



TEACHING AND LEARNING INNOVATION IMPACTS

Measuring quality in Higher Education: a validated scale

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1. **ABSTRACT:** It is relevant to assess the service quality that universities are providing to their customers. This paper analyzes a survey of 2,557 students graduated in the universities of Catalonia in 2013 in order to define and validate a scale to assess the quality provided by universities. Three main dimensions capture the perceived quality of university degrees: (i) "Curriculum", (ii) Student "Skills development", and (iii) "Services and facilities". The paper provides clues to universities managers.
2. **KEYWORDS:** perceived service quality, student satisfaction; higher education; assessment scale.



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3. DEVELOPMENT:

1. INTRODUCTION

The function of Higher Education (HE) is mainly oriented to achieve excellence in teaching, training and research. Currently, this sector is being driven to commercial competition imposed by economic forces, and is focusing on the quality of the service as a way to obtain sustainable competitive advantages (Sohail & Shaikh, 2004; Poole et al., 2000). The concept of service quality related to satisfaction is a central point of the HE industry over recent years (Oldfield & Baron, 2000; Abdullah, 2006). In addition, policies carried out to implement academic modifications for education quality frequently fail due to a lack of comprehensive understanding of the specific nature of HE quality assurance (Cheng & Tam, 1997).

Among the HE institutions' stakeholders, students can be considered as one of the most important concerns to be aware of when measuring quality (Hill, 1995). Service quality underlining student satisfaction is an interesting topic to enhance the research and 'a newly emerging field of concern' (Nadiri et al., 2009). Following Dlačić et al. (2014), we consider students the primary customers of HE services. Indeed, the HE industry needs to understand the perceived quality of their students in order to attract and maintain them in their institution (Kara & DeShields, 2004). According to Brochado (2009), while there is agreement concerning the relevance of service quality in HE, the definition of a correct measurement instrument that ensures a complete understanding of the quality of students' experiences is a challenge for managers and academics.

Consequently, the objective of this paper is to define and validate a scale to assess the perceived quality of students once they have graduated from a university.

2. LITERATURE REVIEW

HE institutions are considered a valuable source for research that has studied the different aspects of HE and its quality assurance. These studies explore the different aspects of HE and its quality assurance in general and all the related services (such as library, cafeteria, student services, scholarships, internships, etc.). Quinn et al. (2009) studied six techniques for measuring and improving service quality in HE such as: Total Quality Management (TQM), Quality Function Deployment (QFD), Six Sigma, ISO 9001, the Malcolm Baldrige National Quality Award, and the Academic Quality Improvement Program (AQIP). They found that TQM has been widely used (e.g. among others, Ali et al., 2010; Mergen et al., 2000; Saunders & Walker, 1991). QFD is gaining in popularity, and while the use of Six Sigma has not been reported in the literature, it has been proposed for administrative areas. On the other hand, ISO 9001 certification is increasingly popular in some countries and is beginning to be seen in K



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-12 education in the United States. Little evidence of impact on quality is currently available concerning the Malcolm Baldrige National Quality Award and for the AQIP.

In particular, it has become of paramount importance to assess the quality provided in services. According to the literature (Ladhari, 2009), the most popular scales used to measure service quality are the SERVQUAL models (Parasuraman et al., 1985; Parasuraman et al., 1990). SERVQUAL operationalises service quality by comparing the perception of service received with expectations. In this sense, many scales for university quality such as SERVQUAL adaptations were suggested (Hasan et al., 2008; Nadiri et al., 2009; Yeo & Li, 2014; Dib & Alnazer, 2013; Dlačić et al., 2014). For example, Brown & Mazzarol (2009) adapt some SERVQUAL scales and findings show that one of the most important antecedents of perceived value in HE is the image of the institution, whereas the perceived quality of people and process, the infrastructure and tangible service elements have only a weak and indeterminate influence. Another study conducted by Yeo & Li (2014) extends SERVQUAL in HE by adding customer orientation, course design and delivery and support systems.

Some studies compare the use of different scales of service quality measurements. Abdullah (2006) tested and compared the relative efficacy of 3 measuring instruments of service quality (HEdPER, SERVPERD and the moderating scale of HEdPER- SERVPERD). More recently, Brochado (2009) examined the performance of different measures of service quality in HE industry (SERVQUAL, SERVPERF, HEdPER).

According to Abdullah (2006) previous studies suggested the existence of difficulties resulting from the conceptual and empirical components of the measurement. There is not yet a conclusive scale to measure service quality and student satisfaction in HE (Yeo & Li, 2014). Not many scales for assessment exist in a holistic way for the entire university system in Catalonia. We take a wide range of data from 11 universities (3 of them private) and for all kinds of degrees in different fields of knowledge.

