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## PERCEIVED SERVICE QUALITY AND STUDENTS' SATISFACTION IN HIGHER EDUCATION: THE INFLUENCE OF TEACHING METHODS

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**Abstract:** *The main aim of this research was to study the relationship between perceived quality (PQ) and satisfaction in Higher education, and especially to identify if these variables could differ between groups of students exposed to different teaching methods. A quantitative study was conducted at a Portuguese Faculty of Health Sciences, through a survey applied to a final sample of 359 students. Data analysis was performed through a structural equation model, using, for this purpose, the PLS method. Results confirm that PQ is positively related to students' satisfaction in the Higher Education Institutions (HEI) context, and that PQ and satisfaction are significantly different when students are exposed to different teaching approaches. Although there is a substantial body of evidence regarding teaching methods in HEI, to our knowledge there is no reliable prior study that explicitly approached the influence of alternative teaching methods on students' satisfaction and their perception of service quality.*

**Keywords:** *Higher Education, Perceived Quality, Satisfaction, Teaching Methods*

## 1. Introduction

More and more, higher education institutions (HEI) have to deal with higher competition for international students, lower government funding, and growing pressures for research outputs, among other issues (Biggs, 2003), especially universities largely dependent on income from teaching, with weaker market positions (Temple et al., 2016).

Globalization in education has encouraged greater competition among institutions, and HEI are realizing the significance of stakeholders' expectations in their strategic

decision-making process. In such increasingly competitive environment, improving and maintaining a competitive advantage is a difficult task (Cubillo-Pinilla et al., 2009), and it becomes important to study thoroughly the factors allowing HEI to attract and retain students, especially considering the many options open to them (Markovi, 2005). Because most institutional revenues are enrollment-related, poor student recruitment and/or poor retention in HEI delivering poor quality services and poorly positioned to recruit students, may represent a competitive disadvantage in today's enrollment markets compared to their high quality counterparts, and result in high rates of student dissatisfaction, and thus jeopardize institutions' financial health

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(Zammuto et al., 1996).

HEI have responded to such a competitive environment by introducing greater efficiency and accountability measures, leading to alternative styles of governance emerged in HEI, characterized by a greater emphasis on outcomes as quality improvement and performance, in line with the main principles of the New Public Management (NPM) approach. Related to public organizations' adoption of management practices, organizational structures, as well as efficiency and accountability principles, generally associated with private organizations (Deem, 1998), New Public Management in HEI represents a significant shift from a culture essentially grounded on intellectualism and freedom of ideas to a management control-based culture (Taylor, 1999), where most HEI have to respond to market pressures by centralizing services, standardizing procedures, and strengthening management controls over teaching processes (Temple et al., 2016).

In such a context, it is vital for HEI to actively monitor service quality and safeguard the interests of stakeholders in general (e.g. students, parents, government, professional bodies), through fulfilling their real needs and desires, and especially regarding students (Al-alak, 2009). As highlighted by Marzo-Navarro, Pedraja-Iglesias, Rivera-Torres (2005), positive perceptions of service quality may lead to students' satisfaction, that in turn can lead to students' return to the HEI to attend different and/or further courses, as well as to new students' attraction (e.g. through word-of-mouth). Indeed, many studies have been undertaken to understand how students perceive service quality, and how student satisfaction is influenced in the context of HEI; organizational image, access and convenience to facilities, fees, programs provided, interaction with staff, are examples of factors that have been extensively studied. Although student satisfaction is generally

associated with university staff, systems and procedures and support mechanisms, several empirical studies have highlighted the importance of students' perceptions of their learning process in determining student satisfaction, concluding that the perceived quality (PQ) of education received and classroom experiences are key determinants of student satisfaction (e.g. Elliott & Healy, 2001). For example, Hill, Lomas, and MacGregor (2003) found that student satisfaction was highly influenced by the quality of lecturers, especially concerning issues as delivery in the classroom, feedbacks to students during the session and in assignments, relationship with students in the classroom.

Indeed, there is ample anecdotal evidence that teaching processes may influence somehow students' perception about service quality, and thus their satisfaction. For example, Hill (1995) found that negative results emerged in terms of academic service factors, including course content, teaching quality, teaching methods. According to Voss, Gruber, and Szmigin (2007), lecturers' ability to choose the most suitable teaching approach is important to students, as lecturers can then offer interesting lessons, which result in students being observant and paying higher attention (attentiveness).

Nevertheless, although there is a substantial body of evidence regarding teaching methods in HEI, to our knowledge there is no reliable prior study that explicitly approached the influence of alternative teaching methods on students' satisfaction and perceived service quality. To date most of the literature on teaching methods has focused on effectiveness (e.g. Lee & Li, 2008), and outcomes issues (e.g. Wang & Liao, 2013).

Considering that new generation students have more and more influence and greater awareness as consumers, becoming more interactive and selective (Petruzzellis et al., 2006), it is surprising that limited research has been done to clarify these issues. Our

study aims to help in filling this research gap and add to the knowledge base of teaching methods, service quality, and students' satisfaction. Based on the above reasoning, the main aim of this research was to *i*) study the relationship between perceived quality (PQ) and satisfaction, and to *ii*) study whether perceived quality and satisfaction, and the relationship between them, differ between groups of students exposed to different teaching methods.

In an effort to address such research objective, we conducted a students' survey applied at the Faculty of Health Sciences of the University of Beira Interior in Portugal (hereafter referred to as FHS-UBI), pioneer in Portugal in using a problem-based learning (PBL) approach in the Integrated Master in Medicine, applying "teaching by objectives" and student-centered methods, while the other courses provided in the faculty are still using traditional didactic teaching methods. This research is innovative because the study allowed a comparison of students' perceived quality and satisfaction, as well as the relationship between them, between students from different courses and exposed to different teaching methods.

Findings show that perceived service quality influences students' satisfaction, and confirm significant differences regarding perceived service quality and satisfaction in the HEI context, between students exposed to different teaching approaches.

In addition to this introduction, the paper goes on with a second section focused on the theoretical background and hypotheses development, highlighting significant issues regarding the importance of quality in HEI, students' perceived service quality, the relationship between students' perceived quality and satisfaction, and the potential influence of teaching methods on students' perceived quality and satisfaction. The third section describes the research's methods, including data collection, measurements, and statistical procedures. Section four highlights

and discusses the main results of the empirical study. Finally, the last section concludes the research, presents the main theoretical and practical contributions together with some limitations, and makes some suggestions for further research.

## **2. Theoretical background and hypotheses development**

### **2.1. The importance of quality in higher education**

In recent decades, various factors have contributed to increasing concern about quality in HEI, leading to the emergence of measures and improved mechanisms such as indicators of institutional performance, accreditation, programs and assessment, and quality audits, with attempts to import models from the private sector to HEI contexts (Rosa et al., 2012). The internationalization of higher education (Sultan & Wong, 2010), the growing number of private universities (Halai, 2013), and the reduction of governments funding for public education (Quinn et al., 2009) are examples of such factors. As highlighted by Oldfield & Baron (2000), it becomes more and more obvious that the institutions operating in the higher education sector, previously considered as non-profit organizations, are trying to gain competitive advantages over their competitors, and as a result, should be considered as for-profit organizations operating in a competitive market. Despite the ongoing debate about the applicability of quality management principles, methodologies and tools in the higher education context, Khan et al. (2011) refer that higher education is currently considered as a business, and that many business concepts and theories are already applied in this sector too. Therefore, such as business organizations that are under strict obligation to constantly satisfy their customers, in order to thrive (Calvo-Porrall et al., 2013), HEI need to continuously satisfy their students

(Srikanthan & Dalrymple, 2007), providing high-quality educational services (Teeroovengadam et al., 2016).

