

Analysis of University Students' Perceptions Explaining University Quality: Validation of Measurement Scales

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Abstract

In the present study, an instrument to measure some latent variables of perception (constructs) on university quality from the students' point of view was validated. Factor analysis with dimension reduction and varimax rotation together with Cronbach's alpha reliability analysis were used in the validation. The scales validated for Ecuador contain 15 constructs that can be used by universities and institutions of higher education to massify research and promote continuous quality improvement. A group of 6 universities lead the final rating with very good averages and another group of 4 lagged behind with regular to good averages. A sample of 782 university students was analyzed and the analysis of descriptive statistics, contingency tables, box plots, multivariate analysis, binary logistic regressions and multiple linear regressions preceded the conclusions. An exploratory regression model was constructed based on the multiple regressions performed, with Quality as the final dependent variable and Satisfaction as a partial mediating variable. A massive investigation in universities was recommended.

Keywords: university quality, university satisfaction, exploratory model, perception variables, universities, University students.

1. Introduction

The Council of Citizen Participation and Social Control (CCPSC), approved the creation of the Ecuadorian public policy observatory, called "Citizen Observatory to monitor compliance and academic quality in the Higher Education System of Ecuador" with official letter CPCCS-DGYE-2020-0108-O (see Figure 1).

The aforementioned Observatory resolved in its meetings of Thursday, February 13 and 20, 2020, to approve its strategic plan and, as an initial part of this process, to conduct a comprehensive survey on the academic quality of university students, starting from the consumer who is the student pursuing a career.

After data analysis, this survey will be made available to the CPCCS and the agencies that exercise university authority in Ecuador, such as the Higher Education Council (CES) and the Secretariat of Higher Education, Science and Technology (SENESCYT), so that they consider the results as a relevant element for decision making. The rectors of Ecuadorian universities will also be informed of the results and a presentation will be made to the public as part of the citizen participation process



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0413-0

Guayaquil, June 19, 2020

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With this background, I request you to authorize whoever is appropriate to facilitate free access to the information and observation spaces necessary for the members of the Observatory, in compliance with the constitutional and legal provisions, so that they may exercise their right to social control over the object raised and within the established term.

In this context, we request you as the respective authority to collaborate and coordinate the necessary actions for the Citizen Observatory to comply with one of the actions of the work plan presented, that is to carry out in your institution a survey on satisfaction and academic quality in university students.

For the coordination and technical support of this process, Cesar Hidalgo Rivadeneira has been delegated as Evaluation and Monitoring Specialist of the National Subcoordination of Social Control, whose e-mail address is: chidalgo@cpcs.gov.ec, and all communications should be sent to the e-mail address: nvillavicencio@cpcs.gov.ec of Dr. Narcilo Villavicencio in my capacity as Provincial Coordinator Guayas of the Council of Citizen Participation and Social Control.

Atentamente,

Mgs. Narcilo Natan Villavicencio Maldonado
PROVINCIAL COORDINATOR

Figure 1.Appointment of the Observers of the Public Policy on University Education Quality (CPCCS, 2020).

The present investigation seeks to determine the different key academic factors perceived by university students of different levels and specializations, with the purpose of deductively and on the basis of multivariate statistics, to reach conclusions about some latent variables of perception about the educational quality of universities.

In addition, the research problem is linked and continues with the different qualities of education that exist in universities, considering that some students who have approached the WATCH expressed their dissatisfaction with the deficiency of teaching, from the lack of experience of teachers, the poor attention to the needs of students and the contemptuous treatment of some teachers and authorities.

The complaints were contrasted through interviews, which justify the present research, with the purpose of having first exploratory research, so that the authorities of evaluation and control of higher education can extend it to all universities and then demand certain changes that are necessary, both in the methodology and in the quality of teaching.

The quality evaluations carried out by the control institutions of the Ecuadorian university do not explore the students' perceptions of their university, and there is a gap that will be partially filled with this study.



