FutureJournal

FUTURE STUDIES RESEARCH JOURNAL: TRENDS AND STRATEGIES

PROFUTURO: FUTURE STUDIES PROGRAM
Scientific Editor: James Terence Coulter Wright
Evaluation: Double Blind Review, by SEER/OJS
Review: Grammar, normative and layout
Received on:10/31/2015 Approved on: 08/01/2016

Institutional evaluation: Application of the Item Response Theory for Student Assessment in Accounting

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ABSTRACT

Institutional evaluation is a national requirement which all higher education institutions are subjected aiming mainly at promoting improvement in the quality of education, increase academic effectiveness and deepen commitments and responsibilities of the institutions. This review occurs in both directions, internally and externally. Internally, the students act as important players in the measurement of qualitative and quantitative aspects of education. At this point, this study sought measure the degree of satisfaction of Accounting students of an Institution of Higher Education, empirically evaluating the applicability of the methodology developed by Bortolotti, Moreira Junior, Bornia, Sousa Junior, & Andrade (2012) measurement of graduate satisfaction in Accounting. To do this, with a sample of 64 students of a private institution and using the Gradual Response Model Samejima, the Item Response Theory, empirical evidence was obtained which demonstrate the adequacy of the instrument developed by Bortolotti et al. (2012) to measure the satisfaction of students in Accounting.

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In addition, it was noted that the model, although it does not work constructs separately, contributes highlighting important factors not covered by Paswan model and Young (2002), and as such may be incorporated in future research on the labels, at least 3 categories, namely: Initiatives to promote the quality; Scientific training and Support Information to students. These findings prove to be relevant at the time they provide essential subsidy for the constant improvement of the entire teaching-learning process in accounting.

KEY-WORDS: Institutional evaluation. Student satisfaction. Item Response Theory.

Avaliação Institucional: Aplicação da Teoria da Resposta ao Item Para Avaliação Discente em Ciências Contábeis

RESUMO

A avaliação institucional é uma exigência nacional a que se submetem as instituições de ensino superior visando, principalmente, promover melhoria na qualidade da educação, aumentar a efetividade acadêmica e aprofundar compromissos e responsabilidades das instituições. Essa avaliação ocorre em dois sentidos, interna e externamente. No âmbito interno, os discentes figuram como importantes atores na mensuração de aspectos qualitativos e quantitativos da educação. Nesse ponto, no presente estudo buscou-se mensurar o grau de satisfação dos alunos do curso de ciências contábeis de uma Instituição de Ensino Superior, avaliando empiricamente a aplicabilidade da metodologia desenvolvida por Bortolotti, Moreira Junior, Bornia, Sousa Júnior, & Andrade (2012) à mensuração da satisfação de graduandos em ciências contábeis. Para tal, com uma amostra composta por 64 discentes de uma IES privada e utilizando o Modelo de Resposta Gradual de Samejima, da Teoria de Resposta ao Item, foram obtidos indícios empíricos que permitem concluir pela adequação do

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instrumento desenvolvido por Bortolotti et al.(2012) à mensuração da satisfação dos graduandos em ciências contábeis. Adicionalmente notou-se que o modelo, apesar de não trabalhar construtos de forma segregada, contribui evidenciando fatores importantes não contemplados pelo modelo de Paswan e Young (2002), e que, como tal, podem ser incorporados nas futuras pesquisas sob os rótulos de, pelo menos, três categorias, a saber: Iniciativas de promoção à qualidade; Formação científica e Suporte de informações aos discentes. Esses achados mostram-se relevantes no momento em que fornecem imprescindível subsídio para o constante aprimoramento de todo o processo ensino-aprendizagem em contabilidade.

PALAVRAS-CHAVE: Avaliação institucional. Satisfação discente. Teoria de resposta ao item.

1 INTRODUCTION

Through the Board of Higher Education, the National Council of Education (CNE) issues and reviews resolutions that establish the curriculum guidelines for the undergraduate course in accounting. These guidelines focus on the basic profile of the alumni and accordingly their academic training must include skills and competencies that are compatible with the standard established for the course.

The pedagogic project of the course and the nuclei structuring faculty are instruments designed to ensure that the guidelines are followed (CNE, 2004; Conaes, 2010), however, it is by means of institutional assessments - of the inner and outer, with survey data on institution, teachers and students - that can evaluate the effectiveness of the course and the institution of higher education as to the fulfillment of what is required for the training.

In Brazil, the assessment of higher education comprises the assessment of institutions, courses and students' performance (Brazil, 2004). The complementary instruments for these three axes are self-evaluation, external evaluation, ENADE, assessment of graduate courses and information tools (census and registration). In the context of self-assessment, the evaluation process of the students, their perceptions about the academic experience can be evaluated from various angles, and the satisfaction of the scholar consists of an angle of important verification.

In recent years, it has been noted the rise in the use of multivariate techniques, namely Structural equation modeling (SEM), to measure the determinants of satisfaction of students, taking the literature (*e. g.* Gonçalves Filho, Guerra & Moura, 2003; Vieira, Milach & Huppes, 2008; Lizote, Verdinelli, Borba & Brasil, 2014) gradually optimized the Seminal model of Paswan e Young (2002).

The theoretical basis of the SEM focuses on models of classical psychometrics or of Modern psychometrics of estimation of latent traits, that is, the Classical Theory of Tests (TCT) or the Item Response Theory (ITR), respectively. At this point, since both the SEM and the TRI stem from

the principle of latent traits, the concatenation of techniques is of great importance for the development of both, to the extent that it enables the mutual aggregation (Pilati & Laros, 2007).

