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Zero Score, Now What? Analysis of Zero Scores obtained by Accounting Students in the ENADE

Vitor Hideo Nasu
https://orcid.org/0000-0002-5176-6634

Breno Gabriel da Silva
https://orcid.org/0000-0002-8322-9235

Abstract

Objective: To analyze the zero scores obtained by accounting students on the ENADE 2018 based on the literature addressing the quality of accounting education and the purpose of the Enade.

Method: This is an archival study in which microdata was collected from the INEP's website. In total, 52,847 observations were analyzed using descriptive analysis and binary regression models.

Results: A micro portion of the students scored zero both in the general knowledge (FG) and specific content (CE) portions of the exam. The reason for these students having scored zero is that they left the answers blank. Nevertheless, when these portions were explored separately, zero scores became more representative and were mainly concentrated on open-ended questions. This finding suggests a greater need to motivate students to solve accounting-related open-ended questions. On the other hand, a lower number of zero scores was found among the close-ended questions, which may be associated with the students being more used to tests predominantly presenting close-ended questions. Gender, age, program modality (brick-and-mortar *vs.* distance learning), and region were relevant to explain the students' likelihood of scoring zero points.

Contributions: Zero scores provide some lessons, especially regarding the students' motivations and variables, which can either increase or decrease the probability of zero scores. Likewise, it encourages a critical reflection on the importance of the ENADE and how to motivate students to perform it, including a debate on regulatory implications.

Keywords: Grade; Academic performance; Higher education; Accounting; ENADE.

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1. Introduction

Previous studies verified whether the quality of undergraduate accounting programs has declined over time (Fogarty, Zimmerman, & Richardson, 2016; Madsen, 2015). One of the main criticisms concerns a failure to teach key skills that accountants need in practice (Madsen, 2015). Recently, some actions were suggested to improve accounting education (Boyle & Hermanson, 2020; Brink & Reichert, 2020; Jordan & Samuels, 2020; Madsen, 2020). Madsen (2020), for instance, suggests emphasizing greater integration of research into accounting education.

The quality of Accounting programs in Brazil has also been criticized. The primary evidence supporting such criticism concerns the students' poor academic performance and low approval rates in national assessments, such as the Enade (National Student Performance Examination) and the Federal Accounting Council (CFC) Sufficiency Exam. Studies analyzing the variables that impact academic performance tend to highlight the factors that positively affect it. For example, Ahinful, Tauringana, Bansah, and Essuman (2019) examined the determinants of academic performance among accounting students in Ghana, reporting that the variables Expectation, Will, Academic Interest, and Learning Attitude were positively related to student performance, except for one (Level), which showed a negative relationship.

On the other hand, less attention has been paid to investigations addressing students' poor performances. In many cases, these students fail their courses and professional qualification tests. In fact, repeating students are commonly excluded from such analyses (Coetzee, Schmulian, & Coetzee, 2018; Elikai & Schuhmann, 2010; Papageorgiou & Callaghan, 2020). This study does not suggest that excluding repeating students from analyses is inappropriate, only that less attention is usually given to negative academic aspects, such as failure, poor academic performance, and absence from tests. Analyzing errors is also important (Sanchez, 2019) because a deeper understanding of such phenomena can support professors' decision-making and actions, as well as coordinators and educational institutions.

We should remember that some studies focus on repeating students and other "negative aspects." For example, Xiang and Hinchliffe (2019) analyzed the determinants of repetition in an introductory accounting course among more than 600 students attending a university in the Midwest of the United States. The results showed that the general accumulated mean score, the student's intention to major in accounting sciences, motivation, and determination are significantly associated with failing in a discipline. To broaden the investigation of negative aspects, this study aims to *analyze zero scores obtained by Accounting Science students in the Enade 2018*. Hence, two specific objectives are outlined: (a) understand how zero scores behave and the primary reasons for students to score zero points on the test, and (b) assess the likelihood of obtaining a zero score based on the students' and contextual variables.

Zero scores in the Enade have severe consequences for Brazilian accounting education. First, zero scores negatively affect the evaluation of undergraduate programs because the grades students obtain on the exam are one of the components composing quality indicators. Hence, it influences the institutions' reputation. Second, it is an indication that there is a misalignment between the programs' curricula and what is required by the exam. Third, it reflects students' potential lack of effort and interest in performing well in the Enade, suggesting boycott practices. Finally, there is a regulatory consequence in these cases, as we discuss later.

Although studies address the performance of Accounting Science students, analyzing and discussing zero scores is uncommon. Based on the literature and these authors' knowledge, this is the first paper focusing on zero grades. Hence, the research gap we highlight here is based on Sanchez (2019), who argues that mistakes teach important lessons. From this perspective, the analysis of zero scores allows us to propose more critical reflections and devise potential treatments for the causes, aiming to improve the learning of Accounting Sciences students. Similarly to successful cases, failures can and should be analyzed so that we can at least decrease their occurrence.

The Enade 2018 database available on the Inep website was used to achieve the objective proposed here. Overall, 52,847 observations were analyzed using descriptive statistics and binary regression models. Among the primary findings, we note that 26 students completed failed the entire test. Many zero scores were found when open-ended questions were analyzed though. Students seem to take more time and pay greater attention to close-ended questions. Furthermore, male students and those attending brick-and-mortar programs are more likely to score zero in open-ended questions addressing general knowledge but less likely to score zero in questions addressing specific content. Older students are more likely to score zero than younger students, and, in general, students from the Northeast and Midwest are more likely to score zero points.

This study presents two main contributions. The first is theoretical and concerns the development of a critical discussion about zero scores and potential strategies, including regulatory implications, to decrease or avoid such poor performance among Accountancy students, especially evaluations external to Higher Education Institutions (IES). This critical discussion and the regulatory implications addressed here may be especially relevant for professors and the HEIs in the Northeast and Midwest, considering the findings presented here.

