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## Performance at Enade and the conditions of educational process from Accounting Sciences students

*Desempenho no Enade e as condições do processo formativo de acadêmicos de Ciências Contábeis*

*Desempeño en Enade y las condiciones del proceso formativo de académicos de Ciencias Contables*

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### ABSTRACT

The research aims at analyzing the relationship between the likelihood of high performance at Enade and the conditions of the educational process from Accounting Sciences students, considering 25,998 participations in Enade in 2018 and with the aid of exploratory factor analysis and logit regression. Thus, students with higher levels of satisfaction with the didactic-pedagogical organization and with the infrastructure of educational institutions are more likely to achieve higher performance at Enade. The variables graduation in public HEI, presential modality, male gender, father and mother with higher education and free higher education also maximize the performance of students. The opportunities to expand academic and professional training, older age and not working reduce the likelihood of high performance.

**Keywords:** conditions of formative process; performance at Enade; Accounting Sciences; students; higher education institutions.

### RESUMO

A pesquisa objetiva analisar a relação entre a probabilidade de alto desempenho no Enade e as condições do processo formativo de acadêmicos de Ciências Contábeis, considerando 25.998 participações no Enade de 2018 e com auxílio da análise fatorial exploratória e regressão *logit*. Assim, estudantes com níveis mais elevados de satisfação com a organização didático-pedagógica e com a infraestrutura das instituições de ensino possuem maiores chances de alcançar desempenho mais elevado no Enade. As variáveis graduação em IES pública, modalidade presencial, gênero masculino, pai e mãe com formação superior e nível superior gratuito também maximizam o desempenho dos discentes. As oportunidades de ampliação da formação acadêmica e profissional, faixa etária mais elevada e não trabalhar reduzem a probabilidade de alto desempenho.

**Palavras-chave:** condições do processo formativo; desempenho no Enade; Ciências Contábeis; discentes; instituições de ensino superior.

### RESUMEN

La investigación tiene como objetivo analizar la relación entre la probabilidad de un alto rendimiento en Enade y las condiciones del proceso educativo de los estudiantes de contabilidad, considerando 25.998 participaciones en Enade en 2018 y con la ayuda del análisis factorial exploratorio y la regresión *logit*. Por lo tanto, los estudiantes con mayores niveles de satisfacción con la organización didáctico-pedagógica y con la infraestructura de las instituciones educativas tienen más probabilidades de lograr un mayor rendimiento en Enade. Las variables graduación en IES públicas, modo de aula, género masculino, padre y madre con educación superior y educación superior gratuita también maximizan el rendimiento de los estudiantes. Las oportunidades para ampliar la formación académica y profesional, la edad avanzada y no trabajar reducen la probabilidad de un alto rendimiento.

**Palabras clave:** condiciones del proceso de capacitación; actuación en Enade; Ciencias Contables; estudiantes; instituciones de educación superior.

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## 1 INTRODUCTION

In the last 20 years, Brazil has experienced an accelerated growth in the number of students enrolled in Higher Education. If in 2000 there were 2.7 million students enrolled, in 2010 that number increased to 5.4 million and in 2016 to 8.45 million regular enrollments (Inep, 2018). On the one hand, the increase in the number of Higher Education Institutions (HEIs) and the consequent expansion of the offer of places has brought several benefits to society, such as the accessibility of different social classes to higher levels of training. On the other hand, concerns were raised about the commercialization and measurement of the quality of the education offered (Medeiros Filho et al., 2020), since the main mission of the HEIs remains the promotion of quality learning (Araújo et al., 2013). Thus, it can be said that the first two decades of the 21<sup>st</sup> century were marked by the expansion of educational accessibility and the implementation and improvement of assessment systems in Brazilian Higher Education (Paiva, 2020).

In fact, the looks directed at the quality of teaching and the attention to educational assessments are neither new nor exclusive to the reality experienced in the last two decades. In its article 206, the Constitution of the Federative Republic of Brazil (1988) already provides for the assessment by the public authorities of the education offered at different levels of education, in order to guarantee the standard and quality of education. What is perceived is a continuous movement to improve the attributes, quantity and instruments used in the evaluation processes, which are aligned with the public policies established by Organs competent bodies (Nicolini et al., 2013).

Directed by these constitutional foundations, Law 10,861 was enacted in 2004, which directed the implementation of the National Higher Education Assessment System (SINAES) based on the assessment of institutions, courses and student performance based on the National Student Performance Exam (Enade) (Inep, 2015). In this sense, student performance is a consequence of several personal, socioeconomic variables and the educational environment in which the student is inserted. The HEI, for example, plays a fundamental role in guiding the student's learning process, and possibly its performance, in particular by outlining the conditions of the training process and supporting academic activities, in terms of pedagogical support, educational policies, social and professional inclusion, infrastructure and other factors that interfere in the teaching and learning process (Tumolo, 2010).

