


Experimental research applied to accounting education: current panorama and future opportunities in the Brazilian scenario


Pesquisas experimentais aplicadas à educação contábil: panorama atual e oportunidades no cenário brasileiro

Investigación experimental aplicada a la educación contable: panorama actual y oportunidades en el escenario brasileño


Ricardo Suave*

Doutor em Controladoria e Contabilidade (USP)
Professor no curso de Ciências Contábeis (UNICENTRO),
Guarapuava/PR, Brasil
ricardosuave@outlook.com
<https://orcid.org/0000-0002-9149-2658> 

Stella Maris Lima Altoé

Doutora em Contabilidade (UFPR)
Professora no curso de Ciências Contábeis (UNICENTRO),
Guarapuava/PR, Brasil
stella.altoe@gmail.com
<https://orcid.org/0000-0001-9252-7835> 

Marcelo Marchine Ferreira

Doutor em Educação (UFSCAR)
Professor no Curso de Ciências Contábeis (UNESPAR), Campo
Mourão/PR, Brasil
mmarchine@gmail.com
<https://orcid.org/0000-0002-0102-7622> 

Primary contact address for correspondence *

Rua Padre Salvatore Renna, 875, Santa Cruz, CEP: 85015-430, Guarapuava/PR, Brasil

Abstract

Scientific studies that adopt the experimental method in the accounting area, in Brazil, are uncommon. In the field of accounting education, they are even less frequent. In this sense, the aim of the study was to describe, based on a narrative review of the specifically selected literature, national and international studies in the field of accounting education using an experimental and quasi-experimental method and, additionally, to present research opportunities in this field with the use of the method. Methodologically, the study has a bibliographic character. After surveying procedures with accounting journals, 7 national and 76 international papers were obtained, whose methodology used was experiment or quasi-experiment. As a result, the objectives of the studies, national and international, are similar, with a focus on verifying the effects of different methodologies on student performance and satisfaction. However, the main difference lies in the number of studies, which was higher in the international context, and resulted in a wide array of topics studied. The main contribution of the study is to demonstrate opportunities for using experiments to promote improvements in teaching, learning, professor training and institutional policies.

Keywords: Accounting; Education; Experiments

Resumo

Artigos científicos que adotem o método experimental na área contábil, no Brasil, são pouco frequentes. No campo da educação contábil são menos frequentes ainda. Nesse sentido, o objetivo do estudo foi descrever, a partir de revisão narrativa de literatura especificamente selecionada, estudos nacionais e internacionais no campo da educação contábil que utilizaram método experimental e quase-experimental e, adicionalmente, apresentar oportunidades de pesquisas nesse campo com o uso do método. Metodologicamente o estudo tem caráter bibliográfico. Após procedimentos de levantamentos junto a revistas contábeis, obtiveram-se 7 artigos nacionais e 76 internacionais, cuja metodologia usada foi experimento ou quase experimento. Como resultados percebeu-se que os objetivos dos estudos, nacionais e internacionais, são semelhantes, com foco na verificação de efeitos de diferentes metodologias sobre o desempenho e satisfação dos estudantes.

Entretanto, a principal diferença reside na quantidade, que por ser superior no contexto internacional, resulta em maior variedade de temas estudados. A principal contribuição do estudo é no sentido de demonstrar oportunidades do uso de experimentos para a promoção de melhorias em práticas de ensino, de aprendizagem, de formação de professores e em políticas institucionais.

Palavras-chave: Contabilidade; Educação; Experimentos

Resumen

Los artículos científicos que adoptan el método experimental en el área contable, en Brasil, son poco comunes. En el campo de la educación contable son incluso menos frecuentes. En este sentido, el objetivo del estudio fue describir, a partir de una revisión narrativa de literatura específicamente seleccionada, estudios nacionales e internacionales en el campo de la educación contable que utilizaron un método experimental y cuasiexperimental y, adicionalmente, presentar oportunidades de investigación. en este campo con el uso del método. Metodológicamente, el estudio tiene carácter bibliográfico. Luego de procedimientos de encuesta con revistas de contabilidad, se obtuvieron 7 artículos nacionales y 76 internacionales, cuya metodología utilizada fue un experimento. Como resultado, se notó que los objetivos de los estudios, nacionales e internacionales, son similares, con un enfoque en verificar los efectos de diferentes metodologías en el desempeño y satisfacción de los estudiantes. Sin embargo, la principal diferencia radica en la cantidad, que, al ser mayor en el contexto internacional, se traduce en una mayor variedad de temas estudiados. La principal contribución del estudio es demostrar oportunidades para el uso de experimentos para promover mejoras en la enseñanza, el aprendizaje, la formación docente y las políticas institucionales.

Palabras clave: Contabilidad; Educación; Experimentos

1 Introduction

The scientific field in accounting, in general, has grown in Brazil. There has also been, as a consequence, more interest in the accounting research and growth of the scientific community (Miranda, Santos, Nova & Cornacchione Junior, 2013, Vendramin & Araújo, 2016). The expansion of Brazilian higher education, the largest offer of undergraduate programs in accounting sciences and growth, in recent years, of the quantitative strict sensu graduate programs in the accounting area - Main Vectors of Scientific and Teaching Development in Accounting - they are factors that contribute directly to the growth of the community and the interest in the field (Silva, Ferreira, Leal & Miranda, 2019).

Despite the growth and development, Brazilian accounting research, in general, has followed the same path from other investigative fields, characterizing predominantly by the positivist paradigm and the productivist logic (Costa & Martins, 2016). This generates critical distortions in terms of relevance and quality of knowledge generated. One of these distortions, pointed out by Sangster, Forgy, Stoner & Marriot (2015) and by Hartmann (2017), is the considerable distance between academic knowledge, produced by research, and usable knowledge, capable of being added to the repertoire of those interested and can use it. Such a distortion results in what Hartmann (2017) calls for academic stagnation, that is, the low interlocution that knowledge generated by research has with exercise and accounting professional practice.

The development of research in accounting education, although having consistent evolution, still appears to remain as an investigative field of smaller order and attention (Matos, Niyama, Fernandes & Botelho, 2012; Miranda et al., 2013; Vendramin & Araújo, 2016). Even if graduate programs are considered the locus for training professors for teaching, there are evidence that suggests that such role has not been played enough by them yet, whose focus seems to fall primarily on the training of the researcher (Vendramin & Araújo, 2016; Laffin, & Gomes, 2016). There are few programs that include structured actions in their pedagogical compositions in terms of training professors for teaching and research on accounting education (Vendramin & Araújo, 2016; Laffin, & Gomes, 2016), which probably implies little development of consistent and regular investigations on interrelation between education and accounting.

In this sense, the gap between knowledge generated by scientific production and educational practice in accounting has to be decreased. And educational practice has to feed on knowledge generated in order to promote effective changes in educational and accounting learning processes. However, it is necessary that, among other things, the investigative field in accounting explore and diversify how to conduct studies as it is marked by reproductive logic and choices that tend to strengthen the maintenance of the habitus in which researchers of the field were produced (Costa & Martins, 2016). One of the ways to change this scenario is a relationship with changes in the methodological aspect of the surveys. Unusual research methods in accounting - that potentially can contribute to knowledge-practice feedback - need initiative and space to be developed and applied. Both in the field of qualitative and quantitative methods. And this study, deals with one in specific: the experimental method.

