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USAGE OF A WEB-BASED STUDENT RESPONSE SYSTEM (SRS) IN THE CLASSROOM: AN ANALYSIS OF ACCOUNTING STUDENTS' PERCEPTION[1]

USO DE UM SISTEMA DE RESPOSTA DO ESTUDANTE (SRE) BASEADO EM WEB EM SALA DE AULA: UMA ANÁLISE DA PERCEPÇÃO DE ALUNOS DE CIÊNCIAS CONTÁBEIS

Vitor Hideo Nasu
Doutorando em Ciências Contábeis (USP)
Universidade de São Paulo
vnasu@usp.br

Luís Eduardo Afonso
Doutor em Ciências Contábeis (USP)
Universidade de São Paulo
lafonso@usp.br

Daniel Ramos Nogueira
Doutor em Ciências Contábeis (USP)
Universidade Estadual de Londrina
danielrnog@gmail.com

ABSTRACT
Objective: Investigate the accounting students' perception on the use of a web-based student response system (SRS), called Kahoot!, in a public higher education institution in Brazil.
Background: The paper reviews the SRS literature and highlights its usage benefits and challenges. Also, the study presents empirical studies carried on SRS thus far that offered theoretical support for the discussion of the findings.
Method: Data were collected from 77 students through a survey in a public higher education institution located in the South of Brazil. The survey was based on prior SRS literature, containing two parts. The first one asked for the students' demographics; and the second comprised 22 questions to capture two constructs: "Perception of Use" (16 items) and "Overall Satisfaction" (6 items). Surveys were applied in loco.
Results: The Cronbach's Alpha coefficient indicated high internal consistency among the items that measured both constructs. We also found that the SRS assists in classroom interactivity, promote greater involvement, and was adequate as a didactic tool. Students also thought that the SRS may have the potential to improve their learning and were generally satisfied with it.

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Contribution: The study contributes to teaching methods in accounting education by bringing evidence of the efficacy of a web-based SRS from the accounting students' perspective. It also shows promising results when using SRS in accounting classes, especially when interactivity and active learning are considered educational goals.

Keywords: Student response system. Accounting education. Student perception. Active learning. Survey.

RESUMO
Objetivo: Investigar a percepção dos estudantes de contabilidade sobre o uso de um sistema de resposta do estudante (SRE) baseado em web, chamado Kahoot!, em uma instituição pública de ensino superior no Brasil.
Fundamento: O artigo analisa a literatura da SRS e destaca seus benefícios e desafios de uso. Além disso, apresentam-se estudos empíricos realizados sobre o SRE até o momento, que ofereceram suporte teórico para a discussão dos achados.
Método: Os dados foram coletados de 77 alunos de uma instituição de ensino superior do Sul do Brasil por meio de questionários. A pesquisa foi elaborada com base na literatura anterior do SRE, contendo duas partes. O primeiro pediu informações demográficas dos alunos; e a segunda, composta por 22 questões, buscou capturar dois construtos: "Percepção de Uso" (16 itens) e "Satisfação Geral" (6 itens). Os questionários foram aplicadas in loco.
Resultados: O coeficiente Alpha de Cronbach indicou consistência interna aceitável dos itens que mediram ambos os construtos. Também foi encontrado que o SRE auxilia na interatividade em sala de aula, promove maior envolvimento e foi adequado como ferramenta didática. Os alunos também pensaram que o SRE pode ter o potencial de melhorar seu aprendizado e, em geral, estavam satisfeitos com ele.
Contribuição: O estudo contribui com os métodos de ensino no ensino de contabilidade, trazendo evidências da eficácia de um SRE baseado em web sob a perspectiva dos estudantes de contabilidade. Também mostra resultados promissores ao usar o SRE nas aulas de contabilidade, especialmente quando a interatividade e o aprendizado ativo são considerados objetivos educacionais.

Palavras-chave: Sistema de resposta do estudante. Educação contábil. Percepção do aluno. Aprendizagem ativa. Questionário.

1 INTRODUCTION

Students of the younger generations expect more visual stimuli and the incorporation of technologies into the educational process to maintain focus and motivation during class time (Sprague & Dahl, 2010). Gaviria, Arango, and Valencia (2015) state that sometimes students do not feel interested in classes because they consider them monotonous and boring, leading to demotivation. As a reaction to this scenario, the integration of new technologies into the classroom environment can make it more interactive and dynamic when compared to conventional lectures (Premuroso, Tong, & Beed, 2011).

Since current accounting undergraduates have always had access to the Internet and digital remote devices, new learning patterns have emerged as a result of this technological improvement (Pathways Commission, 2012). Therefore, the modification of accounting education through the insertion of new educational technologies is essential (Gaviria et al., 2015; Pathways Commission, 2012). Thus, the use of educational technology equipment to improve the training of future accounting professionals should be taken into account.

Based on this scenario, Edmonds and Edmonds (2008) and Premuroso et al. (2011) present the Student Response System (SRS) as an alternative for encouraging greater interactivity in the classroom. At its early stages, SRS consisted of alphanumeric devices properly configured in radio frequency or infrared signals, a receiver, and software (Eng, Lea, & Cai, 2013). During class, the teacher projects on screen a multiple-choice question that the students must respond using the devices. Subsequently, the receiver captures the responses via the radio frequency waves or the infrared signals and registers them in the system (software). Finally, the software tabulates the data and displays the responses, usually in graph or histogram forms.

