Student Perceptions of and Satisfaction with Mobile Polling Technology: An Exploratory Study

Bela Florenthal

Purpose of the Study: To further mobile polling research, this study examines student perceptions of and satisfaction with new polling software, Socrative (www.socrative.com), which is comparable to Poll Everywhere but provides instructors with additional features.

Method/Design: An exploratory study was conducted to assess how students perceived benefits, drawbacks, and the level of satisfaction from using this software in an upper level marketing course.

Results: The study identified four key categories using a thematic analysis of qualitative data: (a) student learning, (b) course delivery and assessment, (c) use of technology, and (d) satisfaction and adoption. Eighteen strengths and four weaknesses are presented. Some of the main strengths are as follows: anonymity, knowledge acquisition, interactivity, immediate feedback, usefulness, ease of use, and motivation to participate. Weaknesses include non-participation, distraction, software reliability, and motivation to cheat. In addition, students provided suggestions for improvement while urging other instructors to adopt this technology in their courses.

Value to Marketing Educators: Mobile polling is gradually replacing clicker technology as the student response system (SRS) of choice largely because students prefer to use their own devices to participate in class. So far, a handful of technologies have been investigated with respect to mobile polling. The current study adds to the emerging research on mobile polling in exploring the Socrative technology. It aims to examine whether this software is comparable to other available student response systems (SRSs), such as clickers and Poll Everywhere.

Keywords: student response system, mobile polling, clickers, Socrative, Poll Everywhere

Bela Florenthal, Ph.D., Associate Professor of Marketing, Cotsakos College of Business, William Paterson University, Wayne, NJ, Tel: 973-720-3679, E-mail: florenthalb@wpunj.edu.

Most students own a mobile phone and have used it in the classroom. A recent study investigating mobile usage among students revealed that 95% of students own a smartphone and 57% own a tablet, which they mostly use for social purposes (Chen, Seilhamer, Bennett, & Bauer, 2015). Furthermore, the study indicated that students use their mobile phones (73%) and tablets (45%) for learning purposes whether required by instructors or on their own accord. This creates an opportunity for instructors to adopt mobile devices in their classes as student response systems (SRS), replacing traditional clickers (Noel, Stover, & McNutt, 2015). Moreover, Chen et al. (2015) reported that fewer than 20 percent of instructors require students to use mobile devices for coursework, signaling that instructors fall short in utilizing mobile devices for learning.

In reviewing the literature, one can see that clickers increase engagement, interaction, and participation in class discussions (Han, 2014a; Rana, Dwivedi, & Al-Khowaiter, 2016). With mobile software developers aiming to replace clickers, emerging research has started to examine the benefits students perceive from using their devices as SRSs (Noel et al., 2015; Voelkel & Bennett, 2014; Wong, 2016). Some studies, which have mostly assessed the use of Poll Everywhere, have compared students' usage of mobile polling software with a clicker system and have concluded that the former has some advantages and disadvantages over the latter (Stowell, 2015; Sun, 2014).

Socrative is another mobile polling technology that shares similar features with Poll Everywhere, but it has not been systematically researched. To further mobile polling literature, the main purpose of this study is to introduce this new polling software, including possible classroom uses, and evaluate it utilizing student perspectives. An exploratory qualitative method was employed to identify student perceptions of key strengths and weaknesses of Socrative as well as their level of satisfaction and the extent to which they adopted the technology.

LITERATURE REVIEW

Student response systems (SRSs) have been adopted by instructors for more than a decade in order to increase engagement, participation, and discussion in the classroom (Draper & Brown, 2004; Judson & Sawada, 2002). SRSs, also known as electronic voting systems or interactive response systems, are small electronic devices that allow students respond to questions in class in real time (Sprague & Dahl, 2010).

Researchers using quantitative and qualitative methods have mostly sampled students to examine how instructors use clickers as SRSs in their classrooms (Han, 2014a). Table 1 provides a summary of recent SRS studies specifying the type of SRS investigated, the method(s) used, the sampled population, the courses in which SRSs were implemented, and the concepts/themes that were identified or examined. This growing body of research indicates that the advantages of SRSs outperform their disadvantages. For example, Rana et al. (2016) identified more than 15 benefits that were related to clickers in various studies. Though most studies have not conclusively found that students receive cognitive benefits (e.g., increased performance) from using clickers, they have shown that clickers provide students with non-cognitive benefits (e.g., increased engagement, involvement, and attendance; Ha, 2014a).

Table 1

Interactive Technologies in the Classroom: Types, Courses, and Concepts/Themes

Type of Technology	Method & Sampled Population	Courses	Concepts/Themes	Author/s
Clickers (Student Response Systems – SRS)	Method: Quantitative (T-tests, Descriptive) and Qualitative Sampled Population: Students	Operation and Supply Chain Management Course	Involvement Engagement Participation Interactivity (individual vs. class) Perceived ease of use Perceived usefulness	Heaslip et al. (2014)
Clickers (Student Response Systems – SRS)	Method: ANOVA Sampled Population: Students	Undergraduate Consumer Behavior Course	Student performance (exam scores) Self-reported understanding Attitude	Hedgcock and Rouwenhorst (2014)
Clickers and Mobile Polling by Turning Technologies	Method: Quasi-experimental Design Sampled Population: Students	Educational Research Methods Course Sociology of Education Course	Anxiety Self-efficacy Cognitive engagement Academic performance Attention Relaxation	Sun (2014)
Clickers (Personal Response System – PRS)	Experimental Design (pre-test/post-test/control groups) Sampled Population: Students	Course in Engineering	Interactive engagement Student characteristics Quality of instruction Motivation Learning Academic performance (Aptitude)	Tlhoaelea et al. (2014)
Mobile Phone Polling by Poll Everywhere	Method: Descriptive and Thematic Sampled Population: Students	Undergraduate Courses in Biological Sciences	Learning experience (fun, like, break, want more) Learning process (feedback, engagement, useful, class response, application) Problems with technology (cost, technical problems) Dislike of approach (don't like, approach)	Voelkel and Bennett (2014)