In Accounting Sciences courses, concerns about the performance of students at Enade influenced several studies. Different variables such as gender, teaching modality, type of institution, parent training, teacher training, shift, region and income, were addressed as possible conditioning factors for student performance at Enade

(Santos, 2012; Caetano et al., 2015; Ferreira, 2015; Vogt et al., 2016; Nasu, 2019). However, it is important to deepen the discussions in the Accounting area about the variables that characterize the student's perception of the educational institution's physical and pedagogical environment and structure in view of its possible predictive power of student performance at Enade.

Thus, this research addressed these aspects by aiming at analyzing the relationship between the likelihood of high performance at Enade and the conditions of the educational process of academics in Accounting Sciences courses. In addition, it seeks to verify the relationship between sociodemographic characteristics and the chances of high performance of these students.

The importance of research lies in its theoretical, practical and social contributions. When addressing the students' perception of the conditions of the educational process and the way in which the probability of better performance at Enade behaves from these perceptions, discussions about the theme are expanded and different elements capable of affecting the student's success are inserted to this important assessment process. In practical terms, HEIs can identify which factors are linked to performance at Enade that can be improved in order to maximize the quality of the education offered and as a result the performance obtained by students. In addition, discussions involving university education contribute directly in social terms, since qualified and competent professionals will be made available to the labor market to perform the functions inherent in the accounting profession.

Based on the evidence and justifications exposed, this study sought to answer the following concern: What is the relationship between the probability of high performance at Enade and the conditions of the educational process of academics in Accounting courses?

The following section presents the theoretical framework that supports the research discussions. Then, the methodological procedures are listed, and then the results are presented and discussed. Finally, the theoretical and practical implications of the study are presented in the conclusion, as well as its limitations and suggestions for future investigations.

## 2 THEORETICAL FRAMEWORK

### 2.1 SINAES and higher education assessment

SINAES is anchored in three assessment axes: evaluation of institutions, of courses and student performance at Enade (Inep, 2015). Law 10.861/2004 defines that the assessment of institutions is centered on different dimensions embodied in: I – the institutional development mission and plan; II – the policy for teaching, research, postgraduate studies, extension and the respective forms of operationalization, including procedures to stimulate academic production, research, monitoring and

other scholarships; III – the institution's social responsibility, considered especially regarding to its contribution in relation to social inclusion, economic and social development, the defense of the environment, cultural memory, artistic production and cultural heritage; IV – communication with society; V – personnel policies, the careers of the teaching staff and the technical-administrative staff, their improvement, professional development and their working conditions; VI – organization and management of the institution, especially the functioning and representativeness of the collegiate bodies, their independence and autonomy in the relationship with the sponsor, and the participation of segments of the university community in decision-making processes; VII – physical infrastructure, especially teaching and research, library, information and communication resources; VIII – planning and evaluation, especially the processes, results and effectiveness of institutional self-evaluation; IX – student service policies; and X – financial sustainability, in view of the social significance of the continuity of commitments in the provision of Higher Education.

In turn, the evaluation of the courses is based on visits made by specialized committees in the area of knowledge of the course, with a concept of one to five points being attributed to the dimensions and to the sets of dimensions

evaluated. Finally, student performance is obtained through Enade, applied at the end of the first and last year of the course, with a maximum three-year periodicity, based on standards established by specialists, giving rise to a one to five point concept (Law 10.861 / 2004).

Such assessment instruments generate two important scores for the institution. The first is the Difference Indicator between Observed and Expected Performance (DIP) which aims at “bringing institutions comparative information on the performance of their graduating students in relation to the results obtained, on average, by the other institutions whose profiles of their incoming students are similar” (Inep, 2007, p. 01). The second note concerns the Preliminary Course Concept (PCC) which measures the quality of undergraduate courses through the performance of students at Enade, together the conditions of the educational process, such as the teaching staff, infrastructure and didactic-pedagogical resources. In this sense, observing such conditions becomes important, as they directly interfere in the calculation of the PCC and indirectly in the performance obtained by the students and used both in the PCC and in the DIP. Table 1 shows the dimensions, components and weights of each component when calculating the PCC.

**Table 1**  
Composition of PCC

Dimensions	Components	Weights
Student performance	Grade from Graduates at Enade (GG)	20%
Value added by the educational process offered by the course	Grade of the Difference Indicator between Observed and Expected Performance (GDIP)	35%
Professors	Master Proportion Grade (GM)	30%
	Doctor Proportion Grade (GD)	
	Work Regimen Grade (GW)	
Student Perception on the Conditions of the Educational Process	Grade regarding to the didactic-pedagogical organization (GP)	15%
	Grade regarding to infrastructure and physical installations (GI)	
	Grade regarding to opportunities to expand academic and professional training (GO)	

Source: Technical Note No. 18/2018 / CGCQES / DAES – Inep (2018).

It should be noted that in addition to highlighting elements possibly involved in the teaching and learning process, the student's perception of the conditions of the educational process also represents 15% of the course grade in the calculation of the Preliminary Course Concept. Observing these elements allows us to subsidize data to discuss the qualification of teacher training, integrating diagnostic dimensions in terms of verifying and verifying the reality of higher education, and interpreting causalities and building policies that produce meanings and effects on the educational practices adopted in higher education (Tumolo, 2010).

