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**Competencies in technology and information system demanded in accounting sciences: the national student performance exam (ENADE)**

**Competencias en tecnologías y sistemas de información exigidas en ciencias contables: examen nacional de rendimiento estudiantil (ENADE)**

**Competências em tecnologia e sistema da informação demandadas em ciências contábeis: o exame nacional de desempenho dos estudantes (ENADE)**

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### Abstract

**Purpose:** Identify and analyze the skills and competencies of Information Technology [IT] and Information Systems [IS] that are the object of evaluation of ENADE in Accounting Sciences.

**Methodology:** All ENADE tests related to Accounting were examined, the questions that used the IT and IS theme were individually identified and data related to the ease and discrimination indices of each question were extracted. Data analysis used descriptive statistics and simple linear regression.

**Results:** The IT/IS content was covered in all editions, identifying a growing trend in the number of questions in the 2018 test. The measurement of these skills demonstrates an alignment with the position of other public and private, national and international institutions, which have already issued recommendations on the inclusion of IT/IS as official subjects in the Accounting curriculum.

**Contributions of the Study:** The results can be used as a historical portrait of ENADE's Accounting tests in relation to IT/IS contents; as a reflection on the role of ENADE; as input for the elaboration of the new tests; and as a stimulus for educators and coordinators regarding the debate on the role of accountants and what is currently required of these professionals.

**Keywords:** Information Technology, Information System, ENADE, Accounting Sciences.

### Resumen

**Objetivo:** Identificar y analizar las habilidades y competencias de Tecnologías de la Información [TI] y Sistemas de Información [SI] que son objeto de evaluación de ENADE en el área de Ciencias Contables.

**Metodología:** Se examinaron todas las pruebas de la ENADE relacionadas con la Contabilidad, se identificaron individualmente las preguntas que utilizaban el tema TI y SI y se extrajeron los datos relacionados con los índices de facilidad y discriminación de cada pregunta. El análisis de datos utilizó estadísticas descriptivas y regresión lineal simple.

**Resultados:** El contenido de TI/SI fue cubierto en todas las ediciones, habiéndose identificado una tendencia creciente en el número de preguntas en la prueba de 2018. La medición de estas habilidades demuestra una alineación con la posición de otras instituciones públicas y privadas, nacionales e internacionales, los cuales ya han emitido recomendaciones sobre la inclusión de TI/SI como materias oficiales en el plan de estudios de Contabilidad.

**Contribuciones del Estudio:** Los resultados pueden ser utilizados como un retrato histórico de las pruebas de Contabilidad de ENADE con relación a los contenidos de TI/SI; como reflexión sobre el rol de ENADE; como insumo para la elaboración de las nuevas pruebas; y como estímulo para educadores y coordinadores en torno al debate sobre el papel de los contadores y lo que se requiere actualmente de estos profesionales.

**Palabras clave:** Tecnologías de la Información, Sistema de Información, ENADE, Ciencias Contables.

## Resumo

**Objetivo:** Identificar e analisar as habilidades e competências de Tecnologia da Informação [TI] e Sistemas de Informação [SI] que são objeto de avaliação do ENADE na área de Ciências Contábeis.

**Metodologia:** Foram examinadas todas as provas do ENADE referentes à Contabilidade, identificadas individualmente as questões que utilizaram a temática de TI e SI e extraídos os dados referentes aos índices de facilidade e discriminação de cada questão. A análise dos dados utilizou estatística descritiva e regressão linear simples.

**Resultados:** O conteúdo de TI/SI foi abordado em todas as edições, tendo sido identificada uma tendência de crescimento da quantidade de questões na prova de 2018. A medição dessas competências demonstra um alinhamento frente à posição de outras entidades públicas e privadas, nacionais e internacionais, que já expediram recomendações acerca da inclusão da TI/SI como disciplinas oficiais da grade curricular da Contabilidade.

**Contribuições do Estudo:** Os resultados poderão ser utilizados como um retrato histórico das provas do ENADE em Contabilidade em relação aos conteúdos de TI/SI; como reflexão sobre o papel do ENADE; como insumo para elaboração das novas provas; e como estímulo para educadores e coordenadores quanto ao debate sobre a função do contador e o que se exige atualmente destes profissionais.

**Palavras-Chave:** Tecnologia da Informação, Sistema de Informação, ENADE, Ciências Contábeis.

## 1 Introduction

Access to education is a fundamental duty of the State and a social right established in the Constitution of the Federative Republic of Brazil of 1988 (1988), raised to the level of a fundamental right and a guarantee for all, demanding a positive provision from the State to enable better living conditions for the neediest people and to equalize unequal social situations (Silva, 2007).

The Constitution of the Federative Republic of Brazil of 1988 (1988) also stipulates the main objectives of education, that according to article 205, are the full development of the person, preparation for the exercise of citizenship and qualification for work, highlighting Veiga (2003) that the student's development and preparation for the exercise of citizenship and work make possible for them to be part of the political system, participate in the production processes and develop personally and socially, benefiting from the triple purpose of education.

Besides stipulating universal access, the Constitution of the Federative Republic of Brazil of 1988 (1988) dedicated, in Article 206, to discipline a series of principles related to education, such as the "freedom to learn, teach, research and express thought, art and knowledge" and the "guarantee of standards of quality".