The TRI enables the design of more precise measurement instruments, having in view the principles of estimation of latent characteristics, while SEM needs effectively tools to effective measurement of latent interest phenomena, therefore, from the development of banks of items on the part of TRI, SEM can, with appropriate instruments, elaborated from those items, to improve their models of measurement, thus benefiting the development of both theoretical models (Pilati & Laros, 2007).

Concerning this point, the current study aimed to assess the degree of satisfaction of students of the Accounting Science of an institution of Higher Education (IES), assessing empirically the applicability of the methodology developed by Bortolotti, Moreira Junior, Bornia, Sousa Júnior, & Andrade (2012) to measure the satisfaction of undergraduates in Accounting Science. To this end, the instrument was applied to a sample composed of 64 students from a private species.

The empirical results obtained allow us to conclude about the suitability of the instrument developed by Bortolotti et al.(2012) to measure the satisfaction of undergraduates in Accounting Science. Additionally, it was noted that the model, despite of not working constructs separately, contributes with important factors not captured by Paswan and Young (2002) and which could be incorporated into future research under the labels of at least three categories, namely: Initiatives to promote the quality, scientific training and support information to the students.

At this point, the present study is relevant, at first, to empirically test, in the scope of the Accounting Science undergraduation, a cumulative model based on TRI as a tool for organizational assessment and, secondly, to propose new categories for the model of Paswan and Young (2002).

Through the conduct of studies focused on analyzing the perception of quality of students, it is possible to obtain a vital resource for the constant quality improvement and, consequently, the improvement of the entire teaching-learning process in accounting (Watty, 2005), thus, it is justified to carry out this study.

Besides this Introduction, the study is segmented into four topics. In the theoretical foundation, it is explained about the student satisfaction from a brief survey of the literature on the topic. In the following section it is presented the methodological aspects of the survey, in it, the process of data collection is detailed by the specifications of the mathematical model used.

In the fourth topic, it is evidenced the data analysis and discussion and, in the fifth and last topic, the final considerations are presented with emphasis on the limitations and indications of opportunities to conduct further research. Finally, the references used are listed.

2 2 THEORETICAL FOUNDATION

2.1 IMPORTANCE OF FOCUS ON THE STUDENT'S SATISFACTION

According to Kotler (1998), satisfaction is the feeling of pleasure arising from the comparison of the expected performance of a product or service to the consumer's expectations. The result of this process of confrontation can be positive, negative or even neutral, thus generating satisfaction, dissatisfaction or neutrality (Bortolotti et al.,2012).

In the scope of Higher Education, the satisfaction involves the fulfilling of the students' expectations, being one of the conditions determining the success of Institutions of Higher Education (Coda & Silva, 2004).

Mezomo (1997) contributes stating that the HEI, given the interest of seeking the quality permanently, they should adopt a measure of satisfaction of the learners as a crucial tool in case management and, above all, in the teaching-learning process.

Satisfaction is a key factor to ensure the motivation of students during their academic training, influencing in the learning performance, consequently, on the competence of professionals who will be inserted into the keen labor market (Vieira et al., 2008).

Within the institutional scope, the student satisfaction is relevant in the moment in which, given the amplitude of available alternatives in the

services market of university education, the very survival of the institutions may be affected if the quality of service provided is not the one expected by the public. According to the model of Tinto (1975), the course characteristics and academic integration and social development are important factors for the students' dropping out in undergraduate studies.

The low satisfaction on the part of the student may result in, among other factors, the dropping out - an especially relevant point, mainly when the IES is private - and, especially, the insignificant scores in the performance evaluations that capture the quality of EIS (Yunker & Yunker 2000), as the National Exam of performance of students (Enade).

In addition to presenting enough visibility to the students, creating a mechanism important for the society to make comparisons between institutions (Venturini, Pereira, Vieira & Milach, 2008), Enade subsidizes the production of quality indicators and, concomitantly, the processes of evaluation of courses developed by the National Institute of Educational Study and Research Anísio Teixeira (Inep), thus, the students' obtaining low notes may result in non-renewal of the recognition of the course. In this aspect, it is important for the HEIs to evaluate gradually the students' satisfaction.

In addition, it is added up to this conjuncture the increase of competition in the High Education teaching sector due to the advent of the Law of Guidelines and Bases (LDB) 1996, which facilitated significantly the setting up of HEIs in the country. In this context, due to the need to proactivity, actions that seek to map and monitor the level of students' satisfaction arise as one of the main concerns of the HEIs committed to remaining competitive (Toni, Paese, Larentis, Mattia & Schuler, 2006).

In the vision of Gutiérrez and Camblor (2007), students satisfied with the HEIs' services influence positively in the perception that society and prospective students have about them, increasing the demand, however, the negative perception has the opposite effect.

Being concluded this brief contextualization on students' satisfaction, the following is a brief review of the main studies which proposed to study the HEIs' students' satisfaction

2.2 RECENT RESEARCH ABOUT THE STUDENT'S SATISFACTION

Paswan & Young (2002), using modeling of structural equations, have examined the relationships between the five latent constructs that comprise the Student *Instructional Rating System* (SIRS), students' evaluation widely used in the international context.

The authors realized that the input factors, that is, the organization of the course and the interaction student-instructor, influence the endogenous factors, i.e., the "involvement of the teacher" and "the student's interest", in a positive way. However, Paswan & Young (2002) realized that the factor "demands of the course" affects these endogenous factors in a negative way, as well as being negatively associated to the other two input factors.