**2.2 Related studies and outline of research hypotheses**

In the literature, there is a growing number of studies that directed attention to identify possible players in the performance of students at Enade, as well as their associations to different social, institutional, economic and demographic variables (Caetano et al., 2015; Ferreira, 2015; Camargo et al., 2016; Vogt et al., 2016; Nasu, 2019).

Caetano et al. (2015) verified the existence of significant differences between the grades of students in Accounting Sciences courses in distance learning (n = 5,360) and in person (n = 70,389) from Enade 2009 (n = 75,749).

The findings indicated that the performance in Enade of students in the presential modality is higher than those in the distance modality (p-value <0.01). In addition, a relationship was found between the performance at Enade and the teaching modality ( $\beta = 0.088$ ; p-value <0.01), the administrative category of the HEI being public or private ( $\beta = 0.335$ ; p-value <0.01), condition of the concluding or entering student ( $\beta = -0.528$ ; p-value <0.01), gender ( $\beta = 0.131$ ; p-value <0.01) and academic organization being a university or other type of HEI ( $\beta = 0.183$ ; p-value <0.01).

Ferreira (2015) identified the explanatory variables of the 2012 Enade result of students in the Accounting Sciences course. Evidence showed that in relation to student characteristics, performance at Enade is linked to gender ( $\beta = -1.768$ ), marital status ( $\beta = -1.140$ ), ethnicity ( $\beta = 1.018$ ), income ( $\beta = 2.392$ ), scholarship study ( $\beta = 2.258$ ), enrollment ( $\beta = 0.401$ ), mother's education ( $\beta = -0.633$ ), school attended in High School (public or private) ( $\beta = -0.935$ ), type of High School (traditional or professional) ( $\beta = -0.336$ ), number of books read ( $\beta = 1.069$ ), hours studied ( $\beta = 2.737$ ), participation in scientific initiation ( $\beta = -1.373$ ), participation in monitoring ( $\beta = -1.720$ ) and participation in extension activities are predictors of student performance ( $\beta = 0.496$ ). While at the level of the HEIs, the administrative category of the HEI ( $\beta = -3.999$ ), region ( $\beta = 1.732$ ), number of graduates participating in Enade ( $\beta = -0.003$ ), newcomers' score (ENEM) ( $\beta = 0.071$ ), percentage of masters ( $\beta = 0.014$ ), percentage of infrastructure ( $\beta = 0.037$ ) and percentage of didactic-pedagogical organization ( $\beta = 0.109$ ) have the ability to relate to the performance of students at Enade.

Vogt et al. (2016) analyzed the relationship between teacher training, teaching methodologies and the results achieved in Enade 2012 in the Accounting Sciences courses of 10 Higher Education institutions in the state of Santa Catarina. Teacher training at the doctoral level, case discussion, problem-based study and practical field classes proved to be in line with more positive results from Accounting Sciences courses, resulting in discussions about the methodologies used in the classroom and the need to promote training and the search for higher levels of training by teachers.

Camargo et al. (2016) measured the performance of Accounting Science students at Enade 2012 ( $n = 47,124$ ) through Item Response Theory (IRT). The findings indicated that the issues addressed at Enade are of a high degree of complexity for Accounting Science students, and the results differ positively for those students who attended High School in public schools, whose parents have done Higher Education, who dedicate more hours of extra-class study and attending public HEIs.

Nasu (2019) investigated determinants of academic performance at Enade 2015 of Accounting Science students ( $n = 21,200$ ) with a focus on the existing differences according to the male and female gender. The findings indicated that there are significant differences between the

performance of female and male students (p-value <0.01), with male students having higher marks in general education, specific knowledge and total performance at Enade. In at least one of the regression models, the gender variable, as well as the face-to-face teaching modality, the hours dedicated to extra-class study and the fact of having a labor relationship were related to the performance at Enade.

Such findings are relevant in order to compare with other editions in the referred exam in order to verify if these results are consolidated over the years and which elements are palpable to be improved. In this sense, this research intends to address the perception of the conditions of the training process in the eyes of the students, being composed of elements little explored and discussed in the literature, but equally important in view of the performance of students of Accounting Sciences courses at Enade. Therefore, the study is guided by the following main research theoretical hypothesis:

- H1 (main hypothesis): Students with a better perception of the conditions of the educational process are more likely to achieve high performance in Enade.

Additionally, taking into account the theoretical discussions and the existing evidence in the literature, the additional hypotheses are raised in conjunction with the previous studies that support the proposed relationships:

- H2 (Caetano et al., 2015; Ferreira, 2015): Students who graduate from a public Higher Education Institution are more likely to achieve high performance at Enade.
- H3 (Caetano et al., 2015; Ferreira, 2015): Students who attend undergraduate courses in presential modality are more likely to achieve high performance at Enade.
- H4 (Santos, 2012; Araujo et al., 2013; Ferreira, 2015; Caetano et al., 2015): Older students are more likely to achieve high performance at Enade.
- H5 (Caetano et al., 2015; Ferreira, 2015; Nasu, 2019): Male students are more likely to achieve high performance at Enade.
- H6 (Caetano et al., 2015; Ferreira, 2015; Nasu, 2019): Single, widowed and separated students are more likely to achieve high performance at Enade.
- H7 (Camargo et al., 2016): Students who have a mother with a higher education are more likely to achieve high performance at Enade.