Regarding Accounting, the base of the national curriculum is defined through the interaction and complementarity between the Federal Government, the *Conselho Federal de*

*Contabilidade* [Federal Board of Accountancy] [CFC], and Undergraduate Institutions [UI], in the current stage, the Federal Government through Resolution CNE/CES n. 10/2004 (2004), the CFC through curricular matrix proposals elaborated in partnership with the Brazilian Accounting Foundation [FBC], and each UI through its Pedagogical Political Project [PPP] for the course (V. R. Silva, Miranda & Pereira, 2017).

However, Accounting is in constant evolution in the economic, social, and legal environment, naturally undergoing adjustments over time, becoming, as Iudícibus, Martins, and Carvalho (2005), an ingenious system of bookkeeping and simplified accounting statements in a complex information and evaluation system, which demands, according to Peleias, Silva, Segreti, and Chiroto (2007) and Araújo, Zittei, and Lugoboni (2020), a constant adaptation of the education system to meet the new realities and the best apprenticeship.

Indeed, digital evolution has influenced people's way of thinking, reflecting on the reinvention of models already established in society, which is no different in Accounting, which uses new systems and technologies to seek improvements in fulfilling its duty of data organization, bookkeeping and production, and evaluation of information. In this regard, the capitalist environment, in its essence, has continually challenged Accounting in the search for solutions and technical procedures that can better contribute to the interpretation of the high flow of capital (Coliath, 2014).

Within this scenario, studies such as Oliveira, Marino, and Morais (2001), Mohamed and Lashine (2003), Cardoso and Carraro (2013), Ragland and Ramachandran (2014), Reis, Sedyama, Moreira, and Moreira (2015), Boulianne (2016), Al-Htaybat, Von Alberti-Alhtaybat, and Alhatabat (2018), Maldonado, Eduardo, Ribeiro, and Silva (2020) and Carrozzo, Slomski, Slomski, and Peleias (2020) have been dedicated to assessing skills related to information technology [IT] and information system [IS], understood as fundamental for the training of accounting professionals and which must be addressed/offered in accounting courses to meet this new reality.

With the decentralization caused by the intrinsic attribution of each UI, reflecting on the heterogeneity of the curriculum practiced for accounting courses, carrying out periodic evaluations related to professional training becomes extremely important (V. R. Silva *et al.*, 2017), and it is also justified by the role of the State in providing education in the country and the constitutional duty to maintain a standard of quality in education.

As a result, there is a natural interest in verifying not only whether certain knowledge, in the present case, IT/IS, is being taught to accounting students but also the level of concern that the entities demonstrate with the verification of the apprenticeship of the students of those subjects taught to them during the undergraduate course.

Given the context of the theme, the following research question is extracted: **Are IT/IS skills and competencies subject to assessment by the National Student Performance Examination [ENADE] in Accounting?** Due to this questioning, the general objective of the research is to identify and analyze the skills and competencies in IT/IS ENADE evaluates in Accounting.

Regarding the delimitation of the research, although currently the official evaluation of accounting students is carried out through two different processes, the ENADE by the Federal Government and the Sufficiency Exam by the CFC, the present research will adhere to the evaluation of the ENADE, since that there are already studies that, in some way, covered the issue concerning the sufficiency test, as in Broiotti, Evangelista, Mazaron and Werner (2016) and Carrozzo *et al.* (2020) researches.

The present study is justified by the fact that ENADE is an official means used by the Federal Government to evaluate the quality of undergraduate courses and reflects, in the way

of approaching the contents of the questions, the competencies that are expected of students (Feldmann & Souza, 2016 ), thus serving as the basis for answering the research question. In addition, according to Silva and Miranda (2016), performance in ENADE is correlated to the curriculum of UIs; according to Miranda, Lemes, Lima, and Bruno (2014, p. 158), to the "ability of students to undertake advanced studies"; and according to Souza, Cruz and Lyrio (2017), to the level of approval in the CFC sufficiency exam; revealing, therefore, the level of importance of this tool for the evaluation of the education in Brazil.

## 2 Literature Review

### 2.1 Use of IT/IS in professional practice and the reflection in the national curricular guideline for Accounting in Brazil

At the beginning of the 1990s, there was significant growth in investment in IT and IS as entities sought to maintain competitiveness, seeking to increase processing speed, and improve storage capacity (Silva, Tommasetti, Gomes & Macedo, 2020). In this scenario, the accounting professional gained greater visibility in the management area due to the position of a fundamental element in providing information to assist the decision-making process.

The new technologies applied to the provision of accounting services are a reality of no return, resulting in the insertion of this routine in events that require faster and more consistent responses from Accounting and its professionals (Peleias & Bacci, 2004). In this context, it is essential the reflection of the CFC (2016, p. 62, our translation) when it celebrated the 70th anniversary of the board, emphasizing that "principles, habits, and customs evolve over time, just as professions adjust to the economic and social evolution of countries".

As an applied social science, Accounting needs to keep up with social and economic evolution in order to provide timely, reliable, and relevant information to managers and other users, always in the process of transformation and adaptation to the new demands of society, including updating itself in the changes caused by the globalization of the market and the new technological tools, with UIs, according to Brito (2008), playing an essential role in the development of the necessary skills for future professionals.