More recently, Carnaghan et al. (2011) and Stowell (2015) report the emergence of a new generation of SRS, in which it started using personal remote devices such as smartphones, tablets, and laptops, connected to the Internet. In the web-based SRS, students can answer questions through mobile messaging, web browsing, or voting applications. Note that the receiver and alphanumeric devices are expendable in this version since students use personal devices, connected to the Internet, to send responses to the software. Despite that, SRS types work similarly. Among the main benefits deriving from its use, we highlight the promotion of interactivity between teacher and students, the increase in student participation, the anonymity of the answers, and the encouragement to active learning (Caldwell, 2007; Edmonds & Edmonds, 2008; Kay & LeSage, 2009; Rana, Dwivedi, & Al-Khowaiter, 2016). Despite these positive points, there is no consistent evidence in the previous literature that SRS use increases academic performance (Chui, Martin, & Pike, 2013).

Kahoot!, Socrative, and Nearpod are among the most common web-based SRS types used in current education (Wang & Tahir, 2020; Shehata, Mitry, Shawki, & El-Helaly, 2020). Prior literature shows a positive view of Kahoot! use in education because of its main characteristics, such as challenge, fantasy, and curiosity. Challenge is related to a goal with uncertain outcomes and curiosity is to whether an answer is correct or not (Wang & Tahir, 2020). Fantasy regards the transformation of the class into a game show where there are competition, ranking, and podium. Based on thse characteristics, we chose to use Kahoot!. We provide more details on why we chose Kahoot! in section 3.

SRS has been used by accounting educators in developed countries, especially in the US, UK, and Australia. a. In Brazil, we observe that the use of this technology resource in accounting educational processes is still being disseminated, but there is significant space for improvements. Also, in a Covid-19 era, web-based SRSs become more relevant to promote student engagement in remote learning, as well as is becoming more notable despite the early stage of the Brazilian scientific accounting education literature on this topic. Therefore, the present study aims to examine student perceptions regarding the implementation of a web-based SRS, known as Kahoot!, in an upper-level accounting course, guided by the following question: **What is the perception of accounting students regarding the use and satisfaction with a web-based SRS in the teaching-learning process?**

Investigating how students perceive the use of this educational technology tool can provide guidelines for the improvement of accounting education. In addition, analyzing student satisfaction with SRS may reveal evidence of how well it was integrated into classes. It is also a way of verifying its effectiveness (Beckert et al., 2009). Finally, SRS presents itself as an alternative to foster greater interactivity and student involvement in class, compared to traditional education. Knowing and adopting a variety of teaching methodologies can help accounting educators and students to have a more fluent and expressive educational process (Gaviria et al., 2015). Regarding theoretical contributions, this study reinforces the importance of active learning and shows how SRS can be used to achieve this goal by discussing its main benefits and challenges based on prior literature.

2 LITERATURE REVIEW

2.1 Student Response System (SRS)

Basically, SRS is a system composed of three elements: (1) alphanumeric devices; (2) receptor; and (3) software (Eng et al., 2013). Each student uses an alphanumeric device, also known as clicker, to respond to questions presented by the instructor. The receiver picks up the responses and sends them to the SRS software. It tabulates the responses and provides immediate feedback to the instructor and students, usually in the form of graphs. The instructor has immediate feedback on the mistakes and the correct answers and can direct her explanations on the question. The students can see how they performed and focus on the topics they need to study more. This process repeats until the set of questions is over.

Prior literature reports 26 denominations for SRS (Kay & LeSage, 2009). The most usual in accounting education are Student Response System (SRS) (Carnaghan et al., 2011; Carnaghan & Webb, 2007; Cummings & Hsu, 2007; Edmonds & Edmonds, 2008; Yuen, 2018), Audience Response System (ARS) (Premuroso et al., 2011), and Personal Response System (PRS) (Beekes, 2006; Segovia, 2008). Besides, they are still popularly called Clickers in the United States or Zappers in the United Kingdom (Caldwell, 2007; Morales, 2011).

In its early years, in the 1980s, SRS based on infrared (IR) signal and radio frequency (RF) were more widely disseminated and used among US educational institutions (Mula & Kavanagh, 2009; Premuroso et al., 2011; Zhu, 2007). With the advent of the Internet, a new SRS type has been developed, including the use of mobile devices connected to the Internet. With this enhancement, alphanumeric tools and the receiver were not required anymore since responses were transmitted through students' devices. Despite the difference in sophistication, IR-based, RF-based, and web-based SRSs have a similar form of operation and purpose. However, some obstacles to the application of the web-based type should be listed: (a) the need for a good Internet connection; and (b) older cellular models may not work, as they may not be able to connect to the Internet properly or may not be compatible with SRS applications. Lending devices from colleagues/friends or developing SRS activity in groups may be possible solutions to this problem.

On the other hand, the advantages of this type involve: (i) the purchase of clickers/zappers is not needed; (ii) long-distance use, since responses are sent through the Internet. The student may be on the other side of the world that her answer would still be recorded (Carnaghan et al., 2011); and (iii) it can be used in distance education (DE) and e-learning (Carnaghan et al., 2011). Prior versions of SRS could be used only in face-to-face learning; however, it is now possible to utilize it in DE once its use came to be supported by the Internet. In this way, the use of SRS has become independent of the physical environment.

We could not find any Brazilian developer that designs web-based SRS for educational purposes, as well as national suppliers or distributors of clickers. It contributes to the lack of knowledge about SRS among national accounting professors and, consequently, the lack of SRS use in accounting courses. Therefore, the limited scientific production on SRS in the accounting domestic sphere may be associated with the lack of knowledge of it by Brazilian accounting instructors. The present study also attempts to disseminate information and foster more research on SRS.