The second contribution is practical, as we draw the attention of professors and coordinators of Accounting Sciences programs toward students with poor performance, especially those with zero scores. Even though repeating students and those scoring zero and who present poor academic performance are outnumbered, they deserve to be monitored. Usually, these students demand attention because they need help to improve their performance. In the same way that studies examining mean or median academic performance provide valuable findings, looking to extreme values (in this case, zero scores) may indicate potential practices that can be adopted or avoided to improve the quality of accounting education and training.

The remainder of the paper is structured as follows: section 2 discusses the quality of accounting education and the Enade; section 3 describes the methodological procedures; section 4 reports and discusses the results; and section 5 readdresses the objective, summarizes the findings, and discusses implications, highlighting limitations and research suggestions.

2. Theoretical Framework

2.1. The Quality of Accounting Education

HEIs need to be considered when we debate the quality of accounting education. Fogarty et al. (2016) state that HEIs play two leading social roles, and the first is to provide education to the population. This social role is mostly perceived when we verify the success of HEIs in preparing students for their professional careers. The second role is related to expanding formal knowledge; HEIs are expected to allocate resources to research activities that can change thinking in their professors' and researchers' fields of knowledge. Hence, the reputation of an HEI should reflect the quality and quantity of teaching and research. Therefore, HEIs are subject to more scathing criticism when they fail to provide quality teaching and expand knowledge.

Zero scores are more strongly associated with the HEIs' first role and suggest significant flaws in the teaching process. According to Madsen (2015), the supposed decline in the quality of accounting education has concerned scholars, practitioners, and professional associations. One of the primary symptoms that suggest such a decline is deficient teaching of fundamental skills (Madsen, 2015). For this reason, HEIs have often been harshly questioned for not teaching the critical skills required by a professional career in accounting. Additionally, there is evidence that the expectations of companies and those of Accounting undergraduate students regarding what skills are needed from an accountant differ, particularly regarding soft skills (Dolce, Emanuel, Cisi, & Ghislieri, 2020; Jackling & De Lange, 2009).

Despite these apparent setbacks, Madsen's (2015) historical analysis did not identify evidence of a decrease in the quality of accounting education in the United States compared to other fields of knowledge; nevertheless, strategies have been proposed to strengthen it. Boyle and Hermanson (2020) discuss, for instance, faculty development, focusing on preparation provided in doctoral programs, performance assessment, rewards, and compensation, among others. Jordan and Samuels (2020), in turn, discuss effective learning, especially content and curricula, teaching methods, changes in the students' sociodemographic variables, and ways to measure performance and learning.

There are similar concerns and criticism toward Brazilian accounting education. Advancements in the incorporation of technological resources into the profession pressure Accounting programs to introduce disciplines that focus on developing technological skills, which professional associations have been increasingly considered relevant (Chartered Global Management Accountant, 2019; International Federation of Accountants, 2019; Pathways Commission, 2012). Although the curricula commonly include "Accounting Laboratory", "Information Systems", or "Computerized Accounting", some more recent content, such as data analytics, big data, and cloud computing, are not taught in these programs or are addressed only superficially. As suggested by Jackling and De Lange (2009), this aspect may be one of the reasons why Accounting undergraduate students perceive that they lack essential skills when they enter the job market.

According to data from the *Sinopse Estatística da Educação Superior* [Statistical Synopsis of Higher Education], developed by Inep (INEP, 2019), Accountancy programs rank fourth or fifth in the number of enrollments, first-year students, and graduates since 2009, the year when the first Sinopse was issued. In 2009, there were 235,142 enrollments (fourth place), 83,990 new entrants (fourth place), and 34,557 graduates (fifth place). In 2019, 358,240 enrollments were recorded (fourth place), along with 155,259 new entrants (fourth place) and 49,957 graduates (fourth place). Although Accounting is the program most frequently sought in Brazil, there are doubts about its quality.

The quantitative expansion of Accounting Science programs does not necessarily indicate that the quality of the programs has improved or at least remained the same. Therefore, these programs need to be supervised to remain updated and relevant, mainly due to changes that affect the theory and practice of the profession (Brink & Reichert, 2020; Jordan & Samuels, 2020; Pincus, Stout, Sorensen, Stocks, & Lawson, 2017). One of the ways to assess the quality of undergraduate programs is through the Enade. Students' performance in this large-scale exam indicates various factors to be improved, particularly regarding the HEIs' primary social role, as noted by Fogarty et al. (2016).

2.2. Enade – National Student Performance Exam

Enade was established as part of the Sinaes (Brazilian Higher Education Assessment System), based on Law No. 10.861, on April 14th, 2004 (Brasil, 2004) and has been administered by Inep ever since. According to § 1st of article 5th, Enade

> will assess the students' performance on content provided by the curricular guidelines of the respective program, their skills to adjust the requirements arising from the development of knowledge and competencies to understand topics outside the specific scope of their profession, linked to the Brazilian and world context and other fields of knowledge (Brasil, 2004, §1st of article 5th).

The same article also mentions that the Enade will be applied regularly, with a maximum frequency of three years, and will be accompanied by an instrument designed to collect data from students, considering the value of such data to support an understanding of the exam's results (Brasil, 2004). This survey has been performed via the Student Questionnaire. It is important to remember that the Enade has changed since its establishment (Miranda, Leal, Gama, & Miranda, 2018). In 2009, its scope ceased to be a sample and became population-based, and in 2011, it began to be applied only to graduates of undergraduate courses (Miranda et al., 2018). Accounting Science students took the Enade in 2006, 2009, 2012, 2015, and 2018.

There seems to be a consensus on the importance of assessing undergraduate programs to support an analysis of the development of the education system. However, there are criticisms regarding the incentives and the way such exams are implemented, especially regarding student participation (Leitão, Moriconi, Abrão, & Silva, 2010). Leitão et al. (2010) note, "Brazil is the only country to apply a mandatory national exam to students as one of the main instruments that make up the higher education assessment system." (p. 22). Taking Enade is mandatory for students to graduate, but students do not need to obtain a minimum score. Therefore, students who oppose the application of the Enade or perceive little or no value in taking it can boycott it. The most common forms of boycott include protests and returning the exam completely blank (see Leitão et al., 2010). Such behavior may harm the analysis and relevance of this type of assessment.