Experiments are related to the development of science and scientific thinking. In the literature, this concept has variation in interpretation. In the context of science teaching, "experiencing [...] is to submit to experience; it is to put to the test; it is to assay; is to know or evaluate by experience" (Borges & Moraes, 1998, p. 30). In the field of scientific research, experiment is a method of an interventionist nature and with own

procedures (Teixeira & Megid Neto, 2017). It consists of an action to observe its consequences in the search “[...] to build new knowledge, unknown to science itself” (Lima & Teixeira, 2005, p. 2). It is in this sense that the experiments are addressed in the present study.

An experimental study consists of the deliberate and controlled modification of the determinants of a given phenomenon and the consequent observation and interpretation of the modifications occurring in it. And from such observations and interpretations, unveil the causes of the phenomenon indicating which variables have produced modifications on other variables (Triviños, 1987). Control of the conditions by the researcher occurs when one or more independent variables - foreground causes - are intentionally manipulated with the objective of analyzing their consequences on one or more dependent variables - consequential effects (Sampieri, Collado & Lucio, 2013). Such a scenario allows the inference of causal relationship, which is important to verify that the observed differences will be resulting exclusively from the manipulations carried out. If the experiment is properly designed, with care in the validity of the construct and in the internal and external validations, the causal relationship may be inferred by explaining the phenomenon under study.

In the case of research in the field of accounting, the use of experiments, in general, is recent (Aguiar, 2017, 2018; Hesford, Lee, Van der Stede and Young, 2007). Such use in Brazil, in addition to recent, is also scarce (Frezatti, Aguiar, Wanderley e Malagueño, 2015; Homero Jr., 2016, Aguiar, 2017, 2018). The study by Aguiar (2018), for example, identified that of a total of 99 studies on managerial accounting published in journals in Brazil, only 3 used the experimental method. In the Journal of Accounting Education, which presents literature reviews from the main journals on accounting education, it was found that from 2010 to 2018 only 2.3% empirical studies analyzed used experiments as a method (Apostolou, Dorminey, Hassell, & Watson, 2013; Apostolou, Dorminey, Hassell, & Rebele, 2015, 2016, 2017, 2018; Apostolou, Dorminey, Hassell, & Hickey, 2019).

Nevertheless, the literature points to potentialities that would enable important contributions to the advancement of knowledge and professional practices in various segments such as financial, managerial and audit accounting, for example (Aguiar, 2017). Accounting education can be added. In the field of education its use can be useful, for example, focusing on the teaching and learning process, testing the effects of certain methodologies on student learning (Street, 1995; Abeysekera, 2015; Sithole, 2017). Or even checking the student behavioral response to certain stimuli and set the relation of the effects on performance, on engagement in studies, on motivation with the program. Another possibility would be on issues relating to teaching, verifying whether there is a relationship between different institutional policies (salary, benefits, career promotions and progressions, qualification, professor training, for example) and professor performance in class, in research or in relation to professor engagement with the institution and/or program. Other focuses could also be exploited by experimental studies in accounting education in areas such as curriculum, technologies applied to education or educational practices, for example.

Considering the exposed, to know more specifically what has been investigated in the research on accounting education using the experimental method induced the restlessness of this study. In such a way, the objective was to describe, from a narrative review of the specifically selected literature, national and international studies in the field of accounting education that used experimental and quasi-experimental method. Additionally, to present research opportunities in this field with the use of the method. The inclusion of the quasi-experiments in the scope of the study is due to the fact that they have objectives and structural attributes similar to the experiments (Shadish, Cook & Campbell, 2002).

In general, the little evidence of using the experimental method in the field of investigation on accounting education in Brazil and outside of it presupposes, therefore, a potential investigative horizon to be explored (Aguiar, 2017, 2018; Apostolou et al., 2013, 2015, 2016, 2017, 2018, 2019). In this sense, this study fills out a gap when performing a revision investigation in a significant share of national and international accounting literature on the use of the method in educational research in accounting and pointed out research opportunities with such a method that can potentially promote modifications in teaching, learning, professor training practices, and institutional policies. It should be noted, however, that this study did not intend to exhaust the numerous and multiple possibilities of existing research.

The main contribution of this study, therefore, is in the knowledge that generated on scientific productions using the experimental and quasi-experimental method in investigations related to accounting education. It also provided understanding of the thematic areas discussed in the investigations that were released in the main national journals on accounting and international journals on accounting education. In addition, knowledge generated may have a potential value for researchers in accounting education that will develop or are developing research on the subject, as they will allow to identify themes and directions still not exploited with the use of the experimental method. Thus, this study intended to exploit and at the same time problematize on the use of the method in research on accounting education, raising challenges and possibilities that can be developed in future research.

2 Use of Experiments in Education Research

In the last two decades much has been advanced in education research with the use of experimental methods, as from this methodology, using tests that check cause and effect relationships, one can infer about

what works or not in educational practices (Raudenbush & Schwartz, 2020; Whitehurst, 2012). The greater use of experiments was a change of direction in relation to previous research methodologies, widely based on non-experimental approach studies, in which the lack of success was observed in the identification of reliable causal effects (Pituch, Murphy & Tate, 2010).

The evolution observed is mainly due to the use of randomized studies, that is, randomness in the assignment of participants to treatment and control groups. Thus, with ease of interpretation of results, there is a guarantee that the differences observed between these groups are due to the treatment carried out, which allows to attest to cause and effect relationship (Whitehurst, 2012). In this sense, it is observed that studies with this approach provide scientific basis for the formulation of guidelines for policies, methods and educational practices (Pituch et al., 2010).

In particular, in the research on accounting education, it is argued about stagnation, considering that empirical articles usually adopt surveys, with few studies using experimental or quasi-experimental approaches (Rebele & Pierre, 2015). However, the issue of research guides the method to be used. For example, a survey in order to verify the satisfaction of the students on a certain subject would not need an experiment, on the other hand, this approach is more suitable for the analysis of students' performance after the adoption of new methodology. That is, the experiments are more applicable to demonstrate what works (e.g., teaching and evaluation methodologies, among others) (Whitehurst, 2012). From this context, it is clear that causal inference is the main benefit of experiments.

Recommendations for greater use of experiments at the expense of surveys are not recent (Benke & Street, 1992; Street, 1995), however revision studies in the area do not demonstrate this use as a trend. To illustrate the international context, Table 1 lists the studies carried out in the period 2010 to 2019. It has been emphasized that since 1986, revision studies have been published, starting with Rebele & Tiller (1986). From the second study, held in 1991 by Rebele, Stout & Hassell, (1991), surveys started to be published in the *Journal of Accounting Education*, and only from 2013 it is observed the direct evidence of the number of articles according to the type of methodology, with the study of Apostolou, Dorminey, Hassell, and Watson (2013).

