SATISFACTION AND LEARNING OUTCOMES WITH DISTANCE EDUCATION IN BRAZIL AMONG STUDENTS OF BUSINESS AND ACCOUNTING: IS THE GRASS ALWAYS GREENER ON THE OTHER SIDE?

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ABSTRACT

This article aims at defining how the learning outcomes in Distance Education in Brazil are influenced by the student satisfaction. Thus, it was decided to adopt a mixed method strategy comprising survey and archival investigations. Based on a special extraction of micro-data from the 2012 National Student Performance Exam (ENADE), records of 39,190 students enrolled in the Distance Education format of the Business Administration, Accounting, Tourism and Economics courses were concatenated with 5,087 valid responses to a survey conducted using an electronic questionnaire. The use of Partial Least Squares Structural Equation Modelling allowed to infer the nomological validity of the constructs. Among the results it should be highlighted that the hypotheses of a positive association between satisfaction with Interactivity and with Performance and the students' learning results were sustained. The evidence is discussed in terms of the theory to explain these findings.

Keywords: Learning assessment; Distance education; Technological innovations.

Área temática do evento: Educação e Pesquisa em Contabilidade (EPC).

1 INTRODUCTION

In Brazil, the early start at the job market, time and transportation costs to arrive at Higher Education Institutions along with the reduced offer of courses in small cities are factors that contribute to hamper the access to higher education in classroom mode. In all cases, Distance Education has contributed to attenuate the deficit accrued throughout time. In 2013, around 1.2 million Brazilians were studying in one of the 1,158 Distance Education undergraduate courses in operation in the 164 Higher Education Institutions accredited by the Brazilian government to work in that mode (INEP, 2014). Such number accounts for 20% of Brazilians enrolled in higher education, while the traditional mode in the same year reached 6.1 million of students. A peculiar characteristic of higher education in Brazil is the strict government regulation over colleges and universities. In order to have the Higher Education Institution authorized to offer undergraduate courses, whether in traditional mode or in Distance Education, the institution must comply with

defined minimum requirements of quality. In this context, the National Institute of Studies and Educational Researches (INEP), a federal authority linked to the Ministry of Education (MEC), must carry out the National Exam for the Assessment of Student Performance (ENADE). Thus, to carry out the evaluation, INEP considers the grades obtained by the student in ENADE and in surveys regarding physical and human resources used in Higher Education Institutions and their courses.

The exam requires specific and contemporary knowledge, serving as an important tool to check whether the student developed a professional profile in line with the corresponding abilities and competences required for each education area. The National Curricular Guidelines (DCN), used by MEC to define the minimum content to be offered to the student, guide the scope of the contents required in that exam. Since 2004, ENADE is carried out yearly in the end of the school year, traditionally in November, with the mandatory participation of the last grade students from the course. In view of that, courses are separated by knowledge areas and are evaluated in three-year cycles. So, the evaluated courses in the cycle that began in 2006 were submitted to ENADE both in 2009 and in 2012. Based on ENADE results, INEP publicizes the grade achieved by the course, in a scale from 1 to 5. When the course achieves grades 1 or 2 during two consecutive cycles, it is prohibited to receive new students. Technological innovation, by nature and in the Distance Education mode, has been reasserted as a relevant element. Such implies on saying that the outcomes arising from Distance Education modes are inseparable from adopting Information and Communication Technology (ICT). It is important to mention that the academic performance in Distance Education mode is favored by the satisfaction of the student, once the result obtained at the end of the course does not only happen due to the exclusive use of a particular technology (Miller, 2011; Jackson, Jones, & Rodriguez, 2010). That perspective helps understanding why the student satisfaction is considered as a new multidimensional construction created from the (dis)confirmation of the expectancies of the student regarding the apparel of ICT available for collaborative construction of knowledge (Islam, 2012; Ma & Yuen, 2011).

Based on the above, this article aims at defining how the learning outcomes in Distance Education in Brazil are influenced by the student satisfaction. The performance of the student in ENADE consists of the only available proxy in the country in standardized terms and in large scale, to assess learning outcomes. However, by legal decision, only the student himself can have access to the individual result, i.e., there is no public access to the individual information of ENADE. In order to enable this research, after a public bid in August 2010, an agreement between Universidade de XYZ (XYZ) and INEP was signed. On account of that, in October 2013, INEP provided access to unpublished data of ENADE carried out in November 2012. The provided file contained records related to 97,946 students of Distance Education mode from the courses assessed in that cycle. Nevertheless, a survey was conducted regarding only to Business, Accounting, Tourism and Economics areas, comprising 39,190 students. The 5,087 valid answers of that survey, conducted by means of an electronic questionnaire, were combined with the data of all students who took ENADE. Further to the correspondence identification between the records of those two databases, the relationship between the satisfaction and the academic performance of 4,529 students from the selected sample was analyzed. A Structured Equation Modelling estimated by Partial Least Squares (SEM PLS-PM) was conducted to assess the nomological validity of the constructs. In addition, the work consisted of assessing the proposed model according to the dissimilarities among the students from Business and Accounting, applying the Multi-group Analysis (MGA) technique. That strategy was adopted because a relevant number of courses from that sample part (30% and 22%, respectively) achieved 1 or 2 in ENADE in 2012, while 42.5% of Business and 61% of

Accounting courses achieved grade 3 (medium). It is important to mention that none of the Distance Education Accounting courses achieved grade 5 in ENADE (maximum). Despite of that, the number of Distance Education graduates in those fields has been increasing. Among the graduates in Business or Accounting in 2013, 15% have concluded higher education in Distance Education courses. It is a large growth, considering that such relation was lower than 1% in 2006. The expanding process in Distance Education mode in those two fields is ongoing, to the extent that in 2015, 96 more Business and 28 Accounting courses will be graduating their first students. In view of that, soon Brazil will have 136 courses graduating administrators and 51 courses graduating accountants through Distance Education, compared to the 63 in force in 2012 (40 of Business and 23 of Accounting).