The CFC (2016, p. 101, our translation) also highlights the movement of accounting professionals to review the way of working in search of obtaining more effective solutions through systems that provide greater agility and precision in obtaining and processing information, warning that "for these and other reasons, both professionals and accounting organizations must remain committed to this new 'accounting practice' in order to face the challenges and opportunities arising from the new market scenario".

As noted by Martins (2018), work relationships gradually undergo several changes that interfere with the way of acting and organizing working, which corroborates the position of Leite and Santoro (2003), for whom the profile of the accounting professional has adapted to its evolution while other professions are replaced or even extinguished. Adapting to the new tools helps collect and transfer information, helping professionals to process financial data in real-time, and improving their performance.

The advance of technology has brought more dynamic and efficient methods to the work of the accounting professional (Cardoso & Carraro, 2013), and accounting education must follow this evolution through the restructuring of the learning system (Oliveira, Marino, and Morais, 2001). In research with an approach to the accountant's work, Martins (2018) noted that technological innovation was a crucial milestone in changing accounting practice by enabling the use of increasingly evolved information systems in the daily routine to increase

accounting activity, making the professional in the area to adapt to existing technologies without, however, leaving the essence of human knowledge, which makes it possible to judge the situations that are imposed on them.

In this new environment for the accountant, Boulianne (2016, p. 314, our translation) raises the question about which IT skills should be developed in accounting courses to train qualified professional accountants, presenting evidence of the importance of IT education at an advanced level for the qualification of professionals, however, recognized that it is a challenge for accounting departments to try to "balance the objectives of promoting high-quality learning for professional accountants and the need for content aimed at helping candidates succeed in professional exams".

In Brazil, for undergraduate courses, it is up to the Federal Government, specifically through the *Conselho Nacional de Educação* [National Education Board] [CNE], to decide on the *Diretrizes Curriculares Nacionais* [National Curriculum Guidelines] [DCN] proposed by the Ministry of Education [MEC], which are currently in force for the accounting undergraduate course by the Resolution CNE/CES n. 10/2004 (2004), which indicated the required skills and competencies for the development of the accounting profession, mixing inter and multidisciplinary knowledge, ranging from communication to the development of accounting information systems (Reis *et al.*, 2015).

According to Resolution CNE/CES n. 10/2004 (2004), the accounting undergraduate course must provide conditions for the professional to have the ability to understand the scientific, technical, social, economic, and financial issues of Accounting, present complete domain of their responsibilities, and reveal a critical-analytical capacity to understand the organizational implications from the information technology.

The resolution above was based on Opinion CNE/CES nº. 269/2004 (2004, pp. 6–7, our translation), which established as mandatory for the education of future accountants, among other issues, to acquire competence and ability to "develop, analyze and implement accounting information and management control systems, revealing a critical-analytical capacity to assess the organizational implications of information technology", demanding that the curriculum include "practice in a computer laboratory using updated software for Accounting".

Reaffirming what was established in Resolution CNE/CES n. 10/2004 (2004), Silva and Rêgo (2014, p. 57, our translation) reinforce that ENADE has the purpose of "diagnoses how the training process is taking place and what conditions are offered so that students can receive training consistent with the skills and competencies required for resolving problem situations", providing UIs with data to assess the theoretical and practical contents necessary for professional performance and to adapt to the demanded professional requirements.

According to Ragland and Ramachandran (2014), students need to develop analytical and critical thinking skills, including using technological tools to help them prepare, analyze and report financial information. The educational institutions that prepare future professionals are responsible for bridging the gap between the skills acquired by their undergraduate and those required by the job market.

For companies, investment in IT and IS "has become imperative in maintaining competitiveness" (Silva *et al.*, 2020, p. 228, our translation). Addressing such technologies in accounting education is crucial to ensure undergraduates acquire relevant knowledge for professional life. Thus, UIs "should provide for the development of student's skills necessary for professional performance" (V. R. Silva *et al.*, 2017, p. 262, our translation).

Peleias and Bacci (2004) portray that the success of Accounting and its professionals is very much related to the capacity that current challenges are perceived, practices are adapted, and answers are presented. Therefore, the teaching of Accounting has adapted to new

tendencies, as demonstrated by the curricular proposal for undergraduate courses issued by the United Nations [UN] through the United Nations Conference on Trade and Development [UNCTAD] (2011) with the International Standards of Accounting and Reporting [ISAR], guiding the international community which technical areas the student must dominate to exercise the professional practice.

The base curriculum proposed by UNCTAD (2011, p. 36) was divided into three modules: one on organizational and business knowledge, one on Accounting and Accounting-related knowledge, and another dedicated to information technology, aiming to "ensure that candidates appreciate the contribution of information systems to meet the goals and needs of business and to understand procedures for the development, introduction and use of computer-based systems."

Recently, there has been the movement of the International Federation of Accountants [IFAC], through the International Accounting Education Standards Board [IAESB] (2014, p. 6), which, by editing the International Education Standard 3, listed skills inherent to the profession divided into five groups: intellectual; technical and functional; personal; interpersonal and communication; and organizational, determining as an essential skill of the accountant to "apply appropriate tools and technology to increase efficiency and effectiveness and improve decision making".