- H8 (Carmargo et al., 2016): Students who have a father with a higher education are more likely to achieve high performance in Enade.
- H9 (Miranda et al. 2015; Ferreira, 2015): Students who do not work are more likely to achieve high performance at Enade.
- H10 (Tested by the authors): Students who are scholarship holders (free course) are more likely to achieve high performance at Enade.

### 3 METHODOLOGY

This descriptive and explanatory research, with a quantitative approach, is classified as documentary. The study population comprised the 62,475 students enrolled in Accounting Science courses in Brazil who were invited to Enade 2018. Of these, 36,477 were disregarded, either for not attending the test, not answering all questions, for participating leaving the test blank, for having their participation with results disregarded by the investing bank or filling out the options does not apply and I do not know how to answer the socioeconomic questionnaire and the student available. Thus, the sample of this study was composed of 25,998 students. The procedure for excluding invalid entries was necessary to enable the application of statistical techniques.

In order to carry out this research, the Enade microdata available in Inep's virtual page in 2020 was analyzed. Inep microdata is the lowest level of disaggregation of data collected by surveys, evaluations and examinations, making it possible to find socioeconomic information, perception of the conditions of the training process of the students who took Enade 2018, and the grades obtained. The 2018 student questionnaire was comprised of 68 multiple choice and grading questions. The questions between numbers 27 and 68, concern the student's perception of the conditions of the formative process, and by means of a six-point numerical scale measure the student's agreement regarding the items presented.

In relation to the treatment of the data, the exploratory factor analysis technique was initially used with the extraction method of principal component analysis and varimax rotation to extract the factors that characterize the conditions of the educational process. For Hair Jr et al. (2009), factor analysis is a statistical technique that aims at describing the behavior of a set of variables ( $p$ ) through a smaller number of variables ( $r < p$ ) called "factors". The results of the technique showed that in terms of model adequacy, the correlation matrix indicated associations above 0.30 and of high significance ( $p$ -value  $< 0.001$ ), the

Kaiser-Meyer-Olkin (KMO) was increased with 0.991, the Bartlett's test was satisfactory (Bartlett  $\chi^2 = 1,500,371.432$ ;  $df = 8.61$ ;  $p$ -value  $< 0.001$ ), indicating the presence of significant correlations among variables and commonality were appropriate, ranging from 0.661 to 0.870 (Field, 2009; Hair Jr et al., 2009). Table 2 shows the rotating component matrix together with the statements that made up each factor of the conditions of the educational process.

The results of the factor analysis divided the items of student perception about the conditions of the educational process into three factors, with Factor 1 composed mostly of items inherent to "Didactic-pedagogical organization", Factor 2 to the aspects of "Infrastructure and facilities and "Factor 3 dealing with" Opportunities for expanding academic and professional training". Then, the variance explained by such factors was verified, as shown in Table 3.

It should be noted that the factors generated manage to explain 78.664% from the total variance of the data, and after the routine process, Factor 1 explains about 35.586% of this variation, Factor 2 approximately 22.457% and Factor 3 with 20.621%. Then, the scores for each factor were saved in the respective observations and followed for the procedures that enabled the viability of using the multiple linear regression technique.

Regarding to the treatment of the collected data, some of the variables identified in the related studies and in the hypotheses developed in this study were determined. Table 4 presents the summary of the analyzed variables, their proxies, the expected signs of the relationship with the student's performance at Enade and the source that supports the variable.

To achieve the objective and answer the research hypotheses, the analysis of the results was carried out in two stages. The first stage, student profile, was developed through descriptive analyzes. The second stage, the student's probability of achieving a high performance at Enade based on the conditions of the educational process and the characteristics of academics in Accounting courses, was verified by estimating a logistic regression model. Logistic regression is a technique applied to estimate the probability of an event occurring and to identify characteristics of individuals or elements belonging to each group defined based on a categorical variable (Fávero & Belfiore, 2017). It is noteworthy that the use of logistic regression is an alternative when the assumptions of multiple or simple linear regression are not met.