In addition to the demand, the diversification of ways to provide the Distance Education can also have contributed for the expansion. However, literature suggests that there is persistence in the use of technology as a way to simplify the diffusion of content rather than as a potential to assist and stimulate the learning process (Jackson, Jones, & Rodriguez, 2010). The fact is that the satisfaction feeling becomes compromised (Simpson, 2013) and represents a methodological choice deterrent of the academic performance of the student (Chagas, 2012). It is not by chance that Miller (2011) warns that the satisfaction of the students in Distance Education mode is not as high as the Higher Education Institution would like it to be, and the author recommends caution regarding the relevance given to technological tools so that they do not take core role in the learning process. In view of that, aspects related to the student satisfaction, to their performance and to the framework regarding the adoption of technology within education environment, which have been singly discussed in literature, are considered as a whole in this article. The main contribution of this research is considered of consisting of magnifying the discussion about the education of professionals of Business and Accounting with the appliance of Distance Education, once the mastering of curricular abilities and competences is crucial to support the economic and social development. In other words, it is necessary to understand better the elements that positively affect the learning process and further deliberate actions for the strengthening of the profession. Based on the above, section 2 presents the theoretical platform of the article. Section 3 is about its methodology. Empirical procedure is described in section 4 together with the results of the article. Finally, section 5 presents the results.

2 THEORETICAL PLATFORM

This article is guided by the framework developed in Information Systems areas, particularly the framework linked to factors interfering in the user decision as to the use of Information and Communication Technologies (ICT). The Innovation Diffusion Theory (IDT), the Technology Acceptance Model (TAM), the Unified Theory of Acceptance and use of Technology (UTAUT) and the Continuity Model (CM). This theoretical framework essentially considers that on starting to use a technology, in any context, the user perception is decisive as to the features regarding its utility and the ease of use so that it will be definitely adopted. From that perspective, Venkatesh, Thong, Chan, Hu and Brown (2011) consolidated UTAUT constructs as intrinsic factors for the establishment of the satisfaction feeling in the ICT. Figure 1 presents these constructs.

Constructs	Definition
Effort Expectancy (EE)	The degree of ease that the individual associates to the effective use of a certain technology.
Facilitating Conditions (FC)	The perception of the individual regarding the availability of infrastructure and proper technical support to the use of technology.
Performance Expectancy (PE)	To what extent an individual believes a technology is useful to reach objectives and goals, regardless the environment.
Social Influence (SI)	The importance attributed by the user of a technology based on the opinion of the people from his family and friends.

Figure 1 – Constructs of UTAUT
Source: prepared by the authors based on Venkatesh, Morris, Davis and Davis (2003)

Therefore, once satisfaction is seen as a strong predictive for the learning results (Eon, Wen, & Ashill, 2006), hereafter seminal works in literature related to the subject are evidenced. Next, satisfaction is presented with a view that extrapolates the traditional unidimensional view of this construct. The section ends with the presentation of the research hypotheses.

2.1 Studies focused on the satisfaction in on-line education contexts

Lee (2010) used the Technology Acceptance Model (TAM) framework to personalize the constructs of Perceived Ease and Perceived Usefulness to the research context in Distance Education. UTAUT model incorporated the constructs of Perceived Ease and Perceived Usefulness, and their corresponding classifications are the Effort Expectancy (EE) and Performance Expectancy (PE), respectively. The objective of the author was analyzing eventual cultural differences regarding perception of the Distance Education graduates about support service, acceptance and satisfaction of Distance Education courses. For that purpose, a sample of 872 students, comprising 582 Koreans and 290 Americans, was created. The author concluded that the educational support was a determinant factor for the Distance Education acceptance and the satisfaction of the students, reinforcing the influence of EE and PE in Distance Education over that construct. Constant interaction with the tutor through the internet, with a timely feedback, institutional support and services of proper technical support are relevant factors to increase the satisfaction of students of Distance Education.

Ma and Yuen (2011) research was based in the UTAUT to investigate the involvement of students of a Hong Kong university with the voluntary use of a virtual learning environment. For that purpose, authors tested the validity of the UTAUT constructs in two stages. The first one was carried out before the use of the system and the second one in the end of the school year, when the use had already been concluded. UTAUT constructs were generated by four indexes each, while the Usage Intention (UI) and the Satisfaction (S) were measured from three and two indexes, respectively. 128 students completed stage A and stage B. In order to check UTAUT effectiveness on predicting a behavior of effective use, authors collected the system access data from the e-learning system, which were associated with the answers from the questionnaires in order to build a sole database. The linking of the bases occurred from the identification of the responders mentioned in the records of access to the system. Authors concluded that EE and SI determined UI and S. In order to check the prediction capability of the model, the user access data to the system were correlated to UTAUT constructs. According to the authors, there was no significant correlation between the satisfaction and the index of effective use of the e-learning system in stage B. It is important to mention that, in stage A, the SI was the only UTAUT construct presenting significant correlation with that index. Although the correlation with the effective use of the e-

learning system was not identified, authors reasoned that the SI construct not only affects the current and further use of the e-learning system but it should also affect the way students evaluate such system – i.e., their satisfaction.

In their work, Capece and Campisi (2013) explored Satisfaction (S) as an intervenient learning mechanism within the organizational environment. Authors led a case study based on an energy sector company. The company used a fully on-line type of Distance Education under the support of an e-learning platform. The content taught covered aspects of internal control and of corporate management arising from the Sarbanes-Oxley Act. Qualification course was made of three modules with mandatory participation only in the first two modules. This way, 24,760 employees took part in the mandatory modules and 4,660 did it voluntarily in the third module. The sample researched comprised 5,395 employees, 5,083 of those linked to the mandatory participation modules. Work outcomes indicate that EE and PE constructs significantly influenced S. Authors suggest that the use of e-learning systems favored learning within the organizational environment, based on the satisfaction of the employees. In this sense, the synergy between use and acceptance of the e-learning system not only was determinant to increase the satisfaction of the employees but it also represented an element strongly associated with their performance.

In the e-learning systems field, Islam (2012) developed a research with professors and students from a Finnish university. The population surveyed are the users from the Higher Education Institutions familiar with Moodle with academic activities in 2011. Survey data were collected by employing a questionnaire, generating a sample of 202 professors and 258 students. Moodle was adopted by the university in 2007, both for complementing the classroom mode and to courses fully offered at distance mode. The work consisted of defining the continuance intention of use and the perception of academic performance of the students regarding the e-learning system. In order to define the continuance intention of Moodle use by the students, Islam (2012) proposed a combination of the Continuity Model and of UTAUT. The constructs related to EE and PE were used as indirect determinant factors of the academic performance from the perspective of the students. Outcomes suggest that the e-learning systems potential to assist the students can influence their academic performance. However, the author recognizes that there are no guarantees that the use of those systems automatically implies on positive results in the student performance.