Clickers	Method: Survey, Observations, and Interviews Sampled Population: Students	Two Sociology Courses	Learning engagement (advantages and disadvantages) Learning process Participation Critical thinking Empathy	Hoekstra (2015)
Mobile Polling by Poll Everywhere	Method: Survey, Descriptive Sampled Population: Students	Five Undergraduate Leadership Courses	Behavior-related engagement Emotion-related engagement Cognitive-related engagement	Noel et al. (2015)
Clickers and Mobile Polling by TurningPoint	Method: ANOVA Sampled Population: Students	Two Undergraduate Upper-division Psychology Courses	Academic performance Attitude Preference for polling format Perceived value of classroom polling Frequency of various technology problems	Stowell (2015)
Clickers (Review)	Method: Systematic Review Sampled Population: Students	Courses from Business, Accounting, Management, Marketing, MIS, and Finance Disciplines	Engagement Performance Learning Participation Satisfaction Feedback Attendance Enjoyability Motivation Interactivity Attitude Anonymity Ease of use Assessment Understanding Effectiveness Attention	Rana et al. (2016)
Clickers	Method: SEM Sampled Population: Students	Second-year Digital Marketing Course	Ease of use Usefulness Behavioral intention Behavior Satisfaction	Rana and Dwivedi (2016)
Mobile Polling by Poll Everywhere	Method: Descriptive Sampled Population: Students	Undergraduate Management Information Course	Ease of access Relevance Attention Interest Ease of use Behavioral intentions Behavior	Wong (2016)

More recently, instructors have begun to use mobile technology instead of clickers, to engage students in classrooms, especially in higher education settings (Stowell, 2015). Emerging research indicates that students prefer mobile technology over clickers or raising their hand to participate. Sun (2014), for

instance, found that students perceived mobile polling to be more interactive and responsive than clickers. In addition, 40% of students who could choose between clickers and mobile polling technologies preferred the second option over the first (Stowell, 2015). A significant advantage of mobile polling technology is "its independence from additional hardware or software most often associated with traditional clickers" (Noel et al., 2015, p. 54). Students can use their personal devices (e.g., smartphones, tablets, and laptops) to participate in class. The only technical requirements are that their devices can send short messages (SMSs) and/or be connected to the Internet (Burkhardt & Cohen, 2012).

Forgetting one's clicker or losing it at the beginning of the semester can cause stress. However, millennials constantly use their mobile phones, which does not typically require them to remember to bring them to class. If the burden of cost falls on students, some resent purchasing additional equipment, especially if it is used only in one class throughout their four-year education. Thus, mobile polling is predicted to replace traditional clicker technology in the near future.

Interestingly, students are the subject of most research on SRSs (Table 1), thus ignoring the experience of instructors with SRSs. A few studies have mentioned teachers' experiences but only anecdotally. Voelkel and Bennett (2014) noted that the use of questions via a mobile system was easy for instructors. It takes "only a few minutes at the beginning of lectures to access the Internet and log into the Poll Everywhere website" (pp. 48–49). However, to design meaningful questions that test students' understanding of course material can be challenging (Rana, Dwivedi, & Al-Khowaiter, 2016). Encountering technical problems in class (e.g., transmission failures, poor Wi-Fi, or battery drainage) can deter academics from adopting SRSs (Quinn, 2010; Stowell, 2015; Voelkel & Bennett, 2014).

Investigating instructors' experiences of SRSs can be problematic because of the significant variation in the design and execution of their teaching methods. In a study that compared case study teaching with clickers across institutions for a biology course, Lundeberg et al. (2011) noticed that instructors used three different clicker systems, ranging from simple to complex. As a result, the experience of using clickers in the classroom varied across instructors. They concluded that aggregating different instructors' experiences "can confound the results because instructors who adopt innovative approaches may be better instructors regardless of their use of clickers" (p. 648).

Though mobile polling has begun to replace traditional clicker systems, only a handful of mobile technologies have been investigated (Table 1). Similar to clicker technologies, mobile systems also vary in their operation and features. Some allow student to respond via text messaging, while others require logging onto a website; some are offered for free, whereas others require a paid subscription, purchased by the institute, instructor, or the students; some are only for class participation, while others include more features, such as quiz administration (Stowell, 2015; Sun, 2014). Table 2 presents the strengths and weaknesses of mobile and non-mobile SRSs, a comparison of clickers, and two mobile technologies, Poll Everywhere and Socrative.

