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Professor, Can I Use my Mobile Phone? A Study on the Use of the Student Response System (SRS) in the Educational Process of Accounting Students

Abstract

Objective: This study seeks to investigate accounting students' perception on the use of the Student Response System (SRS) in the educational process.

Method: In this survey research with a quantitative approach, the aim is to describe accounting students' perceptions. This research was developed in a public HEI with two classes of the Accounting for Diverse Entities course during the 1st and 2nd bimester of the academic year 2016. At the end of the 2nd bimester, questionnaires were applied to collect the data.

Results: SRS is easy to use and makes the classes more interactive. A strong relationship exists between the perceptions that SRS helps students as a didactic tool and that it is beneficial for learning. It was verified that there was no relevant significant difference in terms of students' perceptions between the classes. Nevertheless, relevant differences were found in the analysis according to gender and age.

Contributions: The evidences found support that SRS improves the educational process. Therefore, faculty can use it to encourage greater student involvement and active attitudes, as well as to promote an environment different from traditional teaching.

Keywords: Student response system; Accounting students; Education process, Survey; Accounting education

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1. Introduction

New learning patterns have originated from the intensive use of mobile devices and the internet (Pathways Commission, 2012). For this reason, students expect visual stimuli and the insertion of technologies in the educational process to stay interested and motivated in class (Sprague & Dahl, 2010). Cheong, Bruno, and Cheong (2012) argue that new-generation students are technology savvy and, therefore, educators should employ up-to-date pedagogical resources the students already use. With easy access to smart devices, they are an alternative to engage students during the educational process (Cheong et al., 2012).

Active learning practices are increasingly demanded as traditional classes fail to keep students' attention and involvement. This situation is particularly present in higher education in accounting sciences, as perceived in research (Behn, Ezzell, Murphy, Rayburn, Stith & Strawser, 2012; Gaviria, Arango & Valencia, 2015). Gaviria et al. (2015) state that, sometimes, students are not interested in the pedagogical process because they consider it monotonous and passive. In response to this scenario, accounting teachers started using the Student Response System (SRS), although its diffusion is timid (Carnaghan, Edmonds, Lechner & Olds, 2011; Chatham & Davidson, 2011).

In its latest version (web-based SRS), the SRS consists of the use of personal devices, such as mobile phones and tablets, and software connected to the internet. Its functioning is based on the system of quizzes (questions and answers) and basically comprises three stages: (i) the teacher presents a question, usually multiple-choice; (ii) students answer the question through the devices; and (iii) the software receives the answers through the internet and provides feedback to the teacher and students, traditionally using graphs. Based on this process, studies suggest that SRS can encourage active learning, interactivity and enhance students' attention and involvement (Caldwell, 2007; Carnaghan & Webb, 2007; Lea, 2008; Zhu, 2007). Accounting teachers' incipient use of SRS (Carnaghan et al., 2011; Chatham & Davidson, 2011), however, arouses concerns about the use of this technology in the classroom. Based on this framework, the following research question is proposed: What is the perception of Accounting students about the use of SRS in the educational process? Based on this question, the objective is to examine student perceptions about the use of SRS in accounting education.

The focus of the study is to verify the perception of Accounting students - being the main users of this educational technology - about a pedagogical resource of relatively recent use in accounting education, which can possibly enhance learning. Beckert, Fauth and Olsen (2009) point out that the analysis of students' perceptions about SRS is a logical step to verify its effectiveness. Thus, assessing the SRS from the students' perspective can provide indications about the usefulness of the equipment for the educational process. In addition, Gaviria et al. (2015) affirm that mastering and employing various techniques and teaching methods helps Accounting teachers and students to have a more fluent pedagogical process. The use of SRS can collaborate with Accounting teachers and students to improve the flow and speed of classes (Caldwell, 2007). Finally, Apostolou, Dorminey, Hassell and Rebele (2016) explain that testing and analyzing technological resources in the educational process is essential to structure educational models based on up-to-date teaching methods. This is especially important in the context of curriculum innovation (Apostolou et al., 2016), an element of great attention in accounting education.

The article is structured, in addition to this introductory section, in four parts. Section 2 presents a review of the literature, a space dedicated to the discussion of the web-based SRS and its relation to learning, as well as the description of previous research on the use of this technological resource in the scope of accounting education. Section 3 explains the methodological procedures of the study. Then, section 4 presents the results. Finally, the conclusions and limitations of the research, as well as the directions for future studies, are reported in section 5.

2. Literature review

This section presents the theoretical current the SRS is related with. In addition, it explains the operation of the SRS and its general characteristics, also discussing how this pedagogical resource can help students' learning. Finally, related background studies are described in order to highlight the context this research is inserted in and the background literature findings are discussed in confrontation with those of the present research.

2.1 Active learning

The use of SRS in accounting education has been associated and studied within the educational theoretical current called Active Learning. For example, research by Carnaghan and Webb (2007), Edmonds and Edmonds (2008), Marshall and Varnon (2012) and Premuroso, Tong and Beed (2011) is based on this theoretical current to analyze their research foci. The seminal work of Bonwell and Eison (1991), however, argues that the term "Active Learning" has been employed more intuitively than consensually.

Despite the lack of a formalized concept, Gainor, Bline, and Zheng (2014), Sivan, Leung, Woon and Kember (2000) and Sullivan (2009) point out that Active Learning is characterized by the use of instructional techniques that actively involve the student in the education process, opposing the conventional teaching model that aims at passive content absorption. In this sense, the nonconformity with the teacher-centered educational process and the students' passive posture represents a key point of active learning (Sivan et al., 2000; Sullivan, 2009). In addition, Bonwell and Eison (1991) enumerate general characteristics present that are commonly associated with pedagogical strategies that promote active learning: (i) students are involved in the learning process beyond acting as passive listeners; (ii) the emphasis is placed on the development of students' skills instead of information transmission; (iii) students are involved in broader reasoning; (iv) students are engaged in activities; and (v) greater emphasis is placed on the exploration of students' attitudes and values. Based on these characteristics and considering the context of higher education, Bonwell and Eison (1991) propose, as a definition under construction, that active learning is "instructional activities involving students in doing things and thinking about what they are doing" (p.19). Therefore, learning is as relevant as thinking about what has been learned.

The literature reviews on the SRS support a strong relationship of this technological resource with active learning. Kay and LeSage (2009), for example, indicate that the benefits of greater attention, involvement, interaction and discussion by the students can be promoted in the use of SRS. These aspects, if the characteristics discussed by Bonwell and Eison (1991) are taken into account, are closely related to Active Learning, as they encourage the students to leave the position of passive listeners and to act as active debaters and participants in the contents taught. Likewise, literature reviews by Fies and Marshall (2006) and Rana, Dwivedi and Al-Khowaiter (2016) show that SRS provides for greater involvement and interactivity, supporting the idea that this educational technology can offer effective contributions to the education process because it is considered an active teaching technique.