From this, the tested logit model is presented in Equation 1:

$$\text{PERFORMAN}_i = \alpha_0 + \beta_1 \text{AGE}_i + \beta_2 \text{GEN}_i + \beta_3 \text{MS}_i + \beta_4 \text{MOD}_i + \beta_5 \text{CAT}_i + \beta_6 \text{REG}_i + \beta_7 \text{WORK}_i + \beta_8 \text{SCHOLAR}_i + \beta_9 \text{FATHER\_EDU}_i + \beta_{10} \text{MOTHER\_EDU}_i + \beta_{11} \text{FACTOR1}_i + \beta_{12} \text{FACTOR 2}_i + \beta_{13} \text{FACTOR 3}_i + \varepsilon_i \quad (1)$$

**Table 2**

Rotating component matrix

Items	Factors		
	1	2	3
<b>Factor 1 – Didactic-pedagogical organization</b>			
QE_I33 – The course made it possible to increase your capacity for reflection and argumentation.	0.813		
QE_I36 – The course contributed to the development of your ability to learn and update.	0.805		
QE_I34 – The course promoted the development of your ability to think critically, analyze and reflect on solutions to society's problems.	0.800		
QE_I31 – The course contributed to the development of your ethical awareness for professional practice.	0.798		
QE_I35 – The course helped you to expand your communication skills in oral and written forms.	0.786		
QE_I27 – The courses taken contributed to your comprehensive training, as a citizen and professional.	0.764		
QE_I32 – In the course you had the opportunity to learn how to work as a team.	0.757		
QE_I29 – The teaching methodologies used in the course challenged you to deepen your knowledge and develop reflective and critical skills.	0.743		
QE_I42 – The course required organization and frequent dedication to your studies.	0.727		
QE_I38 – The teaching plans presented by the teachers contributed to the development of academic activities and to their studies.	0.725		
QE_I28 – The contents covered in the course subjects favored their performance in internships or in professional initiation activities.	0.718		
QE_I30 – The course provided innovative learning experiences.	0.717		
QE_I37 – Teacher-student relationships throughout the course encouraged you to study and learn.	0.715		
QE_I39 – The bibliographic references indicated by the teachers in the teaching plans contributed to their studies and learning.	0.698		
QE_I51 – The activities carried out during your course completion work contributed to qualify your professional training.	0.684		
QE_I49 – The course provided access to updated and / or contemporary knowledge in your area of training.	0.656		
QE_I57 – Teachers demonstrated mastery of the content covered in the subjects.	0.646		
QE_I55 – The learning assessments carried out during the course were compatible with the contents or themes worked by the teachers.	0.636		
QE_I40 – Opportunities were offered for students to overcome difficulties related to the training process.	0.613		
QE_I66 – The academic activities developed inside and outside the classroom allowed for reflection, coexistence and respect for diversity.	0.599		
QE_I50 – The supervised internship provided diversified experiences for your training.	0.599		
QE_I41 – The course coordination was available for students' academic guidance.	0.555		
QE_I56 – Teachers were available to attend students outside class hours.	0.532		
<b>Factor 2 – Infrastructure and physical facilities</b>			
QE_I61 – The infrastructure conditions of the classrooms were adequate.		0.743	
QE_I62 – The equipment and materials available for practical classes were adequate for the number of students.		0.742	
QE_I63 – The environments and equipment for practical classes were adapted to the course.		0.725	
QE_I64 – The library had the bibliographic references that the students needed.		0.682	
QE_I68 – The institution had a cafeteria, canteen and bathrooms in adequate conditions that met the needs of its users.		0.677	
QE_I59 – The institution had a sufficient number of employees for administrative and academic support.		0.660	
QE_I65 – The institution had a virtual library or granted access to works available in virtual collections.		0.660	
QE_I60 – The course provided monitors or tutors to assist students.		0.601	
QE_I58 – Teachers used information and communication technologies (ICTs) as a teaching strategy (multimedia projector, computer lab, virtual learning environment).		0.584	
QE_I54 – Students participated in periodic evaluations of the course (subjects, teachers' performance, infrastructure).		0.518	
<b>Factor 3 – Opportunities for expanding academic and professional education</b>			
QE_I53 - Opportunities were offered for students to carry out exchanges and / or internships abroad.			0.825
QE_I52 - Opportunities were offered for students to carry out exchanges and / or internships in the country.			0.816
QE_I46 - The institution offered opportunities for students to act as representatives in collegiate bodies.			0.764
QE_I44 - Opportunities were offered for students to participate in scientific initiation projects and activities that stimulated academic research.			0.725
QE_I43 - Opportunities were offered for students to participate in university extension programs, projects or activities.			0.699
QE_I45 - The course offered conditions for students to participate in internal and / or external events at the institution.			0.642
QE_I67 - The institution promoted cultural, leisure and social interaction.			0.595
QE_I48 - The practical activities were sufficient to relate the contents of the course to the practice, contributing to their professional training.			0.580
QE_I47 - The course favored the articulation of theoretical knowledge with practical activities.			0.572

Source: Research data (2020).

**Table 3**

Explained variance

Factors	Initial eigenvalues			Rotary loading sums Squared		
	Total	% of variance	% cumulative	Total	% of variance	% cumulative
1	30.246	72.013	72.013	14.946	35.586	35.586
2	1.747	4.158	76.172	9.432	22.457	58.043
3	1.047	2.492	78.664	8.661	20.621	78.664

Source: Research data (2020).