The interest in service quality in the higher education context began in the 80s, and increased in the 90s. Such growing importance is motivated by the need felt by HEI to cope with a series of factors related to budget deficit and enormous pressure from their stakeholders who demand continuous updating and improvements in service quality (Pariseau & McDaniel, 1997).

## 2.2. Higher education students and perceived quality

A large debate has been conducted on students' ability to be, or not, legitimate referees concerning teaching quality. The general feeling is that students are sources of rational and credible evidence, because they are exposed to several educational experiences, and thus they are certainly qualified to express their satisfaction or dissatisfaction concerning their personal experience (Braskamp & Ory, 1994).

In the higher education context, service quality is defined by O'Neill & Palmer (2004) as the difference between what students expect to receive and their perceptions of what they actually receive. According to literature, service quality in higher education is a complex and multifaceted issue and, as highlighted by Sultan and Wong (2010), should be considered as a contextual issue. Zeithaml et al. (2009) posit that customers do not perceive service quality from a one-dimensional perspective, but make a judgment based on various relevant factors depending on the context being analysed. In summary, findings point out that perceived service quality between different groups is not equal and may vary even within the same group (for example, in different periods), and support the idea that service quality depends on specific contexts, changing

according to students' environment (e.g. place, people).

Highlighting the idea that, considering the own characteristics of services, and despite the recognized importance of PQ, many researchers had found difficult to define and measure service quality, especially regarding intangibility. Parasuraman, Zeithaml and Berry (1985) proposed the SERVQUAL model, a framework based on a multiple-item scale for measuring service quality (also referred to as "GAP model"), which stems from the earlier study performed by Grönroos (1984), identifying ten determinants of service quality that could be applied to most service organizations (tangibility, reliability, responsiveness, courtesy, communication, competence, credibility, access, understanding and security). These ten dimensions were then be regrouped into the well-known five dimensions model (Parasuraman, Zeithaml and Berry, 1988): Tangibility, Trustworthiness, Response Capacity, Empathy, and Guarantee.

Cronin and Taylor (1992) were one of the first authors to criticize reliability and validity of the SERVQUAL model, and developed the SERVPERF model. Other researchers, such as Kuo and Ye (2009) refer to SERVQUAL as a popular instrument for assessing service quality in HEI, but say that SERVPERF can be a more appropriate scale as it measures customers' real perceptions of the service consumed, whereas SERVQUAL assesses the difference between customers' expectations and their perceptions regarding the service provided. Kuo and Ye (2009) corroborate this opinion, alleging that in this area, students will assess their educational experience based on their current experience; expectations will be influenced by real situations experienced by students during the long period spent in education. For this reason, both the former and the latter authors recommend collecting perceptions as a measure of PQ, rather than the difference between expectations and perception as proposed in the original SERVQUAL model.

In addition to SERVPERF, several other models were also developed. However, despite the criticisms levelled at the model, the SERVQUAL is still the approach most commonly used for assessing service quality, and several studies have successfully applied the SERVQUAL model across a wide variety of industries, including public service institutions, such as in healthcare, local authorities, and especially in higher education.

The perceived service quality is defined as a set of products or services' functions and characteristics with the capacity to satisfy customers' explicit or implicit needs (Johnson & Winchell, 1988). The PQ of service is a cognitive process of evaluating quality, which means that assessing service quality is a psychological result of perception, learning, reasoning and comprehension of the service attributes (Sultan & Wong, 2012). Bearing in mind the above, this study will only consider current perception, in order to assess quality, instead of considering the difference between expectations and perceptions. Such approach was already adopted by other researchers in similar studies (Kuo & Ye, 2009). As a result, we can classify the instrument used in this study as a mixture of the SERVQUAL and the SERVPERF model.

### **2.3. The relationship between perceived quality and satisfaction**

The general definition of quality revolves around the idea that quality has to be judged on the assessment of the user or consumer of the service, while the construct of quality as conceptualized in the services literature is based on the perceived quality (Hasan & Ilias, 2008), defined by several authors as consumers' judgment about an organization's overall experience (e.g. Zammuto et al. 1996).

Satisfaction, as defined by Oliver (1981), corresponds to a summary of psychological state when the emotion surrounding disconfirmed expectations is coupled with

consumers' prior feelings about the consumption experience. Satisfaction may be described as an overall customer attitude towards a service provider, or an emotional reaction to differences between what customers anticipate and what they really receive, regarding the fulfillment of some need, goal or desire (Hansemark and Albinsson, 2004).

Briefly, the concept of students' satisfaction has been defined by several researchers as a short-term attitude resulting from an evaluation of student's educational experience (Elliott & Healy, 2001). As described by Petruzzellis, Uggento, and Romanazzi (2006), students are likely to be satisfied when the service provided fits their expectations, will be very satisfied when the service is beyond their expectations, and completely satisfied when receiving more than they expect. On the contrary, students will be dissatisfied when the service fails short of their expectations, and when the gap between perceived and expected service quality is high, they tend to report such negative feelings. Danielson (1998), among other scholars, refer that students' positive feeling is contingent to students' academic and social experiences in education-based institutions, and that students' satisfaction refers to the appealing, pride, and positive emotions that students associate with the institution they are attending. Student satisfaction is a satisfactory feeling for their university experience when their expectations are met or the satisfactory state is exceeded (Schreiner & Juillerat, 1993).

Various authors argue that the determinant factor of perceived satisfaction is PQ (e.g. Carlson & O'Cass, 2010), and thus both variables are considered as distinct constructs (Cronin & Taylor, 1992; Parasuraman et al., 1988). Indeed, although both PQ and satisfaction are stimulated attitudes, the former is a global long-term assessment, while the latter is the result of that global assessment (Sultan & Wong, 2012). In the higher education context, Brown and Mazzarol (2009) observed that

service quality affects satisfaction through perceived value. However, Alves and Raposo (2007) concluded that service quality affects satisfaction directly. It means that students' satisfaction is a psychological state of happiness resulting from assessing the performance of the attributes of services in the HEI context, suggesting that students are satisfied if the service attributes performs well (Sultan & Wong, 2012). Navarro et al. (2005) found that students evaluate service quality on the basis of several factors, such as tangibility, reliability and responsiveness, and institutions' management, and that these factors have direct influence on the level of students' satisfaction.

Considering the above, we formulate the following research hypothesis:

**Hypothesis 1:** Perceived service quality affects students' satisfaction positively in the HEI context.

#### **2.4. Teaching methodologies, perceived service quality and satisfaction**

The traditional methods of the university educational process (lecture, explanation, exercise, etc.) are certainly important for student's professional development (Yakovleva & Yakovlev, 2014). However the university–business relationship plays a key role in today's rapidly changing educational context. (Gómez, Aranda, & Santos, 2017).

According to Henard and Leprince-Ringuet (2010), teaching methods have become an important issue for HEI and have been facing continuous changes since the students community has been considerably expanded and diversified, both socially and geographically. The same authors highlight also that, considering the new students and teaching methods, a special attention must be paid to the teaching skills of teachers, as well as to the learning environment quality that must meet students' personal needs. In accordance, an appropriate support of the whole staff (financial, social, academic and

administrative level) would also improve students' learning outcomes and therefore increase their satisfaction.