Studies indicate changes in the way learners learn (Lea, 2008; Sivan et al., 2000), mainly due to the profile of the new generations (e.g. millennials), which are commonly characterized by multitasking and impatience (Lea, 2008). Gainor et al. (2014) report that current accounting students tend to prefer teaching and learning processes that advance faster and are more engaging, while traditional techniques, such as unilateral (teacher-student) communication, are losing importance. In this context, supported by active learning, the SRS can be important to promote greater interaction and involvement of the students, while representing a modern pedagogical resource compatible with the profile of the new generations. Therefore, the analysis of how SRS is used in the educational processes of Accounting students, especially to stimulate active learning, is relevant to the extent that benefits can be generated for students, teachers and educational institutions.

2.2 Web-based SRS

The most modern generation of SRS rests on the use of mobile devices such as smartphones, phablets and tablets, in combination with software, interlinked through the internet (Carnaghan *et al.*, 2011). The system works in the form of quizzes. The teacher asks the students a question, oral or visually, and they answer through their devices. The software receives the answers and produces the answer graph, providing the teacher and students with immediate feedback on the evaluation result. To illustrate this technology, Figure 1 displays an example of web-based SRS.

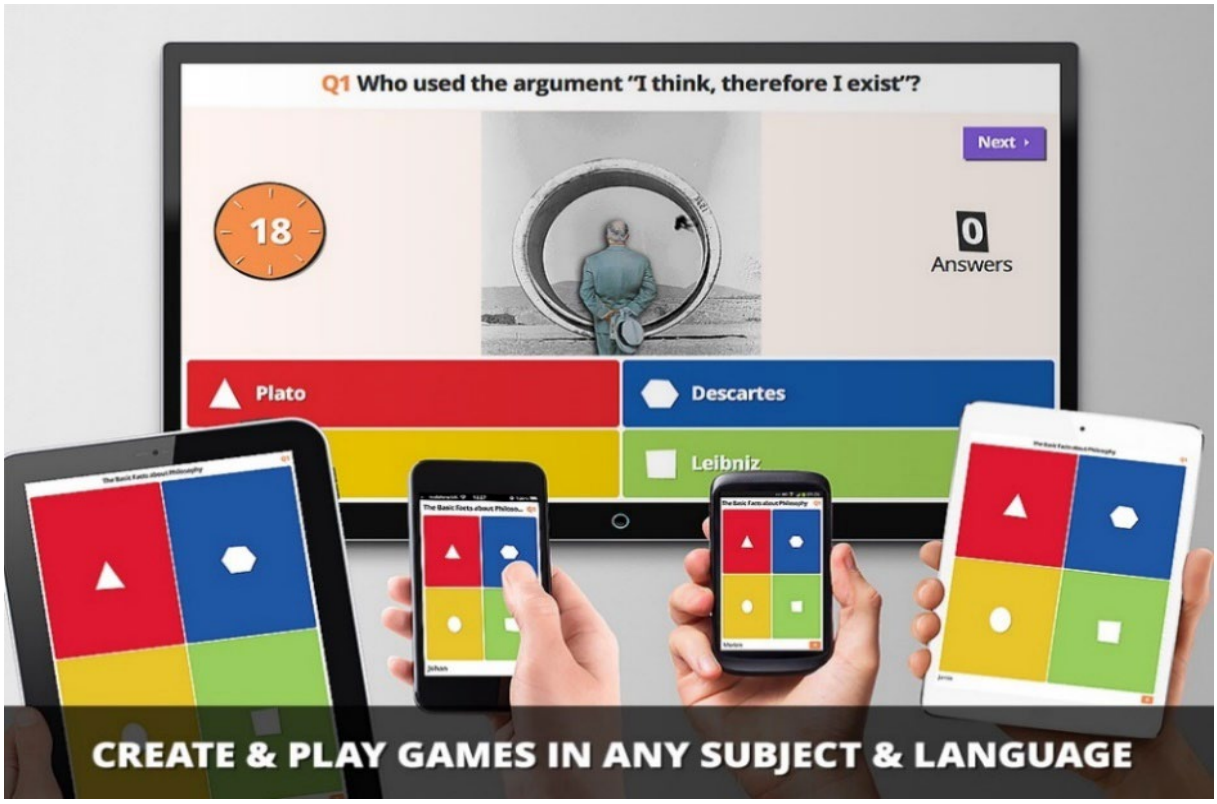

Figure 1. Example of web-based SRS

Source: https://medium.com/@rotemtam/build-a-kahoot-clone-with-angularjs-and-firebase-b8b30891d968

Immediate feedback is important because it allows the teacher to quickly verify students' mistakes and correct answers. Thus, additional explanations can be provided to enhance learning. Likewise, the SRS can indicate the students' level of understanding in each topic, permitting adjustments in the time and effort spent. In addition, the rapid feedback conveyed to students is essential because it enables them to monitor their performance in each class. Students with low performance can modify their study habits to improve their performance before the evaluations (Edmonds & Edmonds, 2008).

The web-based SRS can be used both in face-to-face and distance learning, as the students' responses are sent over the internet (Carnaghan et al., 2011). Another advantage is that this technology can play a central or peripheral role in the classroom (Caldwell, 2007), that is, there is flexibility in the timing of its use. In addition, it can promote an active learning environment as students need to be alert to answer questions and perform well. In addition, increased involvement, participation and student concentration in class are other advantages reported in the literature (Caldwell, 2007, Carnaghan et al., 2011, Kay & LeSage, 2009, Lea, 2008 and Zhu, 2007). It is also emphasized that the students' responses are anonymous, preventing embarrassing situations (Freeman, Blayney & Ginns, 2006).

On the other hand, there are some challenges to using SRS. Firstly, the use of remote devices can cause distractions. Therefore, the teachers should attentively exert control over the activities with the devices. Second, the web-based SRS demands proper connection with the Internet. In this sense, the provision of wi-fi signal to the devices is imperative. Alternatively, computer labs may be used, although the advantage of device mobility is lost. Finally, it is noted that not all students may have devices compatible with SRS software. In this case, the equipment needs to be provided to these students so that the activity can be performed. Otherwise a possible solution is to develop the quiz activity in groups.

Based on the above considerations, it is verified that the use of web-based SRS in the educational process has benefits and challenges that need to be taken into account before its implementation. It is emphasized that the use of the technology should be aligned with the academic objectives in order to achieve the expected results.

2.3 How can SRS help the students' learning?

The SRS can help the educational process, mainly in three dimensions: (i) Active Learning; (ii) Immediate Feedback; and (iii) Interactivity. According to studies (Carnaghan and Webb, 2007; Edmonds & Edmonds, 2008; Eng, Lea & Cai, 2013; Kay & LeSage, 2009; Lea, 2008; Mula and Kavanagh, 2009), SRS favors active learning because it encourages students' greater participation and involvement during classes. Although pushing the buttons or touching the screen of the devices may not be seen as an active practice, teachers report that students tend to be more willing to answer questions (Caldwell, 2007). In addition, by knowing what quizzes will be applied, students can become more attentive to lessons and read contents in advance. Edmonds and Edmonds (2010), in congruence with the literature notes, found evidence that the use of SRS in the Management Accounting classes, according to the students, promotes a more efficient and favorable environment for Active Learning. In this way, by encouraging greater student participation in classes, the SRS contributes to the practice of active learning processes.