Gonçalves Filho, Guerra and Moura (2003), applying SEM to a sample composed of 604 undergraduate students of the College (FACE) of the University Center Fumec, tested empirically the model *American Customer Satisfaction Index* (ACSI)for measurement of satisfaction and the nomological chain of this construct with loyalty, expectations, value and perceived quality in HEIs. The authors concluded that the ACSI model is not fully applicable to the evaluation of the satisfaction of HEIs on part of the learners.

Watty (2005) sought to measure the quality of accounting education from the perspective of a group of academics in accounting. Starting from the *framework* of Harvey and Green (1993) to define quality of higher education in the context of accounting, Watty has developed an instrument with 12 attributes in *Likert* scale of five points.

The questionnaire was sent to 39 Australian universities, having received return from 231 scholars. Watty (2005) perceived that the students have different beliefs and attitudes about the quality of accounting education, that is, invariably the scholars have points of view (beliefs) that are significantly different from the attributes of quality currently retreated towards those people that should be effectively exercised by the HEIs (attitudes), which explains possible negative assessments of the academics in response to initiatives for quality assurance performed by the HEIs.

Faria, Come, Poli and Felipe (2006) (2006) investigated the degree of satisfaction of students from the Accounting Science course of a private HIS. The authors noted that, although the majority of the students were relatively happy with the teaching quality, some measures needed to be adopted, such as the search for teachers with solid academic and professional experience in the field, capable of providing greater integration between theory and practice; the creation of mechanisms to encourage exclusive dedication to teaching and conducting research; the implementation of new teaching methodologies and integration between theory and practice; and the conditions to greater integration among the Professors in order to allow the related disciplines' Professors to talk among themselves.

Continuing the study of Paswan and Young (2002), Vieira et al.(2008) analyzed the determinants of overall satisfaction of Accounting Science students from the Universidade Federal de Santa Maria using the constructs "Professor's involvement ", "the student's interest ", "interaction student-teacher", "demands of course" and "the course organization ", added up of the variable "General Satisfaction", in order to determine whether the student satisfaction in relation to the course can be explained by the constructs.

With a sample of 224 students, and also using the Structural Equation Model, the authors have tested the model of Paswan and Young (2002) as amended in accordance with the results obtained in the analyzes. The authors realized that the model becomes more appropriate if it is removed the construct "demands of the course" and, at the same time, concluded to the validity of the constructs "Professor's involvement", "the student's interest ", "Teacher-Student" and "the course organization ".

Lizote et al. (2014) evaluated the relationships between the constructs "Professor's involvement", "the student's interest", "Teacher-Student interaction", "requirement of the course" and "the course organization " with the satisfaction of students of Accounting Science course at both institutions.

The authors used a self-completed questionnaire composed by six blocks and 42 statements on a Likert scale of agreement of 5 points,

developed by Paswan and Young (2002) and modified by Vieira et al. (2008). Through the application of the instrument to 313 respondents from two HEIs, it was used for data analysis multivariate the methods exploratory factorial analysis (AFE), Confirmatory Factor Analysis (CFA) and structural equation modeling (SEM).

As a result, empirical evidences were obtained that the three exogenous constructs ("requirement of the course", "teacher-student" and "the course organization") influence significantly the "involvement of the teacher"; however, only the interaction "teacher-student" and the "organization of the course" have the potential to affect the interest of the academic community. It was noted that both endogenous constructs ("the Professor's involvement" and "the student's interest") are determinants of overall satisfaction.

Considering that the satisfaction is characterized as a psychological state (Evrard, 1995), not allowing, thus, its direct observation, one can understand it as a latent trait which, as such, should be measured from the observation of background variables related to the former (Valle, 1999).

In this aspect, considering not only the quantity of items, but also their characteristics/parameters, making it possible to obtain more accurate estimates of the construct and evaluate the quality of the items that compose the instrument and, consequently, the quality of the scale used for measuring the latent trait of interest (Pereira & Pinto, 2011), the TRI emerges as the predominant technique in the evaluation of abilities latent in recent decades (Andrade, Tavares & Valle, 2000). Aligned with this fact, in this study, it was decided to use the TRI to the assessment of the student's satisfaction.

3 RESEARCH METHODOLOGY

The present study can be characterized regarding its goals, as a descriptive one; regards the procedures, as a case study; and, finally, regarding the approach, it presents a predominantly quantitative feature (Smith, 2003).

The process of data collection occurred in an *on line* platform, via Google Docs®, in the months of November and December 2014. Out of the universe of 92 students enrolled in the 6th, 7th and 8th periods of the Accounting Science course 64 of them answered the questionnaire, soon, it was obtained a participation of around 70% of the target public. It was chosen to work with the concluding undergraduates due to the fact that the same supposedly have a higher maturity to make an assessment of the HEI, which, as a matter of confidentiality, will be identified as Alpha.

As an instrument for data collection, it was used a questionnaire for the teaching evaluation developed by UNIOESTE, Cascavel (PR), used and previously validated, via TRI, by Bortolotti et all*.* (2012). Composed of 33 items, the questionnaire presents six categories of responses, namely: 1) totally dissatisfied, 2) Dissatisfied, 3) little dissatisfied, 4) not very satisfied, 5) satisfied, 6) fully satisfied.

As in Bortolotti et al. (2012), due to the need for estimation of parameters, the items were grouped into four categories: 1) Dissatisfied, encompassing the categories 1 and 2; 2) a little dissatisfied, covering the categories 3 and 4; 3) satisfied, contemplating the category 5; and, finally, 4) very satisfied, including category 6.