As already referred in section 2.2, perceived services are different between different groups, even within the same group (for example, in different periods), changing according to environment, and thus depending on specific contexts. As stressed by Zeithaml, Gremler, and Bitner (2009), customers' perception about service quality depends on various factors depending on the context being analyzed. For example, in the context of higher education, several studies provided support for the idea that factors related to the teaching process may influence students' perceived service quality, such as teachers' empathy and care (Snipes, & Thomson, 1999), teachers knowledge about student experiences (Pozo-Munoz, Reboloso-Pacheco et al. 2000), lectures' outcome (e.g. information/abilities gained, effectiveness of the lecture, teachers' feedback) (Devinder & Datta, 2003), lectures' delivery, or connection with students (Hill et al., 2003).

Moreover, satisfaction doesn't depend on the service itself, but on customers' personal perceptions and expectations of services attributes (Cameran et al., 2010), and thus, different customers might develop different perceptions toward the same service experience (Thaichon, & Quach, 2015). According to Zeithaml et al. (2009), customer satisfaction is influenced not only by service quality perceptions but also by personal and situational factors. Similarly, concerning students' satisfaction, Appleton-Knapp and Krentler (2006) highlights two influencing factors: personal and institutional/environmental factors.

For example, students' results, engagement, and preferred learning styles are reported as personal significant predictors of student satisfaction (e.g. Kuh et al., 2008). Regarding Institutional/environmental factors, course design/structure, promptness of teachers' feedback, interaction/dialogue

(Eom, & Ashill, 2016), teachers' attitudes (Trivellas & Dargendiou, 2009), teaching performance. (Umbach & Wawrzynski, 2005), learning outcomes (e.g. development of professional skills, and opportunity for intellectual and personal development) (Sojkin et al., 2012), as well as other learning environment issues (e.g. pedagogical atmosphere, supervisory relationship) (Papastavrou et al, 2016) are generally reported as potential significant determinants of students' perceived satisfaction.

Based on the above reasoning, we proposed the following research hypothesis:

**Hypothesis 2:** Perceived service quality and satisfaction in the HEI context are significantly different when students are exposed to different teaching approaches.

### 3. Method

#### 3.1. The relationship between perceived quality and satisfaction

In this study, the key informants for our analysis were the students of the Faculty of Health Sciences at the University of Beira Interior (FHS-UBI) in Portugal. In 1998, the university embarked on a great challenge and gained approval for an innovative project in the Degree in Medicine, today called the Integrated Master in Medicine (IMM). In accordance with this innovative project, the FHS-UBI developed innovative training models characterized by high scientific, pedagogical and practical quality standards, in which articulation with healthcare units is also ensured by a different and innovative organizational model. This faculty currently provides 9 different courses (2 integrated masters, 2 first degrees, 2 masters and 3 Ph.D courses) in the field of health, covering a total of 1697 students.

To collect data, a questionnaire was prepared, and organized into two main sections; the first section included key

variables for this study (Perceived quality and Satisfaction), and the purpose of the second section was to collect some students' demographical information.

To assess the suitability of the questionnaire, nine pre-tests were carried out, one in each course, in order to ensure that all the questions were understood clearly by the potential respondents. After small adjustment, the final version was sent to all the students at FHS-UBI by e-mail via the Public Relations Office of the University of Beira Interior.

Out of the population of 1697 students, a total of 359 questionnaires were completed and returned, performing a final response rate around 21% (degree of significance = 0.05), allowing a sample considered representative (Krejcie & Morgan, 1970). Table 1 shows the number of students surveyed, the number of responses and the respective response rate for each course. The table also shows that responses from IMM students represent around 55 % of the final sample.

Table 2 shows the demographic characteristics of respondents, allowing a comparison between both groups of students, regarding gender and age.

Regarding potential non-response bias threats, we compared early versus late answers across key demographic variables such as age, gender, permanent address (Dalecki et al., 1993). *T-test* results don't indicate any significant difference between early versus late responses. As a result, we believe that non-response bias may not be a major concern for this research.

Furthermore, when self-report instruments are used to collect all the data from a single participant, common method bias (CMB) may be a potential threat. To handle such potential threats, most of the advices proposed by Podsakoff, MacKenzie, Lee, and Podsakoff (2003) were addressed in our study (e.g. pretest, anonymity safeguard).

**Table 1.** Response rates

Courses surveyed		No. of students surveyed	Nº. of Responses	Response rate	% of Sample
IMM	Integrated Master in Medicine	879	199	22.6%	55,4
Other courses	Integrated Master in Pharmaceutical Sciences	285	61	21.4%	17.0
	Degree in Bio-medical Sciences	171	40	23.4%	11.1
	Degree in Optometry	166	33	19.9%	9.2
	Master in Bio-medical Sciences	71	9	12.7%	2.5
	Master in Optometry	39	4	10.3%	1.1
	Ph.D. in Medicine	27	9	33.3%	2.5
	Ph.D. in Pharmaceutical Sciences	15	2	13.3%	0.6
	Ph.D. in Bio-medicine	44	2	4.5%	0.6
Total number of respondents: 359 students					
Global Response rate: 21,15%					

**Table 2.** Sample Profile

Variables	Frequency by course		Frequency	% of Sample
<b>Gender</b>				
Female	IMM	117	229	63.8
	Other courses	112		
Male	IMM	82	130	36.2
	Other courses	48		
<b>Age</b>				
18-20 years old	IMM	69	140	14.9
	Other courses	71		
21-25 years old	IMM	114	183	85.1
	Other courses	69		
26-30 years old	IMM	13	20	5.6
	Other courses	7		
>31 years old	IMM	3	16	4.5
	Other courses	13		

Furthermore, when self-report instruments are used to collect all the data from a single participant, common method bias (CMB) may be a potential threat. To handle such potential threats, most of the advices proposed by Podsakoff, MacKenzie, Lee, and Podsakoff (2003) were addressed in our study (e.g. pretest, anonymity safeguard). Moreover, we also performed the Harman’s single-factor test (Harman, 1967), using an unrotated principal component factor analysis. Using the eigenvalue greater-than-one criterion, the factor analysis enhanced five distinct factors, accounting for 74.27

percent of the variance. In addition, the first factor captured only 31.6 percent of the variance. Results suggest that common method bias may not be a major concern to the validity of our study (see Podsakoff et al., 2003).

**3.2. Measurement and scales development**

Based on the observation that there is already a significant body of evidences in the Higher Education literature suggesting that the SERVQUAL instrument is effective in assessing service quality in the higher

education context, but keeping a consciousness about the instrument's weaknesses, our study only considered perceptions, in order to assess the perceived service quality, instead of considering the difference between expectations and perceptions (thus, a mix of the SERVQUAL and the SERVPERF models). Such approach was already adopted by other researchers in similar studies (Kuo & Ye, 2009). The perceived service quality was then assessed through a construct based on a total of 22 items distributed among the five SERVQUAL dimensions: (i) Tangibility (6 items), (ii) Trustworthiness (6 items), (iii) Response Capacity (2 items), (iv) Guarantee (6 items), and (v) Empathy (2 items) (see Table 3). The 22 items were measured on a 7-point Likert scale from 1 (completely disagree) to 7 (completely agree).

In the context of higher education, student satisfaction is a psychological state of happiness that results from performance evaluation of the service attributes (Sultan & Wong, 2012). As stressed by Oliver and Desarbo (1989), students' satisfaction can be referred to as how students evaluate their outcomes regarding the education and experiences in educational institutions. In this context, satisfaction was assessed through a construct including seven items adapted from Sultan and Wong (2012), and measured on a 7-point Likert scale from 1 (completely disagree) to 7 (completely agree): (i) In general, I am satisfied with the quality of my Faculty; (ii) In general, it is a good Faculty; (iii) In general, my Faculty satisfies my needs; (iv) Choosing this Faculty to study in was a good decision; (v) In general, I am satisfied with the performance of the services provided by my Faculty; (vi) In general, I am satisfied with the value for money; and (vii) In general, my Faculty satisfies me in relation to other Faculties/Institutions of Higher Education (see Table 3).