This study focuses on Enade's zero scores. Even though such scores suggest boycott behavior, other motivations may exist. This study seeks to shed light on such poor performance, which is usually considered negative but can point out aspects that need to be better addressed, such as incentives for implementing external academic assessments and students' motivation (Miranda et al., 2018).

3. Methodological Procedures

3.1. Data Collection

Consistent with this study's object, microdata concerning the Enade 2018 were collected from Inep's website (INEP, 2020). It was the last edition that Accounting students attended, and data are available. This exam presents some advantages. First, it is a large-scale exam, providing a database with many observations. Second, microdata is public; third, it involves many students so that zero scores are easily found, which would be difficult otherwise.

The 2018 exam lasted four hours and was composed of three parts[1]. The first corresponds to a set of questions addressing general knowledge (FG), which involves content on technological advancements, globalization, and social responsibility. These are questions common to all students, regardless of the program. There are ten FG questions; two are open-ended (weight 40%) and eight multiple-choice questions (weight 60%). The second part corresponds to a set of specific content questions (CE), which involves accounting theory, financial accounting, and management accounting in the case of Accountancy (INEP, 2015). There are 30 CE questions, three of which are open-ended (weight 15%) and 27 close-ended questions (weight 85%). The third and last part corresponds to ten questions addressing the students' perception of the exam's difficulty. Although these questions are not scored, they must be answered within the test's stipulated time. The final grade (overall grade) in the Enade 2018 represents the weighted average of the grades obtained in the FG (25% weight) and EC (75% weight) portions of the exam. In addition to the exam, participants complete the Student Questionnaire, in which they provide answers to dozens of questions addressing sociodemographic and academic information.

The Enade 2018 database includes a total of 62,475 Accounting undergraduate students, 9,628 of whom were excluded for being absent (code 222[2]), inappropriate participation (code 334), absence due to double graduation (code 444), the student attended the exam but his/her grade was disregarded by the applicator (code 556), and N/A. Thus, 52,847 students (84.6%) had their performances validated (code 555). Table 1 presents the frequencies and percentages.

Table 1
Sampling: valid observations

Item	Frequency	%
Population	62,475	100.0%
Type of presence in ENADE		
(-) Invalid Results Excluded (codes 222, 334, 444, 556, and N/A)	(9,628)	(15.4%)
Type of presence – Valid Results (code 555)	52,847	84.6%

Note that more than the performance of more than 15% of the students was not valid. Although these exclusions are not the focus of this study, future research could look into it in depth because it may indicate a lack of interest and impact the exam's educational value.

1 On the cover of the ENADE 2018 (INEP, 2018), the questions are classified into five parts: general knowledge open-ended questions, general knowledge close-ended questions, specific component open-ended questions, specific component close-ended questions, and the test perception questionnaire. In this study, three parts were considered: a general knowledge test, a specific component test, and a test perception questionnaire.

2 These codes were prepared by INEP (INEP, 2020) and belong to its registration system. They can be consulted in ENADE's Dictionary of Microdata Variables. The dictionary file is downloaded via the INEP website along with microdata.

After determining the sample, the research variables were selected. The performance of Accounting undergraduate students at the Enade is represented in three ways: (i) score obtained in the FG portion, (ii) in the CE portion, and (iii) general score. These grades are originally on a 0 to 100-point scale. However, this study modified this scale to focus on zero scores. Hence, the scores were coded as binary, with 1 representing a zero score and 0 otherwise (any score above zero). This procedure was also performed for the type of question, considering that the FG and CE tests both present open- and closed-ended questions.

In addition to the performance variables, data were collected from the Student Questionnaire, such as gender, age, and the program's modality (online vs. brick-and-mortar) and region. The literature suggests that these variables are relevant to explain student performance (Ahinful et al., 2019; Chen, Jones, & Moreland, 2013; Daymont & Blau, 2008; Gracia & Jenkins, 2003; Miranda, Lemos, Oliveira, & Ferreira, 2015; Nasu, 2020; Nasu, Silva, Borges, & Melo, 2021). While gender and age refer to students, the region and the modality in which the program is delivered provide a sense of context (Nasu et al., 2021). Table 2 shows the study variables.

Table 2
Study variables

Acronym	Description	Measurement
NTGE	Overall score	1 = Zero score; 0 = otherwise
NTFG	Score obtained in the general knowledge portion	1 = Zero score; 0 = otherwise
NTCE	Score obtained in the specific content portion	1 = Zero score; 0 = otherwise
NTDISFG	Score obtained in the general knowledge open-ended questions	1 = Zero score; 0 = otherwise
NTOBJFG	Score obtained in the general knowledge close-ended questions	1 = Zero score; 0 = otherwise
NTDISCE	Score obtained in the specific content portion	1 = Zero score; 0 = otherwise
NTOBJCE	Score obtained in the specific content close-ended questions	1 = Zero score; 0 = otherwise
SEX	Student's sex	1 = Male; 0 = Female.
IDD	Student's age	In years
MOD	Program modality	1 = brick-and-mortar; 0 = Distance learning
REG	Program region	Southeast (baseline), South, Midwest, Northeast, and North

Authors note that the sociodemographic profile of students entering higher education has changed (Jordan & Samuels, 2020; Pincus et al., 2017). For this reason, even though previous studies considered such variables in their analyses, we need to monitor this information over time, especially for comparative purposes.