Finally, to better understand how SRS can be operated within the academic environment, this study discusses the essential features of it in terms of the benefits and challenges it brings. In addition, relevant studies on SRS in accounting education are described.

2.2 Main Benefits of Using SRS

Among the advantages reported in the literature, the *anonymity* of student responses is evident (Dallaire, 2011; Mula & Kavanagh, 2009; Simpson & Oliver, 2007). Beekes (2006) Kay and

LeSage (2009) indicate that the main advantage of anonymity is that students can answer questions without being judged by their peers. Because students respond using alphanumeric devices or personal devices (smartphones, tablets, etc.), they cannot know their peers' responses. The immediate feedback graphs generated by the SRS show only the frequencies of each chosen alternative, without mentioning names or registration numbers. Thus, if a student misses a question that is considered "easy" and the rest of the room hits it right, there is no reason to be embarrassed, since the answers are anonymous. Also, we emphasize that anonymity is attractive because it does not diminish student participation. In comparison to the traditional classroom, the student can remain silent if he/she wants to go unnoticed, which reduces their class involvement and interaction. However, when the SRS is applied, all students may participate, even if anonymously. This feature is fundamental so that more timid students can participate in the class without exposing themselves. Because of this, anonymity is a factor of appreciation by students (Caldwell, 2007).

Students' *attention* is another element that potentially improved as a result of the use of SRS. Studies have shown that the duration of attention of the individuals revolves around 15 to 20 minutes, reducing after this time (Beekes, 2006; Lea, 2008). In this sense, educators suggest using SRS quizzes throughout the class to question the content that was just exposed to test whether students were paying attention (Caldwell, 2007; Kay & LeSage, 2009). At these times, the application of SRS is timely since it is a technology-based on questioning and that provides feedback instantaneously of the student's understanding. In addition, Kay and LeSage (2009) point out that student attention is natural when using SRS, given that the focus is on answering the questions.

Studies suggest that SRS has a positive relationship with student *attendance* in class (Eng et al., 2013; Kay & LeSage, 2009; Lea, 2008). Since the use of SRS indicates the number of students who are responding, the instructor automatically knows who missed the class. Therefore, SRS employment may give students a sense of attendance in class. The use of SRS itself can be reserved to record student presence (Beekes, 2006; Cunningham, 2008). SRS was implemented in several Higher Education Institutions (HEI) to improve student attendance (Kay & LeSage, 2009). However, it is not recommended to use the SRS only to track the student attendance, since other SRS functionalities that benefit the teaching and the students are wasted (Carnaghan et al., 2011; Zhu, 2007).

Active learning is another favorable point reported in studies (Edmonds & Edmonds, 2008; Eng et al., 2013; Lea, 2008; Morales, 2011). Zhu (2007) points out that students can no longer attend classes passively, but should come prepared knowing that there will be questions to be answered through the SRS. Although the push of a button or the touch of a smartphone screen is questionable if it is a genuine active practice (Marshall & Varnon, 2012), instructors declare that students become active participants in the lesson and gain more visibility when they respond to questions (Caldwell, 2007). Simpson and Oliver (2007) say that interactive teaching does not guarantee an active learner but contributes to this end.

The iterative cycle of questioning and answering provided by the SRS naturally encourages greater *interactivity* in the classroom. The greater teacher-student and student-student interaction contribute to making the educational process more meaningful. In this reasoning, the use of SRS is substantial to ensure discussions about the questions. Kay and LeSage (2009) found that one way to increase effectiveness and maximize the benefit of SRS for students is that this equipment should be used with other active learning practices such as Peer Instruction. Both qualitative and quantitative evidence on the increase of interactivity are widely found in prior literature (Beckert et al., 2009; Cunningham, 2008; Lea, 2008; Newmark, Seaton, & Stallings, 2011; Premuroso et al., 2011; Zhu, 2007), being a feature in favor of the use of SRS.

A substantial feature is an *immediate feedback* made possible by SRS. For teachers, rapid feedback is a usual way of testing and verifying students' knowledge during class about what and how much they are learning (Chui et al., 2013; Marshall & Varnon, 2012). In the case of low student

performance, the professor can repeat the question or elaborate similar ones to those that have already been responded incorrectly to retest the student's understanding after new explanations (Segovia, 2008). Additionally, according to Kulik and Kulik's (1988) meta-analysis, studies have shown that using quizzes is most effective when they provide instant feedback rather than delayed feedback. Consistent with this finding, Chui et al. (2013) found that students performed better when using SRS with immediate feedback than when responding to paper quizzes with delayed feedback (corrected in the subsequent class).

Gibbs (1999) states that feedback time is even more important than its quality. According to the author, if the correction is not instantaneous and the topic at hand is not readily discussed, it is quite possible that the student does not even make an effort to read the comments made about the task or the test and wants to know only her grade. Besides, if the feedback is given too late, three weeks after the activity, for example, it may be that the content is already different and students are preparing for other exercises (Gibbs, 1999). Thus, when feedback is not delivered immediately, its effectiveness is reduced (Gibbs, 1999). Based on this, the SRS is a timely resource to provide rapid feedback integrated with the instructor's explanation, enhancing the quality of information for students. Another point of SRS use is that every student should try to answer the question before receiving feedback (Carnaghan & Webb, 2007). At first, it may appear obvious but is essential because if the feedback is delivered even before the students tries to respond; they cease to practice cognitive processes of integration, elaboration, and retrieval of information (Bangert-Drowns, Kulik, Kulik, & Morgan, 1991). That is, providing feedback before attempting to resolve the question may lead the student to only copy the correct response without striving to understand the content and may negatively impact her learning.

