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專業進修學院

SPEED



Working Paper Series

Title	Student perception on a student response system formed by combining mobile phone and a polling web site
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Issue Date	2015
Issue Number	3
Paper Number	6
Citation	Wong, A. (2015). <i>Student perception on a student response system formed by combining mobile phone and a polling web site</i> (Working Paper Series No. 6, Issue 3, 2015). Hong Kong: The Hong Kong Polytechnic University, College of Professional and Continuing Education, School of Professional Education and Executive Development. Retrieved Jan 5, 2016 from http://weblib.cpce-polyu.edu.hk/apps/wps/assets/pdf/w20150306.pdf
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Student Perception on a Student Response System Formed By Combining Mobile Phone and a Polling Web Site

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ABSTRACT

Every teacher understands the importance of getting timely student feedback for effective and efficient teaching and learning. However, students in Hong Kong are not keen to respond to prompts from teachers for questions and examples. There is a need for an efficient method to engage all the students in a classroom, and evaluate the progress of their learning.

Studies have shown that student response systems (SRS) are effective increasing student engaging and active learning. In a traditional SRS, the students use a small portal device, called a clicker, to choose their answers to questions. With the widespread use of smart mobile phones, it is possible to replace the clickers with mobile phones, and the proprietary software with commercially available polling web site.

The author subscribed to a polling website and used it together with the mobile phones of students to form an SRS. The SRS was used over a period of 6 weeks. Thirty-five polls were conducted and 1,155 answers were received. A follow-up survey showed that the students involved have very positive attitude towards the SRS. Over 90% of the students indicated the polling website was easy to access and worked well. The majority of the students indicated that it SRS made the lessons more interesting and helped them to maintain their attention. They also indicate that they were willing to use SRS in future. It is suggested that the Technology Acceptance Model be used to study teacher's intention to use SRS in future.

KEYWORDS: Student Response System, Mobile Learning, Polling, Clickers

1 INTRODUCTION

To achieve effective and efficient learning, student engagement is essential, but not easy to achieve (Micheletto, 2011; Wang, Shen, Novak, & Pan, 2009). In a classroom where the majority of the students are Chinese, the lack of student engagement is often an obstacle to achieving the learning outcomes (Wang et al., 2009). As digital technology continues to improve and become more economically viable to schools, many researches have been done to exploit technology to increase the student engagement (Hwang, Wu, Tseng, & Huang, 2011; Jungsun & Kizildag, 2011; Liu & Chen, 2015). Recently, many researches have focused on the use of SRS (Student Response Systems) in which the teacher can gather and summarise answers from students inside the classroom immediately (Carnaghan, Edmonds, Lechner, & Olds, 2011; Seamus McLoone, Villing, & O'Keeffe, 2015; Monk, Campbell, & Smala, 2013; Valle & Douglass, 2014). In a traditional SRS, the students use a small portal device, called a clicker, to choose their answers to questions. Then some proprietary software with summarise the responses from the students and display them on screen (Williams & Boyle, 2008).

Many studies revealed that SRS are effective increasing student engaging and active learning (Cain, Black, & Rohr, 2009; Lindquist et al., 2007; Park, Nam, & Cha, 2012; Şad & Göktaş, 2014). They are especially useful in creating a more engaging environment in a large lecture hall. The main benefit of using an SRS is that students are not afraid to answer questions because students can only see the statistics of the different answers, but not the individuals who gave the answers. However, using clickers means the school or the students have to purchase the hardware and software (Monk et al., 2013). Also, the clickers are usually small numeric keypads that have limited text entry capabilities. With the widespread use of smart mobile phones, it is possible to replace the clickers with mobile phones, and the proprietary software with commercially available polling web site.

The rest of this article is structured as follows. It starts with by reviewing the advantages mobile phones over the traditional methods of getting student feedback in the classroom. Then it reports the study that using an SRS that was created by combining a polling website with mobile phones of the students. Finally, it shows the results of a survey about the student's perception of the use of SRS. Lastly, some suggestions for future research in this area of mobile learning are suggested.

2 MOBILE PHONES VERSUS TRADITIONAL METHODS

In the tradition classroom where no technology is used, the teacher cannot get real-time feedback from their students. Typically, the teacher will ask some questions and request students to answer them verbally or raise their hands to choose their answers. Alternatively, the teacher may ask students to write down their answers on pieces of paper. These traditional methods have been used over a long period of time and can be used across many disciplines. Since no technology is involved, there is no special knowledge or equipment requirement. However, this traditional method has some shortcomings that greatly reduce its effectiveness.