3. METHOD

In order to assess the perceived quality and student satisfaction in HE institutions, the authors signed an agreement with AQU (the Catalan University Quality Assurance Agency), to evaluate a survey that AQU had sent to recently graduated students of Catalan universities. The questionnaire included a section in which 20 items were collected to assess university degree quality. These items were gathered from previous studies performed by AQU. All of the items were presented as statements to which respondents indicated their agreement/disagreement on a five-point Likert-type scale (from 1 = strongly disagree, to 5 = strongly agree). Table 1 shows the items of the questionnaire related to degree quality.

Table 1



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The survey was launched in October 2013, and 2557 questionnaires were collected. Table 2 shows the demographics of the sample.

Table 2

The analysis began with establishing the scale. The definition of the scale started with a principal component analysis to explore the natural dimensions among the 20 items of 'perceived quality'. This exploratory factor analysis (EFA) yielded three dimensions. Consequently, the dimensionality of each of these dimensions was analysed. Next, the analysis proceeded by assessing the reliability of these constructs in order to determine internal consistency and divergent validity. Once all of the dimensions showed the correct psychometric properties, a confirmatory factor analysis (CFA) was performed, thus providing the definitive UnivQual scale.

4. RESULTS

The first step was to perform a principal components analysis of the 20 items of perceived quality. A Kaiser-Meier-Olkin statistic of 0.937 forecast a good result for this analysis. A Bartlett test also gave the same conclusion ($\chi^2 = 7174.6$ with 190 freedom degrees and $p\text{-value} = 0.000$). These results confirmed a linear dependence between the variables and supported our view that the results were sound (Hair et al., 2010). Four factors emerged with eigenvalues greater than one (Kaiser criterion), which accounted for 60.04% of the variance in the sample. However, the last eigenvalue was slightly on the threshold (1036) and it was dropped in order to simplify the analysis. Thereafter, a new exploratory analysis was performed, forcing it to extract three factors that accounted for the 54.86% of the variance. Table 3 shows the suggested factors, including the percentage of variance extracted. Only loads above 0.250 are shown.

Table 3

Accordingly, the first factor suggested refers to the syllabus of the degree (Tsinidou et al., 2010; Letcher and Neves, 2010). Some aspects related to the general structure of the curriculum degree are included: the coordination of contents among subjects, the evaluation and assessment systems, the didactic methodologies used, and the workload volume required by different subjects. It also takes into account the overall satisfaction regarding the lecturers and the role of lecturers as guides and tutors for students. Accordingly, the label assigned to this factor is 'Syllabus'. The factor accounts for 41.64% of the variance and is composed of 7 items.

This factor measures how the degree is designed and implemented. It responds to the internal coherence of the curriculum in terms of the content coherence of the subjects. It also includes progression in the difficulty of the subjects, equilibrium and balance of the effort and work



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required, and also the complementarity of the subjects. The subjects taught in the first courses are general; they do not require important previous knowledge, yet at the same time are important in order to study subsequent subjects in higher level courses. The faculty government is in charge of these questions, therefore this factor is assessing a duty that belongs to the faculty.

The first factor also collects part of the lecturer's work, not only as a lecturer (i.e. an academic that delivers some lectures and evaluates his/her students), but also as a mentor throughout the degree. Consequently, this factor is also assessing the lecturer's work.

The second factor gathers items that account for the impact of the formation on the student: assimilation of the formation. More precisely, the concept that underlies this factor is how the degree has enabled an individual to develop personal skills, such as skills in communication, working in a team or leadership. There are also some additional skills considered (self-esteem, decision-making capacity, critical ability, etc. ...). The label for this factor is 'Skills development' and accounts for 7.39% of the variance, and is composed of four items.

This second factor assesses how the student is integrating into his/her life what it is taught by the faculty. It responds to the extent to which the student improves his/her skills and abilities. Therefore, the score for this factor depends mainly on the student. Nevertheless, it seems obvious that the first factor is needed in order to excel in this factor. A good curriculum enables and enhances skill development throughout the degree.

The third factor includes six items that collect information about the general services, facilities and equipment of the university (Tsinidou et al., 2010; Letcher and Neves, 2010). It accounts the 5.83% of the variance. The label for this factor is 'Services and facilities', due to the fact that the items relate to satisfaction with the library, the classrooms, other teaching equipment, support for mobility actions, quality of information on the website (in terms of useful and updated information), information related to the matriculation process, grants, etc.... There is another item related to the satisfaction coming from the answer received about complaints and suggestions.