In addition to these previous constructs, the questionnaire also collected some respondents' demographic information, such

as gender, age, course, and academic year. Based on students' course two sub-samples were constructed to test our hypothesis 2 (*Perceived service quality and satisfaction in the HEI context are significantly different when students are exposed to different teaching approaches.*). As already highlighted, in 1998, the FHS-UBI embarked on a new challenge through an innovative project in the Degree in Medicine, today called the Integrated Master in Medicine (IMM).

In addition to the IMM course, where an innovative teaching method was implemented, the FHS-UBI also provides 8 more courses (1 integrated masters, 2 first degrees, 2 masters and 3 Ph.D. courses) still using traditional didactic teaching method. Thus, the first sub-sample included IMM students, while the second sub-sample included students from the other 8 courses.

Although critics have claimed that the traditional teaching system is obsolete and out of touch with actual healthcare needs and challenges, many medical schools around the world still use the traditional didactic teaching method. However, many medical schools around the world are more and more responding to new healthcare needs by adjusting student' curriculums towards new approaches of integrated teaching, transiting from a traditional top-down educational approach to a more interactive and engaging curriculum, where the responsibility for learning shifts to the student.

The new integrated teaching-based approach assumes a "teaching by objectives" approach, and a contents' aggregation into modules, and thus, the concept of "cycle" (that applies to traditional curriculums) just disappears. Such teaching model allows the use of a problem-based learning (PBL) approach, either in the entire curriculum, or just in specific fields. PBL approaches to learning have a long history of advocating experience-based education, and are well suited to helping students to become active learners, because it situates learning in real-

world problems and makes students responsible for their learning; the goals of PBL include helping students develop i) flexible knowledge, ii) effective problem-

solving skills, iii) self-directed learning skills, iv) effective collaboration skills, and v) intrinsic motivation (Hmelo-Silver, 2004).

**Table 3.** Dimensions and variables of PQ and satisfaction

<i>Dimensions</i>		<i>Variables</i>
<b>PQ</b>	Tangibility	<b>T1.</b> FHS-UBI has appropriate physical infrastructure (comfortable, airy, and well-lit). <b>T2.</b> FHS-UBI has a Library with appropriate contents (quantity and quality of books). <b>T3.</b> FHS-UBI has appropriate laboratories (quantity and characteristics of equipment). <b>T4.</b> FHS-UBI has suitable technological resources (data projectors, overhead projectors, computers etc.). <b>T5.</b> FHS-UBI has appropriate and organized employees and lecturers. <b>T6.</b> FHS-UBI's lecturers use didactic material appropriately.
	Trustworthiness	<b>C7.</b> FHS-UBI promotes talks/seminars/workshops etc. <b>C8.</b> FHS-UBI promotes technical study visits. <b>C9.</b> FHS-UBI promotes university extension courses. <b>C10.</b> The subjects on my course are relevant for my professional preparation. <b>C11.</b> Lecturers balance theory and practice in the classroom. <b>C12.</b> Lecturers are skilled at awakening students' interest through contents.
	Response Capacity	<b>CR13.</b> The service provided by employees/specialists at FHS-UBI is appropriate (support offices, laboratories, library, etc). <b>CR14.</b> Lecturers demonstrate sincere interest in helping students.
	Guarantee	<b>G15.</b> FHS-UBI provides communication elements (notice-boards, manuals, notices, e-mails, etc.) which keep students informed. <b>G16.</b> Lecturers are able to give satisfactory answers to students' questions. <b>G17.</b> Lecturers master the subjects dealt with. <b>G18.</b> Lecturers inspire confidence. <b>G19.</b> Lecturers are fair when assessing students' performance. <b>G20.</b> Lecturers and non-teaching staff are always courteous to students.
	Empathy	<b>E21.</b> FHS-UBI understands students' specific needs. <b>E22.</b> Lecturers give students individualized attention.
<b>Satisfaction</b>	<b>S-23.</b> In general, I am satisfied with the quality of my Faculty. <b>S-24.</b> In general, for me it is a good Faculty. <b>S-25.</b> In general, my Faculty satisfies my needs. <b>S-26.</b> Choosing this Faculty to study in was a good decision. <b>S-27.</b> In general, I am satisfied with the performance of the services provided by my Faculty. <b>S-28.</b> In general, I am satisfied with the value for money. <b>S-29.</b> In general, my Faculty satisfies me in relation to other Faculties/Institutions of Higher Education.	
<b>Note:</b> All the 22 items were measured on a 7-point Likert scale from 1 (completely disagree) to 7 (completely agree).		

In the medicine field, the “teaching by objectives” method is based on the artificial boundaries disappearance of knowledge centered in courses’ contents, in favor of the overall biological systems understanding. Its attractive lays on providing an overall overview of pathologies, and a stimulus to practical action right from the beginning. In clinical teaching, the contents integration is very close to reality, studying clinical problems that are addressed through an interdisciplinary approach. The main purpose of students’ practical training is the acquisition of skills both in laboratories environments, and close to patients. The practical clinical learning takes place in hospitals (e.g. inpatient units, emergency units, differentiated and intensive care services), outpatient services, in primary care units, and includes home care services.

Overall, while traditional didactic teaching methods are didactic and teacher-centered, and thus have the disadvantage of pedagogical variations and information overload causing dissatisfaction to students (Kireeti & Reddy, 2015), and difficult students’ critical thinking (Kaddoura, 2011), problem-based learning approaches are student-centered, facilitate students’ learning by using relevant case studies and discussion and encourage students to define the learning objectives by themselves (Kaddoura, 2011), promoting thus reflection and group discussion (Ferrario, 2003), teamwork (Rajasekaran, 2009), students motivation and engagement (Kaddoura, 2011), and academic performance (Rajasekaran, 2009).

## 4. Results and discussion

### 4.1. The structural equation modelling approach

First of all, a normality test was performed through the Kolmogorov-Smirnov statistic. As the significance value obtained for all the variables was above 0.05, the assumption of normality was accepted. The descriptive statistics of the variables studied reveal that,

on average, the dataset was quite homogenous.

### *Model estimation*

Data analysis was performed through a structural equation modeling (SEM), using, for this purpose, the PLS method, due to the associated advantages, especially when the research objective deals with theory development and explanation of variance (constructs prediction) (Hair et al., 2014). The software used was the SmartPLS.

Models estimation through structural equation analysis normally follows a two-stage process, involving two different assessments: *i*) the measuring model, and *ii*) the structural model (Hair et al. 1998). In the first stage, measures of reliability and validity are studied, according to certain criteria associated with the specification of the formative and reflective measurement model. The second stage involves assessing the estimates of the structural model (Hair et al. 2014).

### *About the Measuring model*

The overall model, testing the relationship between perceived service quality and satisfaction is based on a total of 29 manifest variables. Drawing from previous studies (e.g. Pearson, Tadisina, & Griffin, 2012; Chu, Lee, Chao, 2012), service quality was operationalized as a multidimensional formative construct, while satisfaction was operationalized as a reflective construct.

According to Hair et al. (2014), the reflective indicators should take into account: *(i)* assessment of loading values; *(ii)* assessment of internal consistency; *(iii)* assessment of composite reliability; and *(iv)* assessment of discriminant validity.