3.2. Analysis Techniques

Data analysis was divided into two parts. First, zero and non-zero scores were analyzed according to their frequencies, besides histograms (not reported here). The descriptive analysis showed that a relevant portion of zero scores was obtained in the open-ended questions, both in the FG and CE portions of the exam. This finding motivated the second part of the analysis, which involved a more detailed investigation of NTDISFG and NTDISCE using binary regression models. Four link functions were tested, as shown in Table 3:

Table 3

Link function, scale of the response variable and odds ratio

Model	Link function	Scale of the response variable	Odds Ratio
Logit	$\log\left(\frac{\pi_i}{1-\pi_i}\right) = \beta_0 + \beta_1 x_{i1} + \cdots + \beta_p x_{ip}$	$\pi_i = \frac{e^{\beta_0 + \beta_1 x_{i1} + \cdots + \beta_p x_{ip}}}{1 + e^{\beta_0 + \beta_1 x_{i1} + \cdots + \beta_p x_{ip}}}$	e^{β_p}
Probit	$\phi^{-1} = \beta_0 + \beta_1 x_{i1} + \cdots + \beta_p x_{ip}$	$\pi_i = \phi(\beta_0 + \beta_1 x_{i1} + \cdots + \beta_p x_{ip})$	$\frac{\phi(\beta_0 + \beta_p)}{1 - \phi(\beta_0 + \beta_p)} \times \frac{1 - \phi(\beta_0)}{\phi(\beta_0)}$
Cauchit	$\tan(\pi(\pi_i - 0.5)) = \beta_0 + \beta_1 x_{i1} + \cdots + \beta_p x_{ip}$	$\pi_i = \frac{1}{\pi}\arctan(\beta_0 + \beta_1 x_{i1} + \cdots + \beta_p x_{ip}) + 0.5$	$\frac{\frac{1}{\pi}\arctan(\beta_0 + \beta_1(x+1) + \cdots + \beta_p x_{ip}) + 0.5}{1 - \frac{1}{\pi}\arctan(\beta_0 + \beta_1(x+1) + \cdots + \beta_p x_{ip}) + 0.5} \frac{\frac{1}{\pi}\arctan(\beta_0 + \beta_1(x) + \cdots + \beta_p x_{ip}) + 0.5}{1 - \frac{1}{\pi}\arctan(\beta_0 + \beta_1(x) + \cdots + \beta_p x_{ip}) + 0.5}$
Cloglog	$\log[-\log(1-\pi_i)] = \beta_0 + \beta_1 x_{i1} + \cdots + \beta_p x_{ip}$	$\pi_i = 1 - e^{\left[-e^{(\beta_0 + \beta_1 x_{i1} + \cdots + \beta_p x_{ip})}\right]}$	$\frac{1 - e^{\left[-e^{(\beta_0 + \beta_1(x+1) + \cdots + \beta_p x_{ip})}\right]}}{1 - \left\{1 - e^{\left[-e^{(\beta_0 + \beta_1(x+1) + \cdots + \beta_p x_{ip})}\right]}\right\}} \frac{1 - e^{\left[-e^{(\beta_0 + \beta_1(x) + \cdots + \beta_p x_{ip})}\right]}}{1 - \left\{1 - e^{\left[-e^{(\beta_0 + \beta_1(x) + \cdots + \beta_p x_{ip})}\right]}\right\}}$

Note. Developed by the authors based on Huayanay (2019) and Anyosa(2017).

The link functions are logit, probit, cauchit, and cloglog and their respective odds ratios are calculated by estimating (see results tables) and applying the formula in the odds ratios column in Table 3. The linear predictors of the logit, probit, cauchit, and cloglog models are specified in equations 1 to 4, respectively

$$\eta_i = g(\pi_i) = \log\left(\frac{\pi_i}{1-\pi_i}\right) = \beta_0 + \beta_1 \mathrm{SEX}_{i1} + \beta_2 \mathrm{IDD}_{i2} + \beta_3 \mathrm{MOD}_{i3} + \beta_4 \mathrm{REG}_{i4} \quad (1)$$

$$\eta_i = g(\pi_i) = \phi^{-1} = \beta_0 + \beta_1 \mathrm{SEX}_{i1} + \beta_2 \mathrm{IDD}_{i2} + \beta_3 \mathrm{MOD}_{i3} + \beta_4 \mathrm{REG}_{i4} \quad (2)$$

$$\eta_i = g(\pi_i) = \tan\big(\pi(\pi_i - 0.5)\big) = \beta_0 + \beta_1 \mathrm{SEX}_{i1} + \beta_2 \mathrm{IDD}_{i2} + \beta_3 \mathrm{MOD}_{i3} + \beta_4 \mathrm{REG}_{i4} \quad (3)$$

$$\eta_i = g(\pi_i) = \log[-\log(1-\pi_i)] = \beta_0 + \beta_1 \mathrm{SEX}_{i1} + \beta_2 \mathrm{IDD}_{i2} + \beta_3 \mathrm{MOD}_{i3} + \beta_4 \mathrm{REG}_{i4} \quad (4)$$

where the dependent variables are NTDISFG and NTDISCE, SEX is the student's gender, IDD is the student's age, MOD refers to the program's modality, and REG concerns the region where the program is located. According to Table 2, the baseline (reference categories) of the variables SEX, MOD, and REG are, respectively, female, distance learning (DE), and Southeast. The regression models' suitability was verified using Pearson residuals (Cordeiro & Simas, 2009) and deviance residuals (Ben & Yohai, 2004). The results indicate that the models did not present goodness of fit problems (see appendix for more details). The analyses were performed using R, version 4.0.2 (R Core Team, 2020).

4. Results

4.1 Descriptive analysis

Table 4 shows the frequencies of students who scored zero in the FG or CE portions of the exam and those who scored zero in both (total score). The results show that 26 students (0.05%) scored zero, and 52,821 (99.95%) scored higher than zero in the Enade 2018. A total of 240 students (0.45%) scored zero in the FG portion, while 52,607 (99.55%) obtained higher scores. Eighty-one (0.15%) students scored zero in the CE portion, while 52,766 (99.85%) scored higher. These findings indicate that a tiny portion of Accounting students scored zero and should not be of concern. According to Leitão et al. (2010), Accounting students are among the ones that least boycott the exam.