2.2 Student satisfaction: extrapolating the unidimensional approach

The student satisfaction in Distance Education mode can be understood as a condition in which the offer level of teaching and learning activities and services exceeds expectations, i.e., it is a result of practice experience (Sener & Humbert, 2003; Islam, 2012). When that mode is supported by the ICT use, particularly in the case of e-learning systems, the student is seen as an information system user (IS). According to Shee and Wang (2008), e-learning systems differ from other IS, because while the effectiveness of a general IS is based on the user individual performance, in e-learning systems it depends on the collaboration among other performers involved in the teaching and learning process. According to literature, the student satisfaction in Distance Education can be defined by his interaction with his partners, professors and tutors; by the guidance services, of availability and access to materials; by the tutoring done during on-line study; by the results perceived in the professional field and by an evaluation of the experience after concluding the undergraduate course (Eon et al. 2006). Investigation areas suggested by Sener and Humbert (2003) to understand the satisfaction of the students are in line with such elements and are presented in Figure 2.

Student satisfaction in the simplest scope is defined by the professor's performance, the availability of academic monitoring and technical support, the interaction with the tutor through virtual environments and the creation of learning communities (Sener & Humbert, 2003). According to Sener and Humbert (2003), the student perception as to the learning provided throughout the course is an additional antecedent factor of this level of satisfaction. Once this condition is fulfilled, the student is supposed to encourage other people of his social circle to attend Distance Education in the same Higher Education Institution (Sener & Humbert, 2003). Further, it is likely to assume that he shows the intention of keeping his link to other course after concluding the undergraduate course. In Figure 2, satisfaction about this scope of analysis is called "Interactivity".
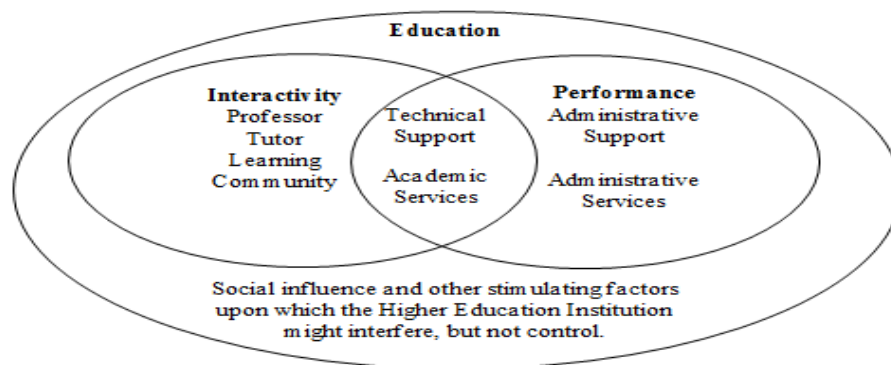

Figure 21 – Student satisfaction: investigation areas
Source: Adapted from Sener and Humbert (2003)

Factors connected with administrative services and institutional support are key to understand the student satisfaction regarding performance focus (Sener & Humbert, 2003). The availability of study material, the following of content and the ease of use of e-learning systems are comprehended in the administrative services category, while starting in the job market and the support and academic guidance represent institutional supporting items. The satisfaction from that perspective is called "Performance" in Figure 2. Sener & Humbert (2003) add that technical support and certain academic services, such as tutoring guidance and mentoring, are factors that influence the student satisfaction and the scope of interactivity and development, one another.

Factors to measure the satisfaction from the interactivity and performance perspective underlie the global experience of learning, including factors upon which the institution has influence, but not the control (Sener & Humbert, 2003). Therefore, aspects related to the institution reputation before the society and other demands of academic life of students complete this level of satisfaction, called "Education" in Figure 2. In this case, the student determines the demand. Thus, even if the Higher Education Institution offers library or infrastructure for group activities, the use is not under its control. The same can be said about its reputation. Despite of its actions, the Higher Education Institution does not have the control over the opinion of society concerning its image. In line with the proposal of Sener & Humbert, 2003, Islam (2012) warns that it is not suitable to consider satisfaction as a unidimensional construction. Based on this reasoning, in this article satisfaction is pictured in three dimensions presented in Figure 3.

Satisfaction	Factor	Characteristics
Interactivity	EE	As an ease tool for tasks and interactivity with other elements of the course, as well as the facility to understand the directions for the use of the e-learning system.
	LR	Confidence for having learned increases the possibility of taking another Distance Learning course in the same Higher Education Institution and/or indicating it to other people.
Performance	PE	Usefulness to perform academic activities and that its professional performance was favored by the Distance Education graduation with institutional support.
	FC	Reliability on the administrative services that provided a proper infrastructure, both concerning the e-learning platform and in terms of technical and academic support.
Education	SI	Reliability attributed to the opinion of close people or of those who he admires, concerning the education in a Distance Education course outlined by the use of ICT.
	SF	The condition of using the Higher Education Institution Center as an adequate environment for group activities and other tasks, even if they could be done at distance.

Figure 3 - Interactivity, Performance and Education: UTAUT antecedent factors
Source: prepared by the authors based on Venkatesh, Morris, Davis and Davis (2003) and Sener & Humbert (2003)

The characteristics shown in Figure 3 result from the interpretation of the constructs of Effort Expectancy (EE), Performance Expectancy (PE), Facilitating Conditions (FC) and Social Influence (SI) of UTAUT under conditions offered by Distance Education, in addition to the Learning Reliability (LR) and other Stimulating Factors (SF), under which three dimensions of satisfaction are constituted. This way, aspects related to the student satisfaction, to his performance and UTAUT framework are considered inseparable elements to understand the learning results achieved by the student.

2.3 Research Hypotheses

The satisfaction in the Interactivity scope is determined when the student trusts that the learning was favored by the interactivity with the tutors, professors, students, technical staff and by the academic services duly provided by employing the e-learning platform throughout the Distance Education course (Sener & Humbert, 2003). It suggests that: **the satisfaction in the Interactivity scope positively influences the satisfaction regarding the Performance (H1$_A$)**. The probability of the student maximizing his satisfaction in the Performance and Education scope is enlarged to the extent that his reliability increases concerning the accomplishment of intended learning objectives (Capese & Campisi, 2013; Lee, 2010; Sener & Humbert, 2003), which substantiates the hypothesis that: **the satisfaction in the Interactivity scope positively influences the satisfaction regarding Education (H1$_B$)**. The influence marked in these two first hypotheses is supported in the understanding that the interactivity and the availability of technical support are crucial for the occurrence of improvements in the student performance. Moreover, satisfaction in this scope increases the probability of confirmation of student expectations regarding the choice of course (Sener & Humbert, 2003; Islam, 2012).