The immediate feedback provided by SRS is another key aspect that contributes to learning. Carnaghan and Webb (2007) point out that the quality of information increases for students when feedback on activities is provided quickly, because there is no delay between performing the activity and its correction, making it easier to associate feedback with the questions and content. In the same line of reasoning, Edmonds and Edmonds (2008) emphasize that immediate feedback allows students to change their study habits and monitor their performance periodically. In addition, Kulik and Kulik (1988) found, through meta-analysis, that quiz-based activities are generally more effective when they provide immediate rather than delayed feedback. In accounting education, the results by Chui, Martin and Pike (2013) support this idea. The authors conducted a quasi-experiment with control (N = 32) and treatment classes (N = 28) in the subject Accounting Principles during one semester. The control group answered the printed quizzes on paper with delayed feedback (corrected during the next class), while the treatment class answered the quizzes using the SRS with immediate feedback. When comparing the classes' performance on the quizzes, it was verified that the treatment class performed statistically better ($t = 2.31$; sig. < 0.01) than the control class.

Instant feedback is equally important for the teachers. As Zhu (2007) points out, the SRS can be used to gather feedback about the class progress. The teacher can associate low student performance with some content and reinforce explanations. Likewise, content the students find easy may require less exposure time. Thus, the class time can be managed more efficiently.

Finally, studies report that the SRS can support the educational process when it instigates greater interactivity and discussion in the classroom (Caldwell, 2007; Cunningham, 2008; Engel et al., 2013; Kay & LeSage, 2009), mainly in the student-teacher and student-student relationships. This interactivity is important for learning because, if the students do not feel engaged in the teaching-learning process, less effort will be made and, consequently, poor performance will be achieved. In addition, Cohn and Johnson (2006) argue that social interaction helps to understand the content and students can learn more from the interaction and exchange of experiences. Therefore, classroom interactivity is a crucial aspect for learning, which the SRs can help to become more present in the academic context.

2.4 SRS in accounting education: findings about student perception

Lea (2008) aimed to verify if the students' perception about the use of SRS in the discipline of Management Accounting changes over time. The author was particularly interested in analyzing the relationship between the use of SRS and ten elements related to students (Frequency, Preparation, Focus, Active Learning, Interactivity, Instant Feedback, Understanding, Content Depth, Fun and Learning Improvement). Therefore, the study was developed with two classes in two different periods (Fall 2006 = 20 students; Spring 2007 = 13 students). The SRS was used in almost all the 15 meetings of the discipline, applying surveys at the beginning and end of the semesters. The mean tests showed that there was no difference in perception about the use of SRS between the classes in the 10 aspects considered (sig.> 0.10), nor was any difference found over time (sig.> 0.10).

Segovia (2008) sought to investigate the impact of SRS in the learning of Introductory Accounting students. The Fall 2002 class (n = 44) answered online quizzes using WebCT software; Summer 2003 (n = 31) answered the quizzes with the assistance of the SRS. The overall performance of the classes was statistically different (F = 0.56, sig. <0.10), with the Summer 2003 group achieving a better performance. In addition, the study aimed to evaluate students' perceptions about the use of SRS by means of surveys with questions measured using a Likert scale. As the main findings, it is appointed that the students did their best to answer the questions; they had enough time to think about the answers; and tend to perceive greater participation in class. In addition, it was verified that they preferred classes using the SRS.

Beekes (2009) developed a case study on the use of SRS in the discipline of Management Accounting at Lancaster University (UK). The results were based on questionnaires, applied at the end of the course with 117 students, and on the researcher's observation. The results of the questionnaires indicated that SRS is easy to use (mean = 3.8, scale = 1 to 5 points) and increases classroom fun (mean = 3.6). The study also shows that SRS encourages students to engage in positive attitudes related to the discipline, especially in terms of participation.

Humphries and Whelan (2009) developed experiments with students in Business Communication and Accounting Principles I, in order to verify the impact of SRS on learning. There was no statistically significant difference between the performance of the control and treatment groups. Therefore, the evidence supports that SRS does not increase students' learning in relation to the traditional teaching method. In addition, a survey was applied at the end of the SRS use period, which indicated, on a scale from 0 (completely disagree) to 10 (totally agree), that the technology is easy (mean = 6.77) and that the immediate feedback is useful (mean = 6.16).

Chatham and Davidson (2011) conducted a study about the perceptions of students in Business Law, Introduction to Financial Accounting and Intermediate Accounting concerning the use of SRS. Two SRS models were used; one based on radio frequency (i>clicker) and another web-based (> clickerTM). The students answered between two and six questions per meeting. At the end of the subjects, the researchers applied surveys (n = 860). As the main results, it is noted that students liked to use the SRS (94.88%); understood that there was greater participation in the classroom (92.59%); perceive the technology as useful and would recommend the SRS for future use (97.20%). Beekes (2009), Chatham and Davidson (2011), Humphries and Whelan (2009), Lea (2008) and Segovia (2008) found evidence from Accountancy students that generally sustains the SRS' beneficial contribution to the education process. More specifically, the students reported that this technology is easy to use and increases the students' participation in the classes and fun in the classroom; and that it is useful for teaching. What the SRS model is concerned, most accounting education literature analyzes the models based on infrared signal or radiofrequency (Beekes, 2009; Carnaghan & Webb, 2007; Chui et al., 2013; Cunningham, 2008; Edmonds & Edmonds, 2008; Eng et al., 2013; Humphries & Whelan, 2009; Lea, 2008; Premuroso et al., 2011; Segovia, 2008, 2006). Only Chatham and Davidson (2011) assess the web-based SRS model. Therefore, it is important to develop further research on this model in order to verify if the results remain consistent with those of earlier versions of the SRS.

3. Methodological procedures

This study is characterized as survey research, which uses questionnaires and interviews to ask individuals about their attitudes, beliefs, information and other factors (Cozby & Bates, 2012). This method was used in this study to question the Accounting students about their experience with the use of SRS in the training process. For the data analysis, the quantitative approach was used. In addition, the research qualifies as descriptive because it aims to characterize the students' perception about the use of SRS. The context of the research, the participants and the data collection instrument are detailed below.

3.1 Context, SRS and participants

The research was carried out in a public higher education institution with students of the discipline Accounting for Different Entities (CED) during the 1st and 2nd bimester of the academic year. The annual, compulsory CED course is offered in the 4th year of the Accounting course. According to the previous planning of the subject, the content taught in the 1st and 2nd bimesters was, respectively, Industrial Accounting and Agricultural Accounting.

For the selection of web-based SRS, five products were analyzed: ClickerSchool; I> Clicker; Kahoot! Socrative; and Quiz Socket. The selection criteria were as follows: (i) usefulness for the discipline; (ii) ease of use; and (iii) cost of the technological resource. After testing the five types of SRSs and considering the prior established criteria, we selected the Kahoot! (www.getkahoot.com).