This third and final factor is therefore an assessment of the services deployed and conveyed by the university. Depending on the strategy of the university, these services depend on central services, whereas in other cases, the faculty has the resources to provide these services and consequently assume responsibility for them.

Finally, in the same way that the students need a good syllabus (first factor) in order to develop their skills properly, it can also be stated that they need a good environment in terms of physical facilities and services.

To examine the unidimensionality of these new constructs, three CFAs were conducted using EQS 6.2 software. The three analyses extracted only one factor each. Table 3 shows the



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statistics for reliability and convergent validity. The reliability of these three factors was then assessed.

Table 4

Table 5 provides the results of the analysis of discriminant validity which was analysed using linear correlations or standardized covariances between latent factors by examining whether the inter-factor correlations were less than the square root of the average variance extracted (AVE) (Fornell and Larcker, 1981). Table 4 shows that the square roots of each AVE were greater than the off-diagonal elements. Discriminant validity was confirmed.

Table 5

The next step was to analyse these three dimensions of UnivQual as dimensions of a CFA. The model was estimated using the robust maximum likelihood method from the asymptotic variance-covariance matrix. The fit indices obtained in the measurement model estimation showed that the variables converged toward the factors established in the CFA (see Table 6). Taking the significance of the robust χ^2 statistic with caution, and noting the global indicators, the global fit was acceptable (Hair et al., 2010).

Table 6

5. CONCLUSIONS

The paper analyses the assessment of perceived quality in the university degrees, and provides a scale. The first finding is that the quality of the university degree is a multifactor construct. It is measured using a scale of 17 items arranged according to three dimensions: syllabus, skill development and services and facilities.

The first contribution is that the quality of an academic programme is a multifactor construct. An in-depth analysis of the aforementioned three dimensions suggests considering two of these factors as 'enablers' --syllabus, and services and facilities --for the 'result' of the service provided --skill development. How the 'syllabus' is designed and implemented strongly affects how students improve their skills (both soft and hard); however, the 'services and facilities' play a second-order role, acting as enablers of the learning process. Nevertheless, both factors are necessary and mutually reinforce each other.

All these conclusions might shed some light for the managers of the university when they develop a global strategy for the university. The students are their clients and their voices should be heard. The paper also offers some clues to the authorities of a local region or country who allocate budgets to this particular public service.



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Although this paper provides an original contribution to the existing literature on the quality of university degrees, we hope that these findings encourage further research and that they can be applied to help define the curricula that universities offer. Future research (both qualitative and quantitative) will benefit also the authorities that are in charge of allocating resources to the different public services of a region or country.

We believe this paper provides an original contribution to the existing literature on assessing quality at universities from the student perspective. We hope our findings can be applied to help define attractive academic programs and provide useful insights into how the supporting facilities should be designed to allow students to take advantage of their learning process at university.

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3.1. GRAPHIC OR TABLE 1

UnQu1	The structure of the syllabus has allowed a proper progression of my learning
UnQu2	There has been good coordination in the content of the subjects to avoid overlap
UnQu3	The volume of work has been consistent with the required number of ECTS of the subjects
UnQu4	I am satisfied with lecturers
UnQu5	The teaching methodology used by lecturers has helped my learning process
UnQu6	The mentoring and personalized attention has been useful and has helped me improve my learning process
UnQu7	The online platform (virtual campus) was a suitable environment to generate knowledge and improve my learning
UnQu8	Evaluation systems have properly reflected my learning
UnQu9	The internships have allowed me to consolidate and apply knowledge and skills acquired during the degree
UnQu10	The mobility activities in which I have participated have been relevant for my learning
UnQu11	The bachelor's thesis has allowed me to assess my level of achievement of competencies
UnQu12	Facilities (classrooms and teaching areas) have been adapted to facilitate my learning
UnQu13	The resources provided by the library services and teaching support have responded to my needs
UnQu14	The student support services (information, registration, academic procedures, scholarships, orientation, etc.) have offered me good advice and care
UnQu15	I have received adequate response to my complaints and suggestions
UnQu16	The information on the website is complete and updated
UnQu17	The training received has allowed me to improve my communication skills
UnQu18	The training received has allowed me to improve my personal skills (confidence level, independent learning, making decisions, solving new problems, critical analysis, etc.)
UnQu19	The training received has allowed me to improve my leadership and teamwork skills
UnQu20	The training received has allowed me to improve my skills for a future professional career



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3.2. GRAPHIC OR TABLE 2

Table 2. Demographic characteristics of the sample (student graduates in 2012/2013).