On the other hand, satisfaction with Performance is formalized by the reliance that the institutional and technical support throughout Distance Education might help the student to obtain professional improvements, besides providing conditions to carry out activities in the e-learning platform (Sener & Humbert, 2003; Capese & Campisi, 2013). Therefore, as the demands of the course are fulfilled due to support received, the trust of the student increases and the probability of maximizing his satisfaction with Education enlarges (Sener & Humbert, 2003; Capese & Campisi, 2013). This reasoning supports the third hypothesis of this research: **there is positive influence in the satisfaction with Performance concerning the satisfaction in the Education scope (H1$_C$).** It is assumed that this is a positive influence once academic support implies on the potential maximization of e-learning systems on assisting students to do their tasks, significantly affecting

the performance (Islam, 2012; Lee, 2010). The institutional support helps the student believe that his academic choice contributed to drive his professional life (Sener & Humbert, 2003). Figure 4 shows the theoretical model of this research, including the three hypotheses herein developed related to the association between the dimensions of satisfaction.

In addition to the satisfaction influence on the Interactivity and Performance scope, the probability that the satisfaction with Education is maximized increases, as increases the student reliance that the learning and performance were favored by the participation in activities at the Higher Education Institution center (Moore, 2005). The confirmation of the expectations created due to the recommendations he received about the Distance Education, supplements the formalization of satisfaction in the Education scope (Venkatesh et al., 2003; Ma & Yuen, 2011; Sener & Humbert, 2003). Figure 4 illustrates the expected association between the constructs of Interactivity, Performance and Education as well as the construct of Academic Performance. Regarding this last variable, it is reinforced that the index used for the measurement refers to the general grade of the student at ENADE. The three hypotheses developed concerning the determination of Academic Performance are:

- $H2_A$: In the Interactivity scope, the student satisfaction positively influences his Academic Performance;
- $H2_B$: The student satisfaction in the Performance scope presents positive influence upon his Academic Performance;
- $H2_C$: There is positive influence in the student satisfaction in the Education scope upon his Academic Performance.
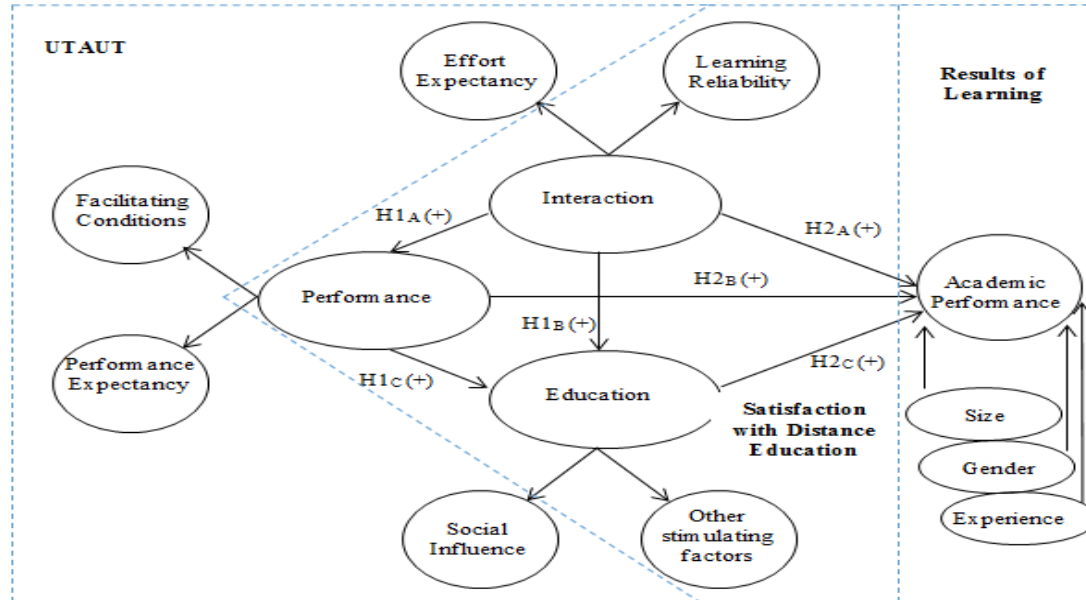
Figure 4 – Modelling of satisfaction and its influence upon academic performance in Distance Education (MSD-Distance Education)

Should the learning experience in Distance Education environment confirm the student expectations, it is presumable that the construct of Academic Performance receives the influences appointed in the last three developed hypotheses, given that the literature informs there is a relation between the student satisfaction and the variable presented by this construct (Eon et. al., 2006; Islam, 2012; Capese & Campisi, 2013). Three control variables complete the theoretical model

illustrated in Figure 4: size of the Higher Education Institution, gender and previous experience of the student regarding to the undergraduate courses (Johnson, 2011). The variable related to the size of the Higher Education Institution was registered taking into account the five largest Higher Education Institutions, where the proportion equals to 67.4% of the sample.

3 METHODOLOGY

This study adopted a mixed model methods to form a unique database, based on the survey techniques and archival conducted in simultaneous steps (Yin, 2006). The first stage (archival) was to analyze the records of INEP database, composed of 97,946 students enrolled in courses in distance education mode evaluated in 2012 ENADE and candidates to complete his graduation that year. Thus, we used only the records of students enrolled in the final period of the Administration courses, Accounting, Economics and Tourism, which reduced the population to 39,190 students. However, 11,050 who missed the application of ENADE were excluded from the file, leaving the records of 28,140 students, as is shown in Table 1.

The second step was conducting a survey, with the use of an electronic questionnaire based on QuestionPro® platform, subject to the prior screen of 88 Brazilian experts. After this validation the instrument was improved and the link to the questionnaire delivered to INEP, who sent by email only to 28,140 students selected in the previous step. In the design of this survey questionnaire did not require any personal information, which prevented the identity of the respondents were to be discovered. We obtained 5,087 free records of missing data.

Table 1 – Research final sample

Course	Archival	Survey	Paired	Exclusions	NBD	NBD/Archival (%)	NBD/Survey (%)
Business	21,915	3,959	3,556	24	3,532	16.1	89.2
Accounting	6,053	1,079	969	14	955	15.8	88.5
Economics	51	16	14	0	14	27.5	87.5
Tourism	121	33	29	1	28	23.1	84.8
Total	**28,140**	**5,087**	**4,568**	**39**	**4,529**	**16.1**	**89.0**

Source: (1) INEP and (2) survey data

To complete the formation of the search database, the third step required the unification of data collected in the first two stages, which allowed the association between student satisfaction (survey) with academic performance (archival). For the combination of 28,140 archival records with 5,087 answers the survey used two key variables: the date of the student's birth and the university's code which was bound. The combination resulted in pairing 4,568 records. Performance 39 cases of students were excluded zero due to the possible intention of this result, which would undermine the analysis of the results. Table 1 presents the main features of the new database (called NBD), with 4,529 students. The chi-square test showed that the proportion of students in the final sample is not statistically different from the composition formed by the 28,140 students present in the proof of ENADE, at a significance level of 5%.