Regarding loading values, various studies (e.g. Chin 1998; Hair et al., 2014) recommended that reflective indicator loadings should be close to or exceed 0.70 and thus ensuring that they have over 50% of the variance of that indicator shared with the

construct. If there are additional reflective indicators as a basis for comparison, the values should be above 0.40 (Hulland, 1999) or 0.50 (Chin, 1998; Hair et al., 2014). As reported in several research papers (e.g. Chin, 1998; Chin, 2010), in the case of formative indicators, the use of the loadings

is misleading; comparison of loadings among indicators within a block of formative indicators is nonsensical. Analyzing the indicators' weights and loadings summarized in Table 4, we can observe that all the reflective indicators' loadings are higher than the reference value of 0.70.

**Table 4.** Indicators' weights and loadings

<i>Indicator</i>	<i>Type</i>	<i>Loading</i>	<i>Weight</i>	<i>Indicator</i>	<i>Type</i>	<i>Loading</i>	<i>Weight</i>
T1	F	0.470	0.122	G16	F	0.895	0.186
T2	F	0.578	0.117	G17	F	0.888	0.166
T3	F	0.579	0.195	G18	F	0.938	0.350
T4	F	0.497	-0.043	G19	F	0.783	0.135
T5	F	0.898	0.476	G20	F	0.689	0.134
T6	F	0.893	0.399	E21	F	0.993	0.866
C7	F	0.646	0.282	E22	F	0.816	0.171
C8	F	0.540	0.066	S23	R	0.977	0.518
C9	F	0.564	0.075	S24	R	0.976	0.506
C10	F	0.624	0.193	S25	R	0.934	0.241
C11	F	0.831	0.226	S26	R	0.940	0.227
C12	F	0.883	0.488	S27	R	0.927	0.226
CR13	F	0.567	0.240	S28	R	0.824	0.184
CR14	F	0.975	0.886	S29	R	0.921	0.217
G15	F	0.705	0.228				

Legend: F = Formative; R = Reflective.

Both internal consistency and reliability can be analyzed through the Cronbach Alpha value. However, Fornell and Larcker (1981) also proposed using the coefficient of composite reliability, opinion corroborated by Chin (1998), and Hair et al. (2014). In our study, discriminant validity was assessed through the average variance extracted - AVE, whose value should be above 0.50 (Hair et al. 2014). Results about internal consistency and discriminant validity of PQ and satisfaction (see Table 5) show that the AVE for the PQ construct was slightly under the reference value. As a result, the model was readjusted, and after several attempts to improve the discriminant validity, we decided to eliminate the indicator T1 from the remaining analyses, because it was the best improvement option, resulting in a substantial increase in the PQ AVE, rising to 0.504. Table 5 shows the analysis results of internal consistency and reliability, as well as the Cronbach Alpha values. Regarding

formative measurement, research papers generally refer that there is no need to report internal consistency reliability, and discriminant validity Chin, 2010).

According to Hair et al. (2014), the criteria to be considered regarding the formative indicators are the following: (i) the value and statistical significance of the weights; and (ii) multi-collinearity.

The assessment should focus primarily on the weights of each indicator (Chin 1998). Hair et al. (2014) reported that the weights of each indicator (relative importance) and the loadings (absolute value) should be examined and that a bootstrapping process should be used to ensure their significance. The minimum number of bootstrap samples is 5000 and the number of cases tends to be equal to the number of observations in the original sample. The value and significance of the weights are evaluated through the t-value, particularly if the latter is greater than the value of a 0.05 statistical significance.

**Table 5.** Internal consistency and discriminant validity of PQ and satisfaction

	Associated indicator	Loading	$\sum_{i=1}^n \delta_i$	$(\sum_{i=1}^n \delta_i)^2$	$var(\varepsilon_i)$	$\sum_{i=1}^n var(\varepsilon_i)$	CR	Cronb Alpha	AVE
PQ	-	-	-	-	-	-	-	0.946	0.487
Satisfaction	S23	0.977			0.045				
	S24	0.976			0.047				
	S25	0.934			0.128				
	S26	0.940	6.499	42.237	0.116	0.950	0.975	0.978	0.838
	S27	0.927			0.141				
	S28	0.824			0.321				
	S29	0.921			0.152				

Among the 21 indicators, only one was found not to be statistically significant, with all remaining t-values greater than 1.96, and therefore, significant at a 0.95 confidence level (Hair et al. 2014). Thus, following Chin's (1998) recommendation, we decided to keep it, because its elimination would imply a potential loss of useful and necessary information for defining and characterizing the constructs.

At a second stage, multi-collinearity was analyzed, based on the indication that the variance value of each indicator (VIF) must be under 5 (Hair et al. 2014). Observing the values of tolerance and VIF, in relation to the formative indicators, we observed that the indicators didn't present any serious problem of multi-collinearity. All tolerance levels were close to zero and VIF values were generally close to 2, except for three indicators. However, Hair et al. (1998) mention that the VIF can reach a maximum of 10, and that higher than 5 can mean having a lower R<sup>2</sup>, since the explanation of some variables overlaps; in accordance, we decided to keep the variables with a VIF above 5.

**About the Structural model:**

According to Hair et al. (2014), the primary evaluation of the structural model is performed according to two assessment criteria: the statistical coefficient of determination (R<sup>2</sup>), measuring the model's degree of adjustment, and the statistical significance of the path coefficients.

As the aim of structural equation analysis using the PLS method is to maximize the amount of the explained variance of the endogenous latent variables, the constructs' R<sup>2</sup> value should be high (Hair et al. 2014). Results in Table 6 (about PQ and satisfaction's determination coefficients, effect sizes, and predictive validity), suggest that the coefficient of determination for both the 2 endogenous variables is reasonable.

With respect to the estimation of effect sizes (f<sup>2</sup>), Cohen (1988) states that f<sup>2</sup> values the degree to which an exogenous construct contributes to explain a given endogenous construct in terms of R<sup>2</sup>. According to this author  $f^2 = (R^2_{included} - R^2_{excluded}) / (1 - R^2_{included})$ , where R<sup>2</sup><sub>included</sub> y R<sup>2</sup><sub>excluded</sub> are the R<sup>2</sup> values of the endogenous latent variable when an exogenous latent variable is included or excluded from the model. The change in R<sup>2</sup> values is calculated by estimating the PLS model twice: one with the included exogenous latent variable (generating R<sup>2</sup><sub>included</sub>), and the second time with the exogenous latent variable excluded (generating R<sup>2</sup><sub>excluded</sub>). The reference values according to the same author are: 0.02 ≤ f<sup>2</sup> < 0.15: small effect; 0.15 ≤ f<sup>2</sup> < 0.35: moderate effect; f<sup>2</sup> ≥ 0.35: large effect. Table 6 presents also the results for f<sup>2</sup>.

Together with these resampling techniques, the Stone-Geisser test (Q<sup>2</sup>) is commonly used to measure the predictive relevance of the dependent constructs. This evaluation is used as a criterion to measure the predictive relevance of the reflective dependent

constructs. A blindfolding procedure is followed, where part of the data is omitted for a given construct during the parameter estimation and then attempting to estimate what has been omitted using the estimated parameters (Chin, 1998). A positive value or  $Q^2$  indicates a predictive relevance, while negative values for  $Q^2$  indicate a lack of predictive relevance. The relative impact on predictive relevance can be assessed by the indicator  $q^2 = (Q^2_{included} - Q^2_{excluded}) / (1 - Q^2_{included})$ ; the references values are the same as for  $f^2$ :  $0.02 \leq q^2 < 0.15$ : small effect;  $0.15 \leq q^2 < 0.35$ : moderate effect;  $q^2 \geq 0.35$ : large effect. As can be seen in Table 6, the  $Q^2$  of both variables are greater than 0.35, which means that both have a large predictive relevance.