Document N. CPCCS-DGYE-2020-0413 -0

Guayaquil, June 19, 2020

Subject: REQUEST FOR SUPPORT FOR CITIZEN'S OBSERVATORY

Doctor
Fausto Toscanini Segale
Rector
UNIVERSIDAD CATÓLICA SANTIAGO DE GUAYAQUIL
Present

The CPCCS, in compliance with the Constitution, the Organizational Law of Citizen Participation, its own Organizational Law and the Organizational Regulation by Processes that regulate its functions and operation, develops programs aimed at the exercise of Social Control.

Regarding social control, the CPCCS has the following attributions:

1. To promote and stimulate the Social Control initiatives on the performance of public policies for the fulfillment of the rights established in the Constitution, and on the entities of the public sector and the natural or legal persons of the private sector that provide public services, manage public resources or develop activities of public interest; and,
2. Observatories and other spaces of social control, that demand it, to demand accounts of the management of the public, within the framework of the constitutional rights.

As part of the execution of this Institutional competence, the CPCCS, within the framework of its attributions, proceeded to the registration, training and accreditation of the CITIZEN OBSERVATORY TO MONITOR COMPLIANCE AND ACADEMIC QUALITY IN THE HIGHER EDUCATION SYSTEM OF ECUADOR, for which we proceeded to duly notify the following institutions prior to the present communication:

- CONSEJO DE ASEGURAMIENTO DE LA CALIDAD DE LA EDUCACIÓN SUPERIOR
- SECRETARÍA DE EDUCACIÓN SUPERIOR, CIENCIA, TECNOLOGÍA E INNOVACIÓN
- CONSEJO DE EDUCACIÓN SUPERIOR.

Those who already have due knowledge of the activation of the CITIZEN OBSERVATORY TO MONITOR COMPLIANCE AND ACADEMIC QUALITY IN THE HIGHER EDUCATION SYSTEM IN ECUADOR

Figure 2. Request to universities to support the survey on university satisfaction and quality to be carried out by the Observatory (CPCCS, 2020).

This is based on the existing asymmetry in university education at different levels, between public and private universities, an asymmetry that produces decisions that are detrimental to students, who once they have entered the university, find themselves in a different reality from the one they imagined.

There are public and private universities that are well evaluated in the research category by the Higher Education Council-CES, and there are public and private universities in the teaching category, some of which are relatively well evaluated and others poorly evaluated; but future students need third party opinions to validate the reality of each university, from another angle, which is the perception of the students.

This different option is what justifies the present research, in the sense of determining how aligned are the current evaluations with what students perceive about their university.

The purpose of this research is to have the perceptions of university students on satisfaction, quality and other key factors, in order to take into consideration, the formative shortcomings and derive them to the directives of university higher education, with the purpose of taking the necessary and sufficient corrective measures, in search of an education of excellence.

The present research work has the relevance of transcending, both to university directors and students, which will help them to make better decisions about their admission to different universities, taking into consideration the expectations and perceptions of the current undergraduate students. The research aims to break the asymmetry between what students actually perceive once they have entered university and what they expect to enter.

The use of the results and their conclusions by authorities and future applicants produces a social Benefit.

2. Objectives

2.1 General Objective

To validate a scale to measure some variables of perception of university students related to satisfaction and educational quality.

2.2 Specific objectives

- Conduct an exploratory descriptive and multivariate analysis of the constructs derived from the research questionnaire.
- Analyze the results of the 10 universities that have collaborated by providing the link to the questionnaire to their students, or that, in some way, their students have seen it and answered it on their own initiative. These results are presented discretely in the data analysis.

3. Methodology and research design

3.1 Methodology

A sample of 782 university students was taken through a survey using a structured questionnaire that was sent, through a digital link, to the universities and student associations, so that it could be distributed among their students in different semesters.

The questionnaire was structured on a Likert scale, which asked about the degree of agreement, from 1 to 5, where 1 is totally disagree, 2 partially disagree, and 2 partially disagree. 2 partially disagree, 3 neither agree nor disagree, 4 partially agree and 5 is totally agree.

