

UTAUT-DCC: New proposal for moderation in the measurement of intention and use of technologies by Accounting professors in Brazil

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Abstract

Objective: The objective of this study is to offer an adaptation to the UTAUT theory, capable of pointing out the intention and use of technologies by professors of Accounting courses in Brazil, based on qualification and the teaching life cycle.

Method: An online questionnaire was used as the research strategy, and 497 accounting professors in Brazil responded. Descriptive analyses and structural equation modeling were carried out.

Results: The results indicate that the teaching life cycle, degree, experience as a teacher, professional experience and initial and continuing pedagogical training are able to moderate the constructs of the original UTAUT, improving the power of application of the theory, especially when applied to undergraduate Accounting teachers. In this way, the so-called UTAUT-DCC is presented.

Contributions: At the institutional level, the application of the UTAUT-DCC makes it possible to map the teaching staff in terms of their intention and use of technologies, as well as offering subsidies for improving the curricula of undergraduate courses in Accounting Sciences, with regard to the adoption of technologies. On a personal level, UTAUT-DCC helps teachers reflect on the application of technologies in accounting teaching and their willingness to do so, depending on their career and experiences. Finally, at an academic level, this study offers the literature a proposal for moderating the UTAUT that is capable of measuring the intention and use of technologies by teachers based on their qualifications and teaching life cycle.

Keywords: Accounting teaching. Technology in Teaching. UTAUT.

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Introduction

The study of the intention and use of technologies in education is full of works that express the result of the application of some methodology (models and/or theories), as observed in the findings of Jonassen (1996), Haddad and Draxler (2002), Hoppe et al. (2003), Man and Zainuddin (2024), Quiraque et al. (2024). The Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003) is the result of combining the best aspects of each model/theory previously discussed in the literature.

The UTAUT is made up of four constructs (performance expectancy, effort expectancy, social influence and facilitating conditions) which are influenced by moderating variables such as age, gender, experiences and voluntariness of use. Venkatesh et al. (2003) state that, with this theory, it is possible to capture the intention and use of a technology in the corporate environment. However, the theory has been used in other areas of knowledge besides management, for example in accounting education, as seen in the studies by Nganga et al. (2016), Mujalli et al. (2022), Man and Zainuddin (2024) and Quiraque et al. (2024).

Studying the intention and use of technologies in the context of teaching is justified by the need to train students who know how to deal with the dynamics of the job market, in which there is widespread immersion in technologies. In addition, the teacher, as the main actor in the construction of knowledge in the face of the traditional teaching method, is sensitive to the use of technology in the classroom, and is the decision-maker as to whether or not to use technology.

In its original structure, UTAUT does not offer elements that can cover aspects intrinsic to the teacher that may interfere with the intention and use of technologies. In this sense, it is hoped that the inclusion of moderating variables linked to the teacher will help to identify the acceptance and use of technologies in the teaching-learning process, especially in the classroom. To this end, this study focuses on teacher qualification, as proposed by Miranda et al. (2013), and on the teaching life cycle, as pointed out by Huberman (2000).

Thus, the aim of this study is to offer an adaptation of the UTAUT theory, capable of pointing out the intention and use of technologies by teachers of Accounting courses in Brazil, based on qualification and the teaching life cycle. In order to achieve this objective, the specific objectives are: (a) to propose an adaptation of the UTAUT theory, changing the moderating variables, called UTAUT-DCC, and (b) to test the proposed adaptation.

The proposal to moderate the variables, including the teaching life cycle, is reinforced by Huberman (2000) when he states that, throughout their career, teachers can show different characteristics in terms of experimentation in the

classroom, expressing more intensity in the initial years and cooling down their experiments in teaching methods and forms as they move towards the final stages of the profession. In this sense, by confirming that the teaching life cycle applies as a moderating variable for UTAUT, it is understood that the model gains scope for tracing the intention and use of technologies in accounting teaching, supported by the conclusions of Huberman (2000).

The proposal to include teacher qualification as a moderating variable in UTAUT is supported by Miranda et al. (2013), who report that the characteristics linked to the teacher's academic and pedagogical training, as well as their professional experiences, shape their performance. In addition, Nagib and Silva (2020) found that teaching qualifications are associated with the use of active methodologies by accounting teachers. In analogy to this finding, it is suggested that the intention and use of technologies by teachers can be moderated by their experiences prior to teaching, acquired during their teaching career or as a result of their training.

UTAUT was chosen because it is a widely tested theory, as pointed out by Nishi (2017). The delimitation of the study focuses on undergraduate courses in Accounting Sciences in Brazil, in public and private universities, in the face-to-face modality. Online or semi-presential courses are excluded, since for these modalities, the use of technologies is part of the essential process to connect the teacher to the student, which could bias the results and conclusions of the study.

This research is defined by looking at technology from a specific point of view: the use of virtual learning environments. This type of technology creates an environment capable of providing teachers and students with an exchange of materials and experiences, file uploading, discussion forums, a virtual library and chats. It also includes communication technologies, which bring the classroom environment into a virtual setting. These technologies have been commonly used during the COVID-19 pandemic, which is why this focus of study was chosen. Many HEIs may have promoted the use of these technologies for the continuity of academic activities during social isolation during the pandemic, and this tends to favor the achievement of the objective of this study, since teachers can better demonstrate the intention and use of technologies that can be adopted in their workplaces. Examples of technologies that guide this study include Moodle, Blackboard and Google Classroom, as well as Google Meet, Zoom, Microsoft Teams and Cisco WebEx communication software.

Hence, this study has made three contributions: institutional, personal and academic. At an institutional level, the application of the UTAUT-DCC allows us to map the teaching staff in terms of their intention and use of tech-

nologies, as well as offering subsidies for improving the curricula of undergraduate courses in Accounting Sciences, as far as the adoption of technologies is concerned. On a personal level, UTAUT-DCC helps teachers reflect on the application of technologies in accounting teaching and their willingness to do so, depending on their career and experiences. Finally, at the academic level, this study offers the literature a proposal for moderating the UTAUT that is capable of measuring teachers' intention and use of technology based on their qualifications and teaching life cycle.