This direction is also followed, for example, by the American Accounting Association [AAA] and the Institute of Management Accountants [IMA], which highlighted the importance of advanced-level IT education in reports on accounting education (Boulianne, 2016).

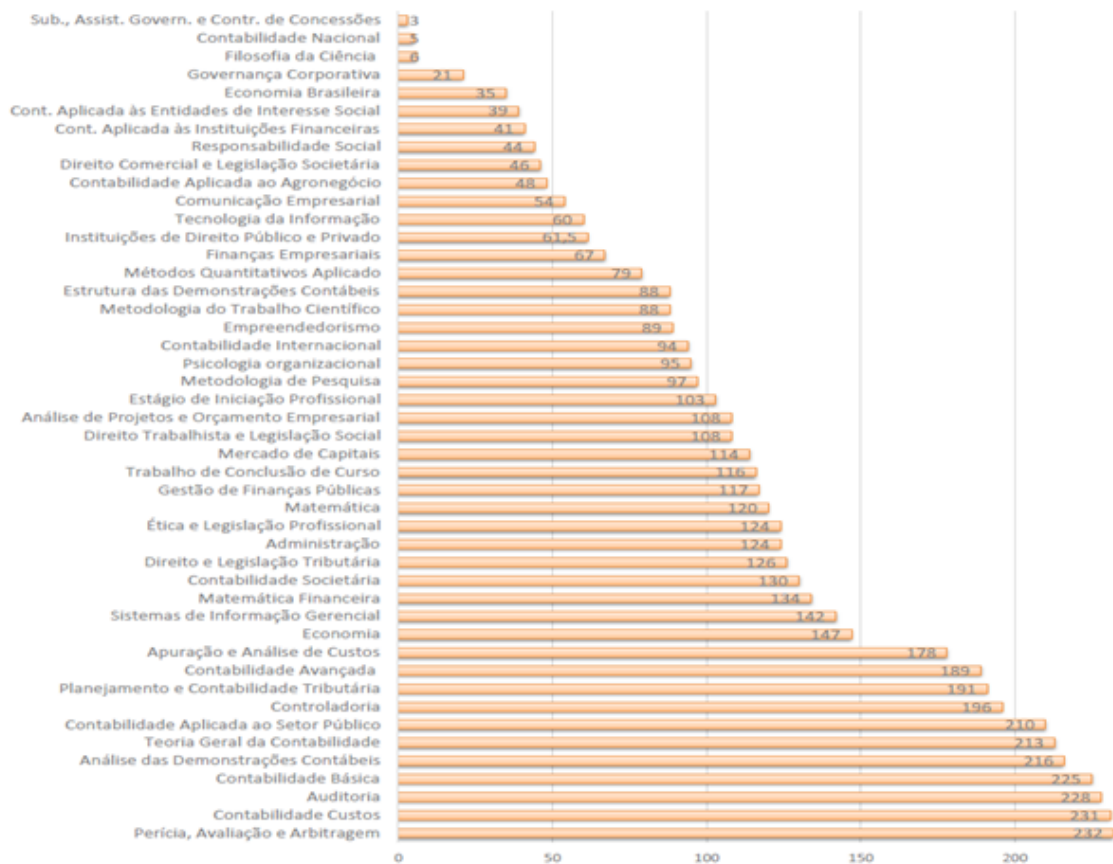
The constant evolution of the curriculum and skills required from the students is a premise under Law n. 9,394 (1996, our translation), also known as the *Lei de Diretrizes e Bases da Educação Nacional* [Law of Guidelines and Bases of National Education] [LDB] which, by defining the purpose of undergraduate education in article 43, V, stipulated the duty of "raising the permanent desire for cultural and professional improvement and enabling the corresponding realization, integrating the knowledge that is being acquired in an intellectual structure that systematizes the knowledge of each generation". And it is up to the UIs, which operate at the end of the education system, to adapt the relevant skills and competencies for future professionals since the DCN stipulated by the Federal Government naturally deals with more comprehensive guidelines (Reis *et al.*, 2015).

Due to this debate, because of the curriculum diversity in Brazil, with more than a thousand UIs offering the undergraduate course in Accounting, the CFC proposed with the FBC in 2007, with revision in 2009, a national proposal of content for the undergraduate course to help and standardize UI curricula (Rodrigues *et al.*, 2009). In the proposal, information technology became a mandatory subject in the basic training cycle and the management information system in the professional training cycle.

Therefore, what is seen is that IT/IS are part of the current reality of the accounting profession, recognized by the most diverse boards as a content that accounting students should be presented in the undergraduate course, qualifying them to apply this knowledge in the exercise of the profession when in the labor market.

When assessing the adherence of the 78 most highly regarded undergraduate courses in Accounting in the Folha de São Paulo ranking to the curricular matrix proposed by the FBC, L. C. Silva, Faria, and Lopes (2017) used a score methodology giving a score of 0 for disciplines presented in the proposal of the FBC and not applied in the UI; score 1 for elective subjects at the UI and suggested as mandatory by the FBC; grade 2 for basic training content subjects, theoretical-practical training content and content of elective subjects provided in the same way in the UI and in the suggestion of the FBC; and grade 3 for professional training content

disciplines provided in the same way in the UI and the FBC suggestion. The ranking of subjects proposed by the FBC is shown in Figure 1.