The analysis of the unidimensionality of the instrument was performed through factor analysis, performed by means of the *software* IBM SPSS, release 20.0. According to the Reckase's criterion (2009), it can be concluded by the existence of a dominant factor when the first factor comprises at least 20% of the total variance.

In the case of the sample, it was observed that the first factor explains about 24% of the total variance, therefore, it was concluded for the unidimensionality of the instrument, a prerequisite for the use of the *Modelo de Resposta Gradual* (*Rating Scale Model*).

According to et al*.* (2000), TRI is a mathematical model that estimates the probability of the respondent *j* offer the true answer to item *i* of a given instrument in function of the parameters of the items and the level of proficiency θ_j (latent trait) of the respondent.

Aligned to the study of Bortolotti et al. (2012), it was used the model of Gradual Response (MRG), Samejima (1969), which assumes that

the categories of responses to the item can be ordered among themselves. It is assumed that the categories of an item *i* are distributed in ascending order and denoted by k = 0; 1; [...]; m_i, where (m_i, em que (m_i+ 1) comprises the number of categories of the *i-th* item. The probability of the respondent *j* to point the response category higher than item *i* is given by means of an extension of the logistic model of two parameters (ML2), according to equation 1 (Andrade et al., 2000).

$$P_{i,k}^{+}(\theta_j) = \frac{1}{1 + e^{-Da_i(\theta_j - b_{i,k})}} \quad (1)$$

where *i* = 1, 2, [...], I; *j* = 1, 2, [...], n; e k = 0, 1, [...], mi, where:

$P_{i,k}^{+}(\theta_j)$ It captures the probability of the respondent *j* to point the response category higher than item *i* considering the latent trait under consideration (satisfaction) θ_j;

a_i = parameter for discrimination of the item *i*;

b_i = parameter for dificulty of the item *i*;

θ_j = latent trait (in this case, the satisfaction of students in relation to the course that he or she attended) of the respondent *j*;

D = constant of scale equal to 1, however, generally uses the value 1.7 when the logistic function provides results similar to normal distribution.

In the MRG, according to Alexandre, Andrade Vasconcelos Araujo and Batista (2002), the discrimination of a specific category of response is dependent on both the parameter of discrimination $a_{\mathrm{i},}$ inherent in all categories of the item, as the distance of the categories of ajacent difficulty. Thus, it is necessary the existence of an order of the difficulty level of the categories of the items (Polytomous model), according to the classification of their scores, $b_{\mathrm{i},1}1 \leq b_{\mathrm{i},2} \leq [...] \leq b_{\mathrm{i},\mathrm{m}_1}$.

From the model ML2, the probability of an individual *j* to have the score *k* on item *i*, in the MRG of Samejima (1969) is determined by equation 2 (Bortolotti et al., 2012):

$$P_{i,k}(\theta_j) = P_{i,k}^{+}(\theta_j) - P_{i,k+1}^{+}(\theta_j) \quad (2)$$

Assuming that:

$P_{i,k}^{+}(\theta_j) = 0$; and

$$P_{i,k+1}^{+}(\theta_j) = 1.$$

Thus, we have the logistic equation of the model of gradual response, according to Equation 3:

$$P_{i,k}(\theta_j) = \frac{1}{1 + e^{-Da_i(\theta_j - b_{i,k})}} - \frac{1}{1 + e^{-Da_i(\theta_j - b_{i,k+1})}} \quad (3)$$

For an item with (m_i + 1) Categories, m_i + 1) categorias, m_i values of difficulty are estimated, in addition to the inclination parameter of the item. At this point, the number of categories of response of each item is impositive to the amount of estimated parameters (Alexander et al., 2002). Thus, as in Bortolotti et al.(2012), in this study, to measure satisfaction, with four categories of responses, three parameters of difficulty and one of discrimination were estimated.

As shown in Equation 3, the MRG of Samejima, two parameters are estimated, $a_{\mathrm{i},}$ and $a_{\mathrm{i},}$ e $b_{\mathrm{i,k}}$ (Embretson & Reise, 2000). The parameter of discrimination $a_{\mathrm{i},}$ e $b_{\mathrm{i,k}}$ (Embretson & Reise, 2000). O parâmetro de discriminação a_{i} refers to the slope of the curve of the logistic model, including the power of segregation of individuals by level of "satisfaction" to the aspect mentioned in the item, therefore, the higher the value of the parameter, the greater the discriminatory power of the item in different levels of latent trait. Although it is possible to assume values of orbiting - ∞ + ∞, there are common negative values (Andrade et al., 2000; Lewis, 2001), being usually worked on parameters within the range from 0 to 2 (Hambleton, Swaminathan & Rogers, 1991).

Whereas the parameter for difficulty of the item$b_{\mathrm{i,k}}$ comprises the level of latent trait in which the probability of an individual to select the response category "fully satisfied" is 0.5, therefore, it represents the point on the scale of the latent trait in that there is a 50% probability of that response category of interest to be selected (Alexander et al., 2002).

To perform the estimation of parameters of the MRG, it was used the software IRTPRO (*Item Response Theory for Patient-Reported Outcomes*) *for Windows*, by means of the Method of Maximum Marginal

Likelihood. After the estimation of the parameters via TRI, it was applied the assessment scale of satisfaction with average 100 and standard deviation 10, developed by Bortolotti et al. (2012), as shown in Equation 4:

$$NS = 10 \times b + 100_{(4)}$$

where:

NS=Satisfaction Level

b = parameter for difficulty of the item i.