**Table 6.** PQ and satisfaction’s determination coefficients, effect sizes, and predictive validity

Construct	R <sup>2</sup>	f <sup>2</sup>	Q <sup>2</sup>
PQ	0.994	0.088*	0.500***
Satisfaction	0.739	0.166**	0.634***

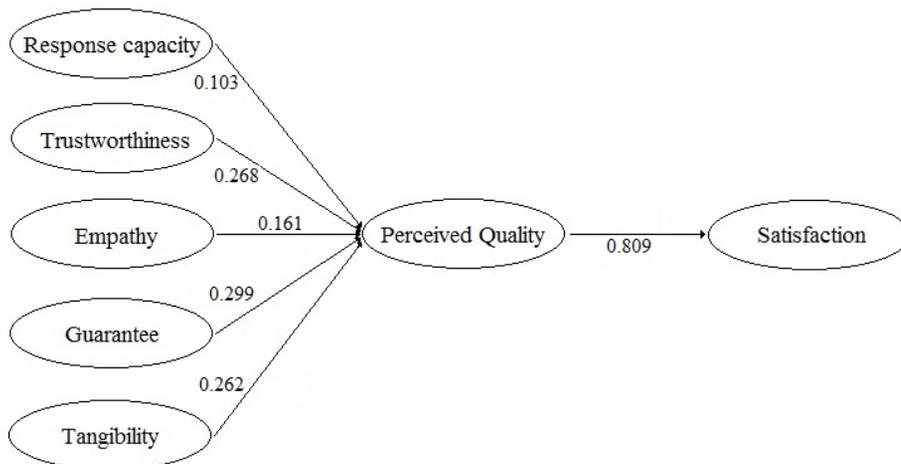
**Legend:**

\*  $0.02 \leq f^2/Q^2 < 0.15$  : small

\*\*  $0.15 \leq f^2/Q^2 < 0.35$ : moderate

\*\*\*  $f^2/Q^2 \geq 0.35$ : large

In what the relationship between perceived quality and satisfaction concerns, figure 1 shows the result of the structural equation modeling approach, highlighting a strong path coefficient between the two main constructs.



**Figure 1.** Model and respective weights

Moreover, regarding the robustness of the path coefficients, the reference is a value above 0.2 (Chin 1998a; Hair et al. 2014). Findings in Table 7, summarizing the path coefficients, the estimated values, and t-values concerning each of the structural relationships, show that only 2 of the coefficients do not have a value above 0.2, which means that 67% of these coefficients indicate robustness of the relationships tested. Nevertheless, results in table 7 show a

statistical significance for all the relationships. Considering the estimated values of the coefficients and the corresponding t-values, we may conclude for a good adjustment of data.

As observed in table 7, all the structural relationships between the five dimensions analyzed and students’ perceived service quality are positive and statistically significant. According to the estimates values, response capacity (0.094),

trustworthiness (0.258), empathy (0.158), guarantee (0.342), and tangibility (0.229) are all positively related to students' perceived service quality in the HEI context for

a significance level of 99%. Nevertheless, findings deserve additional further reflections.

**Table 7.** Coefficients' robustness and structural relationships' level of significance

Structural relationships	Path coefficients	Estimated values	t-values
Resp. Capacity -> PQ	0.094	0.094	8.847***
Trustworthiness -> PQ	<b>0.258†</b>	0.258	23.950***
Empathy -> PQ	0.158	0.158	15.297***
Guarantee -> PQ	<b>0.342†</b>	0.342	26.915***
PQ -> Satisfaction	<b>0.860†</b>	0.860	58.778***
Tangibility ->PQ	<b>0.229†</b>	0.229	18.607***

† = Robustness of the coefficient because the value obtained is above 0.2.

\*\*\* = level of significance: 1%

First of all, we must highlight that guarantee is the most significant dimension in students' PQ in the HEI context. Results show clearly that knowledge and courtesy of staff and their ability to inspire trust and confidence are highly valued by students at FHS-UBI; students need to feel that the returns provided by FHS-UBI is worthy of their trust and able to respond to their needs satisfactorily. These findings corroborate the results reached by Pariseau and McDaniel (1997), who conclude that guarantee has a significant relevance on the quality of education services. More specifically, our results show that the items with a higher weight, in what the guarantee dimension concerns, are G16 (*“lecturers are able to give satisfactory answers to students' questions”* - 0.301), G18 (*“lecturers inspire confidence”* - 0.236), and G19 (*“lecturers are fair when assessing students' performance”* - 0.202), highlighting the relevance of the care provided by lecturers to students in their perception about service quality provided by FHS-UBI.

According to results, the less significant dimension is response capacity. Notwithstanding, our results show that regarding this dimension, the item CR14 (*“lecturers demonstrate sincere interest in helping students”*) has the greatest weight (0.880), indicating that students place a greater emphasis on the sincerity shown and

help offered by lecturers than on services provided by FHS-UBI's employees/specialists. Cronin and Taylor (1992), among other scholars claim that response capacity is a significant dimension of PQ. However, it is important to mention here, that although response capacity has a positive relationship with PQ, according to Chin (1998), an estimate value of 0.094 is not very robust as it is under 0.2. The result found in our study is in line with findings in Al-Alak and Alnaser (2012).

In what the three remaining dimensions concerns, our results show that the items with higher weights are C11 (*“lecturers balance theory and practice in the classroom”* - 0.312), and C12 (*“lecturers are skilled at awakening students' interest through contents”* - 0.444), regarding the dimension trustworthiness, E21 (*“FHS-UBI understands students' specific needs”* - 0.613), regarding the dimension empathy, and T5 (*“appropriate and organized employees and lecturers”* - 0.506), and T6 (*“lecturers use didactic material appropriately”* - 0.400), regarding the dimension tangibility.

Our findings are clearly in line with results of previous studies concluding that the most important factors for students' PQ are those associated with teaching and learning, especially when compared to those associated with physical facilities (e.g

Banwet and Datta, 2003). For example, Schneider and Bowen (1995) concluded that the quality of lectures, as a core service delivery method, is a key factor in the overall perception of service quality. Our findings show that qualities and behaviour of lecturers (e.g. communication, knowledge, fairness, approachability, and proactivity) have a significant weight on students' perceptions of service quality, corroborating other researchers' conclusions (e.g. Hill et al., 2003).

#### 4.2. Hypotheses testin

##### *About the relationship between perceived quality and satisfaction*

Various authors argue that the determinant factor of perceived satisfaction is PQ (e.g. Carlson & O'Cass, 2010), and thus both variables are considered as distinct constructs (Cronin & Taylor, 1992). Satisfaction corresponds to a summary of psychological state when the emotion surrounding disconfirmed expectations is coupled with consumers' prior feelings about the consumption experience (Oliver, 1981). Students' satisfaction involves more than an assessment of the academic experiences, but also administrative processes, the physical environment, the social environment, among other issues of the HEI environment (Brewer & Carnes, 2008).

Regarding our first objective, based on a literature review focused on the relation between PQ and satisfaction, we defined the hypothesis H<sub>1</sub> according to which *perceived service quality affects students' satisfaction positively in the HEI context*. As observed in table 7, the structural relationship between perceived service quality and students' satisfaction is positive and statistically significant. As a result, the hypothesis H<sub>1</sub> was not rejected. In fact, according to the estimate value (0.860) perceived service quality is positively related to students' satisfaction in the HEI context for a significance level of 99%. This result corroborates results of previous studies

conducted in the HEI context (Lazibat, Bakovic, & Duzevic, 2014; Sultan and Wong, 2012; Carlson and O'Cass, 2010). For example, Navarro et al (2005) already found that students evaluate service quality on the basis of several factors, such as tangibility, reliability and responsiveness, and institutions' management, and that these factors have direct influence on the level of students' satisfaction.