Table 4
Frequencies of zero scores and ratios according to content and reasons for scoring zero points

Type of content	NTGE		NTFG		NTCE	
	> Zero	= Zero	> Zero	= Zero	> Zero	= Zero
Frequency	52,821	26	52,607	240	52,766	81
Reasons for scoring zero points	Total Score		FG		CE	
Blank test (code 333)	26		26		26	
Incorrect answers (code 555)			214		55	
Total	26		240		81	

Table 4 shows that zero scores result from two reasons: the exam is either completely blank or incorrect answers are provided. All 26 students who scored zero in the Enade returned a completely blank exam. Twenty-six of the 240 students who scored zero in the FG portion returned it blank, while 214 answered at least one question. Additionally, 26 of the 81 students who scored zero in the CE portion returned it blank, while 55 answered at least one question. Therefore, the students who scored zero points in the FG or CE part tried to answer one or more questions but still got them wrong.

Table 5 shows the frequency of the scores obtained by the students who scored zero points in the open- and close-ended questions provided in the FG portion and their respective reasons. Note that the frequencies become more representative. For example, regarding the FG open-ended questions, 6,988 students (13.22%) scored zero points, and 45,859 (86.78%) scored higher. A total of 1,184 students (2.24%) scored zero on the close-ended questions, while 51,663 (97.76%) scored above zero.

Table 5
Frequency of zero scores obtained in the FG part according to the type of question

Test	**General knowledge (FG)**			
Type of question	**Open-ended (NTDISFG)**		**Close-ended (NTOBJFG)**	
	> Zero	**= Zero**	**> Zero**	**= Zero**
Frequency	45,859	6,988	51,663	1,184
Reasons for scoring zero points	**Open-ended**		**Close-ended**	
Blank test (code 333)	6,218		61	
Incorrect answers (code 555)	770		1,123	
Total	6,988		1,184	

The two primary reasons are blank tests and incorrect answers. Regarding the open-ended questions, 6,218 students handed in a blank test, and 770 tried to answer at least one of the questions. Regarding the close-ended questions, 61 students returned a blank test, and 1,123 tried to answer at least one question. These findings suggest that students tended to hand in a blank test when it addressed open-ended questions. This fact may be explained by the effort each type of question demands, besides its weight in the final grade. Open-ended questions usually require more time, as no ready answer is available, while multiple-choice questions are more easily answered. This type of question allows students to take a guess and choose a random answer.

Table 6 presents the frequency of the scores of those students who scored zero in open-ended or close-ended questions in the EC portion and their respective reasons. Note that the frequencies become more representative and relevant. A total of 19,996 students (37.83%) scored zero points in the EC open-end questions, while 32,851 (62.17%) did not; 133 students (0.25%) scored zero in the close-ended questions, while 52,714 (99.75%) did not.

Table 6

Frequency of zero scores in the CE part according to the type of question

Test	Specific Content (CE)			
Type of question	Open-ended		Close-ended	
	> Zero	= Zero	> Zero	= Zero
Frequency	32.851	19.996	52.714	133
Reasons for scoring zero points	Open-ended		Close-ended	
Blank test (code 333)	11,939		46	
Incorrect answers (code 555)	8,057		87	
Total	19,996		133	

The students scored zero for two reasons: blank tests and incorrect answers. A total of 11,939 students returned the EC open-ended questions blank. It is a large number of students and is of concern. On the contrary, 8,057 students answered at least one question, though incorrectly. Forty-six students left the close-ended questions of the EC portion blank, and 87 provided incorrect answers. These results suggest that students are more likely to answer close-ended than open-ended questions. Since there is no mandatory minimum score to be approved in the Enade, students may return the test blank, especially if questions demand laborious answers.

Similarities and differences are found in the comparison between the results presented in Table 5 and Table 6. Similarities include the fact that most of the students handed in open-ended questions blank, while most students who scored zero answered at least one of the close-ended questions. Regarding differences, 6,218 students left the FG open-ended questions blank, while 11,939 did the same for the EC open-ended questions; i.e., almost double the students did not answer the open-ended questions of the EC portion. This finding suggests that students tend to ignore open-ended questions addressing accounting content compared to general knowledge questions. However, it may also be associated with the way and the order in which the questions were presented. For example, in the Enade 2018 test addressing the Accounting Sciences programs (INEP, 2018), the FG open-ended questions were presented first, while the CE open-ended questions were presented later. Phillips, Lobdell, and Neigum (2020) found evidence that a student's academic performance may vary significantly depending on how questions are presented, especially those questions that include texts in the questions' wording.

Another visible difference concerns the "incorrect answers" reason, i.e. when the students answer the question incorrectly. For the FG portion, 1,184 students scored zero because they answered the questions incorrectly, while only 87 students scored zero for answering the EC portion incorrectly. This finding shows that more students scored zero due to incorrectly answering close-ended questions of the FG portion than of the EC portion, which is possibly explained by the number of questions. The FG portion contained eight multiple-choice questions with five alternatives, while the EC test comprised 27. Therefore, from a probability perspective, it is easier to score zero in the portion with the lowest number of close-ended questions. For example, a student answering the FG close-ended questions randomly was 16.7% more likely (0.8 to the power of eight) to score zero than if s/he randomly answered the close-ended questions in the EC portion; the likelihood of scoring zero, in this case, was 0.24% (0.8 to the power of 27).

The results show that a few students scored zero points in both the FG and CE portions. The 26 students with a total score equal to zero handed the exam completely blank. However, the analysis of zero scores according to the content and type of questions revealed representative numbers, some of which are quite expressive. This is the case of zero scores obtained in the open-ended questions, which a considerable portion of the students left blank. The same problem was not found for the close-ended questions, in which a significantly lower number of students scored zero.

Scoring zero and having a poor performance in the Enade often results from a lack of incentive for students to make an effort to do it well (Leitão et al., 2010; Miranda et al., 2018). Additionally, the exam is based on a consequentialist perspective, in which one assumes that students will perform well if the undergraduate programs they attended are high quality. However, students lack incentives to do well in the exam, while their training before entering HEIs is not equivalent (Leitão et al., 2010); hence, such as assumption may not hold. The Enade is an evaluation mechanism that is sometimes

> contested by the students and institutions for being too dependent on the students. The media publishes statements from students claiming that the weight this exam places on them is unfair, considering that the final objective is to evaluate the program, not the students. On the other hand, some higher education institutions complain that students have no incentive to do their best in the exam, which affects the results of their programs (Leitão et al., 2010, p. 22).