The result obtained by the equation represents an index that orbits seven ascending levels in level of satisfaction: 70, 80, 90, 100, 110, 120 and 130, including the level 70, the category "dissatisfied", the levels 80, 90 and 100 the category "little dissatisfied", the levels 110 and 120 the category "satisfied" and, finally, the level 130 the category "very satisfied".

4 DATA ANALYSIS

4.1 ANALYSIS OF THE INSTRUMENT ACCORDING TO THE THEORY OF ANSWER TO THE ITEM

It was initially performed the analysis of the appropriateness of the instrument to TRI. In Table 1, it is presented the description and estimated parameters *(a) (b)* for each item.

Table 1: Estimated parameters of the instrument items

Item	Description	*(a)*	*(b)*
1	Quality of the Undergraduation course that you are enrolled	0.92	-2.38
2	Curricular Structure (disciplines) of the course	0.10	-0.31

3	Quality of teaching plans submitted by the Professors	0.65	-1.63
4	Organization in the explanatory content by the Faculty.	0.65	-2.64
5	Methodology for the development of the teaching-learning process in the classroom	0.05	-1.12
6	Forms of assessment used in the subjects to "measure" the student learning's level.	0.10	-0.05
7	Alternatives offered to students for the completion of their global education	0.10	-0.38
8	Creativity demonstrated by the Faculty in the performance of teaching activities	1.02	-1.76
9	Grades obtained in the subjects in relation to the earning achieved	1.39	0.19
10	Academic seriousness expressed by the course's Professors	1.13	-0.37
11	Level of education reached by the students who complete the course	0.10	-0.36
12	Academic seriousness of students of the course	0.10	0.5
13	Educational Level of students when they enroll in the course	0.49	-2.78
14	Ability expressed by students for the reading of scientific texts during the undergraduate course	1.24	-0.93
15	Students' qualification for the writing of scientific papers during the undergraduate course	0.10	0.5
16	Qualifications expressed by students for the elaboration of a monograph and/or final paper	0.10	0.72
17	Initiation opportunity of the students in research in the course that they are taking	0.10	-0.05
18	Training opportunities and insertion in the labor market offered by the course	1.59	0.36
19	Number of students who conclude the course every year	0.10	-0.25
20	Measures taken to improve the teaching quality in the course	0.10	0.2
21	Measures taken to overcome the students' difficulties in the subjects	1.02	-0.39
22	Measures taken to improve the classes' methodology in the subjects of the course	0.10	-0.61
23	Measures taken to improve the assessment of students in the subjects of the course	0.10	0.14
24	The procedures taken by the course for the qualification of the contents developed in the subjects	1.50	-0.14
25	Students' conditions for the dedication to the undergraduation course	0.53	-2.55
26	Time dedicated to the study of the subjects that the student is enrolled.	0.10	-0.04
27	The initiative of the students for the completion of their academic training	1.37	-0.84
28	Mechanisms of services and advising of students in the daily life of courses	2.19	0.77
29	Professors' effective involvement with the qualification of the undergraduate course that they teach	0.10	-0.55
30	Knowledge of the situation on the labor market of students who have completed the course	2.12	-0.05
31	Satisfaction regarding the course the student is enrolled	0.10	0.62
32	Knowledge demonstrated by Professors in the subjects that they teach	2.02	-0.42
33	Dynamics of classes to keep the students' attention	0.44	-1.86
	Average	**0.66**	**-0.56**

Source: Research data

Analyzing the Table 1, it is possible to notice that the parameters of discrimination*(a)* ranged from 0.0 to 2.19, indicating that the items exhibit power of variation, which is desirable, and the average capacity of

segregation of the test of 0.66 for the interval from 0 to 2 suggested by Hambleton et all. (1991).

The items 28, 30, 32 and 18, respectively, showed the highest degree of discrimination, while the items 2, 6, 7, 11, 12, 15, 16, 17, 19, 20, 22, 23, 26, 29, 31 presented 0.1 score and item 5, score 0.05, these being those which had lower power of discrimination. The standard deviation (SD) of 0.68, and the coefficient of variation (CV) of 103.50% allows us to conclude the existence of relevant variations of this parameter. In other words, the instrument has varying levels of discrimination.

Regarding the parameter of difficulty (*b)*, it is expected values that orbit from -3 to +3, being, at this point, estimated on the same scale of the latent trait under study, in this case, the satisfaction (Andrade et., 2000).

The items 13, 4, 25, 1 and 33 presented, respectively, the lowest values, while the items 28, 16, 31, 12 and 15 had the highest. The distance between the minimum value of the distribution (-2,78) and maximum (0.77) makes it possible to conclude the existence of important data amplitude, conclusion corroborated by data dispersion (DP of 1.079 and CV of 181.34%). Thus, it can be concluded that the instrument consists of varying levels of difficulty, which is, according to Harraway and Barker (2005), desirable.

