Academic sectors that interfere with student satisfaction in higher education

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ABSTRACT. Brazilian Higher Education has been increasing mainly with the participation of Private Institutions. Recent data show the high degree of dropout and abandonment by the student, which interferes and affects both the personal, professional and emotional bias of the student, as well as the organizational and financial issues of the institution. Knowing what interferes with student satisfaction is one of the ways to reduce the dropout rate, as well as make the student more engaged in their academic choice. Given this, the present study made a survey of the sectors that should be studied analyzed and interviewed 44 undergraduate students, from the areas of 'Health', 'Human' and 'Exact'. It is noteworthy that several factors interfere with student satisfaction. In this sense, the research had as its main result the category 'Academic', mainly with regard to the 'quality of education' and with the 'professor', but also the 'service', the 'physical structure' and the 'relationship' with the student. As a main result, the 'Academic' and 'Professor' sectors were the main points considered for the satisfaction of the higher education student and the evaluations are spontaneous and influenced by the context.

Keywords: satisfaction in higher education; teaching quality; academic sectors; student assessment; perception of the student.

Setores acadêmicos que interferem na satisfação do aluno no ensino superior

RESUMO. O Ensino Superior Brasileiro vem aumentando, principalmente, com a participação de Instituições Privadas. Dados recentes do MEC demonstram o alto grau de desistência e abandono, por parte do aluno, de sua graduação, o que afeta tanto o viés pessoal, profissional e emocional do discente, quanto nas questões organizacionais e financeiras da Instituição. Saber o que interfere na satisfação do estudante é uma das formas de atuação para reduzir a taxa de evasão, bem como fazer com que o aluno se engaje mais na sua escolha acadêmica. Diante disso, o presente estudo fez um levantamento dos setores que deveriam ser analisados e entrevistou 44 alunos de graduação, das áreas de 'Saúde', 'Humanas' e 'Exatas'. Salienta-se que vários fatores interferem na satisfação do educando. Neste sentido, a pesquisa teve como resultado principal a categoria 'Acadêmica', principalmente no que diz respeito à 'qualidade de ensino' e com o 'docente', mas também se tem destaque para o 'serviço', a 'estrutura física' e o 'relacionamento' com o aluno. Como resultado principal o setor 'Acadêmico' e 'Docente' foram os pontos tidos como principais para a satisfação do aluno do ensino superior e que as avaliações são espontâneas e sofrem influência do contexto.

Palavras-chave: satisfação no ensino superior; qualidade de ensino; setores acadêmicos; avaliação do estudante; percepção do aluno.

Sectores académicos que interfieren la satisfacción del estudiante en la educación superior

RESUMEN. La educación superior brasileña se ha incrementado principalmente con la participación de instituciones privadas. Los datos recientes demuestran el alto grado de abandono y abandono por parte del alumno, que afecta tanto el sesgo personal, profesional y emocional del alumno, como los problemas organizativos y financieros de la institución. Saber qué interfiere con la satisfacción de los estudiantes es una forma de reducir las tasas de deserción escolar, así como lograr que los estudiantes se involucren más en su elección académica. Ante esto, el presente estudio realizó una encuesta de los sectores que deberían ser analizados y entrevistó a 44 estudiantes universitarios de las áreas de 'Salud', 'Humanos' y 'Exactos'. Se enfatiza que varios factores interfieren con la satisfacción del estudiante. En este sentido, la investigación tuvo como resultado principal la categoría 'Académica', especialmente con respecto a la 'calidad de la enseñanza' y el 'maestro', pero

también el 'servicio', la 'estructura física' y la 'relación' con el alumno. Como resultado principal, los sectores 'Académico' y 'Docente' fueron los puntos principales considerados para la satisfacción del estudiante de educación superior y las evaluaciones son espontáneas e influenciadas por el contexto.

Palabras-claves: satisfacción en la educación superior; calidad docente; sectores académicos; evaluación del estudiante; percepción del alumno.

Introduction

Since the 1980s, the concern with service provision has gained evidence, which can be observed by for-profit organizations that began at that time and continue to this day, providing research services to classify, conceptualize or measure the quality of service, with a view to improving competitiveness (Hampton, 1993; DeShields, Kara, & Kaynak, 2005; Petruzzellis, D'uggento, & Romanazzi, 2006).

However, little has been studied about customer satisfaction in higher education institutions, as stated by Peng and Samah (2006). About this issue, research by Elliott and Shin (2002) emphasize that student satisfaction can be a competitive advantage; this satisfaction is being shaped and influenced continuously by repeated experiences on campus and also within the classroom.

In the Brazilian scenario, there is an evasion rate of one quarter, reaching courses with more than fifty percent evasion (Ministry of Education [MEC] & National Institute of Educational Studies and Research Anísio Teixeira [Inep], 2017). In parallel, Silva Filho, Motejunas, Hipólito, and Lobo (2007, p. 642) comment that "[...] dropout is certainly one of the problems that afflicts educational institutions in general. The search for causes has been the subject of much educational work and research [...]". This is an international level obstacle, causing social, academic and economic waste and creating idleness in the system. From a public perspective, it is an investment with no return, from a private perspective it is a loss of revenue. It is noteworthy that the authors' analysis refers to the period from 2001 to 2005, and there was already a high dropout rate, with the private sector having an average rate of 26 against 12% of the public rate.

Santana (2016) made an analysis of what could have caused the evasion of undergraduate students from federal universities, with the main results of incoming students: dreams, motivation, the future, profession and society itself and demotivating dropouts.

This implies an educational context characterized by a high dropout rate and a challenging market, but very much based on the perception and feelings of the students. As a result, Higher Education Institutions (HEIs) are aware of this factor. In addition, positively satisfied students tend to be more motivated in their studies, also interfering in their retention, in order to reduce recruitment efforts.

There is already consistent evidence about the relationship between the general perceived service and the satisfaction of the experience by the customer (Ham & Hayduk, 2003; Bigné, Moliner, & Sánchez, 2003). That is why it is important to align the expectations of the two participants in the process: student-institution. In this sense, Cheng and Tam (1997) conclude that institutions can attract and retain students by identifying with their actions and by converging to meet their needs and expectations, obtaining more loyal students.

Therefore, an enshrined way in literature for a better understanding of the process is continuous feedback. This procedure is used to provide students with the opportunity to comment on their perceptions and monitor the organization's performance (Leblanc & Nguyen, 1997; Gibson, 2010), making the provision of a better quality service (Athiyaman, 1997), based on analysis of these opinions - which has been the focus of attention of HEIs around the world (Douglas, Douglas, & Barnes, 2006). Consequently, this measurement becomes a way of locating the global, which implies modifying an offer standardized by local specificities, with cooperation between demand and supply, projecting more satisfactory outputs for everyone and adapting to the demand (Jarvis, 2000; Petruzzellis et al., 2006).

The present study aims to analyze which sectors impact the student's perception regarding academic satisfaction in higher education.

The knowledge society

Our current society can be characterized as a 'knowledge society' or 'information society', for having knowledge as a commodity within an economic context and having information as a subjective matter. Where both cases have the possibility of creation, innovation, alienation and manipulation (Demo, 2000). However,

life in society becomes ambiguous, since knowledge becomes a type of power for the cultivation of ignorance or for development and freedom, but it also has innovative effects for the market (Demo, 2000; Bauman, 2008). This takes consumption to different dimensions, including cultural consumption (Rocha & Barros, 2008).