Fifty-four students from two groups constituted based on criteria established by the educational institution participated in the study. At the beginning of the research, all the participating students received and signed the free and informed consent form. The two classes were named "Class 1" (N = 28) and "Class 2" (N = 26). The classes for both groups took place on Thursday evenings and were taught by the same teacher. Class 1 had classes in the first hour (19:20 to 21:00) and Class 2 in the second (21:15 to 22:55). In the first two months, four quizzes were applied to the classes, totaling 24 questions on Industrial Accounting. In that period, Class 1 answered the quizzes on paper, while Class 2 used the SRS. In the second two-month period, five quizzes were applied, totaling 31 questions on Agricultural Accounting. Class 1 started using SRS and Class 2 discontinued its use and began to answer the quizzes on paper. This procedure was adopted so that both classes used the technological resource and students could perceive similarities and differences between traditional classes (paper exercises) and classes using SRS (technology use). In addition, the aim was to avoid Resentful Demoralization (Gall, Gall & Borg, 2003; Smith, 2015), which is the circumstance in which different levels of motivation of the participants are caused by different treatments. For the sake of clarification, Figure 2 shows the SRS usage procedure throughout the study.

Period/Class	Class 1 (n = 28)	Class 2 (n = 26)
1st bimester (Industrial Accounting)	No SRS	SRS
2nd bimester (Agricultural Accounting)	SRS	No SRS

Figure 2. Classes' SRS usage procedure during the research

Source: the authors

The quizzes were the same for both groups, without any difference in the quantity or difficulty of the questions, preserving equal treatment. In most cases, the quizzes took place at the end of the meetings, with questions about key content points. The students answered all the quizzes applied with the help of the SRS through their personal mobile phones. For this process to take place properly, a pilot test was carried out with 77 students from three CED classes during the 4th bimester of the academic calendar of the previous year. This test revealed the need for three easily movable routers to provide wi-fi signal in the classroom, which was only available at the time of the SRS activity to avoid distractions with the devices.

3.2 Instrument and data collection

To evaluate the use of the SRS in the education process, questionnaires were applied to the 54 students at the end of the 2nd bimester. In order to increase the response rate, we followed the recommendation of Mertens (2010) on the in loco application of questionnaires, in the printed form. Even so, one student did not answer the questionnaire. Thus, there were 53 respondents.

The questionnaire was structured in two parts: (a) sociodemographic characteristics of the students (gender, age, family income range and insertion in the job market); and (b) 14 questions on the use of SRS. These questions were elaborated in the affirmative format. Students scored their perception of the statements between 0 (totally disagree) and 10 (totally agree). According to the guidelines for the elaboration of questions by Cozby and Bates (2012), only the extreme ends of the scales were labeled. This was done to avoid bias or suggest answers. With the exception of one question, all were based on the SRS literature. In Table 1, the questions and the basic literature are described.

Table 1

Questions about the use of SRS

Question	Description	Literature
Q1	The SRS is easy to use.	Beekes (2006); Carnaghan and Webb (2007); Cunningham (2008); Humphries and Whelan (2009)
Q2	The SRS helped me as a didactical resource.	Beckert et al. (2009); Carnaghan and Webb (2007); Cunningham (2008); Marshall and Varnon (2012); Mula and Kavanagh (2009); Premuroso et al. (2011); Sprague and Dahl (2010).
Q3	The SRS made the class more interactive than the traditional classes.	Beckert et al. (2009); Cunningham (2008); Lea (2008).
Q4	The SRS benefited my learning.	Cummings e Hsu (2007); Cunningham (2008); Eng *et al.* (2013); Lea (2008); Mula e Kavanagh (2009); Premuroso *et al*. (2011); Sprague e Dahl (2010).
Q5	The SRS should be used in other disciplines.	Carnaghan e Webb (2007); Chui et al. (2013); Premuroso *et al.* (2011).
Q6	The SRS made it easier for me to learn the subjects that do not use it.	Premuroso *et al.* (2011); Sprague e Dahl (2010).
Q7	The use of the SRS helped me to stay concentrated in the classes.	Beekes (2006); Cunningham (2008); Eng *et al.* (2013); Humphries e Whelan (2009); Lea (2008); Premuroso *et al*. (2011).
Q8	I remained more actively engaged in the classes due to the use of the SRS.	Beckert *et al.* (2009); Chatham e Davidson (2011); Cummings e Hsu (2007); Segovia (2008).
Q9	I faced no difficulties to understand the questions applied with the help of the SRS.	Premuroso *et al.* (2011); Segovia (2008).
Q10	The use of the SRS encouraged me to attend the classes more often.	Beekes (2006); Duncan (2006); Eng et al. (2013); Humphries e Whelan (2009); Lea (2008); Marshall e Varnon (2012); Premuroso *et al.* (2011).
Q11	The SRS enhanced my motivation in the classes.	Eng *et al*. (2013); Humphries e Whelan (2009); Lea (2008).
Q12	The number of questions applied with the help of the SRS was appropriate.	Premuroso *et al.* (2011).
Q13	The time to answer the questions was satisfactory.	Carnaghan e Webb (2007); Segovia (2008).
Q14	The instructions provided were appropriate to handle the SRS.	*Elaborated by the researchers.

It is important to note that part (b) of the questionnaire presented in Table 1 results from the pilot test previously mentioned. In addition to being important for the operational part of the research (internet access, need for routers), the pilot test contributed to improve the questionnaire, mainly in two aspects: (i) substitution and quantity of the questions; and (ii) measuring scale. Regarding the first point, the preliminary version of the questionnaire contained 12 statements, two of which were withdrawn and four added to the final version. This procedure was necessary as it contributed to better relate the SRS to the learning and to its use. Concerning the second point, the measuring scale was changed from 1 to 10 points (preliminary version) to 0 to 10 points (final version). It was noted that some students answered 0 (zero) in the preliminary version of the questionnaire, which is why this adjustment was made.

Finally, it is emphasized that the instruments used for the data analysis were MS Excel and Stata version 13. The first was used for data processing and table formatting. The second was used to perform the statistical procedures, mainly tests of average, medians and correlation analysis.

4. Results

Table 2 shows the characteristics of the research participants. Overall, most participants are male (58.5%), but there is some difference between the groups. Class 1 consists of 67.9% of male students and 32.1% of female students. In contrast, Class 2 presents 48.0% of male students and 52.0% of female students. The students were grouped by age into two categories: (1) less than or equal to 25 years; and (2) above 25 years. It is noticed that both classes are predominantly composed of students aged up to 25 years (Class 1 = 57.1%, Class 2 = 64.0%). A significant proportion of students report a monthly family income superior to five minimum wages (Class 1 = 50.0%, Class 2 = 48.0%). Finally, in terms of job market insertion, it is worth noting that most students in both groups perform some type of activity (Class 1 = 85.7%, Class 2 = 80.0%). Overall, 83% of the participants work.

Table 2
Sociodemographic profile of the students

Sociodemographic Profile	Class 1 (n = 28)		Class 2 (n = 25)		Total (n = 53)	
	Freq.	%	Freq.	%	Freq.	%
Gender	28	100.0%	25	100.0%	53	100.0%
Male	19	67.9%	12	48.0%	31	58.5%
Female	9	32.1%	13	52.0%	22	41.5%
Age	28	100.0%	25	100.0%	53	100.0%
=< 25 years	16	57.1%	16	64.0%	32	60.4%
> 25 years	12	42.9%	9	36.0%	21	39.6%
Monthly family income	28	100.0%	25	100.0%	53	100.0%
Up to 1 minimum wage[1]	0	0.0%	0	0.0%	0	0.0%
Between 1 and 3 minimum wages	5	17.9%	4	16.0%	9	17.0%
Between 3 and 5 minimum wages	9	32.1%	9	36.0%	18	34.0%
More than 5 minimum wages	14	50.0%	12	48.0%	26	49.1%
Job market	28	100.0%	25	100.0%	53	100.0%
Inactive	2	7.1%	0	0.0%	2	3.8%
Training	2	7.1%	5	20.0%	7	13.2%
Job	24	85.7%	20	80.0%	44	83.0%

[1] The Brazilian minimum wage at the time of data collection was considered (R$880.00).

