questions, yet none of them suggested a way to improve things was to ask fewer questions, instead 21% suggested asking more questions. A lot of the suggestions for improvement was on better question construction – with some wanting more focused questions – such as multiple choice questions, but others looking for more open ended questions which might be posed at the end of one lecture to be answered at the start of the following weeks lecture.

10% of the respondents would have liked to see more discussion in class on the answers provided. This was done on a few occasions during the module, but the suggestion indicates that students found benefit in this and allowing for more of this is likely to further increase the sense of engagement and active learning experienced by the students. One of the features within Vevox is that the answer to a question can be displayed as a word cloud. To enable the word cloud to be displayed effectively, Vevox limits each individual answer to 20 characters. This character limit on answers was cited by 3 students as something that they suggested might be usefully removed to allow a more complete answer.

**Table 3. Suggestions for improvement.**

Suggestions for improvement	Responses	% of Responses
No Suggestions	13	25.49%
Improved Question Construction	13	25.49%
More Questions	11	21.57%
More discussion in class on answers provided	5	9.80%
No Character Limit on Answer	3	5.88%
More Time to Answer	3	5.88%
Use for Assessment	2	3.92%
Vevox Software Capability Improvement	1	1.96%
Total	51	100.00%

#### **4. Conclusion**

The use of a student response system consisting of open-ended questions to enable in-class interaction with students in a large lecture is something that is highly regarded by the students as being beneficial to their learning experience. The answers given by students via the SRS were graded and could account for up to 15% of their final grade, yet this benefit from the system was only cited as a benefit by less than 10% of the students. Instead, the key self-selected benefits that students identified were active engagement, active participation and real-time feedback on their answers relative to their peers. This case study clearly shows that used in the correct way asking open-ended questions via a SRS enable simultaneous individual student engagement and learning in a large classroom setting.

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