Because consumption is composed of products, services, identities and social relationships, it refers to a system of meaning with an essential symbolic necessity to be met. It is also a code that translates these social relationships, feelings, sense and the elaboration of various dimensions of subjective experiences. Finally, consumption forms a system for classifying things and people, products and services, individuals and groups, being able to always include new elements. That said, the subject must first become a commodity and then be inserted into the society of consumers, which transforms the act of consumption into a social duty (Bauman, 2008; Rocha & Barros, 2008). This act becomes a set of socio-cultural processes that carry out the appropriation and use of products and must be linked to citizenship in order to reposition the market in social, public and private aspects. In this way, it acquires a cognitive, significant and renewing value (Canclini, 1999).

In the academic world, the relationship experience benefits the HEI, the student and society. Having satisfied students, they converge to achieve goals (DeShields et al., 2005). The 'academic experience' consists not only of the teacher-student-class experience, but also other aspects of university life, such as administrative practices, physical characteristics, academic facilities, the social environment and the 'counseling' support (Leblanc & Nguyen, 1997; Sohail & Shaikh, 2004; Thomas & Galambos, 2004; DeShields et al., 2005; Gibson, 2010). In this particular case, paying students can be considered as consumers who must contribute in partnership with their institution (Wilkins, Butt, Kratochvil, & Balakrishnan, 2016). Therefore, the academic program is a part of the product of an HEI, which is the sum of academic, social, physical results and student expectations. Promptly, these perspectives confirm the view of education as an act of consumption.

As seen, this is a market segment that has social, cultural and commercial aspects. Unlike other types of consumption, educational consumption encompasses expectations, dreams, time and knowledge. The evasion, in addition to resulting in personal frustrations and the losses already mentioned, can compromise, in a private network, compromise the financial health of the company and generate idleness in the system. The private sector has maintained almost a quarter of egress for more than a decade. However, methods of analysis of understanding student satisfaction can assist in monitoring contingency actions in this scenario.

Regarding this aspect, satisfying customers is a solid fundamental principle, however, many of the measurement methods used do not assertively address which customer evaluations are being measured. The more distorted the evaluations, the greater the divergence with reality, the more fragile the analysis is, consequently, the strategic direction is compromised and the core of the issue is underestimated. However, it is known that just the act of researching customer satisfaction alone increases satisfaction, regardless of the product or service being analyzed (Peterson & Wilson, 1992).

In the face of the exposed, understanding the measurement methodologies related to the satisfaction of the students already published becomes a relevant factor in this context. Elliott and Shin (2002) carried out a study to analyze these methodologies in American HEIs. In their research, they understood that the verification is subtle and complex. It is based, in most cases, on a rating scale of a single item on which students must evaluate by rating how satisfied or dissatisfied they are. This method has a weakness of not offering qualitative attributes for the educational experience or the quantitative degree for each educational criterion that resulted in the general assessment.

This type of evaluation is based on comparisons of the previous expectations of the results obtained with the perceived performance, which makes its base of analysis a cognitive process. This implies that past experiences, by word of mouth, the implicit or explicit promises of the service and personal needs influence the desired service (what customers really want). Situational factors, the expected service (what customers believe will probably happen), the way to approach and solve problems or unplanned situations and the perceived service alternatives influence the expectation of the adequate service, in the pattern that consumers are willing to accept (Zeithaml, Berry, & Parasuraman, 1993). Therefore, the perceived value has a real influence on consumer behavior, with the existence of a quality-satisfaction-value-loyalty chain (Gallarza & Saura, 2006) and it is this perception that should be of interest for analysis (Hill, Lomas, & MacGregor, 2003).

Nevertheless, these same students may not fully reflect on their answers or be able to recall several items that they have evaluated. Or, they can make the assessment based on memories triggered in this judgment process. This implies the possibility of answering the questions according to a memory, of a positive or negative experience that may or may not have been relevant in the process (Elliott & Shin, 2002). In this sense,

investigating students' expectations is important even when their memory or when their explicit memories have flaws. The previous expectations must be managed for greater accuracy and precision of the recall in the face of satisfaction, having as a challenge the convergence of experiences among the learners (Appleton-Knapp & Krentler, 2006). It is evident that the results must be analyzed from the perspective of customer standards, as inconsistencies in perceptions between professionals and consumers can result in dissatisfaction and interfere in the construction of the relationship (Swartz & Brown, 1989).

Higher education and its perception of quality

Service quality is an abstract and imprecise construct because of three unique characteristics of this type of product: (1) intangibility, (2) heterogeneity and (3) inseparability between production and consumption. So that what is perceived by consumers happens according to a comparison between what they feel that companies should offer (the expectations) in the face of their perceptions of what was offered. An addendum in this context is that expectations for satisfaction imply the predictions made by consumers about what is likely ahead of consumption. For quality of service, expectations are seen as consumers' wishes or needs that professionals must offer (Parasuraman, Zeithaml, & Berry, 1985; 1988).

From this perspective, it can be seen that the base for measuring the proposal is the divergence between the ideal and the actual development. For Swartz and Brown (1989), the service, when provided, involves the professional and the client, since both have an inherent perception of quality. In the provision of the experience occurs that results in the perceived quality of the service. While in the process, four gaps in perception may occur: (1) from the client their self, in which their expectations and experience do not match, (2) the client's expectation before the 'provider' of the service, (3) the customer experience in the face of the supplier's perception of the customer experience and (4) the professional's experience and expectation in relation to the customer's expectation. I the last one, a great divergence between what professionals think about consumers 'opinions and what they really perceive from consumers' opinions have been proven. All of these gaps generate dissatisfaction. Parasuraman et al. (1988) argues that satisfaction is an emotional reaction that is related to a specific transaction after an experience.

Within this logic Zeithaml et al. (1993) shaped the quality of service and demonstrated that between the desired service and the one acquired, there is a zone of tolerance, which together portray the expected service. There is also the possibility of five different gaps: a (1) difference in experience and expectation, (2) discrepancy in marketing management in service specification, (3) delivery, (4) communication and (5) service design. The service gap expected for the perceived is what will indicate the degree of perceived superiority or inferiority, which the authors call the Perception of Quality of Service (PQS). Athiyaman (1997) defines PQS as the global assessment of the goodness or badness of a product or service, being a short-term attitude resulting from a consumer experience. In the case of higher education, being an important influence on communication behavior in post-enrollment.

According to Peterson and Wilson (1992), true satisfaction is intertwined with intrapersonal characteristics (such as mood), context and methodological considerations, therefore raising another point that is the method of applying the methodology. This implies that the way the questions are asked, the measurement time, the method of collection, among other factors can significantly influence the results. They also point out that more effort is needed to improve this form of analysis and measurement. In continuation of this study, Hampton (1993) found three independent and significant factors in the educational field, in order of importance of service quality and student satisfaction: a (1) educational quality, (2) life on campus and (3) strivings or desires needed to pass the course. They jointly realized that completing studies on personal needs and preparing for a future career have a high relevance in satisfaction. Despite the 'striving to pass' being the least relevant item, it represents a dilemma for HEIs, since the result of changing this item may be the perceived reduction in overall quality. The fact is that students' opinions can change as they graduate and become alumni.

A poor quality perception results in a student who ceases to be an effective member, but remains at the HEI and starts to perform poorly (Aldridge & Rowley, 1998). They express negative opinions and comments about the experiences and the service (Brown & Swartz, 1989). A suggestion to avoid the dissatisfaction of Appleton-Knapp and Krentler (2006) is to ask students to list, at the beginning of the analyzed period, what their expectations are and how they imagine them. With preventive work, these expectations can be aligned and readjusted. Swartz and Brown (1989) suggest that to improve dissatisfaction, one must either: change the behavior of service providers, change customer expectations, or change customer awareness.

Browne, Kaldenberg, Browne, and Brown (1998) concluded in their studies that the recommendation of the HEI by students is strongly influenced by the student's personal interaction with the institution and the overall satisfaction, willingness to refer and valued satisfaction are correlated, to a moderate degree, with the quality of service or product. In the case of the academic world, this implies in the quality and accuracy of the program, but in second place is the student's feelings, including their perception regarding treatment, justice and trust towards the institution.