Table 2
Comparing Mobile and Non-mobile SRSs

Characteristics	Clickers	Poll Everywhere	Socrative
Costs	• Free option unavailable • Out of pocket purchase of clickers by students or the institution	• Free option available • Free access for class of 40 students or less • Subscription starts at $14 per month per students to use more features	• Free option available • Free access for 50 students or less • Subscription of $60 per year to use additional features
Target market	• Higher education	• Business and non-profit organizations • Higher education • K – 12	• Higher education • K – 12
Device	• Clicker (electronic student response system)	• Mobile device (smartphone or tablet) • Desktop • Laptop	• Mobile device (smartphone or tablet) • Desktop • Laptop
Hardware & software	• Installed software is required • USB device to receive responses	• No required software to be installed • Laptop, desktop, and/or mobile devices	• No required software to be installed • Laptop, desktop, and/or mobile devices

	• Clicker devices (electronic voting systems)		
Means of response	• Clickers	• Text messages via smartphones • Twitter • Website	• Website • Application via mobile device
Type of questions	• Multiple choice • True-false • Fill in the blank • Numeric	• Multiple choice • True-false • Open-ended • Numeric • All available with free subscription	• Multiple choice • True-false • Open-ended • Numeric • All available with free subscription
Anonymous responses	• Available	• Available	• Available
Graded Responses	• Available	• Available only with paid subscription	• Available with free subscription
Presentation of responses (feedback)	• Distribution for quantitative responses	• Distribution for quantitative responses • Word cloud or a list of statements for qualitative responses	• Distribution for quantitative responses • List of statements for qualitative responses
Type of activities	• Attendance • In-class formative assessment • In-class summative assessment	• In-class formative assessment (no option for grading) with free subscription • Attendance with paid subscription • In-class summative assessment with paid subscription	• In-class formative assessment (with and without grading) • In-class summative assessment • All activities are available with free subscription
Identification	• Students are identified via clickers' ID numbers	• For texting, students need to join a session by testing a word or a username to a specific number • For Internet use, students are required to enter a webpage address	• No option of texting • For Internet or application use, students are required to enter an online room number to participate • Instructors use same room number for all classes

Additional features	• Click in when done with an assignment in class	• Not available for free subscription • Additional features are available with paid subscription	• Questions and answers can be randomized in quizzes and exams • Student progress of completing a quiz, an assignment, or an exam can be monitored • Different options for setting up the pace of completion of quizzes, exams, and assignments • Reusing and editing pre-designed quizzes, assignments, and exams • All features are available with free subscription
Main concerns	• Clicker is not working • Students forget to bring their clicker to class • Students lose their clicker	• Drained battery of mobile device • Software glitches • Wi-Fi is not working • Not a good cellular reception • Limited data plan	• Drained battery of mobile device • Software glitches • Wi-Fi is not working • Not a good cellular reception • Limited data plan

As specified in Table 2, all three SRS technologies can be used for class polling (formative assessment). Summative assessment (e.g., grading option) is available for clickers and the free subscription to Socrative. Poll everywhere has the summative option only with a paid subscription. Hence, a free subscription to Poll Everywhere reduces the engagement in class to only anonymous polling, while a free Socrative subscription and clicker technology provide instructors with additional options, such as attendance checking and administration of in-class quizzes and exams.

Both Socrative and Poll Everywhere can be accessed via their respective websites and are free of charge in small classes. A class of up to 50 students can use Socrative software for free, whereas Poll Everywhere limits free participation to 40 students per class. Clickers have no web access but can be used in small and large classes. Because Socrative has only a web-based presence, the access method is very simple. Instructors are assigned a virtual room number for all their classes, and students participate by typing the room number of their virtual classroom. Poll Everywhere is more complex from a user's perspective, as it has two systems to generate responses, connecting via SMS or using a designated URL.

The way students respond to questions is another differentiator among the three systems. The non-mobile option requires students to use their assigned clicker device for class activities. Poll Everywhere allows students to respond via text message and Twitter, while Socrative offers students the option to respond via its website or application. Thus, mobile SRSs are more versatile in terms of means of response. Student participation rate can be reduced if some forget or lose their clicker but with mobile systems, students can use multiple devices to stay engaged in class activities.

When polled in class, instructors who use any of the three systems, can display responses as a distribution (for multiple choice and true-false questions). Open-ended responses can be presented as a list of statements via Socrative and Poll Everywhere. Poll Everywhere, in addition, can display results as a cloud of words. Socrative, on the other hand, provides monitoring and grading of open-ended questions with its free subscription, while Poll Everywhere does not.

Furthermore, with a free subscription, Socrative software offers additional features that are not available when employing Poll Everywhere or clickers: (a) randomizing questions and answers, (b) determining the pace of completion (e.g., teacher- or student-paced), and (c) providing reports via email in the form of Microsoft Excel files. Clickers require instructors to learn how to use the software for creating questions and assignments and for viewing student grades. Poll Everywhere requires instructors to select "Paid Subscription" to receive reports in various formats.

However, mobile polling has some shortcomings, such as not being very reliable compared to clickers. Stowell (2015) found that students had trouble connecting to the Internet during class time. He also reported that students provided more incorrect answers when using mobile polling compared to clickers and

responded fewer times to questions. This result pinpoints the problem of anonymous responses, which are allowed through mobile polling but not via clickers, as students might not invest enough effort to identify a correct response or even to participate.

In summary, the free subscription to Socrative allows students to use mobile devices as response systems (similar to Poll Everywhere), and instructors can utilize it to grade assignments (similar to clickers) as well as make use of a variety of additional features that are not accessible via clickers or via a free subscription to Poll Everywhere. Furthermore, Poll Everywhere has been designed to satisfy businesses' and educators' needs, while Socrative was built to attract only educators. Therefore, learning to operate Poll Everywhere is more complex, particularly the paid subscription.