Finally, it is observed that the average value of the parameter *(b)* of -0.56, relatively close to 0 (central point of the scale), allows us to conclude that there is a difficulty level from low to intermediate. In Figure 1, it is presented the distribution histogram of the parameter *(b)*:

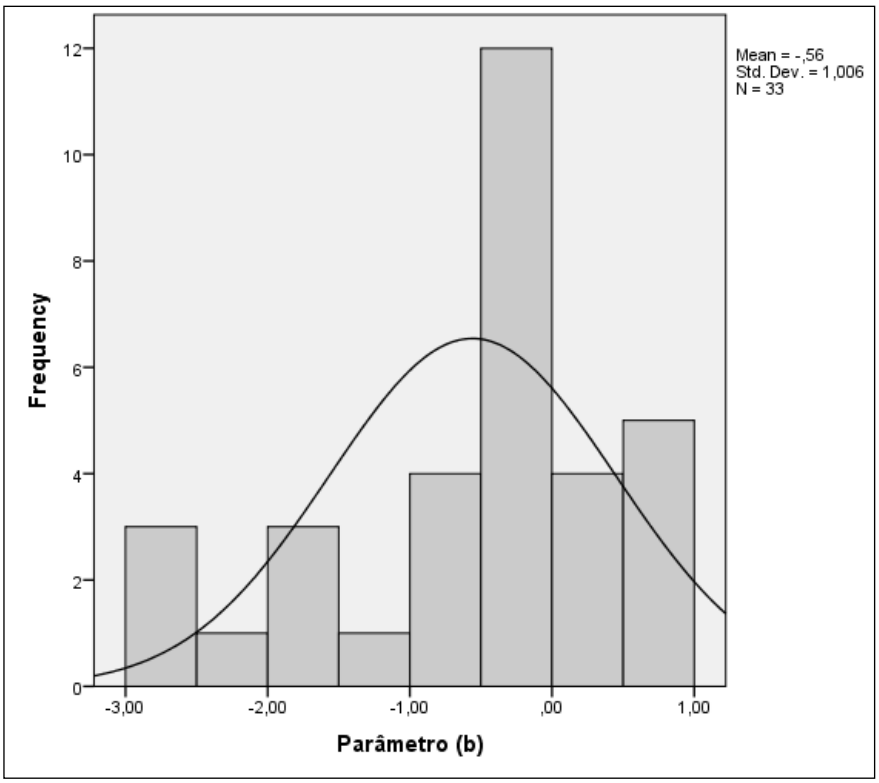

Figure 1: Histogram of parameter *(b)*

Source: Research data

The distribution of the parameter (*b*) showed negative asymmetric or to the left (asymmetry of -0,912), logo, with a concentration of occurrences above the average. The negative value of kurtosis (-0.06) indicates a slightly platykurtic distribution, i.e., with slightly "flat" distribution when compared to the normal distribution. Thus, it can be concluded preliminarily for the existence of relevant dispersal of the satisfaction of students, with a special focus of occurrences above the average, therefore, it can be concluded for the existence of satisfaction moderated on part of the students.

Finally, after the analysis of the parameters of the items, the curve of test information, which comprises the sum of information coming from all items of the instrument is shown in Figure 2.

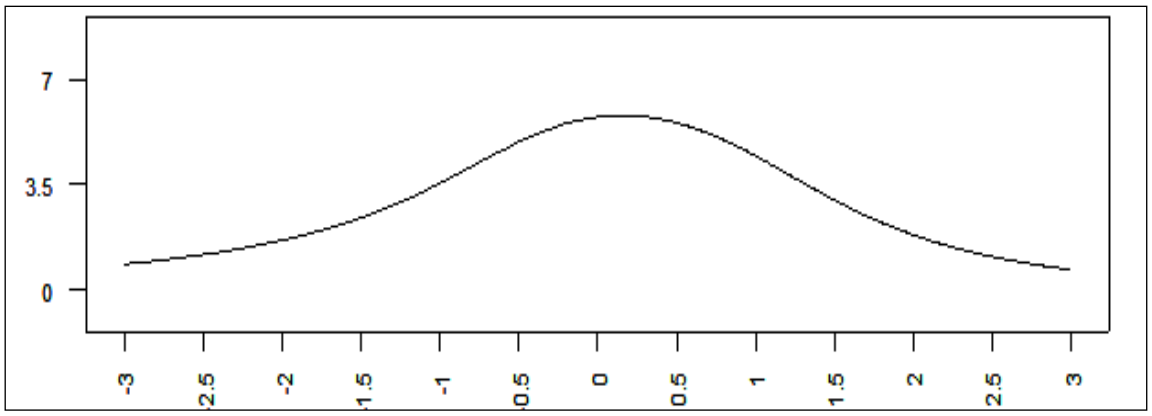

Figure 2: Function of instrument information

Source: Research data

The function of instrument information shows the region of the scale of latent ability in which there is greater precision of the test. Analyzing the figure 2, it is possible to notice that the instrument obtains success in capturing the satisfaction of respondents at any level, with special emphasis in the range from 1.5 to + 1.5, approximately.

After verified the adequation of the model of Bortolotti et al. (2012) to measure the satisfaction of the Accounting Science' students, it is advisable to show some nuances of this model when confronted with the customarily used in previous research.

The model of Paswan and Young (2002), modified by Vieira et al. (2008), captures the determinants of satisfaction segmented into exogenous constructs ("requirement of the course", "teacher-student interaction" and "the course organization") and endogenous ("the Professor's involvement" and "the student's interest") added to the variable "overall satisfaction", but according to Lizote et al.(2014), it is necessary and timely the incorporation of new constructs to the questionnaire, given the interest of having forms more and more suited to measuring the satisfaction of learners.

In this aspect, the model of Bortolotti et al. (2012), despite of not working constructs separately, contributes with important factors not captured by Paswan and Young (2002) and which could be incorporated into future research under the labels of at least three categories, namely:

"Initiatives to promote the quality,"; "scientific training" and "Information support to the students."