Several different ways of measuring students' satisfaction were pointed out. Douglas et al. (2006) used the concept of service-product package, along with quadrant analysis, to determine which aspects of university services were most important and the degree that satisfied students. Brandl, Mandel, and Winegarden (2017) analyzed satisfaction through focus groups, which resulted in increased confidence for employees and students and improved communication. Liaw (2008) and Espeland and Indrehus (2003) used standard questionnaires. Thomas and Galambos (2004) used the regression method with decision tree analysis with the Chaid algorithm. Pariseau and Mcdaniel (1997) used the ANOVA method. And Hasan, Ilias, Rahman, and Razak (2008), Parasuraman et al. (1988), Galloway (1998) and Banwet and Datta (2003) used the concept of Servqual, proposed by the authors Parasuraman et al. (1985; 1988), also validated and referenced by Swartz and Brown (1989).

Elliott and Shin's research (2002) showed that the most traditional way of measuring student satisfaction is through single item questions, with binary answers (yes or no) or questions that assess the degree of satisfaction on scales that vary from completely dissatisfied to completely satisfied. In general, this last example comes with a question in the style: 'How would you rate your level of overall satisfaction with your educational level?' Analyzing the issues related to student satisfaction in relation to individual educational attributes in the face of general academic attributes. This implies a simplistic and inaccurate analysis of the educational criteria/aspects that the students consider to be fundamental for their general satisfaction or how they perceive the accomplishment of each attribute.

Therefore, in their analysis, Elliott and Shin (2002) proposed an alternative method to assess student satisfaction that should be of greater value to both: academics and professionals. The suggested approach used educational attributes, the degree of satisfaction with each aspect and the relative importance of each of them, also in scalar response, in the style of the seven-variable Likert scale. The response possibilities ranged from the 'very satisfied' to 'very dissatisfied' scales. Eleven dimensions were evaluated in ninety-three topics, added to three broader initial questions regarding perceived satisfaction. This method measured satisfaction based on the weighted average of the difference between the student's expected performance and real experience. The results analyze the divergence of expectations and reality, the importance of each attribute and the satisfaction itself. And it has resulted in high reliability and high convergence.

To support and understand the factors that influence students in their perceptions, several studies were analyzed regarding this form of satisfaction assessment.

Hill et al. (2003) questioned students about 'what does quality education mean to you?'. Realizing that the teacher's expertise and knowledge within the classroom has a great influence on the answers, as they help learners with enthusiasm and knowledge.

While Thomas and Galambos (2004) reached three measures that most influence general satisfaction, being them: (1) academic experiences, (2) social integration and pre-registration opinions and (3) services and facilities on campus. It was shown that social integration has the most effect on satisfaction, when it comes to students less involved academically. Another relevant factor of the research is that academic experiences differentiate students who are more satisfied with those who are less satisfied, as well as distinguishing the student's relationship with the teaching staff in the classroom. It still counts in its results that academic diversity is more important than demographic diversity; student satisfaction is significantly influenced by pre-university attitudes and on-campus experiences. It was also observed that different perceptions of facilities and services on campus have little influence on the student's variable satisfaction, while the importance of programs that promote social integration with freshmen becomes important, since it increases the sense of belonging.

The studies by Peng and Samah (2006), also analyzing the experiences perceived in the face of expectations, resulted in seven variables that constitute the education service, which are:

1. The content of the course: which encompasses the requirements that are adequate for the course, such as developing skills, career preparation, quality of the course material, usefulness of the program and personal needs;

2. Teacher and Institution: contains the assistance availability offered by HEI's outside of class, the organization of classes, availability of teachers outside class hours, the personal attention that students receive;

3. Evaluation of the course: the student's chances of success if they put in effort, the adequacy of the content offered;

4. The means of instruction: lectures and tasks in compatible language;

5. Social activities: referring to the social activities and events that are offered and that those students can participate in;

6. Concerns for students: availability of 'counselors' where students can ask for help;

7. The facilities: includes the library, leisure environments for students to relax throughout the day, laboratories, availability of computing resources, recreational facilities, and availability for activities in the classroom.

It is emphasized that the analysis is carried out at an institution of Distance Education (DE), which has a bias for the online modules offered. Another study that analyzes the attributes of satisfaction, with an emphasis on educational perceptions and experiences, in the case of students in the business area, is from Gibson (2010). In this study, it was evidenced that the academic factors, such as: (1) teaching quality, (2) curriculum quality, (3) skills and knowledge acquired and (4) achievement of learning objectives are the most significant and determining factors for general satisfaction. Factors such as (5) availability, (6) quality of facilities and services and (7) the capacity and response of the academic and support staff are also important. However, the criterion is composed and influenced by non-academic factors: (8) sense of 'belonging', or degree of social integration, (9) perceptions of the institution's responsiveness and (10) the institution's concern, also has its impact more significant in the analyzed aspect, mainly in larger institutions. The author also points out those non-academic variables often seem to be the cause of student dissatisfaction in the general academic experience and that the variables can be changed according to the type of HEI and student body.

Parasuraman et al. (1985; 1988) separates the quality of service into ten potentially overlapping dimensions: (1) tangibility, (2) reliability, (3) responsiveness, (4) communication, (5) credibility, (6) security, (7) competence, (8) courtesy, (9) customer understanding/knowledge and (10) access. This was the basis for the Servqual methodology, which derived these ten items into five dimensions, which are:

1. Tangibility: physical facilities, equipment and the appearance of employees;

2. Reliability: the ability to deliver the promised service reliably and accurately;

3. Responsiveness: willingness to help customers and provide the service;

4. Guarantee: knowledge and courtesy from employees and their ability to inspire confidence;

5. Empathy: the service, the individualized attention that the company offers to the customer.

The last two dimensions contain seven items of the original dimensions from the service (communication, credibility, security, competence, courtesy, understanding/knowledge of customers and access; Parasuraman et al., 1988).

Hasan et al. (2008) demonstrates the positive relationship between these five dimensions of service quality and student satisfaction. And he concludes that improving the tangibility can potentially improve the disciple's contentment. Of these factors, empathy is the strongest factor, followed by guarantee, tangibility, responsiveness and reliability. The study was conducted in the United States, with two hundred students from private institutions, based on Servqual. The authors Bigné et al. (2003) converge with this study, realizing that these same five dimensions apply in hospitals and higher education institutions.

Furthermore, Leblanc and Nguyen (1997) used 38 items of analysis, also based on the Servqual model, and highlighted the factors below as important items for judging the perception of quality that must be applied throughout the provision of services, namely:

1. Curriculum: course content, program orientation, number of courses offered, degree that the objectives of the programs are explained to students;

2. Physical evidence: classroom layout and lighting, general physical appearance, cleanliness, degree of comfort, decoration and environmental 'atmosphere';

3. Responsiveness: time for making information available to students, assertiveness and accuracy of records;

4. Access to facilities: parking, computers, classrooms and study rooms;

5. Reputation: if the HEI is innovative, it's organizational culture, beliefs, values, the institution's involvement with the community, updating degree of the curriculum, the administrative actions aligned with the students;

6. Management: administration and availability of people, friendliness and cordiality, ability to solve problems when they arise, knowledge of the rules and procedures by employees;

7. Teachers aptitude: teachers aptitude and appearance, friendliness and cordiality of the teaching staff, research productivity; communication skills, academic credentials, whether they are innovators and change managers.

The results of this research suggested the strong relationship between perceived quality and reputation, with work aligned with business management and the faculty behavior, to ensure quality standards. In a more recent survey by Sohail and Shaikh (2004), the variables were reduced to six, which combined the teacher's management and aptitude items into one.