2 Theoretical Framework

2.1 UTAUT

The UTAUT is made up of the best features of each model/theory that preceded it, as described by Venkatesh et al. (2003). From this perspective, the authors developed a theory of intention and technology use based on four constructs and four moderating variables.

The construct "Performance Expectancy" means, for the authors of UTAUT, the degree to which the person analyzed believes that the use of technology will result in better performance in their work. In research looking at UTAUT in the academic context, this factor has been shown to be one of the main motivators for using technology (Leal, 2012; Perez et al., 2012).

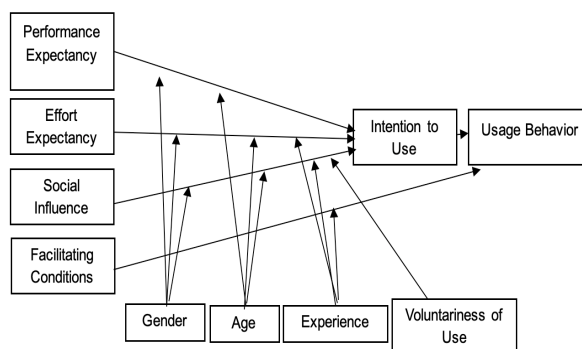
The "Effort Expectancy" construct reflects the degree to which the individual surveyed finds it easy to use technology. Venkatesh et al. (2003) reveal that evaluating this factor is important both in scenarios where the individual adopts technology of their own free will and in situations where using technology is not an alternative, since, for the authors, adopting a technology with which the individual already has a certain degree of familiarity will express a lower degree of applied effort. However, when you don't know a technology and want to apply it, the authors point out that there is a need for more effort on the part of the user, given that there is a learning curve to be completed until this new technology starts to sound natural to those who use it.

Another UTAUT construct, defined by Venkatesh et al.

(2003), is "Social Influence", which seeks to reveal the context in which the adoption of technologies takes place, by measuring the degree to which the individual's surroundings are perceived as stimulating the use of technologies. This factor is only effective when analyzing a scenario in which the use of technology is mandatory. Abu-Al-Aish and Love (2013) point to distance learning as an example, where the intention to use technology is not voluntary.

Finally, the "Facilitating Conditions" construct, according to Venkatesh et al. (2003), is the representation of the perception of how much the individual will use more technologies in cases where a support network is perceived, helping them on their journey of use, such as technical support in digital teaching tools. The constructs, together with the moderating variables, are shown in Figure 1.

Figure 1
Structure of the UTAUT



Source: Venkatesh et al. (2003)

The relationship between the constructs and the moderating variables - shown in Figure 1 - generates the intention and use of technologies. Thus, intention measures the individual's willingness to use a given technology, and this willingness is linked to motivational factors. The use of technology takes place when the intention is realized, in which the individual, equipped with knowledge, will and stimuli from the environment in which they are inserted, practices the use of a certain technology.

In order to bring the concepts of UTAUT closer to the related literature, Table 1 is presented.

Table 1
UTAUT related studies

| Author(s) | Area of application | Objective | Results |
|----------------------------------|---------------------|--|---|
| Nganga et al. (2016) | Accounting Sciences | To verify and evaluate which aspects influence the acceptance of the use of technological resources by teachers in stricto sensu postgraduate courses in Accounting Sciences (PPGCC), based on the UTAUT Model. | Effort Expectancy and Performance Expectancy are, in the teachers' perception, the most influential constructs. The Social Influence construct was only partially perceived and, finally, it was found that the Facilitating Conditions were perceived as important in the process of adopting technologies in the PPGCCs. |
| Yahaya et al. (2022) | Various Areas | To assess educators' intention to adopt the flipped classroom based on the factors of intention to use listed by UTAUT. | The results show that social factors are fundamental in educators' decision to adopt the flipped classroom, as well as educator satisfaction and willingness to adopt other teaching methods in the classroom. |
| Mujalli et al. (2022) | Accounting Sciences | To identify and test the factors of the UTAUT theory that influence students and teachers regarding the use of the Blackboard platform - e-learning system - during the COVID-19 pandemic. | The results show that the factors pointed out in the UTAUT theory are applicable to the respondents investigated and that effectiveness and self-management are relevant factors regarding the use of the Blackboard platform. |
| Man and Zainuddin (2024) | Accounting Sciences | To provide empirical evidence on the determinants of accounting educators' behavioral intention and digital technology use behavior, addressing a critical gap in the application of UTAUT in the context of accounting education. | The results suggest a positive relationship between performance expectancy, effort expectancy and social influence on accounting educators' intention to use digital technology. In addition, behavioral intention also shows a positive relationship in the actual use of digital technology. |
| Quiraque et al. (2024) | Accounting Sciences | To analyze the perception of university professors on the determinants of the adoption of market technologies in the curriculum of undergraduate Accounting courses in Latin America, based on the UTAUT. | The results show the symmetrical influence of habitus, performance expectancy and social influence on the adoption of market technologies, regardless of age, academic experience or gender. In addition, various asymmetric combinations of conditions lead to a high adoption of market technologies in accounting curricula, with performance expectancy present in all possible combinations. |
| Leal, Lourenço and Araújo (2024) | Accounting Sciences | To identify the didactic-pedagogical competences of Accounting teachers and their intention to use educational technologies in the teaching-learning process. | The results showed that the teachers understand how the virtual learning environment works and its importance, and that they are interested in inserting technologies into the teaching process in order to improve results. However, the reports indicate that some educational institutions do not offer adequate support for the use of technological tools. |

The studies involving the UTAUT are generally applying the constructs and moderating variables of the original model to analyze the context portrayed by the research, so there are no suggestions or proposals for altering the constructs and moderating variables pointed out by Venkatesh et al. (2003). In this way, it was not identified how the variables linked to the teacher can influence the intention or use of technologies in teaching. This reinforces the need to identify, more specifically, the configuration of the UTAUT for the context of Accounting teachers, based on the addition of moderating variables linked to the teaching life cycle and teaching qualifications.