When the teacher wants to get qualitative answer from students, they would invite some students to answer question verbally. Many students are too shy to give verbal answers in front of their classmates (Wang et al., 2009). It is not uncommon that when students try to answer questions, their voices are too low so that the teacher and the rest of the class cannot hear them correctly. This problem becomes more serious in Hong Kong where classes are often conducted in English, but the student's mother tongue is Chinese. Using mobile phones, even shy students

are not intimidated to answer questions and show their answers in front of the class. This is assuming the answers are shown anonymously on screen.

When the teacher wants to get quantitative answer from students, they would invite some students to raise their hands to indicate their choice of answers. If the teachers ask the students to raise their hands, many of them are afraid to be the first ones. Conversely, when most of the students raised their hands, the remaining few students are often forced to raise their hands too (Withey, 2010). Raising hands creates the problem for the teacher because it is hard to count and even harder to keep track of who raise their hands to what question. If the teacher collects answers in written form in class, then the teacher has the extra effort of handling paper and try to interpret styles of writing that are sometimes difficult to read (Bae & Kim, 2014; Cheung, 2008).

Due to the limitations of the traditional methods mentioned above, the teachers who teach the same subject cannot easily and accurate compare the response and progress of the students. With mobile phones, the teacher can collect and show answers instantaneous on screen. The answers are stored on the server and can be analysed by the teacher later. There is no extra effort to count hands and handle paper. The teacher can focus on the teaching. The statistics from different class on the same subject can be collated and compared easily.

3 THE STUDY

The author used PollEverywhere, a commercially available polling web site to teach a class of undergraduates who were taking the Management Information Systems course in Hong Kong. PollEverywhere can accept student response in a number of channels including SMS text, Twitter and Web. This study only accepted student responses through the web because of the following reasons. Firstly, SMS text may have cost implications on the students, who are studying full-time. Secondly, Twitter is not popular in Hong Kong.

There are no costs to the students who are subjects of this study. The campus at which the author is teaching provides free WIFI access to all students via both the Eduroam and CPCE-Student. This means students do not need to subscribe mobile data plans for answering polls in this course. The software offered a free trial version which can only accept 25 responses per poll for business users. For educators, the software offered a free version which can accept 40 responses per poll. In both trial versions, grading of responses is not allowed.

The cost of the software is minimal and flexible. The author subscribed the USD19 per month plan which can accept up to 50 responses and allowed grading of responses. It is flexible because the plan can be terminated when polling is no longer required. In terms of question design, the author's subscribed version and higher version is the same. The more expensive versions have additional features such as moderation of answers, more responses per question and team competition.

Student accounts are created without too much effort. The software can import student accounts directly from Management Systems (LMS) such as Blackboard and Canvas. Since the LMS is not supported by the software, the author created forty-four students accounts exporting student names from the School's LMS into a common-separate value (CSV) file. Then they are formatted according to the requirements of the polling website. Finally, they are imported into the polling website to create usernames and passwords.

The SRS was used in 12 lessons over a period of 6 weeks. Thirty-five polls were conducted and 1,155 answers were received. There are three types of questions, namely, true/false, multiple choice and open-ended. On average, three questions were asked through polling per lesson. The maximum number of questions used in one class was six. In some lessons, the author found it

Figure 3: Student responses to the same open-ended question as in Figure 2, but shown as clusters.

At the end of the study, a survey was conducted using an online questionnaire. The students filled out the questionnaire anonymously. There were forty-four students in the class and thirty-nine students completed the questionnaire. The survey response rate was 89%. The results of the survey are presented and discussed in the following section.

4 FINDINGS

Both the hardware and the polling web site worked smoothly during the study. The question creation process requires about one full day to learn. It was found that the majority (85%) students used mobile phones as the device for answer questions in the polls. Only a few students used the tablet (5%) and notebook computer (10%) to answer questions in the polls (Table 1). The phone reception was excellent in the classroom and no students experience problems in connectivity. Three students created their own guest accounts when they didn't have to. They answers using the wrong account until 7 out of the 33 polls are done.

Table 1 Devices used by students for answering questions in the polls

Device Type	Number of Students	Percentage (n=39)
Mobile phone	33	85%
Tablet	2	5%
Notebook Computer	4	10%

The response rates in the SRS polls were satisfactory (Table 2). Students are more responsive to true/false questions, which has the highest response rate of 68%. Students are also willing to answer multiple choice questions, whose response rate is 56%. However, less than half of the students responded to open-ended questions. Note that the response rate is the percentage of student responses divided by students on the register, not students in the classroom. Since some students in the register may not attend all lessons, the response rates may be underestimated.

Table 2 Response rates to different types of poll questions

Question Type	SRS Poll Response Rate*	Number of Polls
Multiple Choice	56%	16
Open-Ended	47%	5
True/False	68%	2

The open-ended questions were useful because it is easy to spot the problems the students faced. There are two problems that occurred frequently. Firstly, many students did not follow the instructions. Firstly, they used more words than the question allowed. Secondly, there are grammatical and/or spelling mistakes in their answers. For example, a student wrote down "willing to be promotion". No offensive or obscene answers were received for open-ended questions. This is probably because it was stated clearly at the beginning that the teacher could track the users to the students who made them.