**Figure 1** Ascending order of use of disciplines

Source: L. C. Silva et al. (2017)

The result reveals the degree of the use of IT/IS in the curriculum of the most reputable UIs (in the ranking of Folha de São Paulo) and demonstrates the IT discipline with 60 points, among the least adherent to the FBC curriculum (first quartile), and the discipline of Management Information Systems with 142 points, most used, positioned in the third quartile of data distribution.

## 2.2 Assessment of skills required of accounting students - The role of ENADE

The obligation to guarantee a quality standard in education is expressly provided in the Constitution of the Federative Republic of Brazil of 1988 (1988) as a fundamental principle, and in fulfilling this duty of the State, the determinations of the LDB stand out, which determines the Government to evaluate the quality of public education (art. 9, VI, VII and IX; art. 10, IV) and private (art. 7, II), as well as the academic performance of the students (Art. 9, VI). The role of defining the DCNs is conferred to the Government, although the UIs have the necessary autonomy for the elaboration of their PPPs, stipulating the specific curriculum of each undergraduate course, which is why they assume a role of absolute relevance in the teaching insofar they must adapt the PPP to the market's expectation of qualification of these professionals (Araújo et al., 2020).



For this reason, Brito (2008) adds that the objectives of evaluating undergraduate courses involve assessing the adherence of the UIs to the DCNs, the teaching conditions, and the correlation between the student's particular development plan, the course's pedagogical project, the curriculum, institutional vocation, and regional insertion.

Studies on the reflexivity of the accounting curriculum in some exams, such as in the CFC Sufficiency Exam (Carrozzo *et al.*, 2020) and public entrance exams (Rodrigues & Miranda, 2013) revealed to be habitual a mismatch between the curriculum and the skills and competencies evaluated in both exams. In all the analyzed exams, the IT/IS contents either were not covered in the exams or did not reach a percentage of 1% of the total, a result that emphasizes the research of Silva, Miranda, and Pereira (2017), which found that the greater the alignment of UIs with the CFC curriculum proposal, the better are the evaluations in ENADE.

At the moment, the assessment of undergraduate courses and students at the national level is carried out through the *Sistema Nacional de Avaliação da Educação Superior* [National Higher Education Assessment System] [SINAES], established by Law n. 10,861 (2004) and, in some cases, also by the sufficiency exams established by professional regulatory entities, such as Accounting, as the CFC (2015) maintains the approval of the national sufficiency exam as a requirement for obtaining professional registration.

The basis of SINAES is founded in three pillars: evaluation of undergraduate education institutions, undergraduate courses, and the academic performance of their students, as provided for in Law n. 10,861 (2004).

Since each UI presents a different reality (Brito, 2008), SINAES emerged as a capable way of organizing the national evaluation process of UIs, undergraduate courses, and the undergraduate students themselves (Marinho-Araújo & Rabelo, 2016). For that, it makes use of some instruments, such as self-assessment, external assessment, ENADE, assessment of undergraduate courses, census, and registration (Instituto Nacional de Estudos e Pesquisas Educacionais Anísio Teixeira [INEP], 2015a), making SINAES an essential element in the definition of public education policies for Brazilian undergraduate education (Brito, 2008).

ENADE is, therefore, one of the tools used to assess academic performance established by SINAES, being a mandatory component of undergraduate courses and whose relevance lies in the fact that it is a mechanism that "helps institutions in the self-assessment process, for those seeking to continuous improvement" (V. R. Silva *et al.*, 2017, p. 263, our translation). INEP's (2019) position corroborates the purpose of the present research, reinforcing the provisions of article 5 of Law n. 10,861 (2004), as ENADE's function is to assess the performance of students on programmatic contents of the DCN as well as skills given the profession's evolution.

The ENADE exam is divided into three parts, one on general knowledge, another on specific knowledge, and a questionnaire about the student's perception of the exam itself. The preparation of the exam is INEP's responsibility, an autarchy linked to the MEC, which, aided by committees in each area of knowledge, defines the guidelines and formulation of the reference matrix of the exam based on the respective DCN founded on the profile and skills that should be expected from undergraduates to exercise their professional duties (Marinho-Araújo & Rabelo, 2016).

Several aspects can influence student performance, such as gender, age, ethnicity, marital status, nature of schools (public or private), class size, and, concerning the object of this research, the PPP and the curriculum, the last, vital because it is the link between theory and practice (Silva & Miranda, 2016). Lemos and Miranda (2015, p. 114, our translation) identified "teacher qualification, infrastructure, didactic-pedagogical organization, and teaching work regime in higher education institutions" among the factors that interfere with the performance analyzed by ENADE.

Specifically concerning the questions and their evaluative purpose, ENADE uses a methodology called Item Response Theory [IRT], seeking to assess the ability and minimize the guess, assuming that a student tends to opt for the correct answer with a lower level of its proficiency and miss the higher level ones, using some important parameters, such as the *Índice de Facilidade* [Ease Level] [IF] and the *Índice de Discriminação* [Discrimination Level] [ID] (Brasil, 2011).