##### *About the influence of teaching methods on student's perceived service quality and satisfaction*

To test our hypothesis H<sub>2</sub> (*Perceived service quality and satisfaction in the HEI context are significantly different when students are exposed to different teaching approaches*), we used a *t-test* for independent samples to analyze whether the means for IMM students (exposed to an innovative problem-based learning system with a "teaching by objectives" approach) were statistically different from those for students on the remaining 8 courses (exposed to traditional teaching approaches). For this purpose, a new composite binary variable was created, in order to distinguish between both groups of students (IMM students, and the others).

Then, since our purpose was to use a *t-test* for independent samples to analyze whether the means for response capacity, trustworthiness, empathy, guarantee, tangibility, and satisfaction, were statistically different between students exposed to different teaching methods, we first computed the respective mean for each construct. The mean was computed summing up the scores of each item, divided by the number of items in each construct. As the *p*-values obtained through the Levene Test were above 0.05 in all variables, except for satisfaction, empathy and tangibility, we concluded that the variances were homogenous, and therefore the statistic used for this test was the one assuming equal variances in all variables, except for satisfaction, empathy and tangibility.

Table 8, summarizing means, standard deviations, and t-test's results, shows that the differences observed in all the variables between the two groups are statistically significant. As a result, we concluded that IMM students' perceived service quality and satisfaction is significantly different from perceived service quality and satisfaction

regarding students from the other courses. Results show that IMM students are less satisfied with the quality of services provided by FHS-UBI than students from other courses, especially in what response capacity (3.876), trustworthiness (3.881), and empathy (3.573) concerns.

**Table 8.** Comparing PQ and Satisfaction between groups: t-test results

Variable	Group	n	Mean	Standard deviation	Standard error of the mean	Sig. (t-test)
Satisfaction	IMM	199	4,162	1,581	0.112	0.000
	Other Courses	160	4,919	1,265	0.100	
PQ	IMM	199	4,087	1,154	0.082	0.000
	Other Courses	160	4,616	1,073	0.085	
Resp. Capacity	IMM	199	3,879	1,454	0.103	0.000
	Other Courses	160	4,453	1,388	0.110	
Trustworthiness	IMM	199	3,881	1,166	0.084	0.000
	Other Courses	160	4,384	1,131	0.089	
Empathy	IMM	199	3.573	1.592	0.113	0.000
	Other Courses	160	4.341	1.346	0.106	
Guarantee	IMM	199	4.003	1.336	0.095	0.000
	Other Courses	160	4.685	1.237	0.098	
Tangibility	IMM	199	4.228	1.287	0.091	0.000
	Other Courses	160	4.902	1.189	0.094	

To deepen our understanding in what differences in perceived quality concerns between students exposed to different teaching methods, we also analyzed the means observed between the two groups regarding the items presenting a greatest weight in the 5 dimensions of perceived service quality (CR14, C11, C12, E21, G16, G18, G19, T5, and T6). Results are summarized in Table 9. The assessment of services provided by FHS-UBI, of students studying in other courses is more positive that the assessment of IMM's students, especially regarding services provided by lecturers, such as: interest in helping students, balance between theory and practice, competences, ability to give

satisfactory answers to questions asked by students, unfair assessment and inappropriate use of didactic material.

According to *t-test* results, presented in tables 8 and 9, the hypothesis could not be rejected, and thus we conclude that perceived service quality and satisfaction in the HEI context are significantly different when students are exposed to different teaching approaches. These results are consistent with the general idea (e.g. Zeithaml et al, 2009) that customers do not perceive service quality from a one-dimensional perspective, but make a judgment based on various relevant factors depending on the context being analysed,

and that perceived service quality between different groups is not equal and may vary even within the same group, supporting the idea that service quality depends on specific contexts, changing according to students environment. Our findings corroborate previous results of the unique study that somehow analysed students' satisfaction in different learning contexts. Conducting an

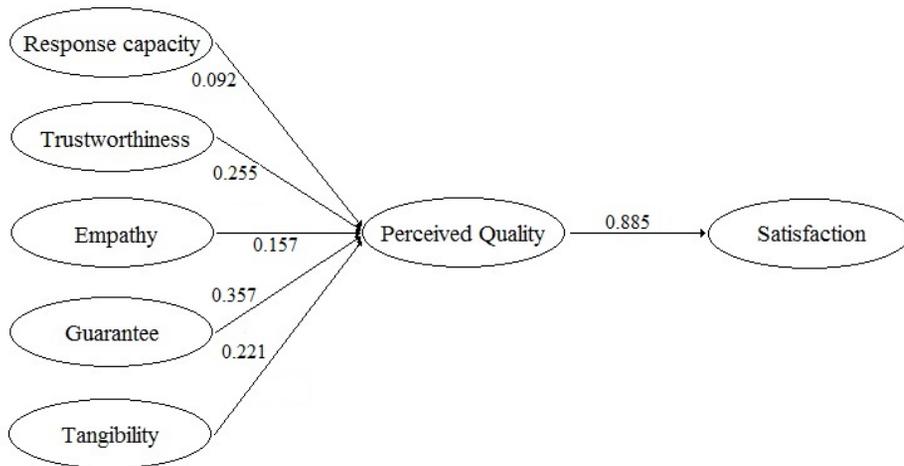
empirical study on a course of "Introduction to Operations Research", Wang and Liao (2013) concluded that two alternative teaching methods not only lead to differences regarding exams scores, but also lead to differences in students' notion of the course value, in students' doubt regarding the feasibility of the course, as well as in students' satisfaction level.

**Table 9.** Comparing PQ's most significant items between groups: t-test results

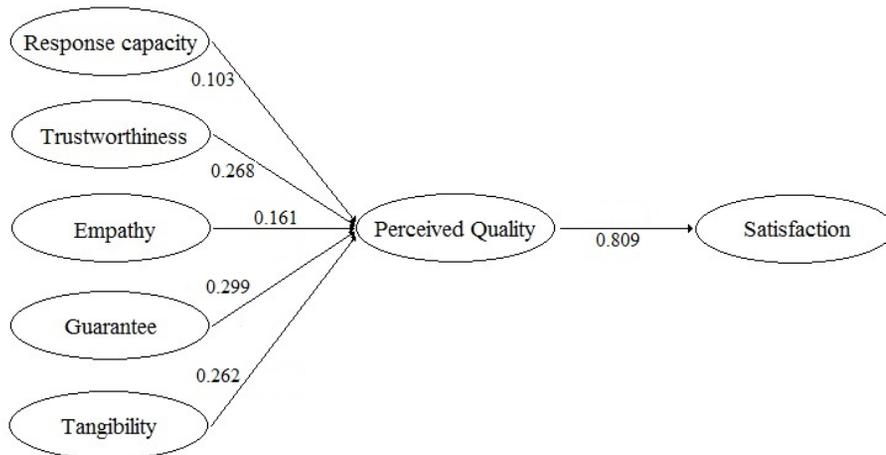
<i>Variable</i>	<i>Group</i>	<i>Mean</i>	<i>Standard deviation</i>	<i>Standard error of the mean</i>	<i>Sig. (t-test)</i>
<b>CR14</b> - Sincere interest in helping students.	IMM	3.487	1.657	0.117	0.000
	Other Courses	4.337	1.609	0.127	
<b>C11</b> - Balance between theory and practice in the classroom.	IMM	3.231	1.635	0.116	0.000
	Other Courses	4.168	1.607	0.127	
<b>C12</b> - Awakening students' interest through contents.	IMM	3.105	1.495	0.106	0.000
	Other Courses	4.237	1.540	0.122	
<b>E21</b> - FHS-UBI understands students' specific needs.	IMM	3.703	1.678	0.119	0.000
	Other Courses	4.568	1.395	0.110	
<b>G16</b> - Ability to give satisfactory answers to students' questions.	IMM	3.381	1.665	0.118	0.000
	Other Courses	4.612	1.500	0.119	
<b>G18</b> - Lecturers inspire confidence.	IMM	3.592	1.664	0.118	0.000
	Other Courses	4.662	1.541	0.122	
<b>G19</b> - Fairness when assessing students' performance.	IMM	3.638	1.611	0.114	0.000
	Other Courses	4.331	1.491	0.118	
<b>T5</b> - Appropriate and organized employees and lecturers.	IMM	3.633	1.655	0.117	0.000
	Other Courses	4.593	1.523	0.120	
<b>T6</b> - Appropriate use of didactic material.	IMM	3.889	1.663	0.118	0.000
	Other Courses	4.912	1.411	0.112	