Table 1:
Identification of the use of experiments in revision studies

Period	Study	Total	Number of experiments	Number of quasi-experiments
2010 – 2012	Apostolou, Dorminey, Hassell, and Watson (2013)	291	2 (0.7%)	23 (7.9%)
2013 – 2014	Apostolou, Dorminey, Hassell, and Rebele (2015)	256	1 (0.4%)	12 (4.7%)
2015	Apostolou, Dorminey, Hassell, and Rebele (2016)	97	1 (1%)	7 (7%)
2016	Apostolou, Dorminey, Hassell, and Rebele (2017)	108	-	7 (6.5%)
2017	Apostolou, Dorminey, Hassell, and Rebele (2018)	103	1 (1%)	3 (3%)
2018	Apostolou, Dorminey, Hassell, and Hickey (2019)	101	3 (3%)	1 (1%)
2019	Apostolou, Dorminey, and Hassell (2020)	81	-	5 (6.2%)

Source: Prepared by the authors (2021).

From Table 1, it is possible to note that, for the different periods analyzed, there is no significant increase or reduction in the number of surveys, nor of variations in the representativeness of experiments and quasi-experiments in relation to the total. While such methodologies were adopted by 8 and 58 studies in the period, respectively, the survey as a data collection strategy was adopted by 236 studies in that period. In this sense, it is remarkable that the use of experiments and quasi-experiments remains little representative, that is, still in line with the stagnation of accounting education research (Rebele & Pierre, 2015).

Most analyzed studies using non-experimental approaches provide results that capture associations rather than cause and effect (Apostolou et al. 2019). According to the authors, the identification of cause-and-effect relationships can be carried out through random and controlled experimental approaches, as they enable the isolation of constructs. Experimental and quasi-experimental methods, as well as student performance data, are ways to collect data considered to be more stringent, but their use has been reducing (Apostolou et al., 2018).

Rebele and Pierre (2015) list some challenges related to the application of experimental studies in the educational field. The first concerns approval in ethics committee, as there is usually the expectation that the treatment group can benefit from something that is intended to study, and the control group does not. Thus, performance (scores) and attitudes of students, in relation to a subject, can be affected when they participate in the study. Secondly, the dropout rates of a subject can be different between control and treatment groups, and there is the possibility of treatment affecting the decision to drop out.

Another challenge inherent in the use of experiments, and of any type of research, concerns the validity of the construct and the internal and external validity. The validity of the construct describes how much abstractions can be operationalized, either in terms of reliability of measurement until the ability of measurements to capture the essence of abstraction (Smith, 2003). The internal validity refers to the inference of cause and effect from A to B in the way such variables were measured, which requires the researcher to

certify that A precedes B in time (Shadish et al., 2002). Finally, external validity is related to the ability to generalize the results (Smith, 2003).

Aguiar (2017) explains three types of experiments (natural, field and laboratory) from accounting research, as well as the advantages and disadvantages of each related to internal and external validities. In a natural experiment, the researcher does not manipulate independent variables, and, in relation to the other types of experiment, it has greater external validity and less internal validity. Applied to accounting education, a fact exogenous to the researcher's control may be some curricular change, thus, one can study whether there is a difference in any dependent variable (student performance, placement in the market) by comparing the before and after the change. In this case, the problem of internal validity refers to the difficulty of controlling the effect of variables outside the study design (Aguiar, 2017).

The field experiment, in turn, happens when an intervention is made with some students and the others are the control group. This approach has greater external validity than laboratory experiments, especially through direct application with students, but less internal validity than laboratory experiments (Aguiar, 2017). The implementation of a new form of evaluation or teaching methodology, random among a group of accounting students at a university, are examples of field experiments. Finally, in relation to the previous approaches, the laboratory experiment has less external validity and greater internal validity, due to the fact that there is greater use of abstraction and greater control by the researcher, respectively (Aguiar, 2017). As examples of laboratory experiments in education, mention is made of the application of a hypothetical test with different forms of questions (open or closed) or different arrangements of students (individual or groups), to verify the effect on performance.

Considering the challenges and care to be taken with the use of experiments, it is worthwhile to undertake the initiative of applying such methodology in research in accounting education so that the benefits of this method can also be used and improved. Following, the main aspects of the methodological design of the study are presented.

3 Method

The research was a qualitative, revision and interpretative study. The type of literature review adopted is located between the narrative and the systematic review. This is because part of the adopted design (specifically the option for the specific set of investigated journals instead of bases for indexed journals) was established by the judgment of the authors of this study and part was established in a research protocol. The focus was to describe studies conducted using the experimental and quasi-experimental approach, in addition to pointing out directions for possible investigations and considered as potential with the use of experiments in the field of accounting education in Brazil.

The investigated corpus of literature consisted of articles published in national and international scientific journals in the accounting field. The option, outlined in the study, was to know what has been published in representative accounting journals in terms of publications on accounting education. Internationally, there are specific journals, specialized in accounting education. They are consolidated journals and, therefore, considered representative with regard to the dissemination of educational research and the reach they have within the scientific and professional accounting field. In Brazil, on the other hand, there are no specialized journals specifically dedicated to the theme. Publications on accounting education find space in almost every journal that also publish articles in the various areas of accounting knowledge. Because of this, the study option was to include the set of Brazilian accounting journals, which allows to affirm that they are, likewise, representative in the research and national professional scenarios. Evidently, the path chosen implies limitations, the main one is the fact that research on accounting education using the experimental method may have been published in journals that are outside the scope of accounting.

Thus, with respect to national articles, the corpus consisted of 40 journals selected for being included in the Brazilian Qualis-Journals classification in the area of Public and Business Administration, Accounting Sciences and Tourism carried out by CAPES for the 2013-2016 quadrennium (available at: <https://tinyurl.com/oedf4xj>). The search for articles in Brazilian journals occurred by accessing the specific electronic address of each. The terms 'experiment' and '*experimento*' were used as descriptors, with the criterion that they could appear in the title, abstract or keywords. The time period was broad and diversified, covering the period of online availability of publications in each of the journals. After a preliminary selective analysis of the material retrieved with the search performed, seven articles were included in the corpus. The criteria for inclusion of the articles were two: they should have a methodological design as an experiment or quasi-experiment and that the studies investigated subjects/themes about accounting education.

With regard to international articles, they were selected from the same set of journals on accounting education used in the studies by Apostolou et al. (2013, 2015, 2016, 2017, 2018). Such studies are part of a series of literature reviews published in the Journal of Accounting Education and focus their analysis on six specific journals on the field of accounting education, namely: *Journal of Accounting Education*, *Accounting Education*, *Advances in Accounting Education: Teaching and Curriculum Innovations*, *Global Perspectives on Accounting Education*, *Issues in Accounting Education* and *The Accounting Educators' Journal*. The publications of the author and collaborators map, among other topics, the various areas and subjects in which

the research published in the journals is developed, which, in turn, are taken as consistent references in terms of disseminating knowledge about accounting education.

The search for articles in international journals occurred similarly to that described for national journals. The specific electronic address of each was accessed and the term 'experiment' was used as a descriptor, with the criterion that it could appear in the title, abstract or keywords. After selective analysis of the material, 76 articles were included in the corpus, which fit as experiments and whose investigation was about accounting education.

The analysis of the corpus adopted an orientation that is close to the interpretative description. Interpretative approaches, in qualitative research, are concerned with understanding the meanings of the investigated phenomenon, without a priori predeterminations (Pozzebon & Petrini, 2013). The interpretive description, here received a new meaning appropriate for a study of a revision nature, takes on an inductive analytical perspective, designed with the purpose of creating ways to understand the set of scientific publications on a specific theme that used a specific method. And such understanding generated by the researchers' interpretation has the potential to produce implications for the context investigated and, therefore, for the investigative practice of the field (Teodoro, Rebouças, Thorne, Souza, Brito & Alencar, 2018). In the interpretative description, the researcher's role is outlined by the need of their reality to generate new knowledge, and it is up to them to combine the understanding of what is already known with new possibilities in structuring knowledge (Teodoro et al., 2018).