**Table 4**

Summary of Variables and Proxies

Variables	Proxies	Expected Signal	Source
Student Performance at Enade (PERFORMAN)	Gross mark of the test - Assigned a value of 1 for high-performance students (above the second quartile) and a zero value for those of low performance (equal to or below the second quartile).	Dependent Variable	Not applicable.
AGE (AGE)	Student age in years	+	Santos (2012), Araujo et al. (2014), Ferreira (2015) and Caetano et al. (2015)
Gender (GEN)	0 – Female 1 – Male	+	Caetano et al. (2015), Ferreira (2015) and Nasu (2019)
Marital Status (MS)	0 – Married 1 – Single, Separated, Widowed	+	Caetano et al. (2015), Ferreira (2015) and Nasu (2019)
Course modality (MOD)	0 – Distance Education 1 – Presential Education	+	Caetano et al. (2015) and Ferreira (2015)
Course category (CAT)	0 – Private 1 – Public	+	Caetano et al. (2015) and Ferreira (2015)
Course region (REG)	Dummy variables for each region of Brazil (Midwest (reference); North, Northeast, Southeast, South)	+	Control Variable
To work or not to work during the undergraduate course (WORK)	0 – Work 1 – do not work	+	Miranda et al. (2015) and Ferreira (2015)
Scholarship or not during the undergraduate course (SCHOLAR)	0 – Non-scholarship 1 – Scholarship	+	Tested by the authors
Father's Education (FATHER_EDU)	0 – Not Graduated 1 – Graduated	+	Carmargo et al. (2016)
Mother's Education (MOTHER_EDU)	0 – Not Graduated 1 – Graduated	+	Carmargo et al. (2016)
Factor 1	Didactic-pedagogical organization	+	Tested by the authors
Factor 2	Infrastructure and physical facilities	+	Tested by the authors
Factor 3	Opportunities for expanding academic and professional training	+	Tested by the authors

Source: Prepared by the authors (2020).

## 4 ANALYSIS AND DISCUSSION OF RESULTS

### 4.1 Profile of the participants

Initially, an analysis of the students who participated in Enade 2018 was carried out by age, gender, marital status, course category, course modality, region of the course, working or not during the undergraduate course,

scholarship or not during the undergraduate course and father and mother education. These variables were analyzed using descriptive statistics and the results are shown in Table 5.

By analyzing Table 5, the prevalent profile of students who participated in Enade 2018 is substantiated as being female; in the age group of up to 25 years; single; white

race; private higher education institutions; presential course non-scholarship holders; and the educational level of the mother and father is high school.

**Table 5**

Students profile

Variables	Possibility of response	F	Percentage (%)
Gender	Female	14,881	57%
	Male	11,117	43%
Age	Up to 25 years	11,985	46%
	26 to 30 years	6,896	27%
	Above 31 years	7,117	27%
Course Category	Private	22,077	85%
	Public	3,921	15%
Course Modality	Presential education	21,281	82%
	Distance Education	4,717	18%
Marital status	Single / Separated / Widowed / Other	20,066	77%
	Married	5,932	23%
Work or not during the course	Yes	19,982	77%
	No	6,016	23%
Course region	North	1,943	7%
	Northeast	4,650	18%
	Southeast	10,018	39%
	South	7,048	27%
	Midwest	2,339	9%
Scholarship or not during the course	No	15,234	59%
	Yes	10,764	41%
Color or Race	White	13,354	51%
	Black	2,137	8%
	Yellow	683	3%
	Brown	9,478	36%
	Indigenous	76	0%
	I don't want to declare	270	1%
Mother's Education	Postgraduate studies	1,229	5%
	Higher Education – UNdergraduate	2,574	10%
	High school	8,859	34%
	Elementary School (6 <sup>th</sup> to 9 <sup>th</sup> grade)	4,681	18%
	Elementary School (1 <sup>st</sup> to 5 <sup>th</sup> year)	7,008	27%
Father's Education	None	1,647	6%
	Postgraduate studies	667	3%
	Higher Education – UNdergraduate	2,528	10%
	High school	7,641	29%
	Elementary School (6 <sup>th</sup> to 9 <sup>th</sup> grade)	4,560	18%
Elementary School (1 <sup>st</sup> to 5 <sup>th</sup> year)	8,317	32%	
None	2,285	9%	

Note: F = frequency.

Source: Research data (2020).

#### 4.2 High performance probability at Enade based on the conditions of the educational process and the characteristics of academics in Accounting Science courses

The logit regression model was estimated, initially, considering all independent variables of the research. Then, the stepwise selection approach was used, which according to Hair et al. (2009) is an estimation process in which the

independent variables enter the model sequentially, according to the discriminatory power added by them to the forecast of the group's relevance.

Table 6 shows the results of the model using the stepwise approach. The model can be considered globally valid by analyzing the maximum likelihood statistical ratio (LR statistic), since the p-value found was lower than the  $\alpha$  of 0.05 established for the research.