Although the Servqual model has been used in several studies, it has also been criticized by other authors (Buttle, 1996; Asubonteng, McCleary, & Swan, 1996; Pariseu & McDaniel, 1997; Douglas et al., 2006) for not having data associated with expectations, as it is not a model applied to all types of services, such as industrial service, and whether the five elements are independent and sufficient. Another point raised was whether the evaluators' perspective is in line with the research premises. However, all authors recognize this parameter as a valuable methodology for periodic use and service trend analysis, combining ease of application and flexibility.

However, other perspectives were also used. Douglas et al. (2006), in their analysis in England, they suggested introducing pre-established service standards and deadlines, aiming at alignment, the appropriate 'quality standard' and student satisfaction. They also showed that many of the physical aspects of the institution are not important for student satisfaction. So that the most important aspects are related to the main part: the academic service, such as lectures, obtaining knowledge and material delivery. After all, the student can 'tolerate' physical disabilities as long as they perceive the education received to an acceptable level. As an example, if you tolerate wobbly tables in the face of good teaching. In this regard, this research converges to the analysis of other authors (Banwet & Datta, 2003; Hill et al., 2003), however, they emphasize that the conditions within the classroom are those that have the strongest effects in this point of quality perception. However, the physical infrastructure influences the choice of the study location and that large classes can cause dissatisfaction (Douglas et al., 2006).

In the Brazilian scenario, the research by Redin et al. (2015), held in Rio Grande do Sul, where he pointed out that private institutions establish a duality between education, human resources and infrastructure, with many more attributes taken into account than public HEIs. Another relevant fact is that the attributes vary according to the HEI, but the most indicated were: (1) improvement of laboratories, (2) practical experience by teachers and (3) diversity in the teaching method. Nineteen attributes were analyzed, divided into six categories: (1) service, (2), teacher training, (3) teaching methods, (4) attitude, (5) content and (6) infrastructure.

Research published in lower ranking magazines, as in the case of the research by Aldemir and Gülcan (2004), carried out in Turkey, pointed out the items: (1) academic factors, (2) extracurricular factors, (3) expectations and (4) demographic factors, such as factors related to student satisfaction. And he stressed that the main purpose for education in higher education is, in order: the development of intellectual skills, specializing and having a profession, reaching a more prestigious position with a higher status in society and finding a job. The other options were: receiving a diploma, becoming a sociable person and meeting the parent's expectations. In addition, the research by Rastoder, Nurovic, Smajic, and Mekic (2015) addresses nine items (general quality, academic quality of the teaching staff, quality of administrative staff, quality of campus, quality of service, academic programs, personal development, educational facilities and cafeteria), with the quality item of teachers being the most relevant item for students.

Another study carried out in the United Arab Emirates pointed out that culture and social norms vary in different parts of the world, and they influence people's behavior and attitudes. However, it had a convergent result, since the identification of the students with the organization impacted on the commitment and satisfaction of the apprentice, reinforcing the importance of internal marketing and the reputation of the HEI (Wilkins et al., 2016).

In contrast to what was addressed in previous research, Petruzzellis et al. (2006) points out that HEIs should focus their efforts on two main areas: on (1) improving the quality of teaching and not teaching services, focusing on the target; and (2) a stronger relationship with the local economy and the productive system, responding to the demand for careers and skills. It should be noted that the study was carried out in Italian institutions.

In relation to Distance Education (DE), the social side interferes very little in the overall satisfaction of the student, but in contrast of the course structure (the virtual environment), the emotional support or the psychological effect and communication gain more evidence, as well as Inappropriate use of social interaction negatively affects the analysis (So & Brush, 2008; Liaw, 2008). And when approaching more practical courses, such as nursing in Norway, it was noticed that satisfaction was directly linked to clinical practices (Espeland & Indrehus, 2003).

Finally, what strongly brings the authors together (Peterson & Wilson, 1992; Hampton, 1993; Leblanc & Nguyen, 1997; Elliott & Shin, 2002; Gibson, 2010) is the use of more analysis dimensions, more categories of scale and refinement of labels, in addition to the fact that extra academic factors have a strong relationship with student satisfaction (Bigné et al., 2003; Ham & Hayduk, 2003; Petruzzellis et al., 2006; Peng & Samah, 2006; Hasan et al. , 2008; Gibson, 2010). Therefore, the characteristics of this type of service must be based on the delivery of value and long-term interests, for students and for society (DeShields et al., 2005).

Methodology: higher education environments and their satisfaction

It was possible to observe several analysis variables for consumer satisfaction, which varied between authors. Therefore, to validate which area really interferes in the analysis of the perception of satisfaction of students in higher education, presented above, it was possible to concatenate the information and subdivide it into five different categories, being: (1) academic: teaching quality, curriculum quality, academic experiences, academic diversity, content, course curriculum, course evaluation, extracurricular activities and relationship with the market; (2) teacher: knowledge, academic credentials, practical experience, concern and relationship between the faculty and the student, responsiveness, teaching method and research productivity; (3) the student's personal: personal needs, social integration, network, achievement of learning objectives, employability, sense of belonging, emotional support, sense of justice and striving to pass; (4) infrastructure: campus facilities, availability of resources, facilities, leisure, equipment, laboratories, classroom facilities, cleanliness, comfort, decoration, parking, access to facilities and (5) service provision: appearance of employees, reliability, concern for the student's opinion, reputation, quality of service, responsiveness of service, on-time service, courtesy of employees, empathy, life on campus, standardization of service. As summarized in Figure 1.

To validate this information, three classes from different areas were selected, one from 'Humans', one from 'Exact' and one 'Health' from a Higher Education Institution, belonging to one of the largest education groups in Brazil. The classes were selected according to the availability of the teachers and the students' interest in participating. Resulting in the participation of 44 students from the areas: 12 from 'Human'; 17 for 'Health' and 15 for 'Exact'.

The 'Exact' class was more concentrated in the middle of the course, but there were students until the last period. The 'Human' class was at the end of the course and the 'Health' class at the beginning. Therefore, in total there were three focus groups with students from the first to the tenth period, with ages between 18 and 59 years old, who were in their first graduation, like others who came from transference or were doing their second or even third graduation.

The research was divided into two stages: (1) a solo questionnaire followed by (2) a debate in focus groups by area of study. Therefore, an individual questionnaire was passed on, asking about: (1) the sectors that they found most relevant: as a stimulus to enter the research and also to capture some information; (2) what they thought was important in each of the pillars, and they could select as many as they wanted and add options if they noticed an absence of items and (3) make a hierarchy of the five items mentioned in Figure 1.

In the second moment, the focus group had begun, where the three items of the individual questionnaire were discussed together, namely: (1) what they thought was the most important; (2) what they missed and (3) the hierarchy and its justification. In case there was a change in hierarchy, a new question was asked.

The analysis of the results was made from the analysis of the students' speech and the material of the individual questionnaire. It should be noted that this research is under the registration of CAAE number 09062919.3.0000.5666, under opinion 3,272,982.

Academic	Professor	Student's Personal	Infrastructure	Provision of Service
• Quality of Teaching/Education • Curriculum Quality • Academic Experiences • Academic Diversity • Course Content/Curriculum • Course Evaluation • Extra-curricular activities • Relationship with the market	• Knowledge • Expertise - Academic Credentials • Practical Experience • Student Faculty Relationship/Concern with Faculty • Responsiveness • Instructional media/teaching method • Research Productivity	• Personal Needs • Social Integration • Network • Achievement of Learning Goals / Objectives • Employability • Sense of Belonging • Emotional support • Sense of fairness • Striving to pass	• Accessibility to Facilitiess • Availability of resources • Leisure facilities • Equipment • Laboratories • Classroom facilities • Cleanliness • Comfort • Decoration • Parking • Access to facilities	• Appearance of the employees • Reliability • Concern for student opinion • Reputation • Quality of service • Responsiveness of service • Attendance of deadlines • Courtesy of staff • Empathy • Campus Life • Standardization of service

Figure 1. Items for the analysis on student perception and satisfaction. Source: the authors.