The choice of the teaching life cycle and teaching qualifications for this study is based on the application of the themes in characterizing the teacher profile, as pointed out by Miranda et al. (2013) and Nagib and Silva (2020). Thus, to guide the study, the teaching life cycle presented by Huberman (2000) is used, as it is the seminal model on this subject and, for teaching qualifications, it is based on the findings of Miranda et al. (2013), due to its relevance and breadth in relation to the study of teachers.

2.2 The teaching life cycle

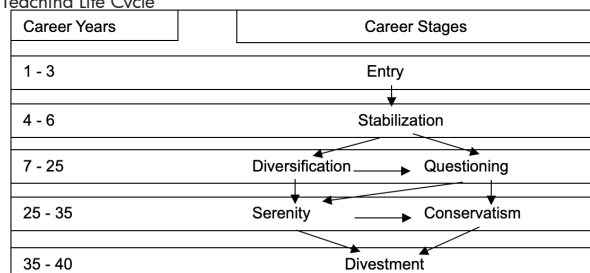
The teaching life cycle is defined by Huberman (2000, p. 37) as "the structuring of the professional life cycle of teachers". The author proposes a five-level model, covering the period from entering the teaching career to leaving the profession.

As Nagib and Silva (2020) point out, the life cycle based on Huberman's (2000) model was not developed specifically for the Brazilian scenario, especially in the application of the teacher life cycle. However, this fact does not detract from the application of the model proposed by Huberman (2000), on the contrary. According to the research by Nagib and Silva (2020) and Bittencourt and Silva (2024), this model can be applied in the Brazilian context, especially in the delimitation of the stages of the teacher life cycle, especially since there is no teaching life cycle model developed strictly for the Brazilian reality in the national literature.

The teacher's profile can be a factor that dictates their willingness to propose new methodologies in the classroom (Nagib & Silva, 2020). In this sense, understanding the teaching life cycle is important, especially when stratifying the differences at each stage of a teacher's professional career. Figure 2 shows the stages of the teaching life cycle. It is advisable to read Figure 2 as a line, so as to understand each stage of the life cycle according to Huberman (2000).

Figure 2

Teaching Life Cycle



Source: Adapted from Huberman (2000, p. 47).

Huberman (2000) explains that the beginning of a teaching career is marked by the "Entry" phase. According to the author, this moment is around 1 to 3 years into teaching. In this phase, Huberman (2000) reveals that the teacher is totally open to getting to know the proposals and challenges of the career, with high expectations and focus on the profession, but that, due to factors external to the teacher, such as student resistance, pedagogical loneliness and pre-determined standards by educational institutions, they can lead the professional - according to Huberman (2000) and Isaia et al. (2006) - to "reality shock", faced with what is actually exposed by the profession.

The second stage of a teaching career is the "Stabilization" phase. Huberman (2000) states that it is at this point - between the fourth and sixth years of the profession - that teachers increase their confidence in the classroom. In addition, Araújo et al. (2015) reinforce that, during the stabilization phase, teachers overcome the fears and apprehensions they had at the beginning of their teaching career.

The third stage of the teaching life cycle comprises the 18 years following the Stabilization phase and is referred to as "Diversification and Questioning". During this period, Huberman (2000) and Araújo et al. (2015) point out that the teacher feels mature enough to experiment with new lesson formats, diversifying the presentation of content and classroom formats. It should be noted that, in the search for diversification, teachers are more committed to the teaching teams at the Higher Education Institution (HEI) where they work (Huberman, 2000).

Because the third stage of the teaching life cycle covers a long period of time - and this is even a criticism of the model's application - teachers may begin, towards the end of their career, to lose inspiration to continue experimenting with new teaching proposals, starting to reflect on what possibilities still exist within the teaching career. This moment is referred to by Huberman (2000) as "Questioning" and becomes a period in which the teacher seeks to recover everything they have delivered during their career and what they can still deliver, and may seek new roles in the academic world - such as administrative

roles - or reduce contact with the duties of HEIs (Araújo et al., 2015).

The fourth stage of the teaching life cycle is an offshoot of the third stage, i.e. the teacher tends to follow a certain path based on how their experience in the previous stage ended. Thus, the fourth stage can be understood as "Serenity or Conservatism".

The teacher who left the third stage linked to the characteristics of diversification and sought to innovate in the classroom, proposing new classroom layouts, diversified materials, adopting teaching strategies other than lectures, carried the motivation to experiment in the classroom. However, this motivation to "experiment" is waning, which can increase the distance between students and the academic environment itself. For Huberman (2000), this distancing may be related to the generation gap between students and teachers, leading to the fourth stage of serenity. On the other hand, the teacher who followed the path of questioning in the third stage arrives at the fourth stage of the life cycle reinforcing their questions, regrets and resistance to change, tending towards conservatism (Araújo et al., 2015).

Finally, the last stage of the life cycle, according to Huberman's (2000) model, is called "Divestment". At this point, the teacher prepares to leave the profession and can have two distinct feelings: a serene and happy exit, where there is recognition and value for the achievements of the teaching career, or a feeling close to bitterness, where the teacher clings to the frustrations and unfulfilled expectations throughout their career.

It is expected that teachers at the beginning of their teaching career, i.e. in the first two stages of the teaching life cycle, will be younger and more connected to technology trends in the classroom, through mobile apps, gamification or other digital tools. However, it would not be a contradictory result if teachers in the third to fifth stages of the teaching life cycle showed positive results in terms of their intention to use technology in the classroom, whether motivated by a change in the student profile, pressure from educational institutions, the state of the environment or individual willingness to be aligned with market trends and teaching practice. This fact could be observed in 2020 and 2021, when teachers, due to the pandemic scenario caused by COVID-19, had to adopt digital strategies in order to minimally be able to exercise their profession.