	Number	%
Sex		
No answer	23	0.8
Female	1,984	62.3
Male	840	36.8
Total	2,557	100.0
Age		
No answer	19	0.7
Less than 21 years old	2	0.1
Between 21 and 24 years old	1,710	66.9
Between 25 and 30 years old	543	21.3
More than 30 years old	201	7.9
Total	2,557	100.0
Location of high school studies		
No answer	18	0.7
Does not apply	37	1.4
Catalonia	2,303	90.0
Rest of Spain	143	5.7
Europe Union	23	0.9
Rest of the world	33	1.3
Total	2,557	100.0
Access to the University		
No answer	21	0.8
From official exam	1,875	73.3
From a professional cycle	328	12.8
From other degree	170	6.6
From the same degree in other university	20	0.8
From previous low-degree	53	2.1
From special examination for people older than 25 years	62	2.4
Others	23	0.9
(Missing/total)	Total	2,557 100.0
Year of the first degree		
2007 or before	187	7.3
2008	259	10.1
2009	1,850	72.4
2010	118	4.6
2011	85	3.3
2012	34	1.3
2013	46	1.8
Total	2,557	100.0

3.3. GRAPHIC OR TABLE 3

Table 3. Matrix of the three components extracted using the principal component analysis and the varimax rotation of the UniQual items.

	1	2	3
UnQu5	.707	.313	
UnQu8	.686	.275	
UnQu3	.673		
UnQu2	.664		
UnQu4	.646	.295	
UnQu1	.617	.318	
UnQu6	.531		.276
UnQu11	.413		.263
UnQu19	.325	.812	
UnQu18	.312	.798	
UnQu20	.326	.749	
UnQu17	.289	.747	.262
UnQu9		.489	.458
UnQu14	.352		.715
UnQu16	.286	.302	.643
UnQu13	.309		.618
UnQu15	.456		.618
UnQu12	.389		.541
UnQu10		.346	.522
UnQu7	.299	.339	.411
Percentage of variance extracted	41.64%	7.39%	5.83%

3.4. GRAPHIC OR TABLE 4

Table 4. Loads of the three CFAs and statistics for their reliability analyses.

	Syllabus	Skills development	Services and facilities
UnQu1	0.744	UnQu17 0.844	UnQu10 0.442
UnQu2	0.646	UnQu18 0.888	UnQu12 0.706
UnQu3	0.623	UnQu19 0.873	UnQu13 0.710
UnQu4	0.737	UnQu20 0.810	UnQu14 0.800
UnQu5	0.811		UnQu15 0.790
UnQu6	0.622		UnQu16 0.748
UnQu8	0.723		
Cronbach's alpha	0.821	0.876	0.787
Range of Cronbach's alpha if one item is removed	0.778–0.815	0.821–0.865	0.730–0.814
Range of correlations between items and total corrected scale	0.483–0.691	0.672–0.785	0.314–0.636
Composite reliability	0.872	0.915	0.855
Average variance extracted	0.496	0.730	0.504

All loads significant at p-value = 0.01



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3.5. GRAPHIC OR TABLE 5

Table 5. Correlation matrix of latent factors.

	1	2	3
1 Syllabus	<i>0.704</i>		
2 Skill development	0.587	<i>0.854</i>	
3 Services and facilities	0.674	0.562	<i>0.710</i>

All correlations are significant at the 0.01 level (bilateral)

Diagonal elements are the square roots of the average extracted

3.6. GRAPHIC OR TABLE 6

Table 6. Confirmatory factor analysis of UniQual.

Dimension	Items	Load	t-value	r ²
Syllabus	UnQu1	0.689	-	0.474
	UnQu2	0.565	17.350	0.319
	UnQu3	0.577	16.596	0.333
	UnQu4	0.721	18.962	0.520
	UnQu5	0.808	22.327	0.653
	UnQu6	0.619	17.681	0.383
	UnQu8	0.717	20.416	0.513
	UnQu17	0.820	-	0.672
Skill development	UnQu18	0.877	28.107	0.796
	UnQu19	0.839	26.435	0.704
	UnQu20	0.795	23.161	0.633
	UnQu10	0.372	-	0.138
Services and facilities	UnQu12	0.620	9.501	0.384
	UnQu13	0.631	8.842	0.398
	UnQu14	0.754	9.283	0.568
	UnQu15	0.767	9.259	0.588
	UnQu16	0.707	9.442	0.500
Goodness of fit summary				
Satorra-Bentler scaled χ^2		489.15		
Degrees of freedom		116		
p-value		0.000		
χ^2 df		4.22		
Comparative fit index (CFI)		0.931		
Root mean-square error of approximation (RMSEA)		0.063		
90% confidence interval of RMSEA		(0.057, 0.068)		

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