2.3 Main Challenges of Using SRS

Research has shown that the *technical problems* that occur during classes continue to be one of the most important reasons for students' dissatisfaction with SRS (Caldwell, 2007; Zhu, 2007). Failures and bugs can produce frustration and dissatisfaction among students (Rana et al., 2016). Zhu (2007) recalls that some technical problems usually arise at the beginning of the semester. For this reason, students should take advantage of this moment to test the devices and to solve any obstacles before teachers begin to assign grades to the SRS questions or validate attendance through the devices. Students in Cunningham's (2008) study reported that technical flaws hamper class flow because the professor has to wait for the connection between the system and the devices to proceed with the activity. In this way, clickers must be properly calibrated, and, in the web-based type, mobile devices must be properly connected to the Internet. Possible solutions should be studied according to the context and available resources of HEIs to verify the best option to circumvent such circumstances. These types of challenges must be solved so that the professor and the students can focus on the main objective of the teaching-learning process. Despite that, the natural advancements in technology must reduce the magnitude of this kind of problem.

The *loss* and *forgetting* of personal devices are obstacles that inhibit the use of SRS. Because clickers and devices are small in size, it is common for students to forget or lose them. According to Dallaire (2011), 57% of the students (n = 151) reported that forgetting the device is quite common and prevents the use of SRS in classes. It is necessary to remind the students of the importance of bringing the devices to the class. The "Bring Your Own Device" (BYOD) policy can be agreed upon with students to try to reduce forgetting devices.

From Sprague and Dahl's (2010) perspective, the *modification of the design of the teaching method* is one of the reasons instructors resist to use SRS. With the incorporation of this technology resource into the educational process, the increase in class preparation time is significant (Kay & LeSage, 2009; Sprague & Dahl, 2010). Professors should plan classes to cover less content since a

portion of the time is spent on the use of SRS (Sprague & Dahl, 2010). Therefore, there is concern about the exposure of content within the scheduled class time (Dallaire, 2011). Thus, the instructor must verify the balance between technological use and the transmission of knowledge.

Another challenge related to the figure of the instructor is the formulation of *effective questions*. Different questions demand distinct responses that require differentiated levels of cognitive engagement (Zhu, 2007). Cheong, Bruno, and Cheong (2012) have demonstrated that it is possible to use the same SRS type to encourage three levels of cognition: (1) reinforcement of common concepts (simple comprehension test in which learners chose an option of a multiple-choice question); (2) extraction of student knowledge (there were no options to be chosen, students should recommend a response); and (3) thinking and critical analysis (there is no previous correct answer. Discussion and reflection of possible solutions to the question are encouraged). Thus, Zhu (2007) states that if instructors want to test students' basic knowledge about content, conceptual questions will suffice. However, if the purpose is to engage students at a deep cognitive level, critical thinking questions will better serve this purpose.

The questions cannot be too easy to the extent that feedback is dispensable because they have apparent correct answers. This is crucial because Bangert-Drowns et al. (1991) argue that if information about student performance is unnecessary, feedback from external sources is pointless and can discourage learners from their learning experience. Caldwell (2007) stresses that there are no pre-defined steps to formulate good questions and that the only "rule" would be that they are aligned with learning purposes. However, extensive recommendations for elaboration and application of the questions via SRS can be found in the literature, as reported by Sullivan (2009). The act of developing questions is an essential practice that can influence student performance and content retention.

The *cost* of the clickers or subscriptions can be a barrier to SRS adoption by HEIs and instructors. The acquisition of clickers/subscriptions can be done by the HEIs or the students, depending on the institutional policy. Caldwell (2007) says that the cost of devices is one of the most present complaints from students. Therefore, the HEIs can acquire the clickers and lend them to the students, who return them at the end of each class. However, at other times, the students have to buy the alphanumeric devices, which can generate discontent if they are not used effectively and regularly. Rana et al. (2016) affirm that although the cost of alphanumeric devices has decreased, it can still be a considerable expense for HEIs. Zhu (2007) explains that there is excessive student concern with the cost of devices when they do not realize the value of their use for learning. Thus, HEIs and teachers should ensure that they will employ technology throughout the academic period constantly (Zhu, 2007).

A final main challenge regarding the use of SRS in the educational process is student cheating (Carnaghan et al., 2011; Duncan, 2006). The most common way to cheat is to lend or borrow the device of colleagues to record the presence of others in the classroom or answer the questions (Caldwell, 2007; Duncan, 2006). Similarly, students who are physically close to each other can see which button was pressed and imitate (Carnaghan et al., 2011). Students in Cunningham's (2008) study realized that their colleagues lent the devices to each other to cheat, breaking the whole purpose of the activity. Also, due to the advent of Whatsapp and other communication apps, students can transmit messages to one another more easily. To try to reduce these undesirable practices, the instructor can pay attention to the students or register the attendance manually (Carnaghan et al., 2011). Additionally, Duncan (2006) emphasizes that professors should explain the reasons for using SRS and be clear about the consequences of cheating.

2.4 Prior SRS Studies in Accounting Education

Carnaghan and Webb (2007) aimed to examine the effects of SRS on satisfaction, learning, and student involvement in the Introduction to Management Accounting course. To do so, the authors conducted an experiment and applied surveys. They concluded that students were satisfied with the SRS technology, but satisfaction with the course only slightly increased. Therefore, SRS use does not necessarily guarantee that students will feel more satisfied with the course. Regarding student performance, there was no significant difference between students who used SRS and who did not. However, SRS increased student performance only when the question format between SRS quizzes and the course exams was similar. A final finding is that SRS decreased the students' verbal interactions (est. = -0.48, sig. < 0.01). That is, the students became less communicative when the SRS was employed, a result contrary to what literature has been pointing. One possible explanation may be that this equipment encourages non-verbal student participation (Beckert et al., 2009).