**Table 6**

Results of the logistic regression model - Stepwise approach

Observation	25,998	Probability > F	0.0000			
F (1.38)	1370.67	Adjusted R <sup>2</sup>	0.0380			
Variables	Coefficient	Standard error	Odds Ratio	Standard error	t	p-value
<i>Low performance in Enade - Reference cluster</i>						
<i>High performance in Enade</i>						
Constant	-0.6957227	0,0728236			-9.55	0.000***
CATEGORY	0.1792582	0.0394854	1.19633	0.0472376	4.54	0.000***
MODALITY	0.5983994	0.036889	1.819205	0.0671087	16.22	0.000***
NORTH	-0.3668675	0.0499698	0.6929015	0.0346242	-7.34	0.000***
NORTHEAST	0.252342	0.018521	0.776979	0.0143904	-13.62	0.000***
SOUTHEAST	0.1940244	0.0189394	1.214126	0.0229948	10.24	0.000***
FACTOR_3	-0.026057	0.0131936	0.9742796	0.0128543	-1.97	0.048**
AGE	-0.006682	0.0019719	0.9933403	0.0019588	-3.39	0.001***
GENDER	0.4417374	0.026061	1.555407	0.0405355	16.95	0.000***
FACTOR_2	0.0806422	0.0131909	1.083983	0.0142988	6.11	0.000***
WORKS	-0.1398839	0.0313453	0.8694592	0.0272534	-4.46	0.000***
SCHOLARSHIP	0.4354391	0.0282339	1.545642	0.0436395	15.42	0.000***
FATHER_EDU	0.2121443	0.0412193	1.236326	0.0509605	5.15	0.000***
MOTHER_EDU	0.162853	0.0384297	1.176864	0.0452265	4.24	0.000***
FACTOR_1	0.0362879	0.0131369	1.036954	0.0136223	2.76	0.000***

Note: \*\*, \*\*\* significant at 5% and 1%, respectively.

Source: Research data (2020).

Through the analysis of Table 6, it can be seen that the variables CATEGORY, MODALITY, NORTH, NORTHEAST, SOUTHEAST, FACTOR\_1, FACTOR\_2, FACTOR\_3, AGE, GENDER, WORK, SCHOLARSHIP, FATHER\_EDU and MOTHER\_EDU were statistically significant (p-value <0.01; 0.05), which implies that they condition the performance of students at Enade.

The variables FACTOR\_1, FACTOR\_2 and FACTOR\_3 proved to be statistically significant. It is noted that the factor 3 coefficient is negative, as well as the odds ratio is less than 1, indicating a divergent result from the literature as students with a higher level of satisfaction with the opportunities for expanding the academic and professional training offered by the course are less likely to belong to the group of students with the highest Enade performance. On the other hand, higher levels of satisfaction with the didactic-pedagogical organization (+ 3.69%) and with the infrastructure and physical facilities (+ 8.39%) maximize the probability of high performance of academics at Enade.

CATEGORY proved to be statistically significant. Thus, it can be said that students from public HEIs are 19.63% more likely to achieve high performance in Enade than students from private HEIs. This result allows not to reject hypothesis 2 and contributes to the results exposed by Caetano et al. (2015) and Ferreira (2015).

The MODALITY was statistically significant, indicating that when the student attends a classroom teaching course, there is approximately 81.92% greater

chance of a high performance at Enade when compared to distance learning courses. These findings were also confirmed in the studies by Caetano et al. (2015) and Ferreira (2015) and enable the non-rejection of the research hypothesis 3.

The AGE variable was also shown to be statistically significant. Although the coefficient is negative, the odds ratio reached a value very close to 1, indicating that there are chances of older students achieving a lower performance in Enade, but with a probability of less than 1% difference. This result allows not to reject hypothesis 4, even if to a lesser extent, and is in line with the findings of Santos (2012), Araujo et al. (2014), Ferreira (2015) and Caetano et al. (2015).

Hypothesis 5 was confirmed since the variable GENDER was statistically significant, with a positive coefficient. Therefore, male students have a chance factor related to high performance in Enade of 55.54% higher than female students. This result is in line with the studies by Caetano et al. (2015), Ferreira (2015) and Nasu (2019) who showed similar results.

Hypotheses 7 and 8, related to the formation of parents, were also not rejected since these variables proved to be statistically significant. Thus, students in which the mother has at least completed her degree have a chance factor related to high performance in Enade 17.68% higher than those in which the mother does not have higher education and students in which the father has at least completed graduation present a chance factor related to the

performance in Enade 23.62% higher than those in which the father does not have higher education, confirming the findings of Carmargo et al. (2016).

It was also possible to verify that students who do not work tend to have a lower probability of high performance in Enade (Hypothesis 9), since the variable WORK has a negative coefficient. When comparing students who do not work with those who work, it is noted that those without employment have a -13.06% chance of achieving high performance at Enade. This result is in line with the studies by Miranda et al. (2015) and Ferreira, (2015) who also stated this hypothesis.

Finally, the SCHOLARSHIP variable was also statistically significant, with a positive coefficient. Thus, it can be said that students who attend courses free of charge have a chance factor related to high performance at Enade 54.56% higher than those who attend the course free of charge. This finding allows not to reject the research

hypothesis 10 that students who are scholarship holders (free course) tend to have a higher probability of high performance at Enade.