In this sense, the idea behind the analytical option adopted was to explore how experimental research in accounting education has been carried out. The analytical path considered the (non-statistical) description of the studies and sought to organize and synthesize them into thematic areas. Such organization and synthesis occurred posteriori, being constituted from the data (analyzed articles). Subsequently, and based on the investigated studies, we sought to organize referrals for future research, adding contributions not covered by the analyzed corpus.

4 Results and Discussion

4.1 Experiments in Brazilian accounting research on education

Studies on accounting education using the experimental (and quasi-experimental) approach in Brazilian accounting journals are scarce. The survey identified seven that could be objectively associated with the use of the approach. In the analysis process, they were grouped into four thematic areas, as shown in figure 1. It is important to mention that a given study could be grouped in more than one area due to its scope, as is the case, for example, of Passos, Cornacchione Júnior, Gaio and Brito (2016), included in the area of Student Behavior and Characteristics and Teaching in Specific Subjects.

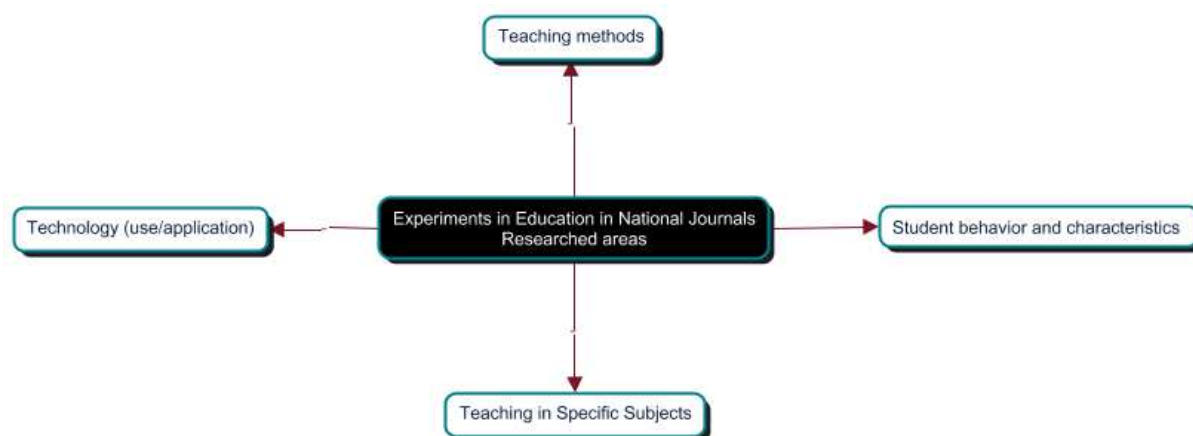


Figure 1: Areas addressed in national experimental and quasi-experimental studies

Source: Prepared by the authors (2020).

Among those evaluating a specific teaching technique or strategy, three studies focused on the authorship of Passos, Cornacchione Júnior, Gaio and Mori (2015), Passos, Cornacchione Júnior, Gaio and Brito (2016) and Passos Cornacchione Júnior, Gaio, Brito and Mori (2016). In a quasi-experiment, Passos et al. (2015) sought to know, analyze and evaluate the effectiveness of teaching the model of Richard Paul (1995) of critical reasoning in undergraduate students in face-to-face teaching in Accounting Sciences at FEA-USP, in the development of skills to think critically about accounting. The study showed that the students of the treatment class, in relation to their critical reasoning, were no better than the students of the control class. Therefore, Richard Paul's model had no significant effect.

Passos, Cornacchione Júnior, Gaio and Brito (2016), in another quasi-experiment study, evaluated the application of Richard Paul's model in the virtual Moodle environment, using EWCTET. The study was carried out with students who were taking the subject of Business Budget and Controllership, from the Administration program at a Higher Education Institution (HEI) in the interior of the state of São Paulo. The results showed that Richard Paul's model had no significant effect on critical thinking skills when using the virtual Moodle environment.

Passos, Cornacchione Júnior, Gaio, Brito and Mori (2016) evaluated the application of a Capital Market simulation for the development of critical thinking skills, based on the EWCTET, in students in the business area, having as main innovation the insertion of the variable Business Games. The study was carried out in the Capital Markets subject at an HEI in the interior of the state of São Paulo. The results show that the Capital Market simulation had no significant effect on the development of critical thinking skills in the treatment group.

Quintana and Afonso (2018) verified the consequence of using technology in the performance of students in the subject of Introductory Accounting at a Federal HEI. After an experiment, the classes were divided into treatment and control groups, with subsequent inversion of the groups to identify the effect of using chat and discussion forum in the learning process. The importance of the assignment of participants to treatment and control groups is emphasized as a fundamental characteristic of the experiments (Apostolou et al., 2018). At the beginning of each two-month period, an assessment was applied to assess the student prior knowledge about the content. The results of the study indicate that the use of technology, specifically the chat and forums, contributes to increase the academic performance.

Santos (2003) also used the variable Business Games in his experiment. The application of Business Games in accounting teaching and learning was investigated, highlighting aspects such as: i) theoretical approaches of teaching and learning processes; ii) Business Games and their advantages in teaching and learning; iii) Business Games and adult learning; iv) Business Games and teaching and learning approaches; v) Game Theory and vi) Business Games and accounting. The results found demonstrate that the teaching strategy called Business Games should be applied in adult learning and in student-centered education, based on the constructivist approach that is directed to team work. In addition, it was found that in this process the participants acted actively, thus stimulating teaching and learning.

Pereira and Silva (2018) verified the contributions that cooperative learning can provide for academic performance and communication skills of Accounting students. An experiment was carried out with 34 undergraduate students from the Tax Accounting subject of a public HEI, consisting of two independent variables, cooperative learning in class (Jigsaw learning) and traditional lecture class, which mapped the teaching method. The level of knowledge was based on Bloom's Taxonomy and was characterized as a dependent variable. Moreover, the authors used the Cloze technique, analysis of variance and the Tukey's test. The findings show that cooperative learning contributes to the improvement of written communication skills, on the other hand, there is no significant difference for academic performance.

Carvalho Júnior, Rocha and Bruni (2010) verified the impact of controllership formal learning in minimizing cognitive biases in management decisions, caused by the framing effect. For that, they built scenarios related to opportunity cost, Sunk Costs, replacement cost and theory of restrictions. Such perspectives, according to the authors, may contain biases and are related to the controllership formal learning. In addition, the effect of intervening variables, defined as academic performance, perceived level of knowledge and internship in the program, on reducing the framing effect was analyzed. The study sample consisted of students from the initial and final grades of the Accounting and Law programs at the Federal University of Bahia (UFBA), which resulted in a sample of 155 students. The findings indicate that the framing effect can be identified in situations when concepts of sunk costs and replacement cost are presented, and for the replacement cost the insertion of the bias resulted in a framing effect in the opposite direction to the intended one.