The sample of 782 is larger (more than double) than that required for unknown and infinite populations, with probability of success equal to the probability of failure (expected proportion) ($p=q$) and for a confidence level of 95% and a maximum admissible estimation error of 5% in terms of proportion, considering a variance of 1 on the Likert scale from 1 to 5. The expected variance for proportions is $p*q$.

This gives the following sample size.

$$n = [Z^2 (p*q) / e^2] = [1.96^2 (0.5*0.5) / 0.05^2] = 385 \quad (1)$$

The research questionnaire was constructed by the authors based on the constructs found in the literature review of Fernández J.E. et al., (2007) and Vergara-Morales J et al. (2018), to which additional items were added according to the experience of the observers (3 of them retired after more than 38 years of university teaching).

The research questionnaire was sent by the CPCCS to the rectors of the universities and at the same time, the members of the Observatory sent to the student associations and leaders, the corresponding link to be resent.

Using the professional ROTATOR SURVEY program, the research questionnaire was uploaded to the cloud through a link, so that university students, who were in distance education during the pandemic, receive the link sent by their student associations, their university or their friends in the course. Social networks were used to support the dissemination of the research link.

First, a dimension reduction of the research questionnaire items was performed, obtaining the factors and communalities derived from the reduction analysis with varimax rotation following what was done by Maluk (2018b).

Each factor was given its corresponding name, following Fernández et al. (2007). The methodology consists of descriptive and multivariate MANOVA analysis on the resulting factors, after dimension reduction and varimax rotation, which were performed with the items of the research questionnaire and as recommended by Maluk (2018b).

Only the analysis was performed for universities with more than 20 responses, which are numbered from 1 to 10, the number being derived by random selection and the name has been reserved in a list that will be given separately to each university.

Binary logistic regressions were also performed for each university, revealing the acronyms of its name, in which the factors and variables that have regression with each of those are determined. Dummy variables were constructed for each of the 10 universities analyzed.

The order in which the logistic regressions were performed does not necessarily coincide with the numerical listing of the 10 universities. In addition, linear regressions were performed for some constructs obtained as dependent variable and the universities as binary independent variables, in order to determine the ones that have significant regression with each of them.

3.2 Research Design

The variables in the research were:

Demographic: age, gender, career, university and province.

Perception variables: The average perception variables, derived from the process of principal component analysis and dimension reduction, of the structured questionnaire items, are as follows.

$$\begin{aligned} \text{CONTENIDOS} &= (C1 + C2 + C3 + C4) / 4. \\ \text{ACTIVIDADES} &= (AC1 + AC2 + AC3) / 3. \\ \text{EVALUACION} &= (EV1 + EV2 + EV3) / 3. \\ \text{INFORMACEXAMEN} &= (IE1 + IE2 + IE4) / 3. \\ \text{CONOCIMIENTOS} &= (CN1 + CN2 + CN3) / 3. \\ \text{EXPLICACION} &= (E1 + E4 + E6) / 3. \\ \text{EXPLICACIONDEF} &= (E2 + E3 + E5) / 3. \\ \text{MATERIALES} &= (M1 + M2 + M3 + M5 + M6) / 5. \\ \text{ACTITUD} &= (A1 + A2 + A3 + A4 + A5) / 5. \\ \text{TRATODEF} &= (T2 + T4 + T5) / 3. \\ \text{ATENCIONDIFICULTADES} &= (AD1 + AD3 + AD4 + AD5 + AD6 + AD7) / 6. \\ \text{SATISFACCION} &= (S1+S5+S7+S8+S9+S10+S11+S12) / 8. \\ \text{INSATISFACCION} &= (S2 + S3 + S4 + S6) / 4. \\ \text{CALIDAD} &= (CAL1 + CAL2 + CAL3 + CAL4 + CAL5 + CAL6 + CAL7 + CAL8 + CAL11 + CAL13 + CAL15) / 11. \\ \text{CALIDADDEFICIENTE} &= (CAL12 + CAL14 + CAL16) / 3. \end{aligned}$$

Figure 3. Latent variables as constructs derived from the exploratory factor analysis of the research questionnaire items, with dimension reduction and varimax rotation.

Source: Own elaboration.