It is also worth noting that the marital status variable (MS) did not show statistical significance in the model. Therefore, this variable does not increase or decrease the probability of high student performance at Enade, rejecting hypothesis 6, that single, widowed and separated students tend to have higher chances of high performance at Enade. It also points out that the control variable referring to the region of the course was significant in the north, northeast and southeast regions, pointing out evidence that the probability of high performance of students at Enade can be conditioned by belonging to one of these regions.

After estimating the model, it became necessary to verify its adjustment capacity through the classification matrix. The results are shown in Table 7.

**Table 7**

Results of the classification of the model of the situation of students in the sample

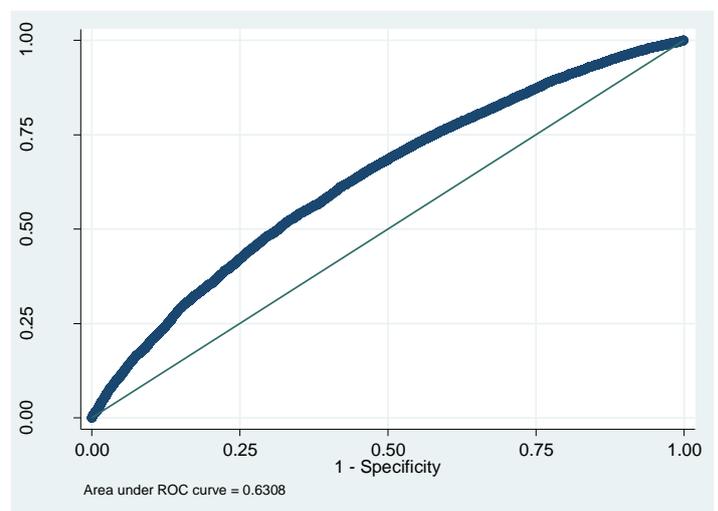
Student Situation	Student Rating		Hit percentage (cutoff 0.50)
	High performance	Low performance	
High performance	7,399	5,578	7,399/12,977 = 57.02% (Sensitivity)
Low performance	5,015	8,006	8,006/13,021 = 61.49% (Specificity)
<b>Total</b>			<b>(7,399+8,006)/25,998= 59.26%</b>

Source: Research data (2020).

It is observed that the model considering the proportions of correct predictions as a cutoff in the prediction expectation table presented 59.26% of correct classification about the student's performance. Of the 12,977 observations referring to students with high performance at Enade, 7,399 were captured by the model, indicating a 57.02% correctness. Regarding to underperforming students, of the 13,021 observations, 8,006 were captured by the model, indicating an accuracy of 61.49%. The results captured by the sensitivity and specificity demonstrate that the model presented a good adjustment, in terms of expectation of prediction.

To validate the logit model, the other method used was through the ROC (Receiver Operating Characteristic) curve, which relates the sensitivity versus the specificity of the estimated model, shown in Figure 1. For Bressan, Bressan, Oliveira and Braga (2015), the greater the concavity of the curve, the greater the predictive power of the model, and the area under the curve is used as a measure of the model's predictive capacity. A model with no predictive power would have the ROC curve as a 45 degree line.

As shown in Figure 1, the estimated model had a satisfactory predictive capacity, with an area of 0.6308, reinforcing the prerogative of a good fit of the model.



**Figure 1.** Area under the ROC curve that evaluates specificity versus sensitivity of the logit model.

Source: Research data (2020).

**5 CONCLUSION**

This study aimed at analyzing the probability of high performance at Enade based on the conditions of the educational process and the sociodemographic characteristics of academics in Accounting Sciences courses. In this sense, it contributed to the field of study by examining the probability of the student's satisfaction with the educational institution's environment, delineating the

academic training of the Accounting Sciences course and interfering in the propensity of his performance in Enade.

The results indicate that a higher level of satisfaction with the didactic-pedagogical organization and with the infrastructure and physical facilities of the HEIs leads to a higher probability of high performance at Enade. Likewise, attending graduation at a public HEI, being in person, being male, having a father and mother with higher education levels and attending higher education for free are variables that maximize the chance of belonging to the group of students with higher performance. Conversely, the older age and the fact of not working lead the students' chances to achieve a lower performance in Enade. Such findings lead to theoretical and practical implications about the theme, which are discussed below.

In theoretical terms, it contributes to the literature by indicating that the environment in which the student's education occurs has different dimensions that lead students' performance in a different way. Unlike what is claimed in the literature, not all dimensions of the conditions of the educational process positively affect the probability of high performance of academics. From a practical perspective, promoting the training of the faculty in order to maximize the didactic-pedagogical elements, in addition to investing in infrastructure are actions that can maximize the chances of better performance of students.

In addition, it is recommended to focus attention on students who do not have professional experience, as they belong to a group that directs to lower performance. Thus, extension projects can be promoted in order to bring these students closer to the job market, and as a consequence to supply this need for contact with the professional environment.

It is noteworthy that the analysis of these variables together can imply different results from those exposed here. The statistical probability technique used considers the modifications of the variable under analysis, assuming that the other variables remain constant, making it a limitation of the research. Studies can investigate motivational aspects regarding to participation in Enade, since a high proportion of students do not attend or have their evaluation canceled due to not meeting minimum analysis requirements.

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