2.3 Teacher qualification

Teacher qualification can be understood through three aspects: academic qualification, professional qualification and pedagogical qualification. This triad was proposed by Miranda et al. (2013) and is commonly used in the

literature, such as the research by Nagib and Silva (2020), who used teacher qualification as a variable to measure the adoption of active methodologies in undergraduate Accountancy teaching. In order to make it easier for the reader to understand, the qualifications are shown in Table 2.

Table 2
Triad of teaching qualifications

| Qualifications | Variables | Description of variables |
|----------------------------|---------------------------------|---|
| Academic Qualification | Degree | This can be understood as the teacher's most recent academic training, distributed between undergraduate, specialization, master's or doctorate. |
| | Work regime | This identifies the contractual working relationship between the teacher and the educational institution, and can be distributed between hourly (20 and 40 hours a week), exclusive dedication or via an employment contract. |
| Professional Qualification | Teaching experience | The amount of experience the professional has or has had as a teacher. |
| | Experience as a professional | The experience in the job market (except as a teacher). |
| | Professional certifications | Number of professional certifications the teacher has. |
| Pedagogical Qualification | Initial Pedagogical Training | Analyzes whether, during their academic and/or professional training, the teacher took any courses focused on pedagogical practices, especially those applied to the teaching of Accounting. |
| | Continuing Pedagogical Training | Analyzes if, after completing their academic and/or professional training, the teacher took any further training aimed at pedagogical practices, especially those applied to the teaching of Accounting. |

Source: Nagib and Silva (2020)

The variables linked to teacher qualifications are expected to be related to the intention and use of technologies in the classroom. In this sense, it is worth noting that the degree makes a contribution to the relationship sought, since the teacher who has completed *stricto sensu* training may have had contact with technologies or research that shows changes in student behavior, market expectations regarding the skills and competencies expected. On the other hand, it is not expected that there will be a lack of conformity between *lato sensu* level training and the adoption of technologies, justified by the possibility that teachers, in greater contact with specializations and market trends,

will be able to absorb the use of tools, software, gamification or other strategies from these courses for application in the classroom.

Miranda et al. (2013) also discuss teachers' working conditions. According to the authors, teachers working under the exclusive dedication regime have more time to develop research activities in addition to teaching. It is expected that teachers with exclusive dedication will spend more time immersed in the teaching-learning environment and, by experiencing this reality, will come to understand the opportunities of using technology in the classroom. Similarly, it is hoped that hourly teachers, who often have another professional activity alongside teaching, will understand that technologies used outside the educational context can also be applied in teaching. Thus, it is hoped that the work regime can be associated with the UTAUT constructs.

In line with this, Nagib and Silva (2020) point to the teacher's experience as a relevant factor in the adoption of active methodologies in the classroom, which can consequently favor the intention and use of technologies in teaching. The fact that the teacher has professional experience revealed, according to the authors' research, a greater propensity to adopt methods that make the student active in the construction of knowledge. Thus, based on the findings of Nagib and Silva (2020), it is estimated that teachers with more professional experience may be more likely to adopt technologies in the teaching-learning environment. In addition, professional certification, which enables market professionals to experience situations and experiences unique to those who are certified, may also be a factor that, associated with the UTAUT constructs, reveals the intention and use of technology in the classroom, since the teacher will be able to bring the situations made possible by certification into the classroom.

Furthermore, the study of pedagogical practices comes up against the concept of the competencies required for teaching. McClelland (1973) and Canning (1990) carried out seminal studies on competencies for the exercise of a profession. They were conceptualized as a set of personal characteristics for exercising a particular task in a more refined way, and were treated as knowledge, skills and attitudes aimed at the professional's performance within the context in which they are subjected. In a complementary way, Le Boterf (2003 p. 158) points out that "professional competence is the result of the relationship between the triad of knowing how to act, being able to act and wanting to act". Thus, teachers who have had some pedagogical training may have a greater intention to use technology. Table 3 shows the study's hypotheses, based on the literature explored.

Table 3

Study hypotheses

| Hypothesis | Statement | Rationale |
|------------|---|---|
| H1 | The stage of the teaching life cycle is associated with the constructs performance expectancy, effort expectancy, social influence and facilitating conditions of UTAUT. | Huberman (2000), Miranda et al. (2013) |
| H2 | a: The teacher's degree is associated with the constructs performance expectancy, effort expectancy, social influence and facilitating conditions of UTAUT. b: Longer time spent working as a teacher is associated with the constructs performance expectancy, effort expectancy, social influence and facilitating conditions of UTAUT. | Nagib and Silva (2020), Miranda et al. (2013) |
| H3 | a: Experience as a teacher is associated with the constructs performance expectancy, effort expectancy, social influence and facilitating conditions of UTAUT. b: Professional experience is associated with the constructs performance expectancy, effort expectancy, social influence and facilitating conditions of UTAUT. c: Professional certification is associated with the constructs performance expectancy, effort expectancy, social influence and facilitating conditions of UTAUT. | Nagib and Silva (2020), Miranda et al. (2013) |
| H4 | a: Initial pedagogical training is associated with the constructs performance expectancy, effort expectancy, social influence and facilitating conditions of UTAUT. b: Continuing pedagogical training is associated with the constructs performance expectancy, effort expectancy, social influence and facilitating conditions of UTAUT. | Nagib and Silva (2020), Oliveira and Silva (2012), Miranda, et al. (2013) |

3 Methodological procedures

To achieve the study's objective, six (6) axes of variables were used, as shown in Table 4.