Next, Table 3 reports the descriptive statistics of the second part of the questionnaire, with the 14 questions on the use of SRS in the education process. First, in all the questions, except for Q3 and Q14, extreme minimum and extreme values are observed. That is, at least one student disagreed totally and another agreed totally with the statements. The high median values reveal that most students tend to agree with the questions though. In addition, the means indicate that the students are more likely to agree, as they are closer to the maximum scale (10).

The questions Q3 (mean = 9.70, sd = 0.97), Q14 (mean = 9.64, sp = 0.83) and Q1 (mean = 9.19, sd = 1.81) are highlighted, whose averages are the highest. This indicates that, in the students' view, the SRS makes the class more interactive compared to traditional classes. The instructions provided were appropriate for the correct handling of the technology, and the SRS is easy to use.

On the other hand, for Q6 (mean = 5.40, sd = 3.06) and Q10 (mean = 5.34; sd = 5.34), the mean values are lower. These values lead to the conclusion that students agree with less intensity that SRS increases the ease of learning and encourages class attendance.

The results are consistent with those reported by Beckert et al. (2009), Beekes (2006), Carnaghan and Webb (2007), Chatham and Davidson (2011), Cummings and Hsu (2007), Edmonds and Edmonds (2008, 2010), Lea (2008), Premuroso et al. (2011) and Segovia (2008), studies in which evidence was found that the use of SRS benefits the process and the educational environment in general.

Table 3
Student perception of the SRS

Question	Description	N	Min.	Max.	Median	Mean	SD
Q1	The SRS is easy to use.	53	0	10	10	9.19	1.81
Q2	The SRS helped me as a didactical resource.	53	0	10	8	7.81	2.25
Q3	The SRS made the class more interactive than the traditional classes.	53	5	10	10	9.70	0.97
Q4	The SRS benefited my learning.	53	0	10	8	8.00	2.08
Q5	The SRS should be used in other disciplines.	53	0	10	10	8.87	1.82
Q6	The SRS made it easier for me to learn the subjects that do not use it.	53	0	10	6	5.40	3.06
Q7	The use of the SRS helped me to stay concentrated in the classes.	53	0	10	8	7.25	2.56
Q8	I remained more actively engaged in the classes due to the use of the SRS.	53	0	10	8	7.51	2.56
Q9	I faced no difficulties to understand the questions applied with the help of the SRS.	53	0	10	8	7.42	2.18
Q10	The use of the SRS encouraged me to attend the classes more often.	53	0	10	5	5.34	3.05
Q11	The SRS enhanced my motivation in the classes.	52	0	10	7,5	6.79	2.80
Q12	The number of questions applied with the help of the SRS was appropriate.	53	0	10	10	8.89	1.76
Q13	The time to answer the questions was satisfactory.	53	0	10	8	7.72	2.36
Q14	The instructions provided were appropriate to handle the SRS.	53	6	10	10	9.64	0.83

Considering that the data of the questions do not adhere to the normal distribution and did not present homogeneity of variance, next, the Spearman correlation matrix (Table 4) is reported. The positive correlation between questions Q2 and Q4 (coef. = 0.8423; sig. <0.01) is emphasized, which indicates that there is a strong association between the perception that SRS helped the students as a didactic resource and was perceived as beneficial to learning. Another noteworthy significant correlation was verified between questions Q10 and Q11 (coef. = 0.6753; sig. <0.01), suggesting that the encouraging effect of the SRS to attend classes and the increase of student motivation in the classes are related issues. Also, the relationship between questions Q7 and Q8 (coef. = 0.7945; sig. <0.01) reveals that active involvement and student concentration are strongly correlated. Other significant correlations, between questions Q1 and Q3 (coefficient = 0.4811; sig. <0.01) for example, can also be observed.

Table 4

Spearman's correlation matrix of questions on SRS use

Questions	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14
Q1	1.000													
Q2	0.283**	1.000												
Q3	0.481***	0.384***	1.000											
Q4	0.322**	0.842***	0.291**	1.000										
Q5	0.231	0.544***	0.450***	0.622***	1.000									
Q6	0.060	0.276**	0.091	0.286**	0.402***	1.000								
Q7	0.377***	0.294**	0.350**	0.299**	0.397***	0.297**	1.000							
Q8	0.150	0.191	0.278**	0.233	0.352**	0.257*	0.795***	1.000						
Q9	0.444***	0.150	0.131	0.203	0.180	-0.123	0.211	0.098	1.000					
Q10	0.209	0.191	0.202	0.228	0.330**	0.191	0.595***	0.615***	0.181	1.000				
Q11	0.063	0.239*	0.301**	0.293**	0.437***	0.314**	0.499***	0.522***	0.105	0.675***	1.000			
Q12	0.233*	0.104	0.161	0.203	0.102	0.076	0.216	0.311**	0.078	0.110	0.317**	1.000		
Q13	0.230	0.212	-0.017	0.190	0.095	0.102	0.189	0.088	0.426***	0.076	0.109	-0.088	1.000	
Q14	0.469***	0.180	0.477***	0.166	0.229	0.014	0.162	-0.008	0.156	0.034	0.123	0.199	-0.009	1.000

*** Sig. < 0.01; ** Sig. < 0.05; * Sig. < 0.10.

Based on parts (a) and (b) of the questionnaire, students' perceptions were analyzed according to their characteristics (class, gender and age range). Table 5 shows the means, standard deviations and significance of the statistical tests used in the comparison of student perception per class. The Shapiro-Wilk's and Levene's tests were executed for each question, considering the assumptions of the t-test. For the questions in which these were verified, the t-test was used. Otherwise, Mann-Whitney's U test was used, which is the nonparametric alternative to the t-test (Cohen, Manion & Morrison, 2007; Smith, 2015). Analyzing the results of the statistical tests (Sig. column), it is verified that all the values are superior to the significance level of 0.10, usually accepted in the applied social sciences. This indicates that there was no difference in perception about the 14 aspects questioned concerning the use of SRS when analyzed specifically by class.