In order to deepen our analysis, we performed a multi-group analysis to understand if the relationship between perceive quality and satisfaction is somehow influenced by teaching methods, comparing IMM students and the other students of the FHS-UBI. As we can observe through

figures 2 and 3 that show the results of the model for both sub-groups, the influence of perceived quality on satisfaction is higher for IMM students (0.885), comparing to the other students, exposed to a different teaching method (0.809).



**Figure 2.** Model and respective weights regarding IMM students



**Figure 3.** Model and respective weights regarding other students at the FHS-UBI

In order to understand if this difference was significant, we performed two additional analyses. First, we followed an extension of the Henseler's (2007) multigroup analysis approach, proposed by Sarstedt, Henseler and Ringle (2011). Based on the bootstrap's outputs (5,000 samples) for each group, we computed in a spreadsheet, a binary variable where 1 means that IMM students' structural path is higher than others'. Results are shown

on table 10. For all of the 5,000 samples, the result was 1. According to the method, summing up all the values obtained and dividing by the number of samples considered we obtain the probability of IMM students' structural path being higher than other students' path. In our research, the result is 100%, meaning that statistically the IMM students' structural path will be always higher, compared to other students at the FHS-UBI.

**Table 10.** Results of the multigroup analysis

<i>BS Sample</i>	<i>IMM Group</i>	<i>Others Group</i>	<i>IMM Group&gt;Others Group=1</i>
1	0.925	0.835	1
2	0.892	0.802	1
3	0.867	0.823	1
4	0.895	0.866	1
...	...	...	...
<i>N</i>	0.885	0.808	1

Furthermore, we also applied the confidence set approach, which builds on Keil et al’s (2000) parametric test. As observed on table 11 that shows confidence intervals (Bias Corrected) for both groups, related to the multi-group analysis. When there is no overlap between intervals, we can assume that group-specific path coefficients are

significantly different (Sarstedt, Henseler, & Ringle, 2011). As observed, the confidence interval for others students falls within the corresponding confidence interval of IMM students. As a result, we can assume that there are no significant differences between students exposed to different teaching methods.

**Table 11.** PLS multigroup analysis: Confidence intervals (Bias Corrected)

<i>Path Coefficients</i>	<i>Model</i>	<i>Original Sample</i>	<i>Sample Mean</i>	<i>Standard Deviation</i>	<i>T Statistics</i>	<i>P Values</i>	<i>Confidence intervals</i>
PQ⇒Satisfaction	MIM	0.885***	0.886	0.021	43.222	0.028	[0.761, 0.853]
	Others	0.809***	0.808	0.046	17.758	0.000	[0.686, 0.847]

*n* = 5000 subsamples: \* *p* < .05; \*\* *p* < .01; \*\*\**p* < .001; significant (two-tailed t Student)

### 5. Conclusions, contributions and limitations

Our study is a first step towards an ongoing effort to understand what drives students’ satisfaction and how it may contribute to retention in HEI context. The main aim of this research was to explore the relationship between perceived quality and satisfaction, especially analyzing whether these constructs and the relationship between them, differ between groups of students exposed to different teaching methods. Briefly, our findings confirm that perceived service quality, whose most important factors are those associated with teaching and learning, especially when compared to those associated with physical facilities, is positively related to students’ satisfaction in the HEI context. Results also suggest clearly that perceived service quality and satisfaction in the HEI context are significantly different when students are exposed to different teaching approaches.

Moreover, although the difference was not found significant, data shows that statistically, for IMM students, the influence of PQ on satisfaction is always higher, compared to other students at the FHS-UBI. These initial results are encouraging as they provide both theoretical contributions and lay the groundwork for further studies.

Indeed, results should be interpreted with special caution, because we are not able to assume/conclude that the differences in PQ and satisfaction between the two groups are caused by the different teaching methods; in fact, differences might be caused by other factors. This is why more research is needed to deepen this issue. First of all, as already highlighted, although there is a substantial body of literature surrounding teaching methods issues in the context of HEI, to our knowledge there is no reliable prior study that explicitly approached perceived service quality and satisfaction issues in different alternative teaching methods contexts. As a

result, for theory development, we believe that our results bring new insights that should be considered in further attempts to model the challenging issues of service quality and satisfaction in the HEI context, especially for the marketing research field.

Furthermore, our findings also provide contributions for practice in HEI, especially for managers responsible for resource allocations. HEI are more and more competing world-wide for both national and international students. Literature in general, and especially in the marketing field, has already proven that satisfaction is a key element to reaching students loyalty. Thus, in order to retain and recruit students, HEI should direct significant efforts to enhance students' satisfaction.

To increase students' satisfaction, it is important for managers in HEI to improve the quality of services provided to their students. Our study is particularly useful for HEI managers by emphasizing the relevant service quality dimensions and related attributes on which HEI should concentrate their efforts. HEI' managers must prioritize these dimensions and attributes, and thus concentrate their efforts in order to improve the quality of services provided, and avoid wasting valuable resources in services that could be referred to as peripheral.

Thus, administrative efforts should be directed at improving the teaching environment, including selecting the appropriate teaching staff or providing the necessary resources to this staff to be able to actuate as expected by students, and applying the appropriate teaching methods to each particular environment. Indeed, the management of courses, the teaching staff, and teaching methods, among others, are issues directly or easily controlled by HEI. Improvements in these issues may represent an added value to HEI and a differentiating element from their direct competitors.

Despite results' significance, we must highlight that our research was conducted in a specific faculty of a specific Portuguese HEI. This is certainly a limitation of this study, as one may not generalize the results to Portuguese HEI in general, and even less to the student population as a whole. Notwithstanding this limitation, the study provides noteworthy findings and provides groundwork for further research on the relationship between PQ and satisfaction in the context of HEI, as well as how this relationship can differ between groups of students exposed to different teaching methods.

In order to allow generalizability and to demonstrate that our findings are valid beyond specific research contexts, further studies should be performed using similar data collection and analysis methods in other different fields (e.g. management/economics, engineering), in other Portuguese HEI, as well as in HEIs in other countries. Further studies should also allow comparative studies between private and public HEIs. Moreover, longitudinal research should also be performed in order to allow a better understanding of this phenomenon over time, during students' whole learning cycle at HEIs.

Further studies should also allow comparative studies between private and public HEI. Moreover, longitudinal research should also be performed in order to allow a better understanding of this phenomenon over time, during students' whole learning cycle at HEI.

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