Table 4

Study variables

| Axis | Variable |
|---|---|
| Theory UTAUT (intention and use of technologies) | Performance Expectancy |
| | Effort Expectancy |
| | Social Influence |
| | Facilitating Conditions |
| | Gender |
| | Age |
| | Experience |
| Teaching Life Cycle | Voluntariness of Use |
| Teaching Life Cycle | Stages of the Teaching Life Cycle |
| Academic Qualification | Degree |
| Acadêmica | Work regime |
| Teaching Qualifications - Professional | Teaching Experience |
| | Professional Experience |
| | Professional Certification |
| Teaching - Pedagogical Qualification | Initial Pedagogical Training |
| | Continued Pedagogical Training |
| Sociodemographic | Status of the teacher, HEI in which they work as a teacher, age, gender, undergraduate degree, type of undergraduate institution, subject area of postgraduate studies, current level of training, employment relationship with the HEI, length of time dedicated to teaching accounting, whether they have taken any pedagogical training. |

Once the variables had been defined, the data collection instrument was developed in the form of a questionnaire presented in two sections. The first section covers sociodemographic questions, whose data was

used to define the respondent's profile, as well as questions involving the teaching life cycle and teaching qualifications, which are closely linked to the aim of this study. The second section is reserved for questions about the respondent's intention to use a particular technology.

In order to gauge the respondent's intention and use of the technologies studied, an open numerical field was set as the judging interval for the answer, to provide a score between 0 and 10, with up to two decimal places. The closer to 10, the greater the intention and use of a technology. On the other hand, the closer to zero, the lower the propensity of intention and use. In addition, for scores that reach the average of the scale (five), it is inferred that there is no consolidated position as to the intention and use of that technology by the teacher respondent. The research project was approved by the Research Ethics Committee (CEP).

Two (2) pre-tests were carried out, both by inviting teachers who work in lines of research related to the research proposal. The first pre-test was carried out with 5 teachers, in order to improve the instrument, such as the wording of the questions, the wording of the acceptance form and the logical sequence of the questions. The second pre-test was carried out in order to validate the questionnaire statistically, with 20 teachers from both public and private HEIs. In both situations, the invited lecturer was contacted via e-mail, with the collection instrument attached to a text document and made available via Google Forms.

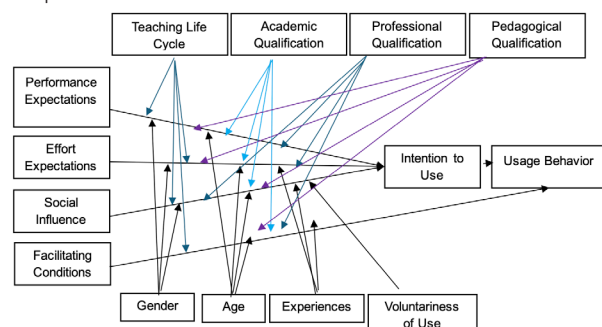
With the volume of responses statistically sufficient for the development of multivariate analysis, Exploratory Factor Analysis (EFA) was applied, determining the KMO and MMA indices, as well as calculating Cronbach's alpha. The results showed a KMO = 0.78 and MMA > 0.5 for all the variables analyzed, so, based on what was said by Hair et al. (2009), the instrument proved to be satisfactory for carrying out the EFA, which exposed all the significant variables, as well as being able to be presented under 4 structured and statistically known dimensions. In addition, Cronbach's alpha was 0.735, suggesting that the instrument was reliable.

Once the data collection instrument had been validated, it was disseminated to the study's target population of 5,421 different teacher contacts. The questionnaire was distributed and data collection began at the end of January 2023, with reminders sent in March and April 2023. When the volume of responses was found to be stationary, it was decided to end data collection, with the link to the electronic questionnaire being made unavailable.

The process of analyzing the results began with formatting the database, obtaining 497 valid responses, which

represents 9.16% of the target population. Subsequently, structural equation modeling (SEM) was applied, based on the UTAUT model adapted for this study (Figure 3).

Figure 3
Adapted UTAUT model



Among the types of MME, we opted to apply covariance-based structural modeling (CB-MME), used to confirm or reject a set of systematic relationships between multiple variables (Marôco, 2010). The R Statistics and JAMOVI software, both free and at no cost, were used as tools for data analysis.

4 Presentation, analysis and discussion of results

4.1 Respondent profile

Of the 497 valid responses, 205 were male, while 292 were female. Of the male respondents, 59.9% said they worked in public educational institutions, while for the female respondents, 55.6% worked in this type of institution. As for their degrees, 78.7% of the respondents said they had a degree in Accounting, 13.7% in Administration and the rest in other areas of knowledge, such as Law, Economics and Mathematics. This result is similar to the profile observed by Nagib and Silva (2020).

In terms of qualifications, the results show that of the 212 respondents working in private HEIs, 133 (62.7%) have a master's degree, 41 have a doctorate (19.3%) and 38 (17.9%) are teachers with a specialization or MBA. A possible explanation for this result could be that teachers at private HEIs have another career alongside teaching, since specializations/MBAs are aimed at complementary training in management careers.

When analyzing the distribution of professors at public HEIs in terms of qualifications, there was a high concentration of professors with a doctorate (63.1%). This result was also found by Miranda (2011) and Nagib and Silva (2020). As the vast majority of public HEIs are based on teaching, research and extension, it is understandable that PhDs are strongly linked to these institutions, especially through research. In addition, there are 33.3% masters, justified by the profile of certain competitions, especially for substitute

teachers. There were also specialist professors, with 3.1% of the total number of responses, as this profile is no longer covered in public HEI competitions.

With regard to working hours, 148 respondents said they worked on an hourly basis - mostly at private institutions, 29 teachers worked 20 hours a week, 99 worked 40 hours a week and 221 worked exclusive dedication - mostly at public institutions. Looking at the answers related to professional qualifications, 203 teachers work in parallel to teaching, while 294 respondents said they only work as a teacher. With regard to professional certification, 272 teachers said they had this certification, while 225 did not.