Edmonds and Edmonds (2008) conducted a quasi-experiment to investigate the impact of SRS on student performance on quizzes in the Introduction to Management Accounting course. The authors used three control groups and another three treatment groups with a sample of 229 students. Regression analysis indicated that SRS is a significant predictive variable of student performance (coeff. = 2.89; sig. = 0.0004). That is, the SRS increased student performance by 2.89 points in thequizzes. They also found that the use of SRS is most useful for students who have lower GPA scores.

Premuroso et al. (2011) conducted an experiment in two classes of the Introduction to Financial Accounting course, in which the SRS was used with the treatment group and the control group used the paper multiple-choice quizzes. The SRS has a significant impact (coeff. = 0.226; sig. = .015) in the test grade, as well as the paper quiz (coeff. = 0.336; sig = 0.000). The gender control variables and percentage of correct answers in online tasks were also shown to be significant in determining student performance.

Marshall and Varnon (2012) examined the impact of SRS on student performance in a Financial Accounting Principles course using a repeated measure design and surveys. Results indicated that the implementation of SRS alone was not sufficient to increase students' performance. However, when implemented with peer instruction, SRS significantly improved students' performance. Moreover, surveys indicated that the students were more actively engaged in the classes and paid more attention due to SRS.

Chui et al. (2013) tested the effects of SRS on 60 accounting students' course performance, confidence, and study time through a quasi-experiment design. Students who used SRS (mean = 92.25) performed better at multiple-choice quizzes than those who did not (mean = 82.71). However, no significant difference was found when the overall course performance was analyzed (p = .41). SRS increased students' confidence comparatively to those who did not use it. Finally, students who used SRS spent less time studying to perform similarly at the course than their colleagues who did not use it.

In general, evidence indicates that either SRS has no impact or has a positive impact on accounting students' performance. Even those studies that found a positive effect, the coefficients can be considered low (Carnaghan et al., 2011). Besides, SRS increases student performance only in specific scenarios, such as when used with peer instruction (Marshall & Varnon, 2012) or when the type of questions used in SRS quizzes are similar to those used in the course exams (Carnaghan & Webb, 2007). These conflicting results suggest that more research is needed.

Other research on SRS in the area of accounting education can also be identified (Beekes, 2006; Cummings & Hsu, 2007; Cunningham, 2008; Kokina, J., & Juras, 2017; Marshall & Varnon, 2012; Newmark et al., 2011; Paz, 2017; Segovia, 2008; Yuen, 2018). Brazilian literature on SRS is still

in its early stages. We highlight the work of Cruz, Dias, and Kortemeyer (2011), which reports the use of SRS as a formative assessment resource in the physics course at the University of São Paulo. We hope that more national research will be conducted to understand better how SRS can contribute to education. Especially in the context of Covid-19, SRS is a relevant tool to bring more student involvement that can be considered by accounting instructors as remote learning lasts.

3 METHOD

3.1 SRS and Participants

The current research can be classified as descriptive as it verifies the accounting students' perception on the use of SRS. Also, it adopts a cross-sectional data collection and analysis once we collected the data only at one point in time. And we chose a quantitative approach to analyze the data using statistical tests to obtain stronger evidence.The SRS applied in this study was the Kahoot! (www.kahoot.com), because it better served the combination of financial cost, ease of use, and utility for the course criteria set by the authors of this study and the characteristics pointed in the literature (Wang & Tahir, 2020; Fan & Song, 2020). The Kahoot! is a web-based SRS that promises to improve interactivity and student engagement in the classroom. Complementarily, to foster student interest, Kahoot! scores the students according to the number of correct answers and the time took to respond. That is, the faster the students answer the questions correctly, the higher their score. With each round of questions, the ranking of the five most top-ranked students is presented, promoting an environment of competition among the students.

Kahoot! was used in three classes, one of the morning shift (n = 30) and two of the night shift (n = 23; n = 24) of a course called "Accounting for Diverse Entities" that is taught in a South Brazilian public HEI. In this course, students learn to apply accounting knowledge to diverse sectors: Industrial Accounting; Agribusiness Accounting; Real State Accounting; and Hospital Accounting. The population of this study was 80 participants (N = 32,23, and 25, respectively) and we obtained a high rate response because we administered the surveys in loco and right after the final exam, when most of the students are present.

The implementation of Kahoot! took place in the 4th quarter of the 2015 academic year. To amplify the Internet signal inside the classroom, in addition to the institutional wi-fi, two routers were installed and removed from the classroom at each class. The routers were only switched on during the SRS activity. Still, there were bottlenecks related to the Internet connection (some devices could not connect or disconnect during the activity). Students used their devices, cell phones or laptops, to answer the questions. Students were allowed to answer questions in groups (doubles and trios) or individually. This practice is essential for learning because it promotes more excellent verbal communication among students and group work skills for problem-solving (Edmonds & Edmonds, 2008). Also, it circumvented problems with forgetting devices and failing to connect to the Internet.

The content taught in the 4th quarter (October-December period), according to the previous planning of the course, was Real State Accounting. The equipment was used near the end of classes as a content review. The SRS was used in the morning shift class in five of the eight meetings of the quarter, with an average of 7.6 questions per class. For the night shift classes, the SRS was used in four of the seven meetings, with an average of 8.0 questions per class. Conceptual and practical accounting questions were both designed.