Results and discussion

They were asked individually which sectors they thought were important when analyzing satisfaction in higher education and the biggest highlight was the teachers (along with the faculty) followed by the attention and assistance to students and physical structure. Figure 2 presents the answers in a word cloud.
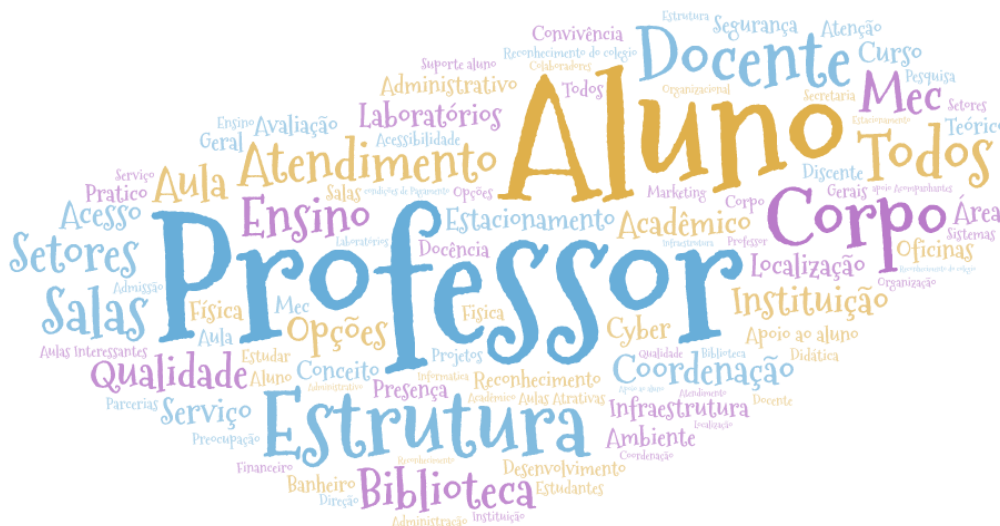

Figure 2. Items for analyzing student perception and satisfaction. Source: the authors.

It is possible to observe the emphasis given to the professor, to the student, followed by the structure, service and teaching.

In the second object of analysis, the five categories shown in Figure 1 were presented and analyzed item by item, in which the interviewee could rate what they considered most relevant without limits of answers and could also add items.

In the 'Academic' part, 'Quality of Education' was the highlight, followed by 'Relationship with the market'. The students added some points such as 'Service - Attending' and 'Infrastructure', which are items that are present at another point in the analysis. There was also the addition of 'Practical workshops', which is implicit in the item 'Extracurricular activities'. 'Academic diversity' was the least important from the students "point of view", despite the fact that academic experiences ranked second. Figure 3 shows the analysis of the students' individual responses structured.

In the two moments of the interview and in the focus group, the 'employability' issue was discussed, with an emphasis on making the professional well-structured in the market and the issue of extra-class events. In one of the focus groups the 'course coordination' was another analyzed point, along with the awareness that this item was missing in the academic part more clearly.
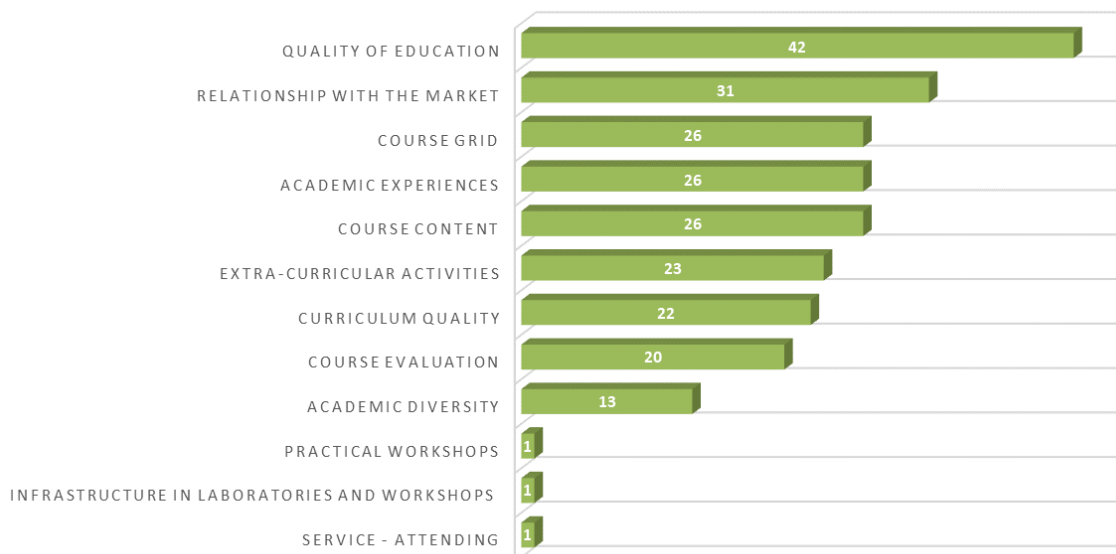
Figure 3. Important points in the academic analysis of an HEI. Source: the authors.

Another point analyzed in the group debates was the more in-depth assessment of the students' opinions and the institution's incentives to motivate students for scientific initiation programs. Finally, in the 'Academic' category, the need for a more practical course, more technical visits, with faster content updates in line with market changes was highlighted. In addition to the importance of the Final Paper and Internships. The students recognized that the MEC score is an important criterion in choosing the HEI together with the reputation in the market, but this is more present at the moment of choice, because during the course this was not 'so important'.

When analyzing the 'Professor' category, 'Teaching method' was the main highlight, followed by 'Practical experience' and 'Knowledge'. The least relevant to the student's perception was 'Research productivity'. Figure 4 shows these responses. It was shown that, depending on the methodology, there is a lack of interest from the student, as well as an influence of the time per class in the face of the students' attention. In the individual moment and in the group debates, the 'Engagement' of the faculty was also brought up, including punctuating the reflection on the students and on the ease of learning together with the 'class methodology'. However, the main point was the mastery of the subject by the teacher and the students in the classroom and the compliance with the teaching hours of the beginning and end of classes, as well as the schedule. It was also commented on the material supplies, like the handouts, but the conclusion reached was that this was not the professor's obligation, but it would be good to obtain technical support from the HEI or the educator regarding this. Still, the degree was seen as something that 'gives reliability' in relation to the teacher, but it is not essential.

In the category of 'Student's Personal', the 'Achievement of learning objectives' was the most prominent, however 'social integration' was almost tied. Thirdly, the 'Sense of justice'. The least important was the emotional support given to students by the HEI, as shown in Figure 5.

In the focus groups, this category did not have strong conscious evidence, but it was implicit in several moments of the debates. In the discussion about the importance of teachers, one of the students mentioned that when the teacher has 'a lively posture', it influences the student to want to go to college more. At other times, the reflection of the 'full or empty' class was in the motivation that the teacher gave the students, as well as in the perception of 'class quality'. This made it possible to understand that if the student understands that it is worthwhile, they endeavor to be present in the room.

From the perspective of 'Infrastructure', 'laboratories' was the main item, followed by 'cleanliness' and 'Library', the least important item was 'Decoration'. The individual responses are shown in Figure 6.