With regard to pedagogical qualifications, 398 respondents said they had taken at least one pedagogical training course during their postgraduate studies (master's/doctorate). In addition, 286 said they had taken at least one pedagogical training course after finishing their postgraduate studies. This result reinforces the arguments of Miranda (2011) and Miranda et al. (2013), who point out that pedagogical training can be acquired in two stages. In addition, this finding is close to that presented by Oliveira and Silva (2012), Guimarães and Pinto (2022) and Santos et al. (2022), who point to pedagogical training as a necessary step in teacher training.

As for the results linked to the teaching life cycle, according to Huberman (2000), we opted to show the results in a double-entry table, crossing the results of the phase of the teaching life cycle with the respondent's most recent degree, as shown in Table 5.

Table 5
Teaching Life Cycle versus Degree

| Life Cycle Phases | MBA | Mestrado | Doutorado | Pós-Doutorado | Total Geral |
|--|------------|-------------|-------------|---------------|-------------|
| Phase 1 - Entry (Years 1-3) | 10 (16,1%) | 40 (64,5%) | 12 (19,5%) | 0 (0,0%) | 62 |
| Phase 2 - Stabilization (Years 4-6) | 14 (16,9%) | 45 (54,2%) | 24 (28,9%) | 0 (0,0%) | 83 |
| Phase 3 - Diversification / Questioning (Years 7-25) | 19 (6,1%) | 126 (40,4%) | 166 (53,2%) | 1 | 312 |
| Phase 4 - Serenity / Conservatism (Years 25-35) | 4 (11,8%) | 15 (44,1%) | 15 (44,1%) | 0 (0,0%) | 34 |
| Phase 5 - Divestment (Years 35-40) | 0 (0,0%) | 2 (33,3%) | 4 (66,7%) | 0 (0,0%) | 6 |

The results show that the phase of entry into a teacher's career, as proposed by Huberman (2000), is made up of specialist teachers (16.1%), masters (64.5%) and doctors (19.5%). This result shows that the master's degree is the most common training for starting a teaching career, which strengthens the role of postgraduate programs as teacher trainers. According to the findings of Nagib and Silva

(2020), teachers with a master's degree can work in both public and private HEIs.

The second phase of the teaching life cycle, shown in Table 5, shows that 83 (16.7%) of the 497 respondents have been in the profession between 4 and 6 years. In this phase, the concentration of teachers is also at master's level (54.2%). However, in this phase there is an increase in teachers with a doctorate (28.9%), showing that in the specialization phase, according to Huberman's model (2000), teachers not only have greater confidence in the classroom, but also seek to improve their training and learn more about pedagogical styles and practices in the classroom. In this phase, there are still 14 (16.9%) specialist teachers, who overcome the barrier of the entry phase and actually seek stabilization as a teacher.

Table 5 shows that 312 (62.7%) teachers are in the third phase of the teaching life cycle, according to the Huberman model (2000). This concentration may be due to the age range of the respondents (average of 44.3 years) and the length of time of the model itself, ranging from 7 to 25 years of teaching. It is at this stage that 93.6% of the respondents hold master's and doctoral degrees. This result is in line with Huberman (2000), who states that teachers at this stage are more mature, more confident and seek out more pedagogical techniques in the classroom, thus embarking on further training. It can be seen from the results that the number of specialist teachers at this stage fell to 6.1% of the total, revealing the search for master's and doctoral degrees in order to effectively remain in the teaching profession.

Also according to the results in Table 5, it can be seen that in phase 4 and phase 5 of the teaching life cycle, in which the teacher is more involved in extra-class issues at the institution, such as coordination, management and research, there is a strong presence of masters and doctors, showing that, after 25 years of teaching, the teacher has completed the necessary training and qualifications and is

heading towards the end of their career cycle.

4.2 Structural Equation Modeling (SEM)

Once the moderating variables have been synthesized and added to the UTAUT of Venkatesh et al. (2003), structural equation modeling (SEM) is applied in order to meet the study's objective.

According to Hair et al. (2009), structural equation modeling is a statistical technique belonging to the list of multivariate techniques, which combines aspects of factor analysis and multiple linear regression. Also according to Hair et al. (2009), this technique is capable of analyzing a set of latent variables (constructs) and observed variables (moderators) at the same time. This study aimed to apply the CB-SEM model, which, according to Hair et al. (2009) and Marôco (2010), is based on covariance and is mainly used to confirm or reject a set of systematic relationships between multiple variables.

The relationships shown in Figure 3 suggest that all the moderating variables included in this study are related to the original UTAUT constructs. Furthermore, the original moderating variables of the UTAUT are reinforced, i.e. age, gender and experiences were inserted into the hypothetical model, but are not included in the relationships analyzed, since the purpose of this study is to add new moderating variables to the original UTAUT and not to remove those that already make it up.

Table 6 shows the fit indices of the original model. The fit indices show how adequate the hypothesized model is, i.e. with all the variables relating without cuts due to the model's performance. To this end, the chi-square, fit quality index (GFI), comparative fit index (CFI), root mean square error of approximation (RMSEA) and Cronbach's alpha are analyzed.

Table 6

Initial Model - Considering all variables for all constructs

| SEM Fit indices | Constructs | | | | | | |
|------------------|---------------|------------------------|-------------------|------------------|-------------------------|------------------|---------|
| | General Model | Performance Expectancy | Effort Expectancy | Social Influence | Facilitating Conditions | Intention to use | Usage |
| Chi-Square | 59,569 | 32,781 | 47,026 | 74,709 | 69,347 | 73,221 | 25,771 |
| GFI | p=0,000 | p=0,000 | p=0,001 | p=0,000 | p=0,002 | p=0,000 | p=0,000 |
| CFI | 0,9106 | 0,8724 | 0,9361 | 0,8991 | 0,8852 | 0,7413 | 0,7960 |
| RMSEA | 0,8221 | 0,8963 | 0,8935 | 0,8537 | 0,9001 | 0,8153 | 0,8237 |
| Cronbach's alpha | 0,111 | 0,136 | 0,115 | 0,101 | 0,098 | 0,110 | 0,188 |
| | 0,771 | 0,683 | 0,637 | 0,381 | 0,601 | 0,461 | 0,482 |

The elements shown in Table 6 reveal that the hypothesized model, as shown in Figure 3, is not adequate, since, in addition to being significant for the chi-square test (showing that there is no difference between the observed matrix and the covariance matrix), the relationships do not have adjustment indices capable of making the model acceptable.