3.2 Instrument, Data Collection, and Analysis

The instrument for data collection consisted of a two-part survey. In the first one, students were questioned about their socio-demographic characteristics (age range, gender, course period, insertion in the labor market, and family income). The second part consisted of questions with

which students should agree on a scale ranging from 1 (totally disagree) to 10 (strongly agree) points. The formulation of the questions was based on surveys of the SRS literature (Beckert et al., 2009; Beekes, 2006; Carnaghan & Webb, 2007; Chatham & Davidson, 2011; Chui et al., 2013; Duncan, 2006; Eng et al., 2013; Lea, 2008; Mula & Kavanagh, 2009; Newmark et al., 2011; Segovia, 2008; Sprague & Dahl, 2010; Stowell, 2015). The 22 questions sought to capture two constructs: (1) perception of use; and (2) general student satisfaction. In this paper, we present the results of the second part of the survey. We also indicate that a prior version of the survey was tested with two students from stricto sensu accounting graduate programs. They provided us with feedback on the instrument's structure and understandability.

The Cronbach's alpha coefficient was calculated for each set of questions that represent the constructs. This procedure is used to evaluate the reliability of the scale that indicates the internal consistency of items that measure the same construct (Hair Jr, Anderson, Tatham, & Black, 2005). Smith (2015) states that this statistic is the most used to test the reliability of instruments, especially those recently developed. The recommended minimum level of acceptance is 0.7 (Hair Jr et al., 2005). However, we highlight that our objective was not to aggregate the items into one construct. The Cronbach's alpha was used to assess whether the items extracted from prior studies were theoretically logical among themselves.

Besides the Cronbach's alpha analysis, we assessed student perception through descriptive statistics (i.e., frequency, minimum, maximum, mean, median, and standard deviation) and one-tailed t-tests to compare the means with the central point of the scale, following prior studies (Carnaghan & Webb, 2007; Keough, 2012).

Smith (2015) states that it is common to get a response rate below 25% in research involving surveys in accounting research. Therefore, in order to increase the response rate, the surveys were printed and applied in loco. Another problem, however, was the missings on some questions. Since there were two paper sheets, some students either forgot or skipped a section of questions or did not know how to answer them. Even so, all the answers were taken into account, resulting in a total of 77 analyzed surveys.

4 RESULTS

Table 1 presents information on the profile of students concerning the age range, gender, period of study, labor market insertion, and family income included in the first part of the survey.

Table 1 – Student profile

Characteristics	n	%
Age range	*77*	*100.00*
20-24 years	**46**	**59.74**
25-29 years	19	24.68
30-34 years	8	10.39
35+ years	4	5.19
Gender	*77*	*100.00*
Male	35	45.45
Female	**42**	**54.55**
Course shift	*77*	*100.00*
Morning	30	38.96
Night	**47**	**61.04**
Work/Internship	*77*	*100.00*
Employee	**54**	**70.13**
Intern	11	14.29
Not working	12	15.58
Family income per month[A]	*76*	*100.00*
Up to 880 BRL	0	0.00

880.01 BRL to 2,640 BRL	12	15.79
R$2,640.01 to 4,400 BRL	29	38.16
More than 4,400 BRL	**35**	**46.05**

[A] The Brazilian minimum wage at the moment of the data collection was 880 BRL.

Source: Authors.

We observe that 59.74% (46 students) of the participants are aged 20 to 24 years. Forty-two (54.55%) students are female. Most of the students in the sample took the accounting course at night (61.04%), work (70.13%), and almost half have a family income above 4,400.00 BRL (46.05%). These data are aligned with what is expected from accounting students' profiles in Brazil.

From this point, the results refer to the second part of the survey. The first step is the analysis of the "Perception of use" construct, composed of 16 questions. The Cronbach's Alpha Coefficient for the first set of questions was 0.8085, above the value of 0.7 (Hair et al., 2005), indicating that the items are consistent to measure the construct.

Table 2 – Perception of use questions

Item	Perception of use (α = 0.8085)	n	Min.	Max.	Median	Mean[1]	SD
Q1	SRS is easy to use.	76	5	10	10	9.67***	0.87
Q2	SRS helped me with the course material.	76	1	10	10	8.74***	2.02
Q3	SRS made classes more interactive.	76	5	10	10	9.72***	0.81
Q4	SRS helped me with my learning.	76	1	10	10	8.96***	1.74
Q5	SRS should be used in other courses.	76	5	10	10	9.62***	0.97
Q6	SRS increased my ability to learn in comparison with other courses that do not use it.	76	1	10	8	6.92***	2.97
Q7	I believe that my grade was better than I expected due to SRS use.	71	1	10	7	6.93***	2.36
Q8	SRS use in all classes helped me to remain focused.	76	1	10	8	8.12***	2.05
Q9	I remained more actively engage in classes due to SRS.	76	4	10	10	9.70***	1.62
Q10	I tried my best to get the questions right.	76	1	10	10	9.13***	1.47
Q11	I found it hard to understand the SRS questions[2].	76	1	10	9	7.40***	2.99
Q12	SRS use motivated me to attend classes.	76	1	10	7	6.04	2.95
Q13	The quantity of SRS questions was adequate.	74	5	10	10	9.23***	1.34
Q14	The time to answer the SRS questions was satisfactory.	74	4	10	10	9.03***	1.51
Q15	SRS was revealed to be a didactic tool.	74	5	10	10	9.58***	0.94
Q16	SRS was revealed to be an adequate interactive tool.	74	5	10	10	9.65***	0.88

[1] One-tailed t-tests to compare the means with the central point of the scale (5,5) *** Sig. < .01; **Sig. < .05.
[2] Reverse coded.