The current study adds to the emerging research on mobile polling in exploring student perceptions of Socrative technology. It aims to examine whether student perceptions of this software are comparable to the results found for other SRSs, mobile and non-mobile. Specifically, the study investigates what benefits and shortcomings students identify when using Socrative and how satisfied they are with using this software in an upper level marketing course.

METHODOLOGY

Software Implementation

Socrative software was implemented in several ways. First, it was used to increase participation in class; Poll Everywhere and clickers are employed in a similar fashion. Various questions were presented by the instructor on Microsoft PowerPoint slides. Students were encouraged to answer anonymously using either their laptop or mobile device. The responses were projected on a screen as a distribution of answers for multiple choice and true-false formats, or as a list of sentences for open-ended questions. A class discussion followed the visual representation of the responses. Secondly, at the end of each class, an exit quiz was administered via Socrative.com, which was designed in advance and included five questions selected from the participation question bank. Students received immediate feedback for each question that they answered. Thus, after completing the quiz, students knew their grade.

Finally, students completed in-class peer evaluation assignments that were designed in advance via Socrative software. These assignments used an open-ended format and did not provide immediate feedback to students, as they were graded later by the instructor. Students were required to evaluate their peers' in-class presentations—an assignment intended to increase student involvement in class presentations. The assignment was also designed to teach them how to assess others' work and how to provide constructive feedback to fellow classmates.

Data Collection and Analysis

Data were collected in two sections of a marketing management course in fall 2014. Using the Blackboard interface, students were required to complete the following: (1) a short survey and (2) a discussion group assignment. The short survey collected demographic (e.g., age, gender, and major) and behavioral (e.g., use of device, frequency of response, and frequency of technical problems) information. The discussion group assignment included three open-ended questions to assess the software's benefits, drawbacks, and the students' level of satisfaction. Students were also required to comment on their classmates' responses. In total, each student was required to comment on nine responses, three for each category—benefits, drawbacks, and satisfaction. Open-ended questions were selected to elicit honest thoughts and opinions from students about the software (Rubin & Babbie, 2008). Students could opt out and complete an alternative assignment, and they received a completion grade if they chose to participate. The study was approved by the Institutional Review Board for Human Subject Research at the university where the study took place.

The inductive process was implemented to analyze the qualitative data using Dedoose, a mixed methods online software package (www.dedoose.com). "Inductive analysis refers to approaches that primarily use detailed readings of raw data to derive concepts, themes, or a model through interpretations made from the raw data by an evaluator or researcher" (Thomas, 2006, p. 238). Themes were identified, and broader categories were formed based on the literature review of clickers and mobile polling technologies. For example, reoccurring themes, such as "enhanced learning experience" and "enhanced attention," were placed in the same category of "student learning," as both were related to how the use of Socrative affected student learning in a marketing management course. The inductive process is well-established as a qualitative method of analysis (Creswell, 2013; Florenthal, 2015a). In addition, previous studies researching in-class interactive technologies, such as clickers and mobile polling interfaces, have used similar methodologies to analyze qualitative data (Han 2014b; Hoekstra, 2015; Quinn, 2010).

In exploratory studies with a qualitative approach, the sample size is usually small, particularly when information saturation is taken into account (Florenthal, 2015a). "The criterion for sufficient sampling is saturation, that is, the point at which no new concepts and themes emerge" (Chen & Haley, 2010, p. 13). For instance, a qualitative study assessed likes and dislikes of clicker usage with a sample size of 40 students (Quinn, 2010). Another investigation interviewed 15 instructors in a focus group setting to evaluate faculty experiences teaching case studies with clickers (Lundeberg et al., 2011). With such a small sample size, external validity might be questioned. One way to validate results of a small-scale study is to compare them to previous research with similar objectives.

RESULTS

Descriptive Characteristics

In total, 29 students completed the Socrative.com survey and qualitative assignment through Blackboard. Fifty-five percent of students were males, 93% were seniors, and 90% were marketing majors. Close to two thirds (62%) of them were between 21 and 23 years old. Smartphones were used by half (52%) of the respondents, followed by laptops (21%), and tablets (10%). About 17% of the students used their smartphones and tablets interchangeably. Most students responded either very frequently (69%) or frequently (24%) to the anonymous discussion questions. Seventy-two percent of students encountered technical problems with the software either very frequently or frequently.

Emerging Categories and Themes

Four broad categories emerged from student responses: (a) student learning, (b) course development and assessment, (c) use of technology, and (d) satisfaction and adoption (Table 3). As students were asked to relay their perceptions in terms of benefits and drawbacks, themes referring to strengths and weaknesses emerged for each category. The satisfaction and adoption category corresponds to student responses to an open-ended question that probed their level of satisfaction with the mobile polling software.