4 EMPIRICAL PROCEDURE
4.1 Theoretical model validation

The convergent and the reliance validity were assessed based on the Average Variance Extracted (AVE) and on the Composite Reliability (CR) of the latent variables, consecutively. In that evaluation level, the target is to verify if the indexes employed to represent each construct actually fulfilled such purpose, which is an evidence that the theory was used adequately. Table 2 presents those results.

Table 2 – Average Variance Extracted and Composite Reliability

Constructs	Average Variance Extracted (AVE)	Composite Reliability (CR)
Academic Performance[1]	1.000	1.000
Interactivity[1]	0.698	0.819
EE-I[2]	0.669	0.889
LR-I[2]	0.635	0.773
Performance[1]	0.802	0.890
FC-P[2]	0.656	0.905
PE-P[2]	0.647	0.879
Education[1]	0.577	0.726
SI-E[2]	0.645	0.879
SF-E[2]	0.302	0.717

Source: research data

Note: latent variables of (1) second order and (2) first order.

Therefore, compared to the works of Islam (2012) and Eon et al. (2006), it was expected that the AVE and the CR of the indexes would be at least equal to 0.50 and 0.70, respectively. In the case of the first order latent variables employed to measure the constructs of satisfaction, except for the construct related to other Stimulating Factors (SF-E), the others presented values consistent with the expected. Even if the literature (Henseler, Ringle, & Sinkovics, 2009) recommends a minimum parameter for the convergent validity (AVE>0.50), the construct relative to the SF-E was kept for two reasons. The first reason refers to the Composite Reliability, which surpassed the expected value. In addition, its elimination neither resulted in increases in the AVE related to the construct of other Stimulating Factors, nor in the Education construct. Thereby, the composition was kept unchanged, even to preserve the content validity of the research tool, as well as to provide an additional comparative element in further researches.

The factor loads calculated within each origin construct for their respective indexes are slightly higher compared to the other model constructs. Such result suggests that the questions used are actually observable indexes of the constructs established in this research. This evaluation standard is part of the discriminant validity stage of the measurement model, which also comprehends the assessment at the latent variable level, as per Table 3. Besides that, the table presents diagonally all the correlations between the constructs which were lower than the AVE square root. This analysis consists of the comparison between the pairs of the correlation coefficients (presented by line in the table) with the AVE square root, shown in the diagonal of the matrix of correlations in relation to each one of the evaluated pairs.

Table 3 – Matrix of correlations between latent variables

Latent Variables of the Structural Model	1	2	3	4	AVE	CR
1. Academic Performance (AP)	**1.00**				1.000	1.000
2. Interactivity (I)	0.09[1]	**0.83**			0.698	0.819
3. Performance (P)	0.07[1]	0.75[1]	**0.89**		0.802	0.890
4. Education (E)	-0.17[1]	0.33[1]	0.38[1]	**0.76**	0.577	0.726
Latent Variables of First Order	**1**	**2**	**3**	**4**	**5**	**6**
1. Effort Expectancy (EE-I)	**0.82**					
2. Learning Conditions (LC-I)	0.45[1]	**0.80**				
3. Facilitating Conditions (FC-P)	0.59[1]	0.56[1]	**0.81**			
4. Performance Expectancy (PE-P)	0.66[1]	0.55[1]	0.61[1]	**0.80**		
5. Social Influence (SI-E)	0.29[1]	0.29[1]	0.31[1]	0.32[1]	**0.80**	
6. other Stimulating Factors (SF-E)	0.09[1]	0.21[1]	0.20[1]	0.16[1]	0.17[1]	**0.55**
Average Variance Extracted (AVE)	0.67	0.64	0.66	0.65	0.65	0.30
Composite Reliability (CR)	0.89	0.77	0.90	0.88	0.88	0.72

Source: research data

Note: (1) $p < 0.01$

That standard is in line with the work of Eon et al. (2006). Therefore, the results presented indicate that the variance of each construct was linked to the indexes employed for their establishment, as compared to the other indexes of the remaining latent variables. Once this condition is fulfilled, concurrently to the previous stages of validity, the structural model evaluation can be conducted. Should the value of any latent variable not comply with the relative condition to the AVE square root concerning the correlation coefficients, the combination of it with other construct should be assessed. As to this research, the latent variables of Interactivity, Performance and Education were built by six, nine and eleven indexes, respectively, in addition to the strength of the VIF, AVE and CR aforesaid. Once detected that the latent variables were properly measured, the structural model evaluation is developed in the next section. The final part of APPENDIX A has a summary with all factor loads and *p* values in relation to each index (question) used in the structural model.

4.2 Structural model evaluation

The evaluation developed in this section is centered in the association between the constructs of Interactivity (I), Performance (P), Education (E) and Academic Performance (AP). Such implies on the analysis and estimation of the structural coefficients. Therefore, it consists on checking if the associations presented in the theoretical model meet the empirical support. The structural model outcomes are presented in Figure 4. To obtain such results, it was carried out a sampling with reposition of the original sample of 4,529 students with the bootstrapping method employed in the SEM-PLS. This way, the structural coefficients were calculated and *p* values estimated from a defined confidence interval. As shown in figure 4, the association obtained between the constructs E and AP showed an inverted signal in relation to the expected. In that case, hypothesis 2_c was not validated, even presenting a 1% statistical significance. Results suggest that the lowest the student confidence in relation to the Distance Education choice is linked to Social Influence, together with the less attendance to the center by the student, the highest the probability of his Academic Performance to be lower ($\beta = -0.194$) in the general average of his pairs.
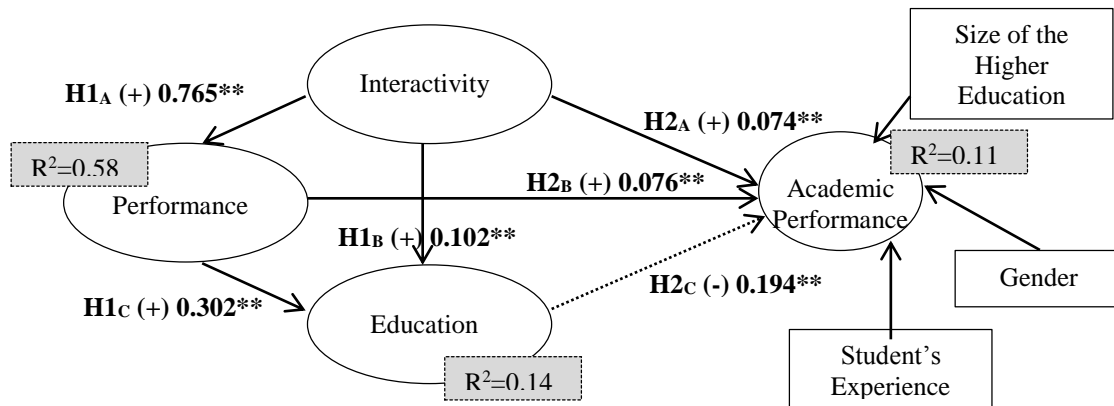
Figure 4 – Structural Model Results
** p<0.01; the dotted arrow indicates that H2$_C$ was not validated