Faced with the situation where the hypothesized model doesn't fit, each construct is cleaned, i.e. the moderating variables that penalize the constructs are removed. The idea behind this process is to restrict the formation of constructs to only those moderating variables that statistically contribute to their formation. Table 7 shows a summary of the composition of each construct, after eliminating the variables that affect the model.

Table 7

Moderating variables versus constructs

| Constructos | Moderating Variables - Investigated in the Study | | | | | | | |
|------------------------------|--|-----|-----|-----|-----|-----|-----|-----|
| | CVD | TIT | RDT | ECD | ECP | CER | FPI | FPC |
| Performance Expectation | X | X | | X | | | X | X |
| Expectation of Effort | X | X | | X | X | | X | X |
| Influence of the environment | | X | | X | | | X | X |
| Facilitating conditions | | X | | | | | X | X |

Note: CVD = teaching life cycle, TIT = degree, RDT = work regime, ECD = experience as a teacher, ECP = experience as a professional, CER = certification, FPI = initial pedagogical training and FPC = continuing pedagogical training.

From the summary in Table 7, it is clear that qualifications, initial pedagogical training and continuing pedagogical training show a strong relationship with all the constructs, reinforcing the importance of the role of postgraduate studies in teacher training, especially in terms of contact with methodologies and their objectives, which are discussed more intensively in pedagogical training (initial and continuing).

In addition, teaching experience and life cycle, both variables that measure the length of a teacher's career, proved to be influential in the development of the performance expectancy and effort expectancy constructs. These constructs are essentially encompassed by the teacher's behavior, which may reveal that the length of

their career affects their expectations and, consequently, their intention to use technology.

Experience as a market professional only proved to be influential in shaping the effort expectation construct, reiterating that market experiences, as well as the use of technologies during professional practice, can bring individuals into contact with tools and technologies which, when taken into the classroom environment, minimize the need for teachers to seek learning, for example, in terms of the usability of the tool.

Finally, it was noted that work regime and professional certification were not included in the development of the constructs, either because they were not statistically significant or because the standardized coefficient penalized the model's adjustment index. The final model's fit indices are shown in Table 8.

Table 8

Final Model - Considering significant moderating variables

| SEM fit indices | Constructs - Final Model | | | | | | |
|------------------|--------------------------|------------------------|-------------------|------------------|-------------------------|------------------|---------|
| | Final Model General | Performance Expectancy | Effort Expectancy | Social Influence | Facilitating Conditions | Intention to use | Usage |
| | 27,108 | 25,019 | 28,338 | 55,397 | 39,208 | 36,660 | 24,207 |
| Chi-Square | | | | | | | |
| | GFI | p=0,108 | p=0,093 | p=0,068 | p=0,099 | p=0,101 | p=0,098 |
| CFI | 0,9591 | 0,9531 | 0,9712 | 0,9549 | 0,9516 | 0,9647 | 0,9544 |
| RMSEA | 0,9444 | 0,9409 | 0,9539 | 0,9411 | 0,9399 | 0,9511 | 0,9551 |
| Cronbach's alpha | 0,091 | 0,078 | 0,083 | 0,091 | 0,089 | 0,082 | 0,0817 |
| Alfa Cronbach | 0,789 | 0,757 | 0,799 | 0,617 | 0,788 | 0,801 | 0,638 |

It can be seen that after inserting the moderating variables linked to the teaching life cycle, academic qualifications, professional qualifications and pedagogical qualifications, relevant to each construct, the fit index of the consolidated model improved significantly. Thus, it can be concluded that the UTAUT, adapted in this study, increases the power of refinement in the investigation of the intention and use of technologies by Accounting teachers in Brazil. Table 9 summarizes the conclusion of the hypotheses.

Table 9

Conclusion on the study's hypotheses

| Hypothesis | Statement | Result | Decision |
|------------|--|--|------------------|
| H1 | The stage of the teaching life cycle is associated with the constructs performance expectancy, effort expectancy, social influence and conditions facilitating UTAUT. | The stages of the life cycle were related to the Performance Expectancy and Effort Expectancy constructs, which in turn had an influence on intention and, consequently, on the use of the technologies investigated. | Partially Reject |
| H2 (a) | The teacher's degree is associated with the constructs performance expectancy, effort expectancy, social influence and facilitating conditions for UTAUT. | Degree was related to all the constructs studied, which, in turn, were related to intention and, consequently, use of the technologies investigated. | Do not reject |
| H2 (b) | Longer time spent working as a teacher is associated with the constructs expectation of performance, expectation of effort, social influence and facilitating conditions of UTAUT. | The work regime was not related to any construct, so it is not related to the intention and use of the technologies investigated. | Reject |
| H3 (a) | Experience as a teacher is associated with the constructs performance expectancy, effort expectancy, social influence and facilitating conditions for UTAUT. | Experience as a teacher is related to the constructs Performance Expectancy, Effort Expectancy and Social Influence. These constructs, in turn, are related to the intention and use of the technologies investigated. | Partially Reject |
| H3 (b) | Professional experience is associated with the constructs performance expectancy, effort expectancy, social influence and facilitating conditions for UTAUT. | Professional experience was only related to the Effort Expectancy construct. This construct, in turn, proved to be related to intention and, consequently, the use of the technologies investigated. | Partially Reject |
| H3 (c) | Professional certification is associated with the constructs performance expectancy, effort expectancy, social influence and facilitating conditions of UTAUT. | Professional certification showed no relationship with any of the constructs investigated, and therefore no relationship with the intention and use of the technologies investigated. | Reject |
| H4 (a) | Initial pedagogical training is associated with the constructs expectation of performance, expectation of effort, social influence and facilitating conditions for UTAUT. | Initial pedagogical training was related to all the constructs studied, so it is related to the intention and use of the technologies studied. | Do not reject |
| H4 (b) | Continuing pedagogical training is associated with the constructs expectation of performance, expectation of effort, social influence and facilitating conditions for UTAUT. | Continuing pedagogical training is related to all the constructs studied, and is therefore related to the intention and use of the technologies investigated. | Do not reject |

The rejection of a variable by the SEM model is foreseen in the literature. Hair et al. (2019) states that rejection (partial or total) can occur when one of the statistical coefficients falls into the rejection area or when the model has not reached its perfect fit. In addition, Cohen (1988) and Chin (1998) point out that rejection can occur even when there is statistical significance, but if there is no

practical relevance, there is support for rejection.