To further motivate Accounting students to take the Enade, Miranda et al. (2018) propose that the score obtained in the exam be used as a criterion for later stages of the undergraduate program, such as, for example, in public tenders, in the admission to graduate programs, in the registration of the diploma or the CFC sufficiency exam. Miranda et al. (2018) showed that these possibilities for using the Enade significantly increase the motivation for students to do it well. Therefore, the regulatory consequence mentioned in this study's introduction precisely refers to these possibilities. The CFC can consider these possibilities to encourage students to take the exam and make the Enade results more accurate so that coordinators and professors can make more accurate decisions. Other related entities (such as the Instituto dos Auditores Independentes do Brasil, Associação Nacional de Programas de Pós-Graduação em Ciências Contábeis, a Fundação de Apoio ao Comitê de Pronunciamentos Contábeis, among others) may pressure regulatory agencies (Federal Accounting Council) to adopt these strategies.

4.2. Analysis of the Binary Regression Models

The descriptive analyses revealed a large number of zero scores for the close-ended questions included in the FG (6,988, which corresponds to 13.22% of the total observations) and EC portions (19,996, which corresponds to 37.84%). Thus, greater attention was paid to these findings, resulting in the following binary regression analyses. First, we interpret findings concerning the NTDISFG model and, later, those of the NTDISCE model.

Table 7 shows the estimates, standard errors (in parentheses), significance level, Akaike's information criterion (AIC), and four coefficients of determination (Kulback Leibler, residual sum of squares, likelihood ratio, and corrected likelihood ratio) for each of the models (logit, probit, cauchit, and cloglog), whose response variable is NTDISFG. Except for REG–North, all estimates were significant ($p<0.01$). Note that the estimates for males are positive, indicating a higher probability of men scoring zero points in the FG open-ended questions. Positive estimates were also found for age. Older students were more likely to score zero points than younger students. Similarly, students attending brick-and-mortar programs were more likely to score zero than distance-learning students; positive estimates were found. Regarding region, students from the South were less likely to score zero than those from the Southeast. Students from the Northeast and Midwest were more likely to score zero than those from the Southeast. Furthermore, students from the North were also more likely to score zero than those in the Southeast. The coefficients of determination were low, but it does not mean that the models are inadequate. However, it indicates that the model's predictive power is restricted. Zhang (2017) notes that it is not uncommon for such coefficients to present low values.

Table 7

Results of the binary regression model considering NTDISFG

Model	**Logit (AIC=40942)**	**Probit (AIC=40937)**	**Cauchit (AIC=40980)**	**Cloglog (AIC=40945)**
Variables	**Estimate (Standard error)**	**Estimate (Standard error)**	**Estimate (Standard error)**	**Estimate (Standard error)**
Intercept	-2.89*** (0.06)	-1.67*** (0.03)	-4.00*** (0.13)	-2.87*** (0.06)
SEX - Male	0.08*** (0.02)	0.04*** (0.01)	0.15*** (0.05)	0.08*** (0.02)
IDD	0.02*** (0.001)	0.01*** (0.0009)	0.04*** (0.002)	0.02*** (0.001)
MOD – Brick-and-mortar	0.27*** (0.03)	0.14*** (0.02)	0.50*** (0.08)	0.24*** (0.03)
REG - South	-0.09*** (0.03)	-0.05*** (0.01)	-0.24*** (0.08)	-0.09*** (0.03)
REG - North	-0.03 (0.05)	-0.01 (0.02)	-0.07 (0.12)	-0.03 (0.05)
REG - Northeast	0.15*** (0.03)	0.08*** (0.01)	0.32*** (0.07)	0.14*** (0.03)
REG - Midwest	0.25*** (0.04)	0.14*** (0.01)	0.47*** (0.08)	0.23*** (0.04)
Kulback Leibler (Colin Cameron & Windmeijer, 1997)	0.008	0.008	0.007	0.008
Residuals Sum of Squares (Efron, 1978)	0.006	0.006	0.005	0.006
Likelihood Ratio (Cox & Snell. 1989; Maddala. 1983; Magee. 1990)	0.006	0.006	0.006	0.006
Correct Likelihood Ratio (Nagelkerke. 1991)	0.012	0.012	0.011	0.012

Note. AIC = Akaike's information criterion. ***p < 0.01; **p < 0.05; *p < 0.10.

Table 8 shows the estimates, standard errors (in parentheses), significance level, AIC, and four coefficients of determination (Kulback Leibler, residual sum of squares, likelihood ratio, and corrected likelihood ratio) for each one of the models (logit, probit, cauchit, and cloglog), the response variable of which is NTDISCE. All estimates are significant ($p<0.01$). The estimates for men were negative and indicate that men are less likely than women to score zero points in the EC open-ended questions. This result contrasts with the previous analysis, in which men were more likely to score zero. The age estimates were positive, supporting the notion that older students were more likely to score zero than their younger counterparts. This result is consistent with the previous analysis. Regarding the program's modality, the estimates are negative and indicate that students attending brick-and-mortar programs were less likely to score zero than distance-education students, a result that differs from the previous finding. The estimates are positive for the programs' region. Thus, these findings indicate that students from the South, North, Northeast, and Midwest were more likely to score zero points than those from the Southeast in the EC open-ended questions.