Table 5
Comparison of students' perception about SRS by class

Question	Description	Class 1 (n = 28)		Classe2 (n = 25)		Sig.
		Mean	SD	Mean	SD	
Q1[a]	The SRS is easy to use.	9.32	1.95	9.04	1.67	0.577
Q2[a]	The SRS helped me as a didactical resource.	7.71	2.37	7.92	2.13	0.743
Q3[a]	The SRS made the class more interactive than the traditional classes.	9.75	0.97	9.64	1.00	0.685
Q[b]	The SRS benefited my learning.	7.89	2.42	8.12	1.64	0.985
Q[a]	The SRS should be used in other disciplines.	8.93	2.04	8.80	1.58	0.800
Q6[a]	The SRS made it easier for me to learn the subjects that do not use it.	5.39	2.95	5.40	3.24	0.993
Q7[a]	The use of the SRS helped me to stay concentrated in the classes.	7.50	2.25	6.96	2.89	0.449
Q8[a]	I remained more actively engaged in the classes due to the use of the SRS.	7.57	2.28	7.44	2.89	0.854
Q9[a]	I faced no difficulties to understand the questions applied with the help of the SRS.	7.50	2.25	7.32	2.14	0.767
Q10[a]	The use of the SRS encouraged me to attend the classes more often.	5.29	3.20	5.40	2.93	0.893
Q11[ac]	The SRS enhanced my motivation in the classes.	6.85	2.94	6.72	2.69	0.867
Q12[b]	The number of questions applied with the help of the SRS was appropriate.	8.93	2.07	8.84	1.37	0.362
Q13[a]	The time to answer the questions was satisfactory.	7.96	2.38	7.44	2.36	0.426
Q14[b]	The instructions provided were appropriate to handle the SRS.	9.75	0.59	9.52	1.05	0.529

[a]t-test (two-tailed) for independent groups; bMann-Whitney's U-test; cClass 1 = 27 answers.

The same procedures to verify the assumptions were adopted to compare the students' perception about the use of SRS per gender (Table 6). For the questions that met the assumptions, the t-test was used. In the opposite case, Mann-Whitney's U-test was applied. In Q3 (sig. <0.10), Q5 (sig. <0.05) and Q13 (sig. <0.10), values below the significance level of 0.10 were obtained. Thus, it can be affirmed that the male students perceived more intensely than the female students that the SRS makes the class more interactive in relation to the traditional classes; that the equipment should be used in other disciplines, and that the time to answer the questions was satisfactory.

Table 6
Comparison of students' perception about SRS by gender

Question	Description	Male (n = 31)		Femiale (n = 22)		Sig.
		Mean	SD	Mean	SD	
Q1[b]	The SRS is easy to use.	9.10	2.07	9.32	1.39	0.865
Q2[a]	The SRS helped me as a didactical resource.	8.16	1.95	7.32	2.57	0.180
Q3[b]	The SRS made the class more interactive than the traditional classes.	9.87	0.56	9.46	1.34	0.086
Q4[a]	The SRS benefited my learning.	8.13	1.93	7.82	2.30	0.596
Q5[b]	The SRS should be used in other disciplines.	9.36	1.02	8.18	2.42	0.039
Q6[a]	The SRS made it easier for me to learn the subjects that do not use it.	5.61	3.05	5.09	3.12	0.546
Q7[a]	The use of the SRS helped me to stay concentrated in the classes.	7.65	2.17	6.68	3.00	0.180
Q8[a]	I remained more actively engaged in the classes due to the use of the SRS.	7.94	1.81	6.91	3.31	0.153
Q9[a]	I faced no difficulties to understand the questions applied with the help of the SRS.	7.71	1.81	7.00	2.60	0.246
Q10[a]	The use of the SRS encouraged me to attend the classes more often.	5.52	3.12	5.09	3.01	0.622
Q11[ac]	The SRS enhanced my motivation in the classes.	7.20	2.37	6.23	3.27	0.219
Q12[b]	The number of questions applied with the help of the SRS was appropriate.	8.68	2.04	9.18	1.26	0.388
Q13[b]	The time to answer the questions was satisfactory.	7.94	2.76	7.41	1.68	0.071
Q14[b]	The instructions provided were appropriate to handle the SRS.	9.68	0.65	9.59	1.05	0.779

[a]t-test (two-tailed) for independent groups; bMann-Whitney's U-test; cMale = 30 answers.

There seems to be no theoretical basis in the literature to consistently justify the existence of perception differences per gender among Accounting students. For this reason, a difference in some other observable characteristic may be generating this result. In order to better understand this difference, the ages of the male students (mean = 26.41 years) were compared with those of the female students (mean = 24.22 years). The t-test showed that the male mean is significantly higher than the female (t = -1.51, p <0.10). Thus, even though they had a lower average age, the female students reported less intense agreement for questions Q3, Q5 and Q13. This result goes against the initial expectation and against the evidence from the literature, as younger individuals tend to perceive the use of technology in teaching more favorably than older students.

Due to this counterintuitive result, next, the perception is analyzed by age range. The same procedures previously reported were used to verify the test assumptions.

Table 7

Comparison of students' perception about SRS by age range

Question	Description	=< 25 years (N = 32)		> 25 years (N = 21)		Sig.
		Mean	SD	Mean	SD	
Q1[b]	The SRS is easy to use.	8.81	2.22	9.76	0.54	0.125
Q2[a]	The SRS helped me as a didactical resource.	8.03	2.07	7.48	2.50	0.384
Q3[b]	The SRS made the class more interactive than the traditional classes.	9.53	1.22	9.95	0.22	0.134
Q4[a]	The SRS benefited my learning.	8.25	2.00	7.62	2.18	0.283
Q5[a]	The SRS should be used in other disciplines.	9.16	1.87	8.43	1.69	0.156
Q6[a]	The SRS made it easier for me to learn the subjects that do not use it.	6.13	2.99	4.29	2.88	0.031
Q7[a]	The use of the SRS helped me to stay concentrated in the classes.	7.50	2.34	6.86	2.89	0.377
Q8[a]	I remained more actively engaged in the classes due to the use of the SRS.	7.84	2.58	7.00	2.51	0.245
Q9[a]	I faced no difficulties to understand the questions applied with the help of the SRS.	7.09	2.32	7.91	1.90	0.188
Q10[ac]	The use of the SRS encouraged me to attend the classes more often.	5.56	3.01	5.00	3.15	0.517
Q11[a]	The SRS enhanced my motivation in the classes.	7.36	2.44	5.95	3.12	0.076
Q12[b]	The number of questions applied with the help of the SRS was appropriate.	8.88	2.06	8.91	1.22	0.557
Q13[a]	The time to answer the questions was satisfactory.	9.19	2.09	7.00	2.63	0.073
Q14[a]	The instructions provided were appropriate to handle the SRS.	9.66	0.75	9.62	0.97	0.876

[a]t -test (two-tailed) for independent groups; bMann-Whitney's U-test; c=<25 years = 31 answers.

As reported in Table 7, the tests indicated statistically significant differences for Q6 (sig. <0.05), Q11 (sig. <0.10) and Q13 (sig. <0.10). That is, students up to 25 years old perceived more strongly than students over the age of 25 that SRS increased the ease of learning when compared to traditional (non-SRS) classes. Similarly, students up to age 25 reported that SRS increased motivation in class compared to students over 25 years of age. These findings are consistent with the idea that technology is more attractive to younger students, who are more familiar with and interested in mobile technologies (Cheong et al., 2012; Lea, 2008). Finally, we found a statistically significant difference for Q13, with students up to 25 years of age agreeing more strongly that the time to send the answers to the quizzes was satisfactory.