Each question applied has its level of ease, calculated according to the percentage of correct answers compared to all students. A question is very easy when more than 86% of students get it right; easy when between 61% and 85% get it right; medium when between 41% and 60% get it right; difficult when between 16% and 40% get it right; and very difficult when only up to 15% get it right (INEP, 2006, 2009, 2012, 2015b, 2018).

The ID seeks to identify, through the Point-Biserial Correlation method, whether the question has the minimum evaluation capacity of the students, based on the assumption that a given question should be more correct answered by students who had a good performance than those that had a bad performance, eliminating from the contest the questions that are considered weak ( $ID \leq 0.19$ ), keeping valid only the questions considered medium (ID between 0.20 to 0.29), good (ID between 0.30 to 0.39) and very good ( $ID \geq 0.40$ ) (INEP, 2006, 2009, 2012, 2015b, 2018).

The ENADE results become inputs for evaluating the quality of Brazilian undergraduate education through the calculation of its standardized indicators in Normative Ordinance n. 40/2007 (2007): ENADE Concept, Preliminary Course Concept, and General Level of Evaluated Courses of the Institution. These indicators are tools for measuring performance and instruments for promoting the country's quality of undergraduate courses and higher education policies (Feldmann & Souza, 2016).

### 3 Methodological procedures

#### 3.1 Typology

As for the objective, this research is classified as descriptive. According to Gil (2008), it is one of the most used in social sciences to evaluate practical situations, as it seeks to identify, compile and describe the characteristics of the population or phenomenon studied. According to Beuren *et al.* (2013), descriptive research has its importance recognized in Accounting as it can clarify characteristics and/or aspects related to it, as in the present case, which the objective of the study is to identify which and how the competencies of IT/IS are demanded in the ENADE in Accounting.

As for the procedures, it is characterized as bibliographical and documental. Regarding research in the social sciences, bibliographical research is naturally mandatory (Beuren *et al.*, 2013; Gil, 2008), and it is through it that gets knowledge of the existing scientific production, in this case, concerning the relevance of IT /SI in the skills expected of accounting professionals.

In addition, as the research pretends to identify the characteristics of a population, documentary research becomes inevitable as it represents the fundamental research database, using materials that have not yet received analytical treatment, allowing to analyze past facts that may be useful to identify future trends (Beuren *et al.*, 2013), as in the present case, which the results of the study went through the analysis of all the ENADE tests carried out in the area of Accounting.

As for the approach to the problem, the qualitative methodology was initially used,

aimed at deeper analyzes concerning the studied phenomenon, highlighting characteristics not observed through a quantitative study (Beuren *et al.*, 2013), which was essential for identifying and differentiating the issues related to IT/IS compared to the others.

### 3.2 Population and data collection

The research analyzed all ENADE tests in Accounting since the institution of the exam. Considering that the frequency in undergraduate courses is three years and that the first exam applied to Accounting happened in 2006, this research analyzed the exams of 2006, 2009, 2012, 2015, and 2018. Due to the Covid 19 pandemic and according to Resolution n. 1/2021 (2021), the 2020 ENADE was postponed to 2021, which means that the assessment regarding Accounting, which would be conducted in 2021, was postponed to 2022.

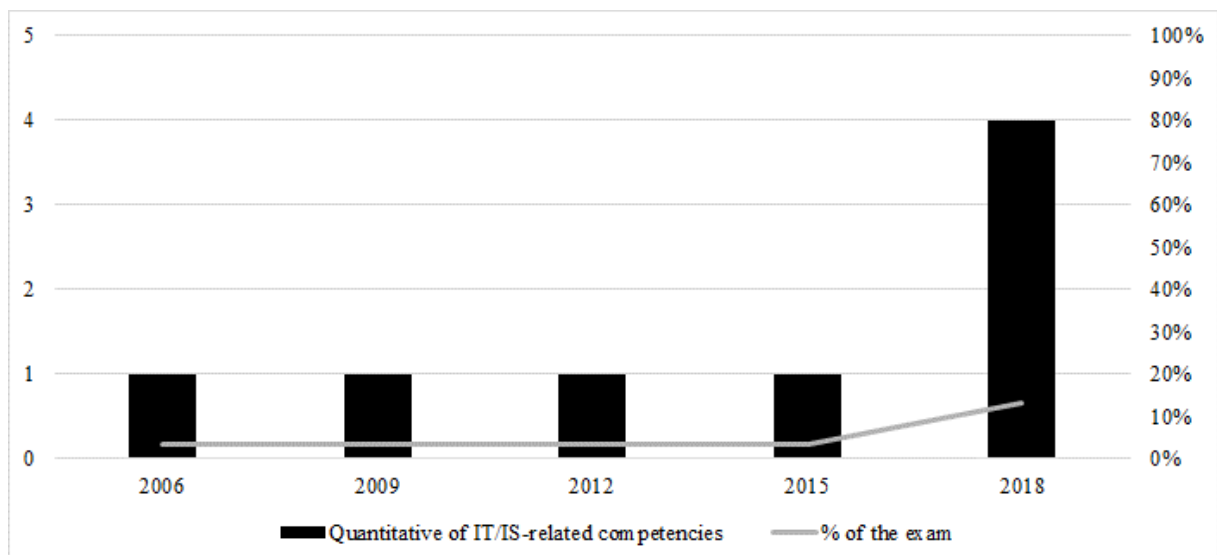
The exams were obtained directly from the official INEP website dedicated to ENADE.