Table 8

Results of the binary regression model considering NTDISCE

Model	**Logit (AIC=40942)**	**Probit (AIC=40937)**	**Cauchit (AIC=40980)**	**Cloglog (AIC=40945)**
Variables	**Estimate (Standard error)**	**Estimate (Standard error)**	**Estimate (Standard error)**	**Estimate (Standard error)**
Intercept	-1.11*** (0.04)	-0.69*** (0.03)	-0.93*** (0.04)	-1.19*** (0.03)
SEX - Male	-0.25*** (0.01)	-0.15*** (0.01)	-0.22*** (0.01)	-0.20*** (0.01)
IDD	0.03*** (0.001)	0.01*** (0.0008)	0.02*** (0.001)	0.02*** (0.0009)
MOD – Brick-and-mortar	-0.52*** (0.02)	-0.32*** (0.01)	-0.44*** (0.02)	-0.40*** (0.01)
REG - South	0.07*** (0.02)	0.04*** (0.01)	0.07*** (0.02)	0.06*** (0.01)
REG - North	0.71*** (0.03)	0.43*** (0.02)	0.62*** (0.03)	0.55*** (0.02)
REG - Northeast	0.48*** (0.02)	0.29*** (0.01)	0.44*** (0.02)	0.38*** (0.02)
REG - Midwest	0.39*** (0.03)	0.24*** (0.02)	0.35*** (0.03)	0.30*** (0.02)
Kulback Leibler (Colin Cameron & Windmeijer, 1997)	0.029	0.029	0.029	0.029
Residuals Sum of Squares (Efron, 1978)	0.038	0.038	0.038	0.038
Likelihood Ratio (Cox & Snell. 1989; Maddala. 1983; Magee. 1990)	0.038	0.038	0.037	0.037
Correct Likelihood Ratio (Nagelkerke. 1991)	0.052	0.052	0.051	0.051

Note. AIC = Akaike's information criterion. ***p < 0.01; **p < 0.05; *p < 0.10.

The regression models addressing the results presented in Tables 7 and 8 found mixed results for the variable SEX. While male students were more likely to score zero in the FG open-ended questions, the opposite was found for the EC open-ended questions. These findings suggest that male students put more effort into solving accounting content questions. Consequently, they may have paid less attention to general knowledge questions, making them more likely to fail this portion of the exam. Conversely, female students spent more effort to solve general knowledge questions and may have made less effort to solve accounting content questions. Therefore, they were more likely to score zero on the EC open-ended questions. The literature reports mixed results (Miranda et al., 2015; Nasu, 2020). The literature reviews by Miranda et al. (2015) and Nasu (2020) show studies in which results favor both males and females, while other studies found that gender is irrelevant to explain student performance. Ahinful et al. (2019), for example, found that male students performed better than their female counterparts. On the other hand, Gracia and Jenkins (2003) found evidence that women performed better than men. No studies were found discussing zero scores according to sex.

Age generated similar results for NTDISFG and NTDISCE. In general, older students were more likely to score zero, supporting the notion that younger students may be more committed to completing the open-ended portion of the Enade, decreasing their likelihood of scoring zero points. HEIs may want to encourage older students to decrease their likelihood of scoring zero points. One way is by implementing institutional policies to assign additional credits according to the performance obtained in the Enade or allow more study hours dedicated to the exam. Studies associating age with student performance also found mixed results (Miranda et al., 2015).

Regarding the programs' modality, the regression models showed conflicting results. Students attending brick-and-mortar programs were more likely to score zero points in NTDISFG, while distance-learning students were more likely to score zero in the NTDISCE. Similar to sex, these findings indicate that the attention and effort of students attending programs in different modalities (brick-and-mortar *vs.* distance learning) reside in different aspects. Students attending brick-and-mortar programs seem to focus more frequently on accounting content questions; hence, they are more likely to score zero in the general knowledge portion as they pay less attention to it. In contrast, distance-learning students seem to put more effort into solving general knowledge questions; hence, they pay less attention to accounting-related questions and are more likely to score zero in this exam portion. Even though historically, Brazilian brick-and-mortar Accounting programs are more frequently associated with high student performance compared to distance-learning programs, recent international studies show that the gap between these modalities is decreasing (Chiu, Gershberg, Sannella, & Vasarhelyi, 2014; Fortin, Viger, Deslandes, Callimaci, & Desforges, 2019). Due to the Covid-19 pandemic, teaching strategies similar to those used in distance education were widely adopted, which may have improved its effectiveness. Future studies should monitor how a program's modality is associated with student performance.

The results concerning the regions show that, in general, students from the Southeast were less likely to score zero, especially in the EC open-ended questions. The greatest concern is with students from the Northeast and Midwest, who were significantly more likely to score zero points than their counterparts in the Southeast for NTDISFG and NTDISCE. It is also noteworthy that the students in the North were much more likely than the students in the Southeast to score zero on the EC open-ended questions. Therefore, the HEIs and professors in these regions should highly encourage their students to take the Enade. Similar to Nasu et al. (2021), these discrepant probabilities may be linked to socio-educational differences across Brazilian regions.

5. Conclusion

This study's objective was to analyze zero scores obtained by accounting undergraduate students in the Enade 2018 based on a theoretical framework addressing the quality of accounting education and the purpose of this exam. Microdata was downloaded from the Inep website (INEP, 2020), and a population of 62,475 accounting students was found. Of these, 9,628 were excluded due to invalid performance, essentially because they missed the exam. Thus, the analysis included 52,847 students (84.6% of the population) with valid performances and focused on those who scored zero. The first specific objective was achieved by performing a descriptive analysis of the zero scores, which showed how these scores behaved and their respective reasons. The second specific objective was achieved by performing binary regression analyses. Finally, the probabilities of zero scores were estimated considering the students' (sex and age) and contextual (modality and region) variables.

The results indicated that 26 students obtained a total zero score, while 240 and 81 students scored zero in the FG and CE portions, respectively. The reason is that these students left the answers unanswered. Zero scores were found when the portions of the exam were explored separately. We found that zero scores were concentrated in open-ended questions for both the FG and CE portions. More than 8,000 students tried to answer the EC open-ended questions but provided incorrect answers. This finding shows that students need to be motivated to answer open-ended questions addressing accounting content. On the other hand, few students scored zero in the EC close-ended questions, possibly indicating that students are more used to or find this format easier to answer, consequently, are less likely to score zero.