5. Final considerations

The use of mobile technologies has reached increasingly broad spheres and circumstances. High mobility devices and applications have been progressively incorporated into society due to their practicality and utility. In this regard, the educational area also needs to take advantage of the potential benefits that can derive from the use of these resources. This aspect is particularly important in higher education in Accounting. Behn et al. (2012) noticed that, despite the technological advance, several undergraduate accounting courses remained stagnant. Watty, McKay, and Ngo (2016), for example, evidence the resistance of accounting teachers regarding the adoption of technology, suggesting stagnation from the viewpoint of using educational technology.

Therefore, the incorporation of technologies into education processes is relevant (Gaviria et al., 2015; Pathways Commission, 2012), particularly in the context of curriculum innovation and the structuring of up-to-date educational models (Apostolou et al., 2016). In this sense, in this study, the students' perception about the use of SRS in the education process was evaluated, a technological resource that can provide an active learning environment, greater interactivity and student involvement in the classroom (Carnaghan et al., 2011; Carnaghan & Webb, 2007; Edmonds & Edmonds, 2008; Eng et al., 2013; Kay & LeSage, 2009; Lea, 2008; Zhu, 2007).

The results suggest, in general, that the use of SRS was beneficially perceived, which is consistent with the findings of earlier studies (Beckert et al., 2009; Beekes, 2006, Carnation & Webb, 2007; Chatham & Davidson, 2011; Cummings & Hsu, 2007; Lea, 2008; Premuroso et al., 2011; Segovia, 2008). It is worth noting that SRS makes classes more interactive compared to traditional teaching. This finding is relevant to the extent that interactivity is related to active learning, providing environments more conducive to learning and greater focus on the students. In addition, evidence has been obtained that shows a strong correlation between the perception that SRS helps students as a didactic tool and the perception that SRS is beneficial for learning. When comparing students' perceptions per class, there were no statistically significant differences in the perspective on the use of SRS. When the analysis takes gender into account, however, evidence has been obtained that male students agreed more strongly that SRS makes classes more interactive; that SRS should be used in other disciplines; and that the time taken to answer the questions of the quizzes was satisfactory. In order to better understand these results, the students' perceptions were analyzed per age, which showed that students up to 25 years of age stated that SRS enhanced the ease of learning. In contrast, students over the age of 25 had the opposite perception. This finding is consistent with the view that young people, being more familiar with mobile technologies, tend to perceive their use as more beneficial. Nevertheless, further research on perception differences according to the students' gender remains necessary. Finally, it is emphasized that students up to 25 years of age felt more motivated in class because of the use of SRS.

Important implications for accounting teaching can be identified. First, the evidence supports that the use of SRS encourages greater interactivity compared to traditional classes. In this case, this pedagogical resource can help teachers who aim to engage their students more in the education process. Second, the lack of a significant difference of perception between the classes suggests that the SRS tends to be seen in a similar way, without the use of this technology favoring one or another group of students. Based on this finding, it is found that the technology is used in a broad manner. Lastly, the use of SRS can benefit mostly male classes of up to 25 years of age even further, as students with those characteristics reported more intensely that the SRS supports the learning and motivation. Hence, it is suggested that teachers assess the sociodemographic profiles of their classes to enhance the effectiveness of teaching through methods and pedagogical tools compatible with the students' characteristics.

As the main limitation of the study, it is pointed out that the results were obtained from the students' perspective, through a survey. Therefore, there may have been bias in the responses (e.g. halo effect), because they knew they were participating in a survey. According to the recommendations of Cozby and Bates (2012), however, it is emphasized that only the extreme levels of the concordance scale were labeled to guide the respondents about its meaning and so as not to indicate responses or create bias.

Finally, as an extension of this research, students' perception about the use of more types and models of SRS with different characteristics is suggested. This is important to verify the effectiveness of technological resources (Beckert et al., 2009) and students' preference. In addition, the use of diverse types of SRS can provide guidance on its appropriate use for different activities (e.g. quizzes with theoretical, practical, calculation, reflection, sensitive questions etc.). Thus, using and reporting various academic practices based on the SRS contributes to better understand how this technology can improve the pedagogical process, especially in the scope of accounting education.

References

Apostolou, B., Dorminey, J. W., Hassell, J. M., & Rebele, J. E. (2016). Accounting education literature review (2015). *Journal of Accounting Education*, *35*, pp. 20–55. https://doi.org/10.1016/j.jaccedu.2016.03.002

Beckert, E., Fauth, E., & Olsen, K. (2009). Clicker satisfaction for students in human development : differences for class type , prior exposure , and student talkativity. *North American Journal of Psychology*, *3*(11), pp. 599–612.

Beekes, W. (2006). The "Millionaire" method for encouraging participation. *Active Learning in Higher Education*, *7*(1), pp. 25–36. https://doi.org/10.1177/1469787406061143

Beekes, W. (2009). Is that your final answer? Encouraging student participation using a personal response system. *The Enhancing Series Case Studies: Student Centred Learning in Business and Management, Hospitality, Leisure, Sport, Tourism.*, pp. 76–86. Recuperado em 30 de maio, 2018,de http://eprints.lancs.ac.uk/47175/

Behn, B. K., Ezzell, W. F., Murphy, L. A., Rayburn, J. D., Stith, M. T., & Strawser, J. R. (2012). The Pathways Commission on Accounting Higher Education: Charting a National Strategy for the Next Generation of Accountants. *Issues in Accounting Education*, *27*(3), pp. 595–600. https://doi.org/10.2308/iace-10300

Bonwell, C. C., & Eison, J. A. (1991). *Active learning: Creating excitement in the classroom*. *ASHE-ERIC Higher Education Report*. Washington, DC. Recuperado deem 30 de maio, 2018, de https://files.eric.ed.gov/fulltext/ED336049.pdf

Caldwell, J. E. (2007). Clickers in the large classroom: Current research and best-practice tips. *CBE - Life Sciences Education*, *6*, pp. 9–20. https://doi.org/10.1187/cbe.06–12–0205

Carnaghan, C., Edmonds, T. P., Lechner, T. A., & Olds, P. R. (2011). Using student response systems in the accounting classroom: Strengths, strategies and limitations. *Journal of Accounting Education*, *29*(4), pp. 265–283. https://doi.org/10.1016/j.jaccedu.2012.05.002

Carnaghan, C., & Webb, A. (2007). Investigating the Effects of Group Response Systems on Student Satisfaction, Learning, and Engagement in Accounting Education. *Issues in Accounting Education*, *22*(3), pp. 391–409. https://doi.org/10.2308/iace.2007.22.3.391

Chatham, M. D., & Davidson, D. (2011). Assessing student and instructor satisfaction using an audience response system in Introductory Business Courses. *Business Education Innovation Journal*, *3*(1), pp. 43–50.

Cheong, C., Bruno, V., & Cheong, F. (2012). Designing a Mobile-app-based Collaborative Learning System. *Journal of Information Technology Education: Innovations in Practice*, *11*, pp. 97–119.

Chui, L., Martin, K., & Pike, B. (2013). A quasi-experimental assessment of interactive student response systems on student confidence, effort, and course performance. *Journal of Accounting Education*, *31*(1), pp. 17–30. https://doi.org/10.1016/j.jaccedu.2013.01.002

Cohen, L., Manion, L., & Morrison, K. (2007). *Research Methods in Education* (6th ed.). New York: Routledge/Taylor & Francis Group.