Control variables added to the model were significant (p<0.01). As these results suggest, the portion of students enrolled in large sized Higher Education Institutions who achieved academic performance lower in relation to the sample average is statistically significant. Thus, the grouping of students from those Higher Education Institutions negatively influenced the coefficient of construct determination for "Academic Performance". Similarly, the "gender" control variable, according to Table 4, captured a significant effect over Academic Performance. It is about a dummy variable in which 1 represents female and 0 male. Therefore, the structural coefficient appoints that the performance of men was higher when compared to the average of women (β = -0,147). On the other hand, the discriminant role of the control variable intrinsic to the student experience in other higher education courses presented positive signal. This outcome does not surprise because it is plausible to expect that students with such profile show an above average academic performance compared to the others. For this sample, this distinction was confirmed by a difference statistically significant capable of positively influencing the construct of "Academic Performance".

The determination coefficient R² indicates that the structural model based on the general sample of 4,529 students was of 0.114 compared to the construct of "Academic Performance". However, this determination coefficient does not comply with the role of assessing the whole sample. In order to compensate the absence of a general index of adequacy of the models based on PLS, the assessment has been conducted by researchers grounded on the Goodness of Fit (GoF), as done by Terzis, Moridis, Economides, and Mendez (2013). That implies on calculating the geometric average of R² (structural model adequacy) and the AVE (measurement model adequacy).

Model GoF introduced in this section was of 0.467 ($\sqrt{\overline{AVE} * \overline{R^2}}$).

Table 4 – Structural Relationship Statistics

Hypothesis	Supports H_0	B	P-value	R²
H_{1A} Interaction => Performance	Yes	0.765	0.00	0.586
H_{1B} Interaction => Education	Yes	0.102	0.00	0.149
H_{1C} Performance => Education	Yes	0.302	0.00	
H_{2A} Interaction => Academic performance	Yes	0.074	0.00	
H_{2B} Performance => Academic performance	Yes	0.076	0.00	
H_{2C} Education => Academic performance	No	-0.194	0.00	
Control Variables				0.114
Higher Education Institution Size => Academic performance		-0.118	0.00	
Student Experience => Academic performance		0.128	0.00	
Gender => Academic performance		-0.147	0.00	

Note 1: Significances (t statistic and p-value) estimated by bootstrap from n=4.529 with 1.000 repetitions

In the next section, MGA is done to compare students from Business and Accounting courses. MGA consists of estimating the parameters of the Measurement and Structural models founded on two or more groups. In this case, the 3,532 Business students and the 955 Accounting students compose the two analysis groups. Therefore, all the steps taken in this section are replicated separately for those two groups, reason why MGA has the role of complementing the validation of outcomes.

4.3 Multi-group Analysis: Business and Accounting

In accordance with the assessment conducted in the previous section with the sample of 4,529 students, it is observed that the sample division between Business and Accounting students did not represent severe alterations regarding the model AVE and CR. Thus, suggesting that the measurement model appeared substantial once the dissimilarities between the two groups were not enough to put at risk the convergence of the indexes. Besides, in Table 5 it can be noticed that the metrics related to the Education construct match with the negative correlation with the Academic Performance variable.

Table 5 – MGA and cross validation: Business and Accounting

2st Order	Business (n=3.532)						Accounting (n=955)					
	AP	I	P	E	AVE	CR	AP	I	P	E	AVE	CR
AP	**1.00**				1.000	1.000	**1.00**				1.000	1.000
I	0.09[1]	**0.83**			0.691	0.814	0.07[2]	**0.85**			0.719	0.834
P	0.06[1]	0.75[1]	**0.89**		0.801	0.889	0.10[1]	0.78[1]	**0.90**		0.804	0.892
E	-0.18[1]	0.33[1]	0.38[1]	**0.76**	0.572	0.720	-0.12[1]	0.36[1]	0.38[1]	**0.76**	0.584	0.736
R²	0.123	#	0.575	0.150	#	#	0.085	#	0.618	0.149	#	#
1st Order	**1**	**2**	**3**	**4**	**5**	**6**	**1**	**2**	**3**	**4**	**5**	**6**
1- EE-I	**0.81**						**0.84**					
2 -LR-I	0.43[1]	**0.79**					0.49[1]	**0.81**				
3-FC-P	0.58[1]	0.56[1]	**0.81**				0.62[1]	0.58[1]	**0.82**			
4-PE-P	0.65[1]	0.55[1]	0.60[1]	**0.81**			0.69[1]	0.56[1]	0.61[1]	**0.81**		
5-SI-E	0.27[1]	0.29[1]	0.31[1]	0.33[1]	**0.81**		0.32[1]	0.30	0.29[1]	0.33[1]	**0.81**	
6-SF-E	0.09[1]	0.22[1]	0.20[1]	0.15[1]	0.16[1]	**0.55**	0.10[1]	0.22[1]	0.22[1]	0.16[1]	0.17[1]	**0.59**
AVE	0.66	0.63	0.65	0.65	0.65	0.30	0.71	0.65	0.68	0.65	0.65	0.35
CR	0.88	0.77	0.90	0.88	0.88	0.72	0.91	0.79	0.91	0.88	0.88	0.76
R²	0.90	0.48	0.90	0.76	0.79	0.39	0.92	0.52	0.85	0.75	0.68	0.49

Source: research data
Note: (1) p<0.01, (2) p<0.05

The determination coefficient R² indicates that the structural model kept the same predicting ability observed in the previous section, even carrying out the analysis from distinct groups. Even though some parameters have indicated differences (Figure 5) regarding the relationship between the constructs of satisfaction, the outcome among the structural coefficients was not significantly different. Business and Accounting students presented similarities as to the reliability that the employment of e-learning platform throughout the Distance Education course favored the learning due to the tuning in the interactivity between tutors, professors, students and technical staff and to the academic services, as shown in hypothesis 1_A and 1_B. This cross-evaluation confirms that the student satisfaction in the Performance and Education scope is maximized by the reliability that the intended learning objectives were accomplished.