In all focus groups, laboratories gained prominence in the debates. The students mentioned the importance of practical classes, regardless of the area of study, the need they felt and how it influenced in satisfaction. Some comments converged on the idea that this would make them more 'prepared' for the market. One student even said that 'it wasn't enough, it had to appear' and laboratories with updated equipment that the student mastered would directly interfere with this appearance.
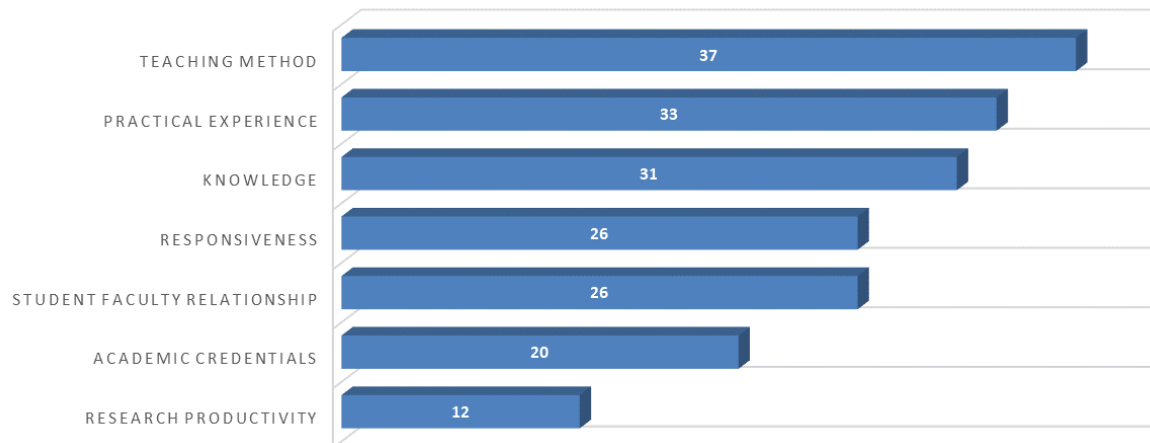
Figure 4. Important points in the analysis of the 'Teacher' of an HEI. Source: the authors.
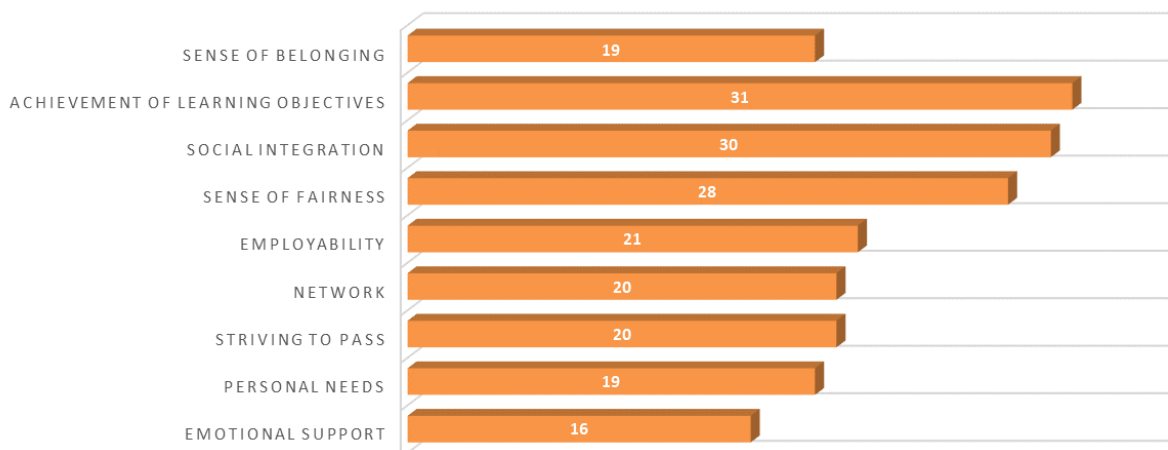

Figure 5. Important points in the analysis of the 'Student's Personal' category. Source: the authors.
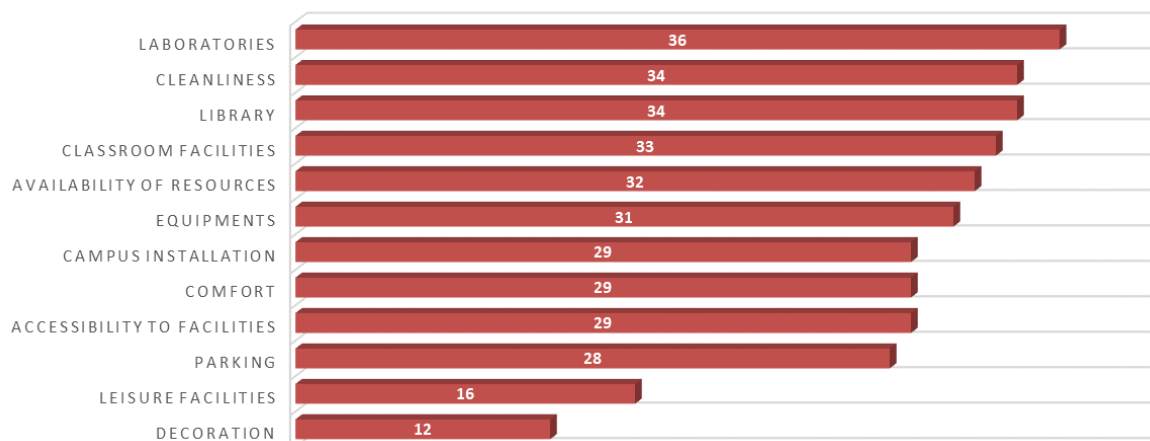

Figure 6. Important points in the 'Infrastructure' analysis. Source: the authors.

Regarding the library, the varied collection, books and structure are attention points, along with a computer lab space for their free demand.

Finally, in the 'Provision of service' category, 'Quality of service' was the main item, followed by 'Reliability' and 'Empathy', where one of the students actually said 'Empathy for the love of G-d'. The least important item was 'Appearance of employees'. Although it does not appear in the graph below, when discussed in groups, the 'Security' factor was much punctuated and from the perspective of the groups this would be the framing category. The individual responses are shown in Figure 7.
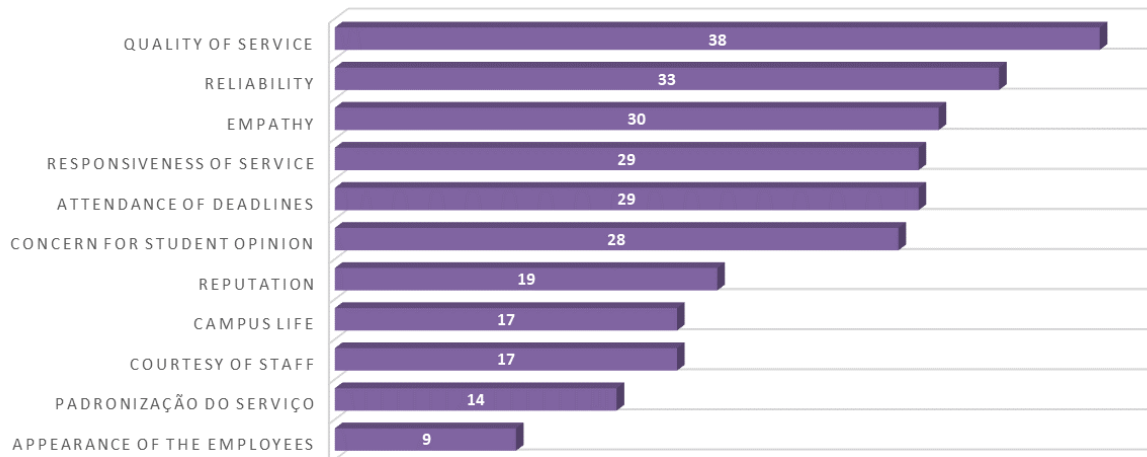
Figure 7. Important points in the 'Service provision' analysis. Source: the authors.