Table 2 shows the results of students' perceptions regarding the use of SRS. We note that students rated 1 (minimum value) and 10 (maximum value) on some items, which indicates there was a contrast of opinion, since at least one student totally agreed or totally disagreed with the question. However, the median and average of these same items show that, in general, the scores are concentrated closer to the maximum possible score (10). That is, students tend to agree with the statements fully.

Item Q3 obtained the highest mean (9.72), suggesting that SRS promotes more interactivity in the classroom. Interactivity is crucial from a social perspective because students can learn from each other, besides the conversations with professors (Blasco-Arcas, Buil, Hernández-Ortega, & Sese, 2013). This finding is consistent with prior studies (Beckert et al., 2009; Blasco-Arcas et al., 2013; Eng et al., 2013; Lea, 2008; Premuroso et al., 2011). For example, Lea (2008) found that the

majority of her study agreed that SRS promotes higher interactivity in the classroom. Eng et al. (2013) reproduced Lea's (2008) survey and found very similar results.

Item Q9 obtained the second-highest mean (9.70) of the "Perception of use" set of questions. It suggests that students were more engaged in classes in comparison with courses without SRS usage. When students are actively involved in the educational process, they may feel more responsible for their learning (Zhu, 2007). This sense of responsibility may make students participate more in class because they know their learning depends more on them. This finding is congruent with prior literature (Fan & Song, 2020; Wang & Tahir, 2020; Eng et al., 2013; Lea, 2008; Marshall & Varnon, 2012; Yuen, 2018). Yuen (2018) reports that 85% of the participants indicated that SRS facilitated their active participation when it was used. Similarly, Marshall and Varnon (2012) show that 80% os their participants declared to be more actively engaged in the accounting classes when SRS was used. Altogether, this evidence suggests that SRS can be used to increase student engagement.

Question Q1 obtained the third highest mean (9.67). It states that SRS is easy to use. This result is crucial because both students and instructors do not need to spend a significant amount of time to understand how this educational resource works. It implies then that it can be implemented with easiness. This result is consistent with prior studies (Carnaghan & Webb, 2007; Keough, 2012; Stowell, 2015). For example, Carnaghan and Webb (2007) found a mean of 3.29 points (scale ranging from 1 to 5) that SRS was easy to use. Consistently, Stowell (2015) also found a mean of 4.65 for clicker and 4.53 for the mobile device (web-based SRS). As future generations of students are familiar with technology, these results reinforce that SRS may be useful because students will not have to spend a significant amount of time learning it.

Another important aspect asked was about student focus (Q8). According to the results, SRS has the potential to increase student focus during classes (mean = 8.12). Because students can only maintain a good level of attention for 15-20 minutes (Beekes, 2006; Lea, 2008), SRS questions can help them to stay more concentrated. Eng et al. (2013), Khan, Schoenborn, and Sharma (2019), and Yuen (2018) obtained similar findings. Yuen (2018) found that 80% of accounting students agreed more with the following statement: "uReply (a type of SRS) increased my attention span." (p. 353). Also, Fan and Song (2020) argue "that once a student is engaged in class-related ARS activities, he or she is more likely to remain engaged, at least for a while" (p. 3). This argument is supported by our findings. Students reported that SRS makes them more attentive and focused.

In addition to descriptive statistics, we ran one-tailed t-tests to compare the questions' mean with the center point of the scale (5.5). This procedure was performed in previous literature (Carnaghan & Webb, 2007; Keough, 2012). Except for Q12, all the means were statistically different from the central note at the significance level of .01 and, consequently, they were significantly above the central point of the scale, indicating that the students agreed with the affirmatives.

The mean of item Q12 (6.04) was not statistically different from 5.5. Students reported that SRS has less influence on their motivation to attend classes when compared to other items' responses. This result is different from Duncan's (2006) research, which found higher rates of student motivation to attend classes. Then, we provide some explanations for this finding in this study: (1) students, anyway, would come to class, regardless of the use of SRS; or (2) we did not adopt ways to encourage student attendance in this research (e.g., assignment of grades to SRS questions or recording of student attendance through SRS). Despite that, we emphasize that at least the SRS does not discourage students from attending classes. Further research is needed to try to clarify how SRS acts on accounting students' motivation for attending classes.

Overall, "Perceptions of use" items are congruent with Carnaghan and Webb's (2007) and Keough's (2012) results. They both found higher means in comparison to the scale midpoint,

especially for student participation and ease of use. We then suggest that accounting instructors try to use SRS for student involvement and active learning purposes.

Table 3 shows the results of the six questions about students' overall satisfaction with SRS. A Cronbach's Alpha of 0.7702 was obtained, also above the level of 0.7 (Hair et al., 2005). This is evidence that the items are consistent in measuring students' "overall satisfaction."

Table 3 – Students' overall satisfaction

Item	Overall satisfaction (α = 0.7702)	n	Min	Max	Median	Mean[1]	SD
Q17	I am satisfied with the SRS questions.	74	1	10	10	9.00***	1.61
Q18	The instructions provided were satisfactory to manage SRS.	74	5	10	10	9.64***	0.87
Q19	The competition provided by SRS increased my satisfaction compared to traditional classes.	74	1	10	10	8.99***	1.65
Q20	My satisfaction with the course increased due to SRS use.	74	1	10	9	7.86***	2.58
Q21	I am satisfied with the SRS incorporation into the course.	74	5	10	10	9.36***	1.19
Q22	I am satisfied with the SRS use.	74	5	10	10	9.42***	1.21

[1] One-tailed t-testes to compare the means with the central point of the scale (5,5) *** Sig. < .01; **Sig. < .05.