In summary, in the field of accounting education in Brazil, the publication of studies using experiments or quasi-experiments as a methodological approach in accounting journals is uncommon. In the studies found there is a concentration of research in two ways: those that evaluated a specific teaching technique or strategy and those that investigated the relationship between teaching and learning in specific situations. However, as illustrated in Figure 1, studies point to little diversity in areas. This demonstrates, at the same time, a gap to be filled in relation to the use of experimental studies in the field of accounting education and an opportunity to explore experiments and quasi-experiments in a wide array of scopes within the educational area (Rebele & Pierre, 2015).

The analyzed data do not allow inferring about the development of research in accounting education using the method. However, attention is drawn to the fact that in the set of Brazilian accounting journals - the main channel for scientific dissemination to the accounting research community - there is no frequency or regularity of experimental studies in education or in other areas (Aguiar, 2017). This finding also points to a vast field of possibilities to be explored in the Brazilian context, both in terms of publications and, possibly, of developing investigations that adopt the method.

4.2 Experiments in international accounting research on education

Research publications that use experiments as a method in accounting education in international accounting journals (those selected for the study) are frequent and include varied themes and with different approaches. Figure 2 represents the themes of studies within the field of accounting education.

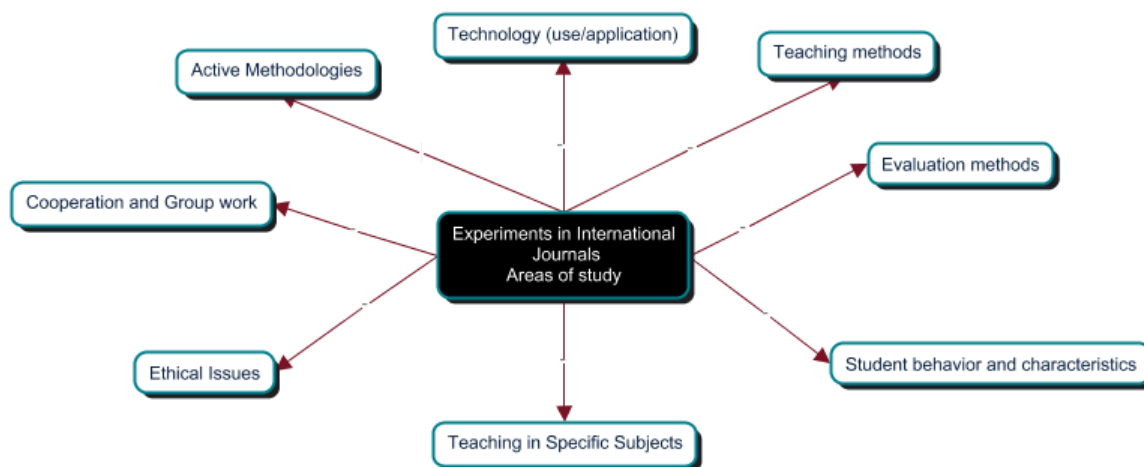


Figure 2: Areas addressed in international experimental and quasi-experimental studies

Source: Prepared by the authors (2020).

It is important to note that, in addition to being frequent, the first publications surveyed date from the mid-1980s. In comparison with the first publication in national journals, it represents about a decade and a half before. There is also a diversity of authors. In the following topics, the studies are described in their characteristics, approaches and results.

4.2.1 Use of technologies

Articles examining the use of technologies in accounting education show the evolution of different types of technology, in this sense, it is clear that the advent of new technologies is studied in the context of accounting education. Although they can be classified as teaching methods, it was decided to classify them separately to highlight this situation. Contemporary studies at the beginning of the use of computers had as curiosity the investigation of their use and possible consequences. For example, Alkafaji and Schroeder (1986) reported differences in solving problems with computers or manually, in which it was found that there were no significant differences in performance, but the speed in solving problems was higher for students with computers.

Former studies reported results regarding the use of new technologies to perform tasks, as is the case of studies that verified the use of computers and spreadsheets close to their emergence (Marriott, 1992; Marriott & Mellett, 1994; McInnes, Pyper, Van Der Meer & Wilson 1995), later studies analyzed the use of technologies that became popular for the presentation of content. Specifically for the use of PowerPoint, the positive aspects are that students have improved their attitude towards the professor who uses such media and find it more efficient and effective when providing notes; but effects of using media on memory and providing annotations on test performance have not been confirmed (Nouri & Shahid, 2005; 2008).

4.2.2 Teaching methods

This topic presents different forms adopted by professors for the teaching-learning process. In general, they are more innovative forms compared to those taken as traditional. A compendium, not exhaustive of the research resulting from the survey, is listed in Table 2. The column 'treatment' refers to the technique or practice adopted, while the column 'objective' refers to the effects that were intended to be analyzed.

This is the most common topic as the focus of the research found. It can be seen from Table 2 that studies analyzing the effects of different teaching methodologies start from the concerns of researchers as professors. Whether their results converge or not with the hypotheses designed, evidence is always an indicator for professors. For example, if in a given situation the classes need to be compressed due to absences from the professor for some commitment, Stout et al. (1987) present evidence that there is no difference in student performance in classes that are compressed for a shorter period of days or worked in their regular period. It should be noted that this type of intervention is the closest to field experiments, in which professors test methodologies in the reality of their classes, in the classroom (Aguilar, 2017).

Table 2:
Experimental studies with teaching methods

Study	Treatment	Objective	Results
Anderson and Boynton (1992)	Omission of redundant material included in intermediate subject.	Check the effect on student performance.	The evidence is that the treatment has no negative effect on performance. Extra time for new or more difficult content.
Boritz, Borthick and Presslee (2012)	Use of diagrammatic, instead of textual representation, for a task of risk assessment and control.	Check student performance on the task. Examine whether students' academic performance and perception of ability affect performance by type of representation.	Regarding accuracy, there was no difference between the methods. But students with textual representation were more efficient and performed better. Academic performance has no effect and the perceived ability reduces performance.
Brink (2013)	Comparison between sections of the subject without questions, questions only after, and questions before and after.	Check the performance of students in relation to the online application of questions.	The use of questions before and after the content improves students' preparation, increases participation in discussions and improves performance.
Calk, Alt, Mills and Oliver (2007)	Use of videos with slides read and not interactive with the professor, versus representation by paid actors.	Compare effects on student performance and perceptions.	There is no difference in performance between the different presentations. There were also no differences between perceptions, with questions such as the use of examples from the professor.
Fordham and Hayes (2009)	Use of four pastel colors (yellow, blue, green and pink) and white in exercise papers.	Analyze whether student's performance differs according to color, based on a 10-year study with almost 4,000 students.	Student performance was better when the exercises were white and yellow than blue and pink. The authors call the attention of professors to avoid the colors, in which the study indicates a worse performance.
Lindquist and Olsen (2007)	Assistance in homework with the provision of no solution, total numbers or complete solution.	Check the improvement in performance, learning perception and student satisfaction.	There were no differences in performance between the different conditions. Students who have not received solutions or feedback are the least satisfied. However, these students are the most satisfied with their test scores.
Phillips, Alford and Guina (2012)	Variations of place and function of illustrations in textbooks.	The way such variations impact students' learning	Students learn more from decorative images that precede than those that follow the related text, and with conceptual images that follow than those that precede the related text.
Phillips and Heiser (2011)	Initial accounts that affect the balance sheet or also the result. Verification of the accounting equation before or after accounts, or in none of the cases.	Check whether such variations in teaching accounting affect learning.	Highest initial success, of a week, when they performed accounts and considered the effect on the accounting equation. Students who performed accounts in a more restricted context, from balance sheet accounts only, were also more successful, which allows for further support when making accounts that also involve the result.
Stout, Bonfield and Battista (1987)	Compressed-time classes, a three-hour weekly meeting, or regular classes, three one-hour meetings a week.	Check the effect on professor performance and assessments.	There was no difference in performance between conditions, nor in the assessments attributed to professors.
Volmer (1992)	Informations of statements in graphical and numerical form.	Check the understanding about the financial position of the analyzed company.	The use of graphic information represents a gain in analysis time in relation to the company's position, when compared to numerical information.