Similarly, it can be checked in Figure 5 that the students from the Business (ADM) and Accounting (CON) courses show similarities as to the association between the satisfaction in the Performance and Education scope. This finding confirms hypothesis 1_C supported in the previous section, which is based on the student reliance regarding the employment of the e-learning platform, as well as on their professional achievements.
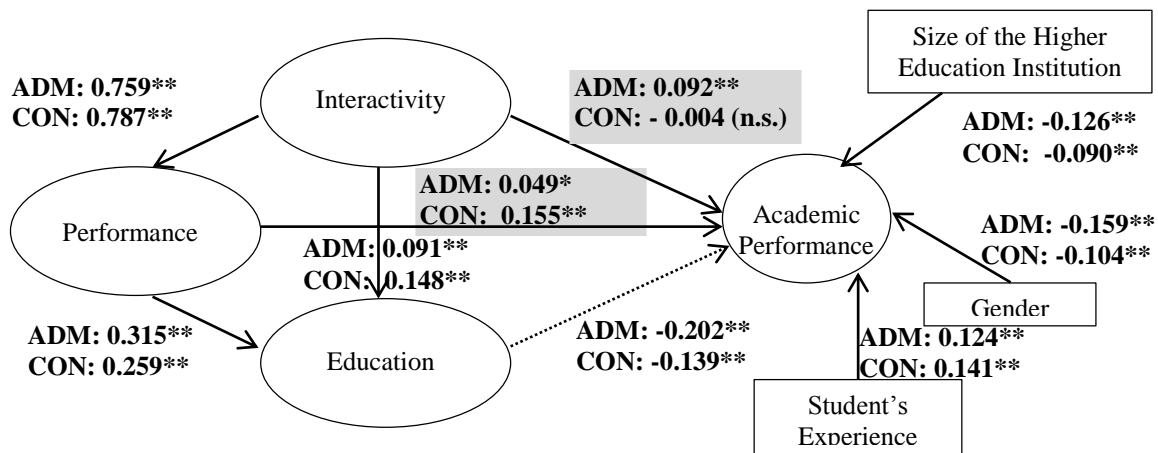

Figure 5 – Structural Model – Business x Accounting
Note: (**) p<0.01; (*) p<0.05; (n.s.) non-significant.

Figure 5 shows that the Academic Performance of Business students from large-sized Higher Education Institutions (H) was lower compared to their pairs in the area (β = -0.126). The effect was relatively higher than the one captured with similar control carried out for Accounting students (β = -0,090). The Academic Performance achieved by women (G) in Business (β = -0,159) and Accounting (β = -0,104) courses was lower than the achieved by men, with a larger difference for the Business courses. Outcomes indicate that student (E) background positively affected the Academic Performance of students, as displayed in Table 6. Results obtained among Business (β = 0,124) and Accounting (β = 0,141) students were higher comparing to other students of each group.

The relationships supported by hypothesis 2_A, 2_B and 2_C do not differ from the outcomes obtained based on Business and Accounting students. This comment is especially valid for the association proposed in hypothesis 2_C, in which the structural coefficient was negative. This finding is confirmed by the result presented in both groups. However, differences were observed between Business and Accounting students regarding the association of the Interactivity and Performance constructs with the Academic Performance construct. Differences presented in Table 6 refer to the

Smith-Satterthwait t-test outcomes. The test assesses the significance of the structural coefficient differences on the grounds of the standard errors obtained by bootstrapping (Velayutham, Aldridge, & Fraser, 2012).

The general assessment model in Business and Accounting groups was of 0.465 and 0.470, similar to the GoF calculated in relation to the sample of 4,529 students (0.467). Although this is an evidence of a proper general assessment of the model, outcomes in Table 6 enable to deduce that the Business and Accounting students are not statistically similar as to the influence of the satisfaction in terms of Interactivity and Performance over Academic Performance. This assertion is reinforced by the relative difference between the determination coefficients of the Academic Performance construct, which was of 0.123 (Business) and of 0.086 (Accounting).

Table 6 – Structural Relationship Comparative: Business and Accounting

Relation	Business			Accounting			Smith-Satterthwaite	
	β	p Value[1]	R^2	β	p Value[1]	R^2	β	p Value
I=>D	0.7585	<0.01	0.575	0.7867	<0.01	0.618	0.0282	0.15
I=>E	0.0911	<0.01	0.150	0.1483	<0.01	0.149	0.0572	0.31
P=>E	0.3148	<0.01		0.2586	<0.01		-0.0562	0.32
I=>AP	**0.0919**	**<0.01**		**-0.0037**	**0.94**		**-0.0956**	**0.05**
P=>AP	**0.0492**	**0.03**		**0.1548**	**<0.01**		**0.1056**	**0.04**
E=>AP	-0.2021	<0.01	0.123	-0.1389	<0.01	0.086	0.0632	0.08
H =>AP	-0.1257	<0.01		-0.0904	<0.01		#	#
E=>AP	0.1239	<0.01		0.1412	<0.01		#	#
G=>AP	-0.1592	<0.01		-0.1037	<0.01		#	#
GoF	0.465			0.470			#	#

Note 1: Bootstrap n=3.532 (Business) and n=955 (Accounting) with 1,000 repetitions.

Satisfaction of Business students in Interactivity scope influenced on their Academic Performance, which was higher (β = 0.0919). More specifically, to recognize that learning expectations were positively complied (indexes LR-I) and that interactivity with the remaining elements of the course was better conducted due to technology use (indexes EE-I), which contributed for Academic Performance increase. On the other hand, the influence of Interactivity on the Academic Performance of Accounting students was not significant. According to Table 6, Smith-Satterthwaite t-test appointed that both groups have differences statistically significant in that relationship (p<0.05).

The usefulness of the e-learning platform, together with the positive results of the professional field (PE-P) and the perception of having enjoyed a proper educational infrastructure (FC-P), showed a contrast to that outcome, thus influencing the Academic Performance of Accounting students (β = 0.154). Results propose that the Academic Performance of this group was higher in cases when the expectations regarding Performance did not confirm or were confirmed with less intensity. There were not similarities in the relationship of those constructs in the case of Business students (p<0.05). Results in Table 6 evidenced that the Academic Performance of Business students was higher among those who marked higher confidence in having their performance favored by the conditions offered by the Higher Education Institution (β = 0.049).