Source: Authors.

For the items Q17, Q19, and Q20, conflicting opinions were obtained, given their minimum and maximum values. However, high medians and averages indicate that most of the scores are closer to the maximum point of the scale (10). Then, we observed that, in general, students were satisfied with the aspects questioned in these statements. These results are consistent with prior research (Beckert et al., 2009; Caldwell, 2007; Duncan, 2006; Edmonds & Edmonds, 2008; Keough, 2012). For instance, Keough (2012) found a mean of 5.98 points (scale ranging from 1 to 8) for student satisfaction, which was significantly higher than the scale midpoint ($p < .01$).

Q18 indicated that students were satisfied with the instructions provided on how to use SRS. This finding is essential because it signaled that the SRS was utilized appropriately. Lack of adequate instructions may lead students to find its use boring and without purpose, decreasing their perception of positive aspects of SRS. Item Q22 also obtained a high score (9.42). Students were satisfied with SRS use. According to prior literature, SRS can promote positive learning experiences (Duncan, 2006; Edmonds & Edmonds, 2010; Yuen, 2018; Zhu, 2007). This finding reflects the potential benefit SRS possesses in providing distinct educational experiences relative to those that students are used to. Combining the results of this research with those reported in prior literature, we suggest SRS as a technology resource to make students satisfied.

We also performed one-tailed t-tests to compare the mean scores with the center score of the scale. All averages are statistically different from 5.5, suggesting that the students agreed with the statements. The high scores obtained for questions Q17, Q21, and Q22 also indicated that the SRS was incorporated into classes satisfactorily in students' perception and that the elaboration of the questions was consistent with the content taught.

The mean of 7.86 for Q20 indicates a lower intensity of agreement with the other questions by the students when asked if the SRS increases the satisfaction with the course. One explanation may be that the students already felt satisfied with the course, without the SRS being employed. This finding is congruent with Carnaghan and Webb's (2007).

5 CONCLUSIONS

This study sought to show students' perceptions regarding SRS use and their satisfaction with it. To this end, we utilized surveys to collect data from 76 accounting students from a public university located in the South of Brazil. Data were submitted to descriptive statistics and t-tests analyses, as well as the Cronbach's Alpha. The calculated Cronbach's Alpha coefficients indicated

that the survey questions were consistent to measure the proposed constructs, namely: "Perception of Use" and "Overall Satisfaction".

The high average scores obtained regarding the statements and the evidence from the t-tests lead to the conclusion that the students perceived that the SRS assists in the interactivity of the educational process, promoting greater involvement and focus in the classroom, giving a slight impression of improvement in academic performance, and benefiting learning. This evidence supports the pedagogical aspects of SRS. Based on these findings, we recommend that professors who are trying to promote higher active engagement and environments use SRS.

In addition, according to the findings, we note that the students liked the competition made possible by Kahoot!. Students were also satisfied with the use of SRS, with the instructions for using SRS, and with the adequacy of the questions asked using SRS. Therefore, the general satisfaction of the students prevailed. These findings are consistent with previous studies (Beckert et al., 2009; Carnaghan & Webb, 2007; Chatham & Davidson, 2011; Cummings & Hsu, 2007; Eng et al., 2013; Newmark et al., 2011; Premuroso et al., 2011). We reached our objective as we provided results of how accounting students perceive the usage of SRS in the teaching-learning processes.

As to theoretical contributions, this study supports the active learning stream insofar as the results show that students had a positive experience with SRS. The discussion of the benefits and challenges can be of guidance to accounting instructors through their decision to adopt the SRS technology. Also, most of the studies on the use of SRS within the accounting education field were conducted in developed countries. The current research is among the firsts to be carried out in a developing country (i.e., Brazil) and expands the findings. Finally, we extracted items from prior literature and combine them into a survey. They showed internal consistency. Subsequent studies can use it with the objective to better assess its reliability and validity, which was not the main goal of this study.

As limitations of the research, we point out the following: (1) The SRS was only used in the 4th quarter of the school year. As SRS might not have been used previously by accounting students and has not been used all year round, their perception was subject to a "novelty effect." Possibly, the impact of SRS use on student perception may be attenuated over time, decreasing the positive perception observed in the data analysis; (2) Technical problems occurred during the SRS activity, especially concerning the Internet connection. Caldwell (2007), Cunningham (2008), and Zhu (2007) argue that such problems are the main reasons students complain about and get frustrated with the SRS. It is difficult to measure how much these problems may have impacted student vision. Even so, the results indicated satisfaction with the tool (the average significantly exceeded the midpoint of the scale). We should also emphasize that there might have a significant relationship between students' demographic information (e.g., age) and their perception. Consistent with our objective, we analyzed only student perception, but we recognize that it would be valuable to include demographic information in the analyses to extract more specific evidence.

Finally, as suggestions for future research, we recommend the analysis of the impact of SRS on student attendance and collaborative learning. Besides, we suggest the comparison of how SRS can be employed in courses that are different in nature (e.g., more practical courses, such as cost accounting, versus more theoretical courses, such as accounting theory) to provide directions on how it can be better used. Lastly, the analysis of the use of SRS in distance learning is also encouraged.

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