Source: Prepared by the authors (2021).

Phillips et al. (2012), as another example of a procedure for classes, found in which places (before or following a content) and types of figures (decorative or conceptual), the presentation of figures is more efficient for understanding the text in question. Based on this result, when there is no way for the professor to choose a book in such conditions, a suggestion is the organization of presentations by the professor. Finally, it is worth mentioning that the examples described in Table 2, which can be in the order of presentation of content, forms of presentation or even in relation to which content, can serve as a guide for professors who question themselves about the methods adopted.

4.2.3 Use of active methodologies

Active methodologies, as the name suggests, are ways of actively involving students in the learning process, so that they do not receive the content, merely, passively. Murdoch and Guy (2002), for example, carried out their research in the context of an active methodology, which consisted of solving cases worked in groups. The aim of the investigation was to check whether active learning is differently effective in cases of large and small classes. Through performance on analytical problems and discursive questions, the results indicate that performance is higher in small classes than in large classes.

Another form of active methodology is problem-based learning (PBL). Breton (1999) compared the use of PBL with traditional classes, which were done through presentations, exercises and tests, in two comparable classes in the subject of accounting theory. The results indicate that the students of the experimental group, PBL, developed a greater ability to remember and reuse the contents that they learned. Thus, the study suggests that students who have learned through PBL are aware of having acquired knowledge and skills which they expect will be most useful in the long run.

Finally, Leauby, Szabat and Maas (2010) report results of an experiment that investigated the use of concept maps in an introductory financial accounting subject. One of the classes was considered the control group, with the use of traditional classes, and in the treatment group, traditional classes were also used, but with the addition of activities with the creation of concept maps. It is noteworthy that the random assignment of participants in treatment and control groups in experiments is important to infer cause and effect from the differences observed between the groups (Shadish et al., 2002). The hypothesis of the study is that the addition of concept maps improves learning, but there was no confirmation. When not finding significant differences between the groups, what is indicated is that there is no advantage or disadvantage with the use of the method. Additional results indicate that the map creators consider it as a valuable tool for learning. That is, even if it does not result in better performance, it can be an additional way to instigate the study.

4.2.4 Particularities in subjects

In fact, some of the studies cited here also address teaching methods, but it was decided to present them here because of the focus on different subjects. Just as some applied studies in financial accounting subjects are presented in the topic on methods, the highlight here is for the tax courses. James (2000) investigated the use of textbooks only, versus the use of a reading list, with books and articles. Two classes were selected, one for each condition. The results show that the best performance was found for the class in which the approach of a single book was adopted.

Also related to the tax, Schadewald and Limberg (1992) report results of a study that analyzes the teaching of complex tax rules through texts or through texts with the addition of illustrated models. The condition that received illustrated models performed better. The authors argue that the benefits of these models can be better perceived when integrated with textual content. Finally, the study by Limberg, Schadewald and Spilker (1995) investigated the way students organize their knowledge in tax. Two classes were analyzed in which the teaching methods are different, one dealing with teaching focused on taxation by types of entity and the other by transactions. The results indicate that students organize their knowledge around taxation by type of transaction, and this focus increases over the program.

In a broader approach, Kopp and Phillips (2005) also studied how students organize their knowledge, but separating two different characteristics of subjects, those that combine and those that separate financial and managerial accounting content. The results indicate that the organization of the contents affects how students structure their knowledge in memory, consequently, the performance in problem solving is better when problems are organized in a similar way to the structures of memory. Chung and Monroe (1999) verified the origin of hypotheses for the development of judgments in the audit. Hypotheses received, instead of those generated by the students themselves, are evaluated more from a confirmation perspective than disconfirmation, thus avoiding the search for other possible conclusions.

Some studies address more specific topics than methods applied to entire subjects. In this sense, some results are presented, such as that the use of a simulator expands the understanding of concepts related to the Balanced Scorecard - BSC (Capelo, Lopes & Mata, 2015). Another topic concerns the Cash Flow Statement - DFC. Evidence indicates that students perform better when DFC is taught more widely, that is, revised when addressing new content, but not taught en masse, with a large content at once (McNellis, 2015). Finally, in the assignment of tasks on the cost, volume and profit ratio, better performance of students is verified when problems are presented in everyday language, instead of accounting language, and with formulas, instead of without formulas (Johnson & Sargent, 2013).

4.2.5 Ethical issues

Ethics-related studies have motivated researchers in accounting, with some of them observing the teaching of ethics in universities from discussions about the need for the subject. In this sense, some studies confirm positive effects of teaching ethics on students (O'Leary, 2009; Saat, Porter & Woodbine, 2012).

However, there are also findings that indicate that the ability to consider ethical aspects in decision-making may be transient (LaGrone, Welton & Davis, 1996) and that there is no increase in students' ethical reasoning (Ponemon, 1993).

LaSalle (1997) tested whether the acceptability of questionable actions is affected by the order in which ethical arguments are presented in the classroom. The results suggest that accounting students differ from students in other programs, in which accounting students tend to give more importance to more recent information than to older ones. Fleming, Romanus and Lightner (2009) investigated the moral reasoning of students in two conditions, those who analyzed audit dilemmas and those who analyzed accounting dilemmas. Those in the audit condition demonstrated greater moral reasoning, indicating that students have greater ethical knowledge based on auditing that is not flexibly transferred to the accounting context.

Finally, Nouri and Shiarappa (1996) applied a test after the beginning of the semester in two classes, with only one of them dealing with the ethics content before the test. All students had points added to their test scores and were asked to report miscalculations in the score. The results show that there was no significant difference between the groups. Thus, the authors draw attention to the fact that, even after the exposure of content on ethics, students did not behave ethically when their interests were directly involved.

It is worth mentioning that the separation of treatment and control groups by classes can be questionable in relation to the random assignment of participants, because the way the classes are selected can cause the general characteristics of the participants to be different. On opposite shifts of the same program, for example, there may be different competition in the selection and different experience profiles, which could skew the results. Randomness allows explanations outside the model to be eliminated (Smith, 2003), as this mechanism seeks to allow groups to be more homogeneous (e.g., in terms of age, gender, experience), and thus, the differences detected are only due to the studied treatment.

4.2.6 Cooperation and group work

Studies of this nature analyze student preferences, as well as results, in relation to classes that adopt such dynamics. Smith and Spindle (2007) did not find support for the hypothesis that the formation of groups composed by the professor with heterogeneous members, instead of the formation decided by themselves, contributes more to a cooperative learning environment. Seow and Shankar (2018) found that students with lone wolf tendencies perceive less benefit from working in groups and are less comfortable with peer reviews. Nevertheless, those who have received a group work skills guide find it easier than those who have not received such a guide. Opdecam and Everaert (2012) found that students in group learning conditions reported greater satisfaction and positive experience in the subject than students in the control group, who attended classes in a traditional format.