In the first category, "initiatives to promote the quality", it is suggested the following factors: "measures taken to improve the quality of teaching in the course", "measures taken to overcome the difficulties of students with difficulties in the subjects" measures taken to improve the assessment of students in the subjects of the course". "measures taken to improve the assessment of students in the subjects of the course".

In the second category, "Scientific training," it is encompassed the factors "capacity expressed by students for the reading of scientific texts during the undergraduate course", "qualification of students for the writing of scientific papers during the undergraduate course", "Opportunity to initiation of students in research in the course that they are enrolled" and "qualification expressed by students for the elaboration of a monograph and/or final paper ".

Finally, at the category "Information support for the students", it is suggested the variables "level of education reached by students who complete the course",, "knowledge of the situation on the labor market of the students who have completed the course", "level of training of students when entering course", "training opportunity and insertion in the labor market offered by the course", "number of students who complete the course each year" and "services and academic advising mechanisms of students in the courses day-by-day".

Additionally, it was noticed the existence of variables and categories that may be incorporated to the model of Paswan and Young (2002), if the researcher wishes to continue this model.

However, it should be pointed out that it is important the development of new studies with the aim of strengthening the empirical tests on the suitability of these categories to the instrument of Paswan and Young (2002).

4.2 ANALYSIS OF THE SCALE OF MEASUREMENT OF SATISFACTION

After concluded the descriptive analysis, it is started the assessment of the scale of measurement of satisfaction developed by Bortolotti et al. (2012). In Figure 3, it is shown the distribution of the satisfaction level of the students.

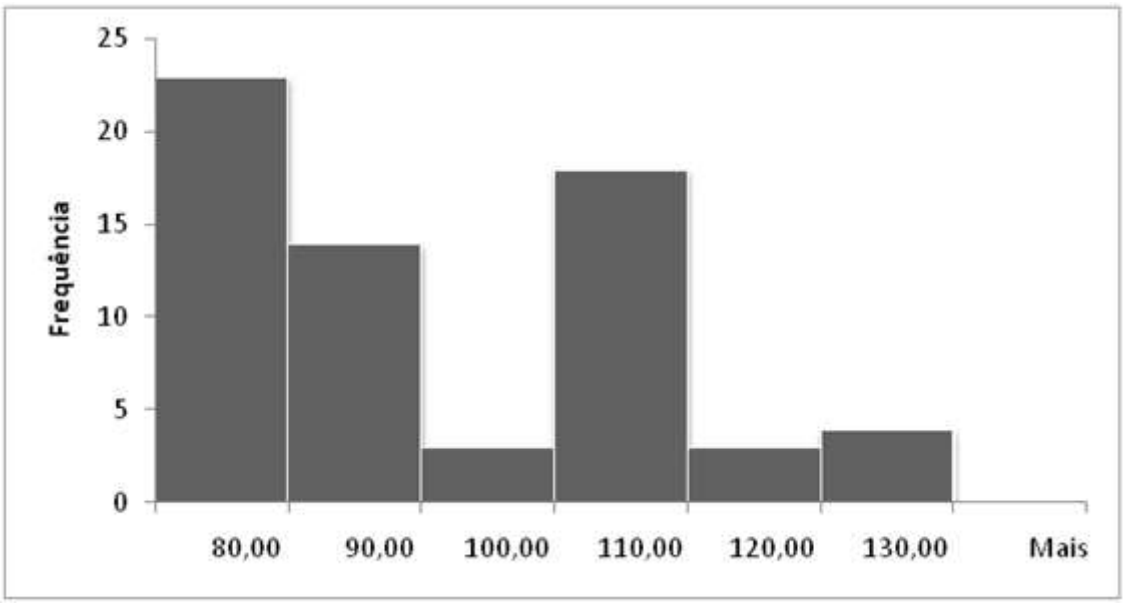

Figure 3: Histogram of the satisfaction level of the students
Source: Research data

The highest concentration (23 students, or approximately 36%) occurred on the level 80, which includes respondents who are less dissatisfied with the form of exposure of the contents, with the forms of assessment of learning, with the seriousness shown by Professors and students, with the quality of the course and, finally, with the educational level of the undergraduate students.

About 22% or 14 students, were classified at Level 90, which, in addition to the characteristics described at level 80, the respondents are less satisfied with the competence and qualification of students for reading and writing scientific texts; with opportunities for scientific initiation of the students; with the measures taken to improve the methodology of teaching and learning Evaluation; with the procedures used by the course for the qualification of content developed in the subjects; with the dynamics of the classes to awaken and maintain the students' attention ; with the services and academic advising mechanisms; with the Professors' commitment

towards the qualifications of the course; with knowledge of the situation of the undergraduate students; with students' educational background attending the first grade; and with the opportunity of training and insertion in the labor market offered by the course.

The low satisfaction with the development of skills for reading and writing scientific texts and with the opportunities for scientific initiation reflects, in part, the professional profile of educational background of the Accounting Science' former students and, especially, the profile of the Professors who, in their vast majority, do not have exclusive dedication to teaching and, as such, does not have the time/competence to dedicate himself or herself to foster a scientific culture in the students.

This partial dedication on the part of the Professors can also be the reason for dissatisfaction with respect to other factors of the level 90, especially, with the measures for the improvement of the methodology of teaching and learning assessment, procedures for the qualification of content developed in the subjects, dynamic classes and Professors' commitment with the qualifications of the course.