In the focus group, the importance of aligning the speech and the practice of HEI was shown, as this not only confers credibility and security for students, but also interferes with quality. It should be noted that, in this context, the quality perceived by the student is very much talked about. One of the students also stressed that 'quality is to offer the best that the student can', and another one added 'that must be different from the standards, 'do more, under the expectation created'.

From the perspective of the five categories, the hierarchy was: 'Academic' first followed by 'Professor', 'Infrastructure', 'Service Provision' and lastly 'Student's Personal'. Figure 8 demonstrates this data.

In the debates with the students, the importance of the 'Good relationship' between the HEI and the student was highlighted, as well as the concern with their 'Opinion'. The 'teaching methodology' was also highlighted, because when the student feels that it is 'more difficult', it generates the search for more knowledge. Furthermore, the 'organization of the academic schedule' was a subject of debate, from the perspective of how it interferes in the semester and in the personal, professional and the academic schedule of the students.

What is interesting to note is that when the hierarchy was made in a group, this structure changed, even the students themselves recognized this. The optics depended on the context and the examples discussed. When asked if they were influenced by momentary events, consciously the answer was 'no', but in practice there was disagreement. However, when asked if they were influenced by the opinion of 'colleagues', the answer was yes. This was repeated in the three focus groups.
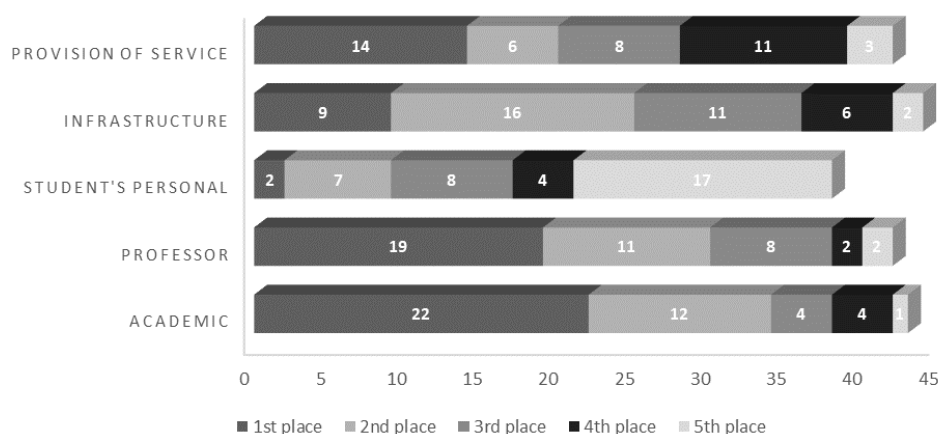

Figure 8. Important points in the 'Service provision' analysis. Source: the authors.

From the perspective of the least important, it was said in the 'Health' group that 'Service' wouldn't be so important. It would be important to enter, but only 'Coordination', 'Finance' and 'Secretary' would be important to 'be here'. Furthermore, the 'organization of the academic schedule' was a subject of debate, from the perspective of how it interferes in the semester and in the personal, professional and academic schedule of the students. For the students of exact, the academic 'organization' has a direct interference in satisfaction, which includes the offerings of subjects for the semester, organization of

subjects in terms of the number of students in the classroom, the overlapping of extracurricular activities with classes, events on the day before a test, the existence of the necessary computer software for the disciplines and the slowness of the machines.

Another point analyzed was the 'teacher's teaching method', where the focus is on the production of the PowerPoint slides, the preparation of the class, the domain and knowing the practice of the subject.

The students mentioned that when it comes to answering the satisfaction survey, they put 'what's on their minds' at the time of the question, with an emphasis on what they are experiencing with the teacher at the moment, which results in spontaneity and the momentary aspect.

The most discussed items in the group were the structure and form of teaching, the faculty, the recognition of the market, the service, and also talked about professional training, coordination, infrastructure, learning and their motivations.

At the end, the 'Academic' section prevailed followed by 'Teacher', 'Infrastructure', 'Service Delivery' and as the last option 'Student's Personal'.

Conclusion

This study is relevant for categorizing what the student understands as important in a Higher Education Institution, with the 'Academic' area as the main category, mainly related to the quality of teaching and the relationship with the market. In second place is the 'Professor', with their teaching methodology, demonstrating the importance of the professional and the professor staff before the institution. Although the item 'Student's personal' was the least important of the five categories, the student, when not emotionally involved, loses interest in learning and ends up becoming unmotivated.

It was also possible to observe that there are many factors that interfere with student satisfaction, but the root factor is within the classroom, that is: in the way in which knowledge is passed on and the student's perception of it with the support. Finally, although it is not consciously perceived by the students, satisfaction is spontaneous and there is much interference, from the relationship and comments with/between professors and students, to the experience on campus.

Once the influence of the moment and the context was found, the work's limitation is a research carried out in a single institution in the same period, therefore leaving as a suggestion the quantitative validation of the result, including other institutions and at different times. .

References

Aldemir, C., & Gülcan, Y. (2004). Student satisfaction in higher education: a Turkish case. *Higher Education Management and Policy, 16*(2), 109-122. doi: 10.1787/hemp-v16-art19-en

Aldridge, S., & Rowley, J. (1998). Measuring customer satisfaction in higher education. *Quality Assurance in Education, 6*(4), 197-204. doi: 10.1108/09684889810242182

Appleton-Knapp, S. L., & Krentler, K. A. (2006). Measuring student expectations and their effects on satisfaction: the importance of managing student expectations. *Journal of Marketing Education, 28*(3), 254-264. doi: 10.1177/0273475306293359

Asubonteng, P., McCleary, K. J., & Swan, J. E. (1996). SERVQUAL revisited: a critical review of service quality. *Journal of Services Marketing, 10*(6), 62-81. doi: 10.1108/08876049610148602

Athiyaman, A. (1997). Linking student satisfaction and service quality perceptions: the case of university education. *European Journal of Marketing, 31*(7), 528-540. doi: 10.1108/03090569710176655

Banwet, D. K., & Datta, B. (2003). A study of the effect of perceived lecture quality on post-lecture intentions. *Work Study, 52*(5), 234-243. doi: 10.1108/00438020310485967

Bauman, Z. (2008). *Vida para consumo: a transformação das pessoas em mercadoria*. Rio de Janeiro, RJ: Zahar.

Bigné, E., Moliner, M. A., & Sánchez, J. (2003). Perceived quality and satisfaction in multiservice organisations: the case of Spanish public services. *Journal of Services Marketing, 17*(4), 420-442. doi: 10.1108/08876040310482801

Brandl, K., Mandel, J., & Winegarden, B. (2017). Student evaluation team focus groups increase students' satisfaction with the overall course evaluation process. *Medical Education, 51*(2), 215-227. doi: 10.1111/medu.13104

Brown, S. W., & Swartz, T. A. (1989). A gap analysis of professional service quality. *Journal of Marketing, 53*(2), 92-98. doi: 10.2307/1251416

Browne, B. A., Kaldenberg, D. O., Browne, W. G., & Brown, D. J. (1998). Student as customer: factors affecting satisfaction and assessments of institutional quality. *Journal of Marketing for Higher Education, 8*(3), 1-14. doi: 10.1300/J050v08n03_01

Buttle, F. (1996). SERVQUAL: review, critique, research agenda. *European Journal of Marketing, 30*(1), 8-32. doi: 10.1108/03090569610105762

Canclini, N. G. (1999). *Consumidores e cidadãos: conflitos multiculturais da globalização* (4 ed.). Rio de Janeiro, RJ: UFRJ.