Caldwell, Weishar and Glezen (1996) conducted a study dividing two groups, the experimental one with half of the classes using cooperative learning techniques, and the control group with traditional classes. Considering students from the subjects of accounting principles I and II, the results reveal that for students in the first period, cooperative learning techniques resulted in positive effects on perceptions about accounting. Similarly, Lancaster and Strand (2001) carried out an experiment in which two classes were submitted to the traditional class methodology and two classes to cooperative learning. The results, however, reveal that there is no significant difference between the groups. Finally, Opdecam and Everaert (2019) found that students who chose to participate in the group learning subject, versus the traditional discipline, had positive effects on their learning outcome.

4.2.7 Evaluation methods

This topic addresses studies that analyze ways of preparing assessments and student performance. Tsui, Lau and Fong (1995) verified the influence of students' cognitive styles on their ability to solve problems with ambiguous information. The results demonstrate that students with greater cognitive independence in the field (prefer to get involved in the organization and sequencing of content), in relation to those with greater dependence in the field (need external references and previously organized content), present better performance. Due to the fact that the analysis was carried out using multiple choice questions, the authors call attention to the fact that professors are careful to include this type of question so as not to disfavor students.

Bible, Simkin and Kuechler (2008) compared the ability to evaluate multiple choice questions in relation to discursive questions. The results indicate that the multiple-choice questions adequately perform the intended assessment. Similarly, Jonick, Schneider and Boylan (2017) examined the effect of multiple choice and discursive questions on student performance. The results point to a better performance in multiple choice questions, and the authors cite reasons such as guessing and the greater cognitive demand of the discursive questions.

Bay and Pacharn (2017) show the results of a study that analyzes the use of group assessments, and as the main positive effect, there is an increase in student performance in relation to the individual format. On the other hand, Hassan, Fox and Hannah (2014) found that self-assessments and peer assessments are neither accurate nor valid, given that these assessments tend to be overestimated and significantly different

from the professor's assessment. Murphy and Stanga (1994) assessed the frequency of assessments and their impact on student performance. Twice the assessments were applied to the treatment group compared to the control group. The results indicate better performance in the treatment group for evaluations during the semester, but not for the final evaluation. In addition, the professor obtained a better evaluation in the control group.

Phillips and Wolcott (2013) found that the frequency of feedback improves the quality of written reports depending on the level of students. The results show that providing interleaved feedback improves the quality of the reports of underperforming students, summary feedback improves the quality of the reports of students with intermediate performance, and the improvement of the reports of high-performance students does not depend on the frequency of the feedback. Finally, Pacharn, Bay and Felton (2013) compare a flexible assessment system, in which students determine the weights of scores. Three groups are compared, with the control group having no power to decide on weights, the second and third groups, both for treatment, can assign weights to the contents at the beginning of the period or reallocate at the end. The purpose of this student participation is to promote self-regulated learning ability. The results indicate that there is little improvement in motivation, scores and attitudes when committing weights at the beginning of the period, but when there is greater flexibility, that is, the possibility of reallocation at the end of the period, these aspects improve.

4.2.8 Students' characteristics

Studies that have analyzed student characteristics, such as anxiety, experience, different cultures, among others, are discussed here. It should be noted that the characteristics of the students are not under the control of the researcher, thus, it can be said that this type of study fits into a natural experiment (Aguiar, 2017). Clark and Schwartz (1989) investigated the effects of a behavior modification program on reducing anxiety and performance. The results indicate a reduction in the anxiety levels of the participants, in addition to an improvement in the performance of individuals with high anxiety. Ott, Mann and Moores (1990) analyzed whether students with certain personality traits achieve better performance when instructed using two different methods, using computers or traditional classes. Regarding performance, it was found that there is no significant difference between the methods. With people's traits categorized by sense or intuition and by thought or feeling, it was found that participants with traits categorized as sense and thought performed better in traditional classes, while the others performed better with computational assistance.

With regard to cognitive styles, Honn and Ugrin (2012) indicate evidence that when students' cognitive style differs from the cognitive demands of a task, students' performance is negatively impacted. In a context of different cultures, Almer, Brody and Masselli (2005) verified whether there is a difference in the perception of Spanish and American students about efforts in gender diversity and family-friendly initiatives. Among the results, the perception among students of both nationalities is similar that men are more likely to be hired than women. On the other hand, Spaniards have less belief that women would voluntarily leave work than Americans. It is also similar the perception that singles, in comparison to married people and children, are more likely to be hired, promoted and leave work voluntarily.

Jones and Davidson (2007) compared three different methods of measuring problem-solving skills. The results demonstrate that students with higher problem-solving skills scored higher on unstructured questions than students with lower problem-solving skills. Finally, outside the school environment, the study by Mauldin, Zachry and Morris (2006) investigated the effects of different students' experiences on recruiters. Considering individuals without experience in accounting, experience in internship related to accounting, experience in the accounting area and without any experience, the results indicate a predilection for individuals who have attended an internship and, to a lesser extent, who have worked in the accounting area.

4.3 Research opportunities in the Brazilian context

As subsidies for the discussion of research opportunities, some notes about the studies presented above can be made. As the main aspect of experimental studies in accounting education, there is an effort to identify methodologies that contribute to improve academic performance. Because the studies discussed have used experiments as a methodological approach, the results found allow for inference of causality (Shadish et al., 2002). When there is evidence that one method is significantly superior to another, this result supports the professor in their choices, even when significant differences are not found.

Work in groups and active methodologies have stood out, in addition to the importance also verified with the teaching of ethics for the professional context. It also highlights the importance related to the investigation of student characteristics, in the sense that results of studies carried out in other countries, or even in regions of the same country, do not apply to all realities, that different cultures can impact performance when analyzed by gender, and what professional experiences can have an effect on a practical program, such as Accounting.

With regard to research opportunities, there is evidence that students value professors who conduct and publish relevant research and who apply such research in the classroom (Miller, Stocks & Proctor, 2010).

In this sense, in addition to the use of data from research with companies, experimental research with students who tend to improve teaching practice should also be promoted. Schwartz, Wallin and Young (2007), for example, highlight the use of economic experiments in class, in which students assume roles related to decision making, which contributes to the intuitive introduction of complex themes. Among the themes, the information asymmetry, the relationship between superior and subordinate, and environments with increased problems related to managerial control stand out.

As a simpler and yet relevant opportunity, mention is made of the replication of the studies mentioned. Replications have as advantages the low demand in the development of the research design, in addition to the possibility of comparability and continuity of the original research, adding robustness to arguments and theories. Lindsay (1995) argues that replication provides a crucial test of the reliability and validity of facts, hypotheses and theories, and, when successful, predictable and generalizable results. In this sense, it is worth highlighting recommendations from journals, such as Behavioral Research in Accounting, from the American accounting association, about the elaboration of studies with a replication character (Salterio, 2017).