1. Contents: This variable expresses on average, the perception that university students have about the humanistic and specialization contents of their career and determines the degree of agreement, in the sense of whether they are appropriate, updated, necessary or sufficient, as questioned in each of the items of the construct.

2. Activities: This variable measures the average perception, as the degree of agreement that students have, with the fact that, at their university, students have activities related to their profession.

3. Evaluation: The variable measures on average, the perception that students have about the planning, objectivity and rigorousness of the evaluations that are required of them in their studies.

4. Examination information: This variable explains the average perception that students have about the information given to them by professors regarding what is required to study for exams and the timely delivery of grades.

5. Knowledge: This is the students' perception variable, on average, of the level, how up-to-date and how new the knowledge is that they are taught at their university.

6. Efficient explanation: The variable explains the average perception, which the students have about the degree of theoretical and practical explanation by the professors and the attractiveness of the subjects they teach.

7. Poor explanation: The negative variable, explains the students' perception of the degree of boredom and lack of application to the practice of the subjects, on average.

8. Materials: The variable explains the average perception that university students have about the availability of the necessary materials for the courses and the degree of availability of the materials in their university.

9. Attitude: The variable explains the average perception that students have about the degree of proactivity and effort made by professors and authorities towards students.

10. Poor treatment: This negative variable of average perception, explains the degree of contemptuous treatment that teachers have towards students.

11. Attention to difficulties: This variable of average perception, explains the degree of assistance given by the professors and authorities of their university to the university student.

12. Satisfaction: This variable of average perception, explains the degree of satisfaction that the student has about the teaching, the social environment, how much he/she enjoys his/her classes and so on.

13. Dissatisfaction: This negative average perception variable, explains the degree of student dissatisfaction with the poor social environment, teaching and lack of experience of the teachers.

14. Quality: This average perception variable explains the degree of acceptance that students have about the teaching processes, the curriculum, the quality of services, the grading methods, the enrollment process, the rating of their university.

15. Poor quality: This negative average perception variable explains the degree to which the quality of teaching and the undeserved national and international rating by their university.

Note: For editorial purposes in this article, the first three items and their respective treatment are analyzed in terms of the results obtained, without altering the general conclusions reached, in order to make known the perception recorded by the number of respondents.

4. Data analysis

4.1 Dimension reduction

4.1.1 Contents

The first component derived from the factorial reduction with varimax reduction has been called Contents and the factor loadings are homogeneous, constituting a communality in which the 4 items contribute in similar proportions, the explained variance is 66.9%, which is considered very good according to Hair et al (1998).

Component Matrix

	Component
	1
C2	.861
C1	.829
C3	.802
C4	.777

Table 1.Extraction method: principal component analysis

a. 1 Extracted component

Total variance explained

Component	Sums of the squared saturations of extraction		
	Total	% of variance	% Accumulated
1	2.677	66.917	66.917

Table 2.Extraction method: Principal component analysis

4.1.2 Activities: The second component found, called Activities, also has homogeneous factor loadings with an explained variance of 80% of the total variance, which is high, capturing a very high proportion of the total variance as mentioned by Hair et al. (1998).

Table 3.Extraction method: principal component analysis

a. 1 Extracted components

Component Matrix

	Component
	1
AC2	.902
AC1	.892
AC3	.890

Table 4.Extraction method: Principal component analysis

Component	Sums of the squared saturations of extraction		
	Total	% of variance	% accumulated
1	2.402	80.079	80.079

4.1.3 Evaluation: Two factors were obtained and one of them presented an item with a very low contribution to communality, which was discarded when the construct reliability analysis was performed. Items EV1, EV2 and EV3 were confirmed. The variance explained was 44.5%, which is the median.

**Table 5.Extraction method: Principal component analysis
Communalities**

	Extraction
EV1	.733
EV2	.778
EV3	.695
EV4	.302
EV5	.793

**Table 6.Extraction method: Principal component analysis
Rotation methods: Vrimax normalization with Kaiser.**

a. Rotation has converged in 3 iterations.