Cheng, Y. C., & Tam, W. M. (1997). Multi-models of quality in education. *Quality Assurance in Education, 5*(1), 22-31. doi: 10.1108/09684889710156558

Demo, P. (2000). Ambivalências da sociedade da informação. *Ciência da Informação, 29*(2), 37-42. doi: 10.1590/S0100-19652000000200005

DeShields, O. W., Kara, A., & Kaynak, E. (2005). Determinants of business student satisfaction and retention in higher education: applying Herzberg's two-factor theory. *International Journal of Educational Management, 19*(2), 128-139. doi: 10.1108/09513540510582426

Douglas, J., Douglas, A., & Barnes, B. (2006). Measuring student satisfaction at a UK university. *Quality Assurance in Education, 14*(3), 251-267. doi: 10.1108/09684880610678568

Elliott, K. M., & Shin, D. (2002). Student satisfaction: an alternative approach to assessing this important concept. *Journal of Higher Education Policy and Management, 24*(2), 197-209. doi: 10.1080/1360080022000013518

Espeland, V., & Indrehus, O. (2003). Evaluation of students' satisfaction with nursing education in Norway. *Journal of Advanced Nursing, 42*(3), 226-236. doi: 10.1046/j.1365-2648.2003.02611.x

Gallarza, M. G., & Saura, I. G. (2006). Value dimensions, perceived value, satisfaction and loyalty: an investigation of university students' travel behaviour. *Tourism Management, 27*(3), 437-452. doi: 10.1016/j.tourman.2004.12.002

Galloway, L. (1998). Quality perceptions of internal and external customers: a case study in educational administration. *The TQM Magazine, 10*(1), 20-26. doi: 10.1108/09544789810197774

Gibson, A. (2010). Measuring business student satisfaction: a review and summary of the major predictors. *Journal of Higher Education Policy and Management, 32*(3), 251-259. doi: 10.1080/13600801003743349

Ham, L., & Hayduk, S. (2003). Gaining competitive advantages in higher education: analyzing the gap between expectations and perceptions of service quality. *International Journal of Value-Based Management, 16*(3), 223-242. doi: 10.1023/A:1025882025665

Hampton, G. M. (1993). Gap analysis of college student satisfaction as a measure of professional service quality. *Journal of Professional Services Marketing, 9*(1), 115-128. doi: 10.1300/J090v09n01_10

Hasan, H. F. A., Ilias, A., Rahman, R. A., & Razak, M. Z. A. (2008). Service quality and student satisfaction: a case study at private higher education institutions. *International Business Research, 1*(3), 163-175. doi: 10.5539/ibr.v1n3p163

Hill, Y., Lomas, L., & MacGregor, J. (2003). Students' perceptions of quality in higher education. *Quality Assurance in Education, 11*(1), 15-20. doi: 10.1108/09684880310462047

Jarvis, P. (2000). The changing university: meeting a need and needing to change. *Higher Education Quarterly, 54*(1), 43-67. doi: 10.1111/1468-2273.00144

Leblanc, G., & Nguyen, N. (1997). Searching for excellence in business education: an exploratory study of customer impressions of service quality. *International Journal of Educational Management, 11*(2), 72-79. doi: 10.1108/09513549710163961

Liaw, S.-S. (2008). Investigating students' perceived satisfaction, behavioral intention, and effectiveness of e-learning: a case study of the Blackboard system. *Computers & Education, 51*(2), 864-873. doi: 10.1016/j.compedu.2007.09.005

Ministério da Educação [MEC], & Instituto Nacional de Estudos e Pesquisas Educacionais Anísio Teixeira [INEP] (2017). *MEC e Inep divulgam dados do censo da educação superior 2016*. Brasília, DF: MEC/Inep.

Parasuraman, A., Zeithaml, V. A., & Berry, L. L. (1985). A conceptual model of service quality and its implications for future research. *Journal of Marketing, 49*(4), 41-50. doi: 10.1177/002224298504900403

Parasuraman, A., Zeithaml, V. A., & Berry, L. L. (1988). SERVQUAL: a multiple-item scale for measuring consumer perceptions of service quality. *Journal of Retailing, 64*(1), 12-40.

Pariseu, S. E., & McDaniel, J. R. (1997). Assessing service quality in schools of business. *International Journal of Quality & Reliability Management, 14*(3), 204-218. doi: 10.1108/02656719710165455

Peng, P. J., & Samah, A. J. A. (2006). Measuring students' satisfaction for quality education in a e-learning university. *Unitar e-Journal, 2*(1), 11-21.

Peterson, R. A., & Wilson, W. R. (1992). Measuring customer satisfaction: fact and artifact. *Journal of the Academy of Marketing Science, 20*(61), 61-71. doi: 10.1007/BF02723476

Petruzzellis, L., D'uggento, A. M., & Romanazzi, S. (2006). Student satisfaction and quality of service in Italian universities. *Journal of Service Theory and Practice, 16*(4), 349-364. doi: 10.1108/09604520610675694

Rastoder, A., Nurovic, E., Smajic, E., & Mekic, E. (2015). Perceptions of students towards quality of services at private higher education institution in Bosnia and Herzegovina. *European Researcher, 101*(12), 783-790. doi: 10.13187/er.2015.101.783

Redin, E., Reimche, G. B., Lixinski, G. M., Stivanin, J. B., Silva, E. I., & Quadros, C. (2015). Satisfação de discentes sobre a formação técnica e profissional em instituições pública e privada (Rio Grande do Sul, 2013). *Holos, 3*, 166-181. doi: 10.15628/holos.2015.1771

Rocha, E., & Barros, C. (2008). Entre mundos distintos: notas sobre comunicação e consumo em um grupo social. In M. A. Baccega (Ed.), *Comunicação e culturas do consumo* (p. 186-202). São Paulo, SP: Atlas.

Santana, O. A. (2016). Evasão nas licenciaturas das Universidades Federais: entre a apetência e a competência. *Educação, 41*(2), 311-327. doi: 10.5902/1984644420199

Silva Filho, R. L. L., Motejunas, P. R., Hipólito, O., & Lobo, M. B. C. M. (2007). A evasão no ensino superior brasileiro. *Cadernos de Pesquisa, 37*(132), 641-659. doi: 10.1590/S0100-15742007000300007

So, H.-J., & Brush, T. A. (2008). Student perceptions of collaborative learning, social presence and satisfaction in a blended learning environment: relationships and critical factors. *Computers & Education, 51*(1), 318-336. doi: 10.1016/j.compedu.2007.05.009

Sohail, M. S., & Shaikh, N. M. (2004). Quest for excellence in business education: a study of student impressions of service quality. *International Journal of Educational Management, 18*(1), 58-65. doi: 10.1108/09513540410512163

Swartz, T. A., & Brown, S. W. (1989). Consumer and provider expectations and experiences in evaluating professional service quality. *Journal of the Academy of Marketing Science, 17*(2), 189-195. doi: 10.1007/BF02723377

Thomas, E. H., & Galambos, N. (2004). What satisfies students? Mining student-opinion data with regression and decision tree analysis. *Research in Higher Education, 45*(3), 251-269. doi: 10.1023/B:RIHE.0000019589.79439.6e

Wilkins, S., Butt, M. M., Kratochvil, D., & Balakrishnan, M. S. (2016). The effects of social identification and organizational identification on student commitment, achievement and satisfaction in higher education. *Studies in Higher Education, 41*(12), 2232-2252. doi: 10.1080/03075079.2015.1034258

Zeithaml, V. A., Berry, L. L., & Parasuraman, A. (1993). The nature and determinant of customer expectation of service. *Journal of the Academy of Marketing Science, 21*(1), 1-12. doi: 10.1177/0092070393211001

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