Another fertile topic for the application of experiments concerns the ethics of the accounting professional. For classroom application, several sources can be used. One of them are the cases for analysis, in which students can carry out evaluations and ethical judgments, through scales, at the beginning and end of the subject. Unlike the between-subjects approach, which is more frequent, a study of this nature would be characterized as within-subjects, given that the same students would be participants in two different moments of the study (See Aguiar, 2017). A study in this sense would be able to assess the evolution of students regarding ethical behavior with the subject. The Accountant's Code of Professional Ethics can also be used for the construction of cases involving ethical behavior and the judgment of students in situations involving professional dilemmas.

In general, different teaching methodologies can also be tested, and in particular, the active methodologies, given the appeal they have received. This appeal is due to the need for, according to Coutelle (2017), the professor to awaken the student's motivation to learn. In addition to the possibility of use by professors in the classroom, scientific study about its effects on learning is also of interest. In the context of accounting education in Brazil, Leal, Miranda and Nova (2019) present several possibilities of active methodologies to be applied in the classroom. Therefore, it is up to the professor, interested in the use of different methods from the more traditional ones, to apply active methodologies, as well as to study their effectiveness through experiments. Tests through experiments are, more than simple convictions, the proof of the cause-and-effect relationship, whether in performance, student satisfaction, or another variable that the researcher is interested in verifying.

Among active methodologies that have motivated studies, the storytelling, inverted classroom and use of games stand out here. According to Taylor, Marrone, Tayar and Mueller (2017), storytelling helps in explaining complex content, which sharpens students' attention and allows a better understanding of the real environment. According to the authors, comparisons between videos that use metaphors or cannot be compared to verify the isolated effect on performance. Bergner and Brooks (2017) verified the effect of using the Monopoly game for proofreading, and this effect is significantly positive in the scores, when compared to traditional methods or in the absence of proofreading. In this context, the use of card games, often practiced by students, can somehow be adopted for teaching, as well as for investigating their effects on learning. Finally, the inverted classroom seeks greater student involvement and learning, differing from the traditional face-to-face method (Williams, Horner & Allen, 2019). Experimental research, in this case, would also be applicable in the sense of comparing, for example, the performance of classes submitted to such a method, in relation to the more traditional methods of class.

Curricular changes in programs are also conducive to the application of experiments. For example, if any subject is relocated more at the beginning or end of the program, performance can be assessed in both cases. Whenever possible, the application of an experiment before the curricular change can help to test possible impacts of the intended changes. Additionally, studies that explore different forms of assessment and their effects on student learning have the potential to produce knowledge that combines with others - on the efficiency and effectiveness of teaching methods, for example - in order to subsidize pedagogical decisions that imply improvement in the teaching and learning process.

Another aspect to be investigated refers to the use of technologies. It is an area that permeates the history of accounting education and that, in times of increasing participation of distance learning in accounting education and in the intensive use and availability of digital technological resources, it makes it possible to explore different nuances and directions. If between the 1980s and 1990s the use of computers was the main objective of these studies, nowadays, new applications, platforms and diversified virtual environments for teaching and active methodologies can be combined in proposals for experiments that deserve attention about their impacts on student learning, interest and satisfaction.

5 Final Considerations

The objective of this study was to describe, based on a narrative review of specifically selected literature, national and international studies in the field of accounting education that used an experimental and

quasi-experimental method. Additionally, present research opportunities in this field using the method. One aspect that drew attention during the course of this study was that in national accounting journals there is little research using the experimental method - both specifically on the theme of accounting education and, in general, on the other themes of accounting.

In selected international journals, experiments appear more frequently, although they still have less participation in the set of research in accounting education. However, since the 1990s, research in accounting education using experiments has been a regular feature of publications. At the international level, there is also an evolution of experimental research on different themes, including tests with the comparison of prints with textual content, use of videos, evaluation methods, content sequence, decision-making skills, among others. Generally, the researchers' focus was on verifying effects on student performance and satisfaction.

In the Brazilian context, there is a record of the 1990s, followed by a hiatus. Only in 2003 did a new publication of an experiment in accounting education appear in a national journal. As a result of this lack, it is necessary to develop further studies and publications of experimental research. As for the themes, they were directed to the identification of students' critical thinking skills, in different subjects, as well as in the use of a virtual environment. There is also research that is directed to the application of business games and others that are related to learning effectiveness, academic performance and student satisfaction. It appears that, although with similar objectives, international research tends to be more varied due to the number of studies.

From this context, some conclusions can be listed. The first is that the shortage of experiments in accounting education hinders the construction of a scientific basis for the area, precisely because of the absence of cause-and-effect inferences and the consequent lack of adoption of more appropriate practices for the area, from planning curriculum to forms of assessment. Another aspect is related to the aforementioned stagnation of research in accounting education, in which the greater adoption of experimental studies is suggested, but this trend is not perceived internationally, nor nationally. Finally, the majority reliance on surveys can lead to skewed conclusions about what is most efficient in the learning process, to the detriment of what is most pleasing to students.

The field for the application of experiments in the context of accounting education is fertile, especially due to the lack of experimental studies in Brazil. Therefore, there are some opportunities for scientific development in the area. As a starting point for researchers, it is recommended to replicate studies already carried out. Studies based on the use of different teaching methodologies, technologies, active methodologies and specific methodologies for subjects with higher cognitive demands are also recommended. As a result of changes in the labor market, and the consequent demand for new skills, curricular changes can also be tested before implemented. Aspects such as ethical behavior and forms of evaluation also deserve attention.

Finally, possible results/implications with the development of experiments are mentioned here. As results for the area, it is highlighted that professors, with their experiences in the classroom, can have the perception of methods or aspects to be improved in the teaching-learning process, in order to carry out studies that contribute both to the academic community, as well as for their own activity. However, attention should also be paid to some difficulties in the development of studies. While few studies with experimental methodology are conducted, the network of evaluators trained to contribute to the development of the area and the quality of the studies is smaller.

In terms of limitation, this study presents the following factors. The first is related to its design - bibliographic research classified between narrative and systematic, revision and interpretive. Even though the investigation took place based on a protocol and with the adoption of criteria for the selection of the corpus, there is a possibility that biases have occurred. In this sense, the results should be taken with reservations, especially regarding their scope and generalization. The second factor refers to the elements analyzed in each study, in which there is no possibility to delve into aspects such as the type of experiment, design, dependent variables and factorial for each one.

The last factor is related to the option to investigate only specific journals in the accounting field - both in the national and international surveys. This, in turn, excludes the studies published in journals from other areas of knowledge, such as those in the area of education, for example. And this proves to be a limiting factor to some extent. Furthermore, it should be mentioned the delimitation of international journals in the area of accounting education, with the exception of other important international journals in the accounting area in the sample of articles. However, this option was given because it considers that, in the case of studies on accounting education, the field of scientific dissemination that potentially causes greater reach within the scientific accounting field is specific scientific journals on accounting. In addition to overcoming such limitations, it is suggested that future studies do bibliometric analysis, identifying more productive researchers, impact of studies (citations) and analysis of the temporal evolution of the themes studied, in order to identify trends.

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Conception and elaboration of the manuscript: R. Suave, S. M. L. Altoé, M. M. Ferreira

Data collection: R. Suave

Data analysis: R. Suave, S. M. L. Altoé

Discussion of results: R. Suave

Review and approval: R. Suave, S. M. L. Altoé, M. M. Ferreira

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