Table 3
Emerged Categories and Themes (N=29)

Category	Strengths (Response Rate)	Weaknesses (Response Rate)
Student Learning	Anonymity (83%) Motivation to participate (69%) Enhanced learning experience (62%) Acquisition of knowledge and understanding (62%) Interactivity and interaction (62%) Engagement, enjoyment, and interest (48%) Encouragement of discussion (48%) Enhanced attention (45%) Retention of information (41%) Practice and preparation (31%) Enhanced performance (21%)	Non-participation and cheating (45%) Response distraction (48%)
Course Delivery and Assessment	Immediate feedback (59%) Assessment of self and other students (52%) Class organization (38%) Clarification of concepts (38%) Ease of grading and managing (21%)	Poorly designed questions (48%)
Use of Technology	Usefulness of the device (55%) Ease of use and convenience (52%)	Reliability and affordability (59%) Suggested improvements (14%)
Satisfaction and Adoption	Satisfaction with the technology (66%) Satisfaction with the course (48%) Adoption (45%)	

Student Learning

The student learning category had the largest number of themes with 11 related to strengths (benefits) and three related to weaknesses (drawbacks). Table 3 provides insight into how frequently each of the themes was mentioned by respondents. Anonymity was perceived as the most beneficial feature of Socarative.com (83%). One key reason why students perceived anonymity as a benefit was that it prevented students from being embarrassed when responding to a question in class discussions, especially when they provided an incorrect answer.

> Since professors usually call upon students to answer questions, they begin to feel pressure and tend to get embarrassed if they answer it wrong. With the help of Socrative, you can answer the question without having the nerve of getting it wrong. Even if you do get it wrong, your classmates will not know what your answer was, and you can correct it for yourself. (Female #7, Age 21)

Anonymity shelters students from unwanted attention in class: “The answers being anonymous allowed me to feel more comfortable with choosing an answer. That way all the eyes were not on me when the choice was made” (Male #23, Age 25). Furthermore, anonymity allowed all students to voice their opinion and, as a consequence, to learn from other student responses. A participant in her mid-twenties remarked: “Yeah, I liked that we were able to answer anonymously because more people would participate. This would

give us a good, honest sense of where the class was at in terms of learning the material" (Female #12, Age 25).

In class participation using Socrative also increased student motivation to participate (69%), encouraged discussion in class (48%), and enhanced attention (45%). With respect to motivation to participate, one student stated, "It made me really try to answer the question the best I could" (Male #2, Age 21). Another mentioned that, "it [Socrative] also was a fun way to motivate students" (Female #17, Age 25). Finally, Socrative motivated students to be "competitive" and answer questions "correctly." Close to 50% of the respondents enjoyed the discussions in class that followed their responses on Socrative: "I also liked how after the answers were posted, we could discuss it to get a better understanding" (Male #19, Age 23). In addition, students engaged in discussion among themselves to learn how their peers responded: "Once we individually put our answers up on Socrative, it was fun asking our peers around us what answer they submitted into Socrative" (Female #21, Age 24). Both class participation and discussion increased student attention:

> It was easy to pay attention, and made paying attention much more enjoyable when you know you're going to be asked a couple of questions at the end of the chapter. I loved being right, so I would always make sure I paid attention to get the question correct, even though I knew none would know if I answered the question correct or not. I just loved challenging myself. (Male #26, Age 24)

More importantly, student participation and attention led them to perceive that they acquired knowledge and deepened their understanding (62%) of the material covered in class: "One benefit being that it allows students to see if they're really understanding the material" (Male #2, Age 21). Students reported that participating in class resulted in better-retained course information (41%): "Being taught the material and then having short quizzes on it helped me retain the information better" (Female #12, Age 25). Additionally, the increased participation through Socrative made students feel as though they practiced and prepared better for quizzes and exams (31%): "The Socrative questions were a great way [to] practice before the exit quiz" (Female #21, Age 24). The reward for responding was evident in improved performance (21%): "Use[ing] the app was very easy, and the visuals were very clear. Certainly helped me boost the grade at the end of the semester!" (Male #9, Age 23).

Overall, their learning experience was enhanced (62%): "It was a great learning tool, and I'm quite sure it improved everyone's grade" (Female #21, Age 24). The process of learning was perceived as engaging, enjoyable, and interesting (48%): "The entire learning experience became much more [re]laxed, which bred an engaging and enjoyable class lecture" (Male #16, Age 23). Furthermore, the use of Socrative was perceived as interactive and students felt they interacted more with others using the mobile application (62%): "I 100% agree that our class was so lively and active because of Socrative. It was nice for once to go to a class that everyone gets along and interacts with one another" (Female #21, Age 24).

Students also mentioned drawbacks related to the learning experience, including ineffective questions designed by the instructor (48%). Students singled out one assignment (evaluation of presentations) that required significant cognitive effort in a short time period: "…it was difficult giving feedback on the presentations. Having to pay attention to the groups in order to have some feedback and then only having a few minutes to quickly type something was not easy" (Female #1, Age 24).

Though the majority of students praised the anonymity feature of Socrative, some (45%) pointed out that it increased non-participation and cheating: "One drawback to Socrative.com is whether or not a student is being honest with their answer, or if they chose a random answer (Male #23, Age 25). The second concern students associated with anonymous answers was that not all students participated: "Since the votes were anonymous, the professor never knew who was actually participating for class participation" (Female #7, Age 21).