It should be noted that approximately 58% of students are concentrated on levels 80 and 90, which allows us to conclude that the majority of the learners of the HEI is not satisfied with the HEI. Although this result does not represent necessarily dissatisfaction (incidences in the lowest level of the scale were not observed, in this case, 70), it becomes imperative to adopt strategies/action on two fronts: related to the teachers and the institutional practices.

Regarding the Professors, it is necessary to adopt recycling, particularly in relation to the form of the explanatory content, methodology and dynamic of the classroom, to awaken the students' attention; review and optimization of procedures adopted for evaluation of learning; and strengthening the commitment and seriousness of the Professors with the qualifications of the course. It is also important to empower teachers to promote the scientific culture in students.

When it comes to institutional practices, it is important to create opportunities and incentives for the students' scientific initiation; improve the services mechanisms; monitor the educational level of the students

attending the first grade and undergraduates; make public to the other students the situation of undergraduate students (how and when they employ, what level of remuneration after the completion of the course, among other related information); improve academic advising; and, finally, promote partnerships aimed at facilitating the integration of students into the labor market.

These measures are aligned to those described by Faria et al. (2006), especially the need to seek for teachers with solid academic and professional experience in the field, capable of providing greater integration between theory and practice; to create mechanisms to encourage exclusive dedication to teaching and conducting research; and to implement new methodologies for the integration between theory and practice.

Returning to the analysis of Figure 2, the third largest concentration of students occurred at 110 (18 students or 28%). According to Bortolotti et al. (2012), this level comprises mainly students satisfied about the organization of the contents by the Professors; with the quality of teaching plans; with the curriculum of the course; with the creativity demonstrated by the Professors; with the opportunities of scientific initiation; with the conditions for their dedication to the course; with the services of academic advising; with the involvement of the Professors and their knowledge about the qualifications of the course.

Thus, it can be concluded that, overall, the students have from intermediate to elevated level of dissatisfaction with the course of bachelor's degree in Accounting Science. This result can be explained, in part, by the distinction between beliefs and attitudes described by Watty (2005).

According to the author, in spite of the initiatives for quality assurance performed by HEI, possibly negative assessments occur as a consequence of the distinct form with that scholars see aspects of quality promoted by the HEI facing the way they believe that quality should be understood and, consequently, promoted. At this point, this misalignment of the visions would be mitigated with the greater participation of learners in planning and conducting quality assurance systems that mitigate this scenario of conflict (Watty, 2003).

4 FINAL CONSIDERATIONS

The advent of the current Law of National Education Bases and Guidelines, Law No. 9394/96, fostered the growth of the offer of educational services in Brazil and, with it, the competition between the HEIs, especially in undergraduate and graduate courses. Thus, in addition to meeting the legal requirements issued by the Ministry of Education, the HEIs must operate at high levels of efficiency in the management, without losing sight of its students' satisfaction (Lizote et al., 2014).

The institutional assessment then emerges as an important instrument that evidences the mishaps and key points, allowing the retrieval of information essential for the identification and understanding of the causes of successes and failures (Bortolotti et al., 2012).

At this point, in this study, it was aimed to empirically test, in the scope of the Graduate degree in Accounting Science, a cumulative mode based on TRI and developed by Bortolotti et al. (2012) as a tool for the evaluation of a HEI.

As a result, it was realized that the instrument enables the identification of the levels of satisfaction of the students understanding aspects related to the institution, students and the faculty. In the context of the intrinsic factors to the students, the instrument captures, among others, the skills, the learning, the seriousness, the time devoted to studies, the level of education of entrants and graduates, the ability to read scientific texts.

Regarding the teachers, it is measured the satisfaction related to the methodology adopted, the creativity, didactics, the dynamics of the classroom, punctuality, attendance, skills and their commitment to the course and with their own development as a Professor. Finally, concerning the institutional aspect, the instrument encompasses requirements such as infrastructure, programs, institutional partnerships, services and academic advising mechanisms and proactive measures adopted by the HEIs to overcome difficulties and promote improvements to the triad teaching, research and extension.

Although the analysis of factors as well as the strategies to be adopted restrict themselves to the HEIs studied, in practice, these are relevant for any HEIs that have the commitment with the quality of services provided. Additionally, it should be emphasized that the objective of evaluating empirically in graduate students in Accounting Science the applicability of the methodology developed by Bortolotti et al. (2012) to measure the satisfaction has been fully achieved.

It was realized that the model of Bortolotti et al. (2012), despite of not working constructs separately, contributes with important factors not captured by Paswan and Young (2002) and which could be incorporated into future research under the labels of at least three categories, namely: "Initiatives to promote the quality,"; "scientific training and" "Information support to the students."

In the present study, it was presented, as a limitation, the fact of having contemplated only 64 students, not representative quantity of the reality of the course of Alpha HEI. The fact that the analysis restricted to a private HEI also appears as a limitation in view of that, eventually, students from public HEI could present a distinct behavior, however, it should be pointed out that this limitation does not affect the validity of the questionnaire to estimate the satisfaction in future research in Accounting Science undergraduate courses.

Finally, it is still highlighted the impossibility to generalize the results obtained. In respect of opportunities for future research performing, it is recommended to relate the satisfaction of the students with indices of academic achievement, especially those that capture the quality of the HEI, such as the National Exam of performance of students (Enade).

Another important opportunity arises in empirical testing of the incorporation of the three categories suggested by the model of Bortolotti et al. (2012) those of Paswan and Young (2002), that is, "initiatives to promote the quality"; "scientific training" and "Support Information to students."

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