Cohn, E., & Johnson, E. (2006). Class Attendance and Performance in Principles of Economics. *Education Economics*, *14*(2), pp. 211–233. https://doi.org/10.1080/09645290600622954

Cozby, P. C., & Bates, S. C. (2012). *Methods in behavioral research* (11th ed.). New York: McGraw-Hill.

Cummings, R. G., & Hsu, M. (2007). The effects of student response systems on performance and satisfaction: an investigation in a tax accounting class. *Journal of College Teaching & Learning*, *4*(12), pp. 21–26.

Cunningham, B. M. (2008). Using Action Research to Improve Learning and the Classroom Learning Environment. *Issues in Accounting Education*, *23*(1), pp. 1–30. https://doi.org/10.2308/iace.2008.23.1.1

Duncan, D. (2006). Clickers : A New Teaching Aid with Exceptional Promise. *Astronomy Education Review*, *5*(1), pp. 70–88.

Edmonds, C. T., & Edmonds, T. P. (2008). An Empirical Investigation of the Effects of SRS Technology on Introductory Managerial Accounting Students. *Issues in Accounting Education*, *23*(3), pp. 421–434. https://doi.org/10.2308/iace.2008.23.3.421

Edmonds, C. T., & Edmonds, T. P. (2010). An examination of the links between SRS technology and an active learning environment in a managerial accounting course. In A. H. Catanach & D. Feldmann (Eds.), *Advances in Accounting Education*, pp. 81–100. Emerald Group Publishing Limited. https://doi.org/10.1108/S1085-4622(2010)0000011007

Eng, L. L., Lea, B.-R., & Cai, R. (2013). Use of Clickers for Assurance of Learning in Introductory Financial Accounting. In *Advances in Accounting Education: Teaching and Curriculum Innovations,* 14, pp. 269–291). https://doi.org/10.1108/S1085-4622(2013)0000014018

Fies, C., & Marshall, J. (2006). Classroom Response Systems: A Review of the Literature. *Journal of Science Education and Technology*, *15*(1), pp. 101–109. https://doi.org/10.1007/s10956-006-0360-1

Freeman, M., Blayney, P., & Ginns, P. (2006). Anonymity and in class learning: The case for electronic response systems. *Australasian Journal of Educational Technology*, *22*(4), pp. 568–580.

Gainor, M., Bline, D., & Zheng, X. (2014). Teaching internal control through active learning. *Journal of Accounting Education*, *32*(2), pp 200–221. https://doi.org/10.1016/j.jaccedu.2014.03.003

Gall, M. D., Gall, J. P., & Borg, W. R. (2003). *Educational research: an introduction* (7th ed.). Boston: Allyn & Bacon.

Gaviria, D., Arango, J., & Valencia, A. (2015). Reflections about the Use of Information and Communication Technologies in Accounting Education. *Procedia - Social and Behavioral Sciences*, *176*, pp. 992–997. https://doi.org/10.1016/j.sbspro.2015.01.569

Humphries, S. A., & Whelan, C. (2009). Effectiveness of Interactive Technology in Business Education. *Business Education Innovation Journal*, *1*(2), pp. 56–61.

Kay, R. H., & LeSage, A. (2009). Examining the benefits and challenges of using audience response systems: A review of the literature. *Computers & Education*, *53*(3), pp. 819–827. https://doi.org/10.1016/j.compedu.2009.05.001

Kulik, J. A., & Kulik, C.-L. C. (1988). Timing of Feedback and Verbal Learning. *Review of Educational Research*, *58*(1), pp. 79–97. https://doi.org/10.3102/00346543058001079

Lea, B.-R. (2008). Clickers Adoption in a Small Class Setting. *Decision Line*, *39*(4), pp. 7–11.

Marshall, L. L., & Varnon, A. W. (2012). An Empirical Investigation of Clicker Technology in Financial Accounting Principles. *Journal of Learning in Higher Education*, *8*(1), 7–18. Recuperado de https://pdfs.semanticscholar.org/d3e3/181482beabceb03cd2dd50f0f8dd5f9cc4fd.pdf#page=14

Mertens, D. M. (2010). *Research and evaluation in education and psychology: integrating diversity with quantitative, qualitative, and mixed methods* (3rd ed.). London: SAGE Publications Ltd.

Mula, J. M., & Kavanagh, M. (2009). Click Go the Students , Click-Click-Click : The efficacy of a student response system for engaging students to improve feedback and performance. *E-Journal of Business Education & Scholarship of Teaching*, *3*(1), pp. 1–17.

Pathways Commission. (2012). *The Pathways Commission: Charting a national strategy for the next generation of accountants*. Recuperado em 30 de maio, 2018,de http://commons.aaahq.org/posts/a3470e7ffa

Premuroso, R. F., Tong, L., & Beed, T. K. (2011). Does using clickers in the classroom matter to student performance and satisfaction when taking the introductory financial accounting course? *Issues in Accounting Education*, *26*(4), pp. 701–723. https://doi.org/10.2308/iace-50066

Rana, N. P., Dwivedi, Y. K., & Al-Khowaiter, W. A. A. (2016). A review of literature on the use of clickers in the business and management discipline. *International Journal of Management Education*, *14*(2), pp. 74–91. https://doi.org/10.1016/j.ijme.2016.02.002

Segovia, J. (2006). The use of personal response system in accounting courses. *Accounting Instructors' Report*, *Winter*. Recuperado em 30 de maio, 2018, de https://blog.cengage.com/use-personal-response-system-accounting-courses/

Segovia, J. (2008). Personal response system and its effects on student learning. *Accounting Instructors' Report*, *Winter*, pp. 1–5. Recuperado em 30 de maio, 2018,de https://blog.cengage.com/personal-response-system-effects-student-learning/

Sivan, A., Leung, R. W., Woon, C., & Kember, D. (2000). An Implementation of Active Learning and its Effect on the Quality of Student Learning. *Innovations in Education and Training International*, *37*(4), pp. 381–389. https://doi.org/10.1080/135580000750052991

Smith, M. (2015). *Research methods in accounting* (3rd ed.). London: Sage.

Sprague, E. W., & Dahl, D. W. (2010). Learning to click: An evaluation of the personal response system clicker technology in introductory marketing courses. *Journal of Marketing Education*, *32*(1), pp. 93–103. https://doi.org/10.1177/0273475309344806

Sullivan, R. (Robin). (2009). Principles for Constructing Good Clicker Questions: Going beyond Rote Learning and Stimulating Active Engagement with Course Content. *Journal of Educational Technology Systems*, *37*(3), pp. 335–347. https://doi.org/10.2190/ET.37.3.i

Watty, K., McKay, J., & Ngo, L. (2016). Innovators or inhibitors? Accounting faculty resistance to new educational technologies in higher education. *Journal of Accounting Education*, *36*, pp. 1–15. https://doi.org/10.1016/j.jaccedu.2016.03.003

Zhu, E. (2007). Teaching With Clickers. *Center for Research on Learning and Teaching - Occasional Papers*, pp. 1–8. Recuperado em 30 de maio, 2018, de http://www.crlt.umich.edu/sites/default/files/resource_files/CRLT_no22.pdf