As students had to complete an exit quiz for each chapter with five questions randomly selected from the questions discussed in class, it was beneficial for all to participate. Thus, some students acknowledged the two problems, non-participation and cheating, but did not perceive it to be very significant: "I believe that majority of the students were being honest with their answers. If there were dishonest answers it only affected the person that was being dishonest." (Male #26, Age 24)

Almost a half of the respondents (48%) suggested that the mobile application could distract students. One type of distraction was when students could engage in activities (e.g., texting, emailing) that did not pertain to class discussion:

> I feel one of the biggest drawbacks was the distraction provided by text messages that may come through as well as different apps one may be prone to open because it's there and the professor has okayed having cell phones out. (Male #16, Age 23)

Another type was when some students responded with a non-existing option, usually mostly symbolized by letter "E": "…This causes a slight distraction for the entire class because they can see if someone answers with letter 'e' even though the answers are only 'a,b,c,d'" (Male #16, Age 23).

Course Delivery and Assessment

About 60 percent of students perceived immediate feedback as a benefit of Socrative.com: "Other benefits included the ample opportunities to give feedback about PPTS [PowerPoint Slides] and lecture discussions" (Male #9, Age 23). Some mentioned the benefit of receiving feedback during the exit quizzes: "The quizzes after every chapter were also beneficial. It is nice to be able to take a quiz and immediately see what answers you got wrong, and why" (Female #4, Age 22).

Students enjoyed learning how they and their classmates responded to each discussion (52%): "The class polls were very helpful. It makes people feel better knowing that others are on the same page as they are" (Female #1, Age 24). In particular, students benefited from the discussions after each question where the instructor clarified the learned concepts based on the displayed responses (38%): "Secondly during the lesson if the wrong answer received too many votes it promoted our professor to explain further and really clarify the subject at hand" (Female #4, Age 22).

Furthermore, students perceived the even distribution of questions throughout the lecture along with exit quizzes that tested attention, retention, and understanding of the material as well-organized (38%). The classes were perceived to flow more smoothly and move faster. Students appreciated the way the information was broken down throughout the class. They also noticed that this application made it more feasible for the instructor to manage and grade class participation (21%): "The fact that the program would log all of our grades made it easier for the professor to keep track of every student's grades and made logging them easier" (Female #7, Age 21).

Use of Technology

Device usefulness was perceived as a benefit by more than 50 percent of the students: "I also agree that it was convenient not having to carry around anything other than a phone, tablet, or laptop" (Female #12, Age 25). In addition, students (52%) enjoyed the convenience and the ease of using the website via their mobile devices: "Socrative is mobile friendly and I felt like that certainly made it great to use" (Male #9, Age 23). However, the technology posed some challenges, as it was not always reliable, and it required an Internet connection (59%): "Socrative did have a few technical difficulties at times, but those are just small bugs that can be fixed" (Male #16, Age 23). Students reported the need to refresh the page in the middle of the assignment; sometimes, they could not connect to the application via their mobile devices, or their answers were not recorded:

> One drawback is the actual functionality on a smart phone. Socrative is a great concept but [I] found that when in use on my iPhone it became very glitchy and problematic. Many times during open ended quizzes, my answers weren't submitted or if I left the Internet app to check an email and reopened the app, I would be kicked out of Socrative as a whole. Which after the 4th or 5th time that [h]appens, it becomes very annoying. (Male #18, Age 22)

An additional concern students expressed was having to use their data plan if they could not connect to the university Wi-Fi, as the university Wi-Fi was not always reliable. A handful of students argued that not all could afford owning a mobile device and that classes that use technology should be conducted in computer labs: "Not everyone has a smartphone or tablet. Some people cannot afford that and it[']s a little assuming to think everyone in class will be able to participate in using the app" (Female #1, Age 24). Finally, battery life was a concern for some students as the extensive use of their phone in class required a full battery charge. If students forgot to fully charge their phones, it affected their ability to participate.

A few students (14%) suggested improvement to the application, such as keeping the student logged in the entire class time. Students reported that when they switched to another application, the software would log them off and they had to log in again. Being able to switch in and out of the application without the extra login step could improve the student experience with this website. Students suggested that developers create a more personized interface that would allow them to store class notes and to have several tabs for different courses similar to the Blackboard experience.

Satisfaction and Adoption

Two thirds of respondents expressed satisfaction with the technology and close to half of them were satisfied with the course: "I was very satisfied with the role of Socrative in our class and would recommend other professors to use it" (Female #10, 21); "All in all, I agree with you in that Socrative is a great learning tool" (Male #23, 25). Students liked using it throughout the semester and believed that it was a great idea and that it saved time. Some associated the use of Socrative.com to playing a game: "A game is a perfect analogy to compare Socrative to" (Male #18, 22). Others believed it was a very powerful tool that would change the classroom environment in the near future.

Adoption was mentioned with respect to a positive first time experience: "This semester was the first time I used the program, and it was very easy to understand" (Female #10, 21). Another facet of adoption was its implementation in other courses or by other professors: "I definitely wish more of my classes made use of it" (Male #2, 21); "I was very satisfied with the role of Socrative in our class and would recommend other professors to use it" (Female #10, 21). One student used the software in her presentation and experienced very positive results: "I enjoyed Socrative so much I used it in a presentation for another class…My peers were engaged, waiting for the next opportunity to answer, and my professor was beyond impressed!" (Female #4, 22).