Table 3 Student Perception on the SRS

("1" to "5" represent Strongly Disagree, Disagree, Neutral, Disagree, and Strongly Disagree respectively)

	Statement	Average Score	Percentage of “Strongly Agree” or “Agree”
Q1	My mobile device(s) work(s) well with the polling website.	4.28	95%
Q2	I can access the polling website easily.	4.13	90%
Q3	Learning with SRS is relevant to the subject of Information Systems.	4.13	85%
Q4	Answering questions using SRS helps me to maintain my attention .	4.10	74%
Q5	Answering questions using SRS makes the lessons more interesting.	4.10	77%
Q6	I have the necessary skills for answering questions using SRS.	4.18	92%
Q7	It is easy to answer questions using SRS .	4.10	82%
Q8	I am willing to answer questions using SRS in future .	3.95	85%
Q9	If another lecturer uses SRS, I will answer all questions.	3.95	72%
Q10	I like answering questions using SRS .	3.87	67%

5 DISCUSSIONS

The following sections discuss the student answers to the questions Q1 to Q10 listed in the table above. These questions can be divided into five groups. Each group will be discussed in a separate section below.

Firstly, the students were happy with the hardware and the web site that form the SRS. The mobile device ownership was 100% and all students were able to participate in the SRS using their mobile devices. This is consistent with similar research in other universities. For Q1 and Q2, almost all students said their devices worked well with the SRS, and that they could access the polling web site easily. The scores were 4.28 and 4.13 respectively.

Secondly, the student had positive perception in the usefulness of SRS in helping them to learn the subject. For Q3, Q4 and Q5, the majority of the students also agreed that SRS is relevant to the subject, and that the SRS helped them to maintain their attention and made the lessons more interesting. The scores were 4.13, 4.10 and 4.10 respectively. It was possibly because the answers from the students were shown in attractive ways such as bar charts, word clouds and clusters. It was also because some students gave unusual answers to some questions.

Thirdly, the students indicated that they didn’t need spend much time and effort to learn to use the SRS. For Q6 and Q7, the majority of the students said they had the necessary skills to use SRS and it was easy to answer questions using SRS. The scores were 4.18 and 4.10 respectively. It was because the students only need to enter the URL of the polling web site into their mobile device and log in once in the first lesson. In subsequent lessons, the students didn’t have to login again. Also, because the teacher could control which exact question the students saw so that they didn’t have to navigate around to find the right question to answer.

Fourthly, although the students were willing to use SRS in future, the average scores were lower than the three groups of questions above. For Q8 and Q9, the majority of the students

mentioned that they were willing to use SRS in future and if another lecturer uses SRS, they would answer all questions. The scores were 3.95 and 3.95 for both questions.

Finally, the students indicated that they like answering questions using SRS. For Q10, the average score is 3.87, the lowest among the five groups of questions. The raw data showed that 26% of the students chose “Neutral” as the answer, while 5% chose “Disagree” and 3% chose “Strongly Disagree” to this statement. Therefore, more research is needed to find out why only sixty-seven per cent of the students liked answering questions using SRS. One possibility was that the polling web site that was used in the study does not allow students to change their answers after submission. In more than one incident, students indicated that they submitted an answer that they didn’t intend to. Another possibility was that the students didn’t like typing in long sentences as answers.

6 CONCLUSIONS AND SUGGESTIONS FOR FUTURE RESEARCH

In summary, the study showed that it is a feasible approach to combine student mobile phones and polling web site to create an effective SRS. The technical side of the SRS went well during the study. Students also agreed that it made them more attentive and the lessons more interesting. Students had generally very positive perception about the SRS, although more research is needed to understand why their intention to use SRS in future is not as positive as other perceptions about SRS. The results are largely in line with a previous research on an SRS formed by using student mobile phones (Séamus McLoone & Brennan, 2013). One special finding is that the average scores on student’s intention to use SRS in future and their general acceptance on SRS are lower than the other constructs. Therefore, there is a need to research on the factors that affect the student’s intention to use SRS in future.

The SRS is an effective and efficient way to get real-time feedback from all students. However, there is a need to investigate the factors that will affect teacher’s willingness adopt this technology in the classroom. Therefore, it is suggested that the Technology Acceptance Model (Venkatesh & Davis, 2000) be adapted to find out the factors that affect the teacher’s intention to use SRS. Furthermore, it has been shown that Internet technology such as online surveys can be an effective tool to perform peer evaluation (Wong & Ng, 2005). Therefore, one possible use of the SRS is to allow students to perform peer evaluations on each other’s work.

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