Although differences between the groups have been observed, we confirm the influence of satisfaction in the Interactivity, Performance and Education scopes over the Academic Performance. Thereby, as relevant as the differences observed between the two groups, outcomes suggest that the research theoretical model is consistent to predict part of the Academic

Performance of students on the grounds of their satisfaction with Distance Education. Despite the inverse relationship as to what was proposed in hypothesis 2_C had been identified, it is possible to conceive an association of Education with Academic Performance. Results showed that Social Influence (SI-E) and the other Stimulating Factors (SF-E) were not intervening factors to maximize student satisfaction with the Education scope between the students. However, the influence was characterized. Thus, it is appropriate to assume that a positive association with the Academic Performance might occur in other conditions of offer.

5 FINAL CONSIDERATIONS

This article contributed to improve the understanding of the association between the outcomes of learning and satisfaction in Brazil, both explored by a multidimensional approach. Outcomes propose that aspects related to satisfaction in the Interactivity scope represent dominant intervening factors to determine Academic Performance. Significant differences of that outcome were detected among Business and Accounting students. This implies on stating that the gaps between the desires and the needs of the Accounting student are not being fulfilled properly, most likely due to the simplified use of the e-learning system.

In general, empirical evidences obtained support the hypothesis regarding the positive influence of satisfaction in the scope of Interactivity over Development (H_{1A}) and over Education (H_{1B}), as well as regarding the positive influence of satisfaction in the scope of Performance over Education (H_{1C}). As to the proposals that learning outcomes (AP) are positively affected by the satisfaction in the scope of Interactivity (H_{2A}) and Performance (H_{2B}), the analysis carried out enabled to support the hypotheses as from the sample perception related to experience with Distance Education. Evidences obtained provide insight for further investigations, for which we recommend the use of a longitudinal strategy. Given the fact that the selected graduation areas will be evaluated again in 2015 by ENADE, the questionnaire shall be replicated as from a sample composed by graduating students in 2012 and 2015. In addition, a longitudinal study could be carried out by checking the expectations, *a priori*, of newly admitted students in Distance Education in 2015, to be questioned again in 2018, at the time of course conclusion.

Furthermore, students presenting less affinity with media offered by the Higher Education Institution could have made use of subterfuges to bypass the use of available technological means, and this was not caught in this work. Such might have interfered in the intensity the explored satisfaction might have influenced the academic performance in the evaluated model. In this event, a qualitative exam of the use of technological resources in Distance Education courses can be carried out and the outcomes compared to the findings of this study.

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Appendix

Constructs		Factor Loading	Question	Source	T-value	P-value
Interactivity	1-EE-I	⬆ 0.8437	It was simple to learn how to use the e-learning platform	Venkatesh, Morris, et al. (2003)	140.1742	0.0000
	2-EE-I	⬆ 0.7390	E-learning platform usefulness reduced the effort to perform course activities.		94.0361	0.0000
	3-EE-I	⬆ 0.8138	E-learning platform simplified the interactivity among colleages and professors/tutors (forum, chats, wiki, etc.)		198.0298	0.0000
	4-EE-I	⬆ 0.8697	Guidelines to use the e-learning platform were easy to understand.		165.8644	0.0000
	1-LR-I	➡ 0.6638	Would you do other Distant Education undergraduate course in the same Higher Education Institution?	Sener and Humbert (2003)	68.5512	0.0000
	2-LR-I	⬆ 0.9111	Which grade would you assign to your Distant Education course?		323.4277	0.0000
Performance	1-FC-P	⬆ 0.8171	The e-learning platform of my course contained useful features.	Venkatesh, Morris, et al. (2003)	125.2607	0.0000
	2-FC-P	⬆ 0.8351	The e-learning platform was enough to comply with the objectives of the learning activities.		265.9243	0.0000
	3-FC-P	⬆ 0.8289	Professors/tutors encouraged the participation in the learning virtual environment.		189.824	0.0000
	4-FC-P	⬆ 0.7724	The guidelines of professors/tutors regarding taks/works were sent in proper advance.		67.9488	0.0000
	5-FC-P	⬆ 0.7960	Professors/tutors frequently monitored if I understood the content.		128.0356	0.0000
	1-PE-P	⬆ 0.8701	I was able to achieve my study goals when I studied with the support available in the e-learning platform.		126.4301	0.0000
	2-PE-P	⬆ 0.8234	Flexibility of time to study in the e-learning platform provided winnings in my learning.		134.2327	0.0000
	3-PE-P	⬆ 0.8393	I was able to quickly perform my tasks when I used the resources available in the e-learning platform.		288.5223	0.0000
	4-PE-P	➡ 0.6710	Graduating in Distance Education mode gave me new work opportunities.		64.2908	0.0000
Performance	1-SI-E	⬆ 0.8582	The opinion of my friends was important when I decided to take an undergraduate course in Distance Education mode.	Venkatesh, Morris, et al. (2003)	480.122	0.0000
	2-SI-E	⬆ 0.7770	The opinion of my relatives influenced in my choice of an undergraduate course in Distance Education mode.		102.8585	0.0000
	3-SI-E	⬆ 0.8028	People from my social relations (workmates, friends at church, neighbours, etc.) were studying in Distance Education and that influenced my choice for this mode.		101.4937	0.0000
	4-SI-E	⬆ 0.7722	People whom I admire are enthusiasts of the idea of studying in an undergraduate course in Distance Education mode.		93.0843	0.0000
	1-SF-E	➡ 0.6804	Group works	Sener and Humbert (2003)	73.5786	0.0000
	2-SF-E	➡ 0.5664	A class recorded and available in the internet can be attended at any time.		105.1211	0.0000
	3-SF-E	⬇ 0.3211	A class broadcasted via satellite, with previously defined schedules.		29.3579	0.0000
	4-SF-E	➡ 0.5924	Class/works with on site tutor/professor.		51.7061	0.0000
	5-SF-E	➡ 0.6458	Consult the library.		110.0551	0.0000
	6-SF-E	➡ 0.6772	To carry out the research in the centre lab.		68.7211	0.0000
	7-SF-E	⬇ 0.0385	Other activities		1.3687	0.1714
AP	General Grade	⬆ 1.0000	general grade in ENADE	Islam (2012)	77.2138	0.0000