The decision to partially reject occurred when part of the hypothesis cannot be rejected, which happens when there is statistical significance between the variable analyzed and part of the constructs and not all of them. It is rejected when no statistical significance is observed.

The rejection of the relationship between the work regime and professional certification variables and the UTAUT variables is not surprising. The work regime variable is related to the teacher's workload, and there is no evidence in other studies to suggest that the teacher's workload contributes more to the use of technology. Similarly, professional certification, as proposed by Miranda et al. (2013), does not delve into the quality of this certification, but rather the binary nature of its occurrence (yes/no), and does not place this variable as relevant to the intention and use of technologies. This last variable was also not statistically related to the adoption of active methodologies, according to the study by Nagib and Silva (2020).

In turn, the partial rejection in the conclusions about hypotheses H1, H3(a) and H3(b) is supported by the explanations of Hair et al. (2019), in which only what was not statistically significant was rejected, not invalidating the conclusions about what is significant and relevant to the context of the study and its results.

Finally, it is denoted as not rejected when the variable analyzed is statistically significant in relation to all the constructs analyzed. With the presentation of the conclusions about the study hypotheses, it is emphasized that only the work regime and professional certification variables were not statistically significant to cover the adaptation presented, denoted as UTAUT-DCC.

5 Conclusions

The aim of this research was to offer an adaptation of the UTAUT theory, capable of indicating the intention and use of technologies by teachers of Accounting courses in Brazil. To this end, it was suggested that variables linked to the teaching life cycle and teaching qualifications should be included. In this sense, the proposition of the study is that, in addition to the factors pointed out by Venkatesh et al. (2003) in the original UTAUT, the addition of the stages of the teaching life cycle and the variables linked to teaching qualifications refines the power of application of the UTAUT to the context of accounting education. As a starting point, it was decided that this study would cover technologies aimed at the virtual environment and communication, so all the conclusions of this study are aimed at these types of technology.

The results of the research show that the stages of the teaching life cycle, qualifications, experience as a teacher, professional experience and initial and continuing pedagogical training are capable of moderating the constructs of the original UTAUT, improving the theory's power of application, especially for teachers of undergraduate courses in Accounting. In addition, the main objective of this study has been met, with the presentation of the adaptation of the UTAUT, denoted as UTAUT-DCC.

This study basically offers three levels of contributions: institutional, personal and academic. With regard to the institutional contribution, this study can provide public and private HEIs with a tool capable of carrying out a diagnosis of the institution's teaching profile, with the aim of verifying the alignment of this profile with educational needs, especially those that may involve the use of the technologies investigated. What's more, with the teacher profile outlined, institutions will be able to promote complementary pedagogical training, offering courses and incentives for teachers to update themselves and keep in line with the educational needs perceived and desired by institutions and students.

The personal contribution of this study is aimed at teachers of Accounting courses. A society that is increasingly connected to technological environments will require professionals who know how to operate in this environment. Teachers should therefore seek to keep up to date with the technologies available and applicable in the classroom, not just to satisfy a possible personal desire, but as a way of providing society with graduates who are aligned with social needs. Thus, a contribution at this level is the ability of teachers to see themselves within the context of their HEI's intention and use of technologies and, on their own, to carry out a self-criticism, recognizing the importance of applying technologies at certain moments in the teaching-learning process and how willing and intent they are to do so, in line with the objectives expected by the discipline, the institutions, the academic context and the professional market.

The third contribution of this study is directed at the literature, pointing to a new proposal for measuring the intention and use of technology, specifically aimed at the context of accounting education in Brazil. This allows a new body of research on the subject, within accounting or otherwise, to have an instrument capable of measuring teachers' intention and use of technology, moderated by qualifications and the teaching life cycle.

Some limitations were encountered during the course of the research. Firstly, studies involving UTAUT, especially in the context of accounting teaching, are limited. In addition, most of the studies aim to apply the original UTAUT to a specific context, such as corporate environments, aiming for adherence in management systems, product launches,

among others.

A second limitation of the work lies in the teaching life cycle model, especially in the accounting teaching scenario. The very application of the life cycle model proposed by Huberman (2000) can be seen as a limitation, given that its development context is linked to the French reality and not limited to teachers on undergraduate courses in Accounting, and there is no teaching life cycle model for Accounting professors in Brazil at the time of concluding this research.

In addition to the very reality of contextualizing the teaching life cycle, the time frame covered by Huberman's (2000) model may no longer reflect the teacher's behaviour, given that several years have passed since its publication. The social, technological and behavioral changes experienced over the decades may have affected the time span between the stages and, for a fairer application, a revision of the life cycle model is necessary.

Still on the subject of the teaching life cycle, this study was not aimed at discussing the behavioral aspects that could influence a teacher's placement in a particular stage of the life cycle. Therefore, in order to determine the stage, only the length of teaching career, as reported during the data collection process, was used.

The results found in this research are the fruit of an exploratory study. Likewise, covering the behavioral aspects linked to UTAUT-DCC may reveal a new contribution to literature and science, keeping the construction of human knowledge alive.

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