The exams are divided into two parts, one regarding general knowledge, with 8 multiple-choice and 2 discursive questions, and another for specific knowledge, aimed specifically at the evaluated course, with 27 multiple-choice and 3 discursive questions. To achieve the objective of this research, only the specific knowledge part was analyzed, since the general part, although it may be related to the IT/IS theme, uses the theme in an accessory way, with the sole purpose of contextualization.

Each question of the specific knowledge was classified according to the reference to IT/SI or other subjects, and according to the IF and ID informed by INEP.

## 4 Results and analysis

From the questions in the reports of the five ENADE editions, in the first four exams, the number of questions that somehow addressed the IT or IS was limited to 1 question, or 3 % of total specific knowledge questions, going to 13% in the 2018 ENADE, with 4 questions, as seen in Figure 2.



**Figure 2** Overview of ENADE in terms of IT/IS competencies

Source: Research data.

The approach to IT/IS-related content is described in Table 1.

**Table 1**  
*Approach to content related to IT/IS*

ENADE	Question	Theme	Ease Index (IF)		Discrimination Index (ID)	
			Value	Classification	Value	Classification
2006	23	IT/IS exclusive	0,54	Medium	0,37	Good
2009	37	Multidisciplinary	0,23	Difficult	0,10	Weak
2012	22	Multidisciplinary	0,20	Difficult	0,22	Medium
2015	9	IT/IS exclusive	0,43	Medium	0,20	Medium
2018	12	Multidisciplinary	0,23	Difficult	0,01	Weak
2018	16	Multidisciplinary	0,41	Medium	0,29	Medium
2018	18	Multidisciplinary	0,52	Medium	0,33	Good
2018	24	IT/IS exclusive	0,61	Easy	0,41	Very good

Source: Research data.

Although the relatively low number of IT/IS questions (8 questions) in relation to the total number of specific knowledge questions in the 5 exams (150 questions), representing approximately 5% of the questions, a result is observed considerably higher than what Carrozzo *et al.* (2020) found on the CFC sufficiency exams applied in the period from 2013 to 2017, in which in a universe of 500 questions (50 per exam), none referred to IT, and only 1 (0.2% of the total) referred to SI, demonstrating that ENADE gives technological contents greater relevance than the sufficiency exam, even having common objectives.

On the other hand, the result of the ENADE analysis is closer to the content required in public entrance exams, that IT was present in 6% of the analyzed questions and SI in 1% of a universe of 1,005 questions in 34 public entrance exams applied in 2011 and 2012, according to the study of Rodrigues and Miranda (2013).

Furthermore, the recent increase in the number of IT/IS questions in ENADE corroborates the importance of these skills and competencies in Accounting pointed out in the literature, as in Mohamed and Lashine (2003, p. 3), which addressing the rapid advances in IT, highlighted that “these rapid changes meant that the environments for which graduates are prepared have changed”; and Al-Htaybat *et al.* (2018, p. 333), who expect “the accounting profession is predicted to experience a significant change in the future, due to technological developments”; and by regulatory bodies, such as the CFC (2016, p. 45, our translation), which pointed out that “without digital inclusion, the accounting professional will be, inexorably, out of time and, consequently, alien to the job market”.

Concerning the IT/IS issues addressed in the 8 questions, they were provided on general topics (general systems theory, definition, and IS component elements) and on specific IT/IS topics (IS internal controls, systems audit, data security, and recovery, cost IS, and enterprise IS [ERP]), demonstrating diversity in the coverage of examined topics.

It is noteworthy that concerning the theme of the questions, in 62.5% of the cases (5 out of 8), the IT/IS was covered in a multidisciplinary way, linked to other accounting themes, as proposed by UNCTAD (2011, p. 37) when recommending that “the study of information technology should be integrated as far as possible in the study of subjects in the other modules, and not as a separate stand-alone, self-contained technical skills course”, which indicates that the ENADE keeps up with teaching trends, gaining strength as a way of evaluating undergraduate education and the adherence by the student to skills and abilities considered relevant.

It is also observed that the respondents found it difficult to answer the 8 IT/IS questions, since 4 questions were classified as medium ease, 3 as difficult, and only 1 as easy, which reveals the adoption by INEP of a level of difficulty mostly from medium to difficult questions

for the assessment of IT/IS skills or an inadequate qualification of examinees in this matter.

From this, it can be concluded that for those who took the exam in Accounting, in 4 questions, between 41% and 60% answered correctly; in 3 questions, between 16% and 40% answered correctly; and in only 1 case, between 61% and 85% got the correct answer.

When observing the ID of the questions, there were 2 questions classified with a weak level, 3 with a medium level, 2 with a good level, and only 1 with a very good level, concluding that in 25% of the cases (2 of 8), the formulated question did not reach the minimum level of discrimination, being eliminated from the calculation of the final grade of the examinees as it was incapable of serving as a form of evaluation of the students.

For comparison between the IT/SI questions and the others with specific content concerning the FI and ID, Tables 2 and 3 were prepared.