DISCUSSION

The categories and themes identified in this study echo and expand existing literature on SRSs, which strengthen the external validity of the study's findings (see Table 4 for a summary). The student learning category lends itself to the learning experience and process identified in many previous studies of SRSs, such as clickers, Poll Everywhere, and Text-to-Learn (Hoekstra, 2015; Rana, Dwivedi, & Al-Khowaiter, 2016; Scornavacca, Huff, & Marshall, 2009; Sprague & Dahl, 2010; Voelkel & Bennett, 2014). Scornavacca et al. (2009), who examined a texting system that capitalizes on students' mobile phones, described the student

learning experience as an interaction with course-related environment, including instructors, other students, and the course material. The current study identified 12 positive and two negative aspects of the student learning experience that were related to their assessment of Socrative as a course-embedded software (Table 4).

Table 4
Comparison of Current Study Categories to Previous Studies

Current Study: Category	**Description**	**Previous Studies: Themes and Systems**	**Supporting Sources**
Student Learning	"The student learning experience is the totality of the student's interactions with the instructor, other students and the aspects of a course that influence (either positively or negatively) their learning" (Scornavacca et al., 2009, p. 144).	Learning experience *Systems:* *Clickers* *Text-to-learn* *Poll Everywhere*	Rana et al. 2016; Scornavacca et al. 2009; Sprague and Dahl, 2010; Voelkel and Bennett, 2014
		Learning process *Systems:* *Clickers* *Poll Everywhere*	Hoekstra, 2015; Voelkel and Bennett, 2014
Course Delivery and Assessment	This category includes "both teaching and learning processes and the interaction between student approaches to learning and instructor approaches to teaching" (Han, 2014, p. 153).	Instructional activities and strategies *System:* *Clickers*	Han, 2014a
		Instructional assessment *System:* *Clickers*	Rana et al. 2016
Use of Technology	Interactive technology in the classroom can be used for: (i) opinion questions (open-ended or multiple-choice), and (ii) knowledge assessment questions (open-ended or multiple choice) questions (Eastman, 2007).	Problems with technology *Systems:* *Clickers* *Poll Everywhere* *TurningPoint*	Stowell, 2015; Voelkel and Bennett, 2014
		Attitude toward technology *System:* *Clickers*	Eastman, Iyer, and Eastman 2011a, 2011b; Quinn, 2010
Satisfaction and Adoption	• Satisfaction is a belief that one can achieve success and/or a desired outcome (Toral et al., 2009). • "…an important consideration to make when adopting any technology is the learning curve and the need to balance the class time between the delivery of course content with the need to learn how to use the technology" (Quinn, 2010)	Satisfaction *System:* *Clickers*	Rana and Dwivedi, 2016; Sprague and Dahl, 2010
		Satisfaction with Interactive Technology *System:* *Clickers*	Eastman et al. 2011a
		Satisfaction with course *System:* *Clickers*	Eastman et al. 2011b

In this study, anonymity was the leading benefit of the student learning category, mentioned by more than 80% of students, but it has only been emphasized by a few researchers (Han, 2014b; Rana et al., 2016). In a study where clickers were examined, anonymity was associated with reduced levels of anxiety (Han, 2014). Similarly, students using Socrative anonymously reported that their level of anxiety had decreased. The second most mentioned theme for Socrative was motivation to participate. Both motivation and participation have been frequently associated with the usage of clickers in previous studies (Rana et al., 2016; Tlhoaelea, Hofman, Naidoo, & Winnips, 2014). In particular, qualitative studies have identified participation and non-participation as key themes of SRS usage (Han, 2014; Heaslip, Donovan, & Cullen, 2014; Hoekstra, 2015; Quinn, 2010). Three additional themes were mentioned by close to one third of the sampled students: interactivity and interaction, acquisition of knowledge, and enhanced learning experience. These themes have also been echoed in other studies on SRSs, such as clickers and Text-to-Learn (Han & Finkelstein, 2013; Scornavacca et al., 2009; Voelkel & Bennett, 2014). While students mentioned a significant number of Socrative's benefits in terms of the learning process and experience, about half of them specified some weaknesses. In Han (2014b), both Socrative and clicker users mentioned non-participation, cheating, and being distracted as weaknesses.

Course delivery and assessment is a process-related category that Han (2014a) identified in his review of clicker usage. Han (2014a) also named three key factors in the "instructional activities and strategies" category: delivery methods, instructional activities/course design, and assessment and feedback. This study explored five themes that are related to delivery or assessment of course material, which are considered benefits of using Socrative. Instructional assessment as a theme was also mentioned in several studies that assessed clickers and mostly referred to grading (Rana et al., 2016).

Immediate feedback was considered one of the main benefits for Socrative users in the course design and assessment category. Similarly, these themes have been used to categorize polling systems, such as clickers and Poll Everywhere (Rana et al., 2016; Voelkel & Bennett, 2014). With respect to assessment, students using Socrative pointed out that they enjoyed the ability to assess their answers in relation to their peers' for each discussed question. Students using clickers identified a comparable benefit of assessing their and other students' learning capabilities (Han, 2014b; Quinn, 2010). Self and others' assessment of responses allows instructors to clarify concepts that are misunderstood, which was considered an additional benefit by students using Socrative and is reportedly a benefit of other SRSs (Han, 2014b).

Class organization and ease of grading were perceived by Socrative users as benefits, which Han (2014a) considered to be conceptualized as process factors for clicker usage. Designing questions suitable for SRS usage can be a concern for instructors who design SRS-embedded courses (Han, 2014a). This concern was expressed by students using Socrative, as they complained about an assignment that was difficult to complete via the mobile software.