A more detailed analysis of open-ended questions using binary regression models showed that male students were more likely to score zero in the FG open-ended questions than their female counterparts. However, they were less likely to score zero points in the CE portion. These findings suggest that male and female students paid attention to different portions of the Enade. Regarding age, older students were more likely to score zero points. Therefore, HEIs and professors may want to talk privately with older students to understand their difficulties and motivations to improve their performance in the Enade. Similarly to gender, the results concerning the programs' modality are conflicting, suggesting that students attending brick-and-mortar programs and distance-learning education pay attention to different portions of the test. Finally, students from the Northeast and Midwest were more likely to score zero in general. Furthermore, the probability of scoring zero points in the EC open-ended questions is of concern, especially among students from the North, who require closer monitoring by professors and HEIs.

Some implications emerge from these results. First, students who scored zero in the FG and CE portions of the exam should not be of immediate concern. These students represent less than 1% of the students with valid performances. Second, a significant portion of the students left open-ended questions blank, suggesting that these students lacked the motivation to answer this type of question, which usually requires more effort than multiple-choice questions. Third, a significant portion of the students answered the EC open-ended questions incorrectly. While this may result from a lack of interest, there may be instances where students genuinely tried to solve the questions but failed. According to Leitão et al. (2010), Accounting students are among those who least frequently boycott the Enade. Thus, we suggest that accounting professors include more open-ended questions in their assessments. Fourth, a zero score obtained, for whatever reason, indicates a deficiency in teaching or the evaluation exam. In the first case, the HEIs' social role of teaching the population needs to be improved. As discussed in section 2, there are strategies for improving accounting education. In the second case, students should receive more incentives. Miranda et al. (2018) discuss some possibilities the regulator of the accounting profession may consider. Finally, decisions should be based not solely on the analysis of zero scores; other findings should also be considered.

This study presents two main limitations. The first is related to literature. There are few studies in Accounting Sciences analyzing zero scores. For this reason, the discussion of results presented by the literature is restricted. The second limitation refers to data. Two reasons for the students' scoring zero points were found (returning a blank test and answering the questions incorrectly), and we could not break down these reasons to provide a more detailed analysis.

Finally, future studies could conduct in-depth interviews for students to report the motivations that led them to score zero points in the Enade. Additionally, longitudinal analyses are encouraged, especially to monitor the proportion of students who score zero compared to the total number of students with valid performances. The last recommendation is to compare the proportion of zero scores among students from different programs, especially in the FG portion, in which the questions are common to all the students, regardless of the program.

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Appendix

Here the diagnostic analyzes of the NTDISFG and NTDISCE binary regression models are reported. Pearson residuals and deviance residuals were examined, which are commonly used to ascertain the suitability of a generalized linear model (GLM) (Ben & Yohai, 2004; Cordeiro & Simas, 2009). The results in Table 9 show that the models are adequate ($p > 0.05$).

Table 9
Degrees of freedom, deviance residual, Pearson's , and p-values

NTDISFG	logit	probit	cauchit	cloglog
Degrees of freedom	52839	52839	52839	52839
Deviance Residual	40926	40921	40964	40929
p	0.99	0.99	0.99	0.99
	52738	52760	52569	52732
p	0.62	0.59	0.8	0.62
NTDISCE	**logit**	**probit**	**cauchit**	**cloglog**
Degrees of freedom	52839	52839	52839	52839
Deviance Residual	68028	68022	68069	68069
p	0.99	0.99	0.99	0.99
	52784	52797	52692	52738
p	0.56	0.55	0.67	0.62

Furthermore, Pearson residuals are graphically reported (Figures 1 and 2). Note that they are random and homogeneous, which is compatible with the tests above and indicates an absence of a relevant problem in the models' goodness of fit to data.

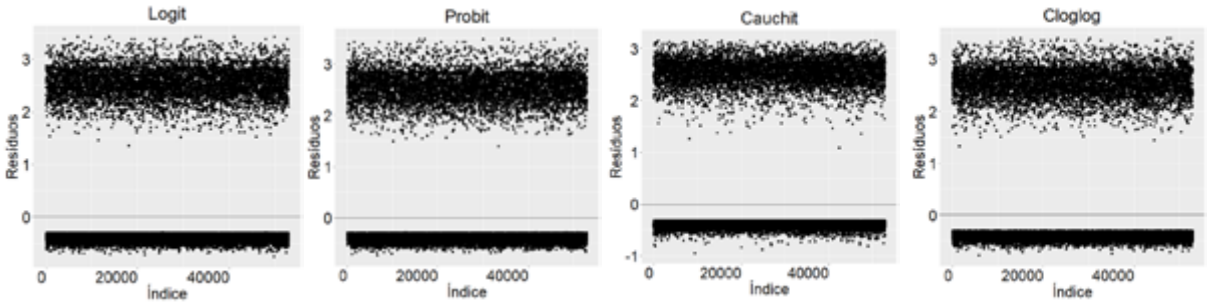

Figure 1. Pearson residuals of the NTDISFG models

Source: Study data

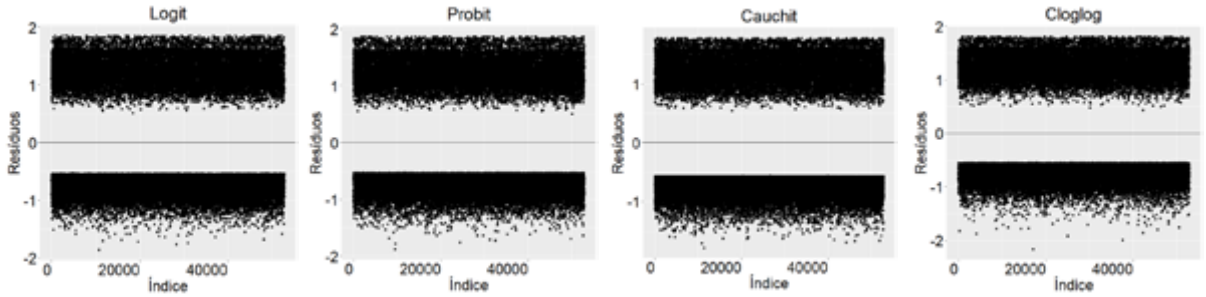

Figure 2. Pearson residuals of the NTDISCE models

Source: Study data