**Table 2**

*Comparison of IT/IS questions against other questions of specific content in relation to the IF*

ENADE	Overall Variation	Overall Average	Observations	Observations Average	Observation Percentile
2006	0,1 to 0,8	0,27	0,54	0,54	88%
2009	0,12 to 0,86	0,28	0,23	0,23	45,8%
2012	0,15 to 0,61	0,29	0,20	0,20	44%
2015	0,15 to 0,72	0,35	0,43	0,43	76%
2018	0,09 to 0,79	0,30	0,23; 0,41; 0,52; 0,61	0,44	41,6%; 75%; 87,5%; 95,8%

Source: Research data.

From the analysis of the variation of the IF regarding the specific content, in none of the years the IT/SI questions were at the extremes, neither the easiest nor the most difficult of the exam. However, from the analysis of the overall average level, 3 of the 8 IT/SI questions were more complex than the overall average, ranking in a percentile lower than 46%.

**Table 3**

*Comparison of IT/IS questions compared to other questions of specific content in relation to ID*

ENADE	Overall Variation	Overall Average	Observations	Observations Average	Observation Percentile
2006	0,08 a 0,41	0,24	0,37	0,37	92%
2009	-0,03 a 1,24	0,24	0,10	0,10	37,50%
2012	0,05 a 0,41	0,26	0,22	0,22	36%
2015	0,09 a 0,43	0,27	0,20	0,20	24%
2018	0,01 a 0,42	0,21	0,01; 0,29; 0,33; 0,41	0,26	0%; 50%; 75%; 95,8%

Source: Research data.

From the variation, unlike the IF, ID in one of the years was at the lowest level compared to all the other questions of specific knowledge content. In addition, two questions were excluded due to their low evaluative capacity, which is not uncommon in ENADEs, for example, in the 2009 exam, when the question related to IT/IS, which had a weak ID, presented a percentile of 37.5%, which represented 10 questions of specific knowledge content that did not present the minimum evaluative capacity of the students.

Furthermore, from the analysis of the overall average, the evaluative capacity of the IT/IS questions was above the average in just 2 years, while in the other 3 years it was below the average, which may be an indication that there were more guesses in the answers to the questions related to IT/IS than in the other questions of the test, and the guess could be possibly

the result of technical lack of knowledge due to difficulty or deficiency in teaching.

## 5 Final considerations

Technology is a reality that is difficult to get away from, directly influencing human relationships and interfering in the way things are done, including Accounting, social science par excellence, which incorporates technical-scientific evolution and social relations to build new ways of action, so that IT/IS disciplines, competencies, and skills are included in its DCN and in the curriculum proposals of various entities.

ENADE is one of the official ways of assessing students and UIs through the reflexivity of the competencies and skills imposed by the DCN of the respective undergraduate course on future professionals. In this regard, this research sought to identify and analyze the IT and IS skills and competencies that are evaluated in ENADE in the Accounting area.

From the evaluation of the 5 ENADE exams related to Accounting since its implementation in 2006, it was verified that there were questions related to the IT/IS theme in all the exams, the first 4 with only 1 question and the last, in 2018, with 4 questions (in all cases, in a total of 30 questions of specific knowledge), demonstrating that there is a government concern in verifying the apprenticeship, by students, of these competencies and skills for the exercise of the profession, highlighting the relevant growth of questions in the last exam.

This concern also reflects the position of other entities, such as the CFC, FBC, ONU, IFAC, AAA, and IMA, which issued recommendations for the inclusion of IT/IS as official disciplines in the accounting curriculum.

Through the distribution of the way of approaching the themes of the questions, it was verified that ENADE addressed, in most cases (5 questions out of 8), the use of IT/IS in a multidisciplinary way, integrated with other accounting subjects and not as a single and specific topic, which demonstrates adherence to international recommendations, such as the UNCTAD guidelines (2011).

Analyzing the level of difficulty of the IT/IS questions compared to the others with specific content, it is not possible to reach a generalized conclusion due to the low number of observations (8 IT/IS questions out of a total of 150 questions with specific content). However, the distribution of the IF of these questions reveals that, in most cases, the questions were on the list of 25% of the most difficult questions on the exams, which may eventually mean a deficiency in the quality of teaching, an indication that must be taken into account when preparing/updating the DCN, the PPPs and the curricula.

The results can be used as a historical view of the ENADE exams in Accounting concerning IT/IS contents, as a reflection on the role of ENADE, and as input for the preparation of new exams. The research also contributes to the literature on accounting education, as the findings can be useful for educators and coordinators, stimulating the debate about the accountant's role and what is currently required from these professionals.

As a limitation that implies the difficulty of generalizing the results at this time of few samples, there is the fact that in the 8 IT/SI questions, 2 were considered unable to use as a form of student assessment, with ID less than 0.19, preventing to distinguish between the hit by competence or by chance (guess).

The debate on the research issue is not exhausted, obviously, with the present study, which should be a reality in academia and professional circles, suggesting as new research the comparison with exams similar to the ENADE in other countries, mainly because of the aspect of internationalization of the accounting curriculum, as well as research with former students and employers to observe their perception regarding the quality and sufficiency of training in

IT and IS for newly admitted accountants.

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