Use of technology has been mentioned frequently in SRS research. Some researchers have identified the problems of SRS (e.g., clickers, TurningPoint, and Poll Everywhere) usage (Stowell, 2015; Voelkel & Bennett, 2014), while others have focused on student attitudes toward these technologies (Eastman, Iyer, & Eastman, 2011a, 2011b; Quinn, 2010). SRSs fall into a category of interactive technologies that have many class applications. When introducing a topic, instructors can use them to elicit opinions and to test knowledge with open-ended and multiple-choice questions. The knowledge assessment questions can end up being included in an exam to provide incentive for participation (Eastman, 2007).

In terms of technology, the two key benefits of Socrative usage identified by students were usefulness of the device and ease of use. Ease of use has been examined both for clickers and Poll Everywhere (Heaslip, Donovan, & Cullen, 2014; Rana et al., 2016; Wong, 2016). In quantitative studies, perceived ease of use has been tested to explain user behavior, drawing on the Technology Acceptance Model (TAM; Rana & Dwivedi, 2016). Close to 60% of students complained about either reliability or affordability of Socrative. Users of other mobile polling software, such as TurningPoint and Poll Everywhere, have expressed similar concerns (Stowell, 2015; Voelkel & Bennett, 2014). Students who used Poll Everywhere, for instance, complained mostly about the cost of sending messages (Voelkel & Bennett, 2014).

Finally, student satisfaction has been studied in relation to clickers; some emphasized satisfaction with the course and others with the technology (Eastman et al., 2011a, 2011b; Rana & Dwivedi, Date; Sprague & Dahl, 2010). According to Toral et al. (2009), satisfaction refers to one's belief about his/her ability to achieve success or a desired outcome. The emerging benefits indicate that the use of Socrative resulted in student success (e.g., enhanced performance, acquisition of knowledge, and retention of information). Technological ease of use and convenience allowed students to reach desired outcomes, such as participation, interaction, engagement, practice, and preparation for quizzes and exams.

Adoption has not emerged as a theme in previous studies but was mentioned by 45% of respondents with respect to Socrative software. Many of them suggested that this software should be adopted in other courses. From an instructor's perspective, the learning curve of technology adoption in the classroom is an important consideration (Quinn, 2010). Mobile polling technologies are considered easier to adopt and implement in a class setting than traditional SRSs, such as clickers. For example, Socrative is a web-embedded software with a user-friendly, simple-to-use interface. Thus, the time and effort instructors would need to invest in learning how to use it is fairly minimal.

In conclusion, the categories and themes identified for Socrative are found in SRS literature, a finding which increases the external validity of this study. This technology is similar to clickers and mobile polling systems in providing an interactive and engaging learning experience. Because the free subscription of Poll Everywhere does not offer grading while Socrative's free option does, assessment and accountability of student learning is possible in Socrative but not in Poll Everywhere. On the other hand, Socrative provides ease of use, convenience, and more opportunities for engagement (e.g., open-ended questions) than clickers. Thus, the free version of Socrative enriches the learning experience and provides more instructional flexibility than clickers and the free option of Poll Everywhere.

Implications

This study has demonstrated that the number of benefits of using Socrative significantly outperform the number of shortcomings in a classroom setting. Though many said that it was the first time they experienced it, they recommended wider adoption: "I think this technology should be used in more classes, and it would make many of my other courses way more interesting" (Male, 23). Students could identify some benefits for instructors who integrate Socrative in their courses, such as ease of grading and managing student responses. Socrative sends a Microsoft Excel file to the instructor's email with student grades or responses depending on what application of the software was used, quizzes or open-ended questions. One student stated that Socrative was superior to clickers from the user's perspective. Instructors might also find course organization and management more feasible through the Socrative website compared to the clicker interface.

As with clickers, not all questions are suitable for SRS use. SRS can be mainly used for multiple-choice, true-false, and short-answer questions. If students need to write longer responses, Socrative becomes less accommodating. Thus, instructors need to carefully design assignments and quizzes that optimally utilize Socrative. Overall, Socrative should be considered as a useful SRS software for increasing student engagement, interaction, and participation in the classroom while minimizing costs and leveraging mobile devices.

Limitations

The findings of this study should be treated with caution as only one upper level marketing course was sampled. To validate the results, Socrative should be examined in a variety of disciplines and at various course levels. Additionally, future studies should use a larger sample size employing a survey method to increase generalizability of the results. It could be also helpful to conduct a study where the two mobile systems, Socrative vs. Poll Everywhere, are compared. Such a study could reveal more directly the strengths and weaknesses of each system. For example, the free subscription of Poll Everywhere has no option for grading, while the free Socrative subscription does. A future study could investigate the value of accountability (summative assignments) versus anonymity (formative assignments) to students using the different mobile systems. Such a study would need to control for variabilities across courses, students, and instructors.

In this study, instructors' perspectives were not considered when assessing Socrative technology. A qualitative or quantitative study that focuses on instructors' experiences with Socrative and other mobile systems could enhance the emerging literature on mobile SRSs. Paid subscriptions to Poll Everywhere and Socrative could be examined in a study targeting instructors to assess their experiences on whether and how various features of these technologies are implemented in their classrooms. Finally, consistent with other qualitative studies, no reference to a specific theoretical framework has been made herein. Some researchers suggest utilizing the Technology Acceptance Model (TAM) to investigate factors affecting students' attitudes and behaviors toward SRSs (Wong, 2016). Thus, more theory-driven studies should be developed with respect to SRS systems in the future.

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