Component	Sums of the squared saturations of extraction			Sum of the saturations squared by rotation		
	Total	% of variance	% accumulated	Total	% of variance	% accumulated
1	2.226	44.527	44.527	2.225	44.496	44.496
2	1.075	21.502	66.029	1.077	21.533	66.029

4.2 Reliability analysis

4.2.1 Contents

Cronbach's alpha is 0.832 with a confirmatory and intermediate character, higher than 0.7 as mentioned by Hair et al. (1998)

Table 7. Reliability statistics

Cronbach's alpha	No. of elements
.832	4

Table 8. Statistical total-element

	Average of the scale if the element is eliminated	Variance of the scale if the element is eliminated	Element-to-total correlation corrected	Cronbach's alpha if the element is removed
C1	12,5402	6,648	0,667	0,784
C2	12,4791	6,662	0,721	0,763
C3	12,7588	6,496	0,648	0,793
C4	12,7154	6,426	0,616	0,81

4.2.2 Activities: Cronbach's alpha is 0.875 confirmatory and intermediate, higher than 0.7 as stipulated by Hair et al. (1998)

Table 9. Reliability statistics

Cronbach's alpha	No. of elements
.875	3

Table 10. Statistical total-element

	Average of the scale if the element is eliminated	Variance of the scale if the element is eliminated	Correlation element-to-total correlation corrected	Cronbach's alpha if the element is removed
EV1	8,1511	4,064	,752	,831
EV2	8,2219	3,828	,773	,811
EV3	8,2251	3,756	,756	,828

4.2.3 Evaluation

Cronbach's alpha is 0.765, confirmatory and intermediate, higher than 0.7 as stipulated by Hair et al. (1998)

Table 11. Reliability statistics

Cronbach's alpha	No. of elements
.756	3

Table 12. Total statistic-element

	Average of the scale if the element is eliminated	Variance of the scale if the element is eliminated	Correlation element-to-total correlation corrected	Cronbach's alpha if the element is removed
IE1	8,0563	3,467	,675	,631
IE2	7,9244	3,764	,699	,611
IE3	7,9453	4,338	,486	,833

4.3 Descriptive statistics

It can be seen in the detail of the descriptive statistics that the average age is 21.5 years, with a range of ages from 17 to 27. There are 10 universities that obtained more than 20 surveys and therefore subject to analysis.

The average standard deviation of the constructs obtained is close to 1, as assumed in the research design. The positive constructs with means lower than 4 out of 5 points are: Examination Information and Quality. The negative constructs that exceed 2 out of 5 points are: Poor explanation, Poor treatment, Dissatisfaction and Poor quality.

The final score, which is the average of the scores of all the constructs obtained, has a mean of 34.67 out of a maximum of 51, which is only 68% of the maximum possible score. The final weighted score, in which the Knowledge, Quality and Poor-Quality constructs have been double weighted, has a mean of 40.60 out of a maximum possible total of 60, which produces the weighted sum as detailed in APPENDIX 2 and is 68% of the maximum possible value.

Table 13. Descriptive Statistic.

	Estadísticos descriptivos									
	N	Mínimo	Máximo	Media		Dev. tp.	Asimetría		Curtosis	
	Estadístico	Estadístico	Estadístico	Estadístico	Error típico	Estadístico	Estadístico	Error típico	Estadístico	Error típico
EDAD	782	,00	27,00	21,5409	,08494	2,37523	-,603	,087	7,651	,175
GENERO	782	1,00	2,00	1,5243	,01787	,49973	-,097	,087	-1,996	,175
UNIVERSIDAD	782	1,00	10,00	5,8747	,08821	2,46661	-,310	,087	-,871	,175
CONTENIDOS	782	1,00	5,00	4,2439	,02825	,78999	-1,478	,087	2,168	,175
ACTIVIDADES	782	1,00	5,00	4,1714	,03252	,90927	-1,365	,087	1,607	,175
EVALUACION	782	1,00	5,00	4,2600	,02889	,80793	-1,438	,087	2,205	,175
INFORMACEXAMEN	782	1,00	5,00	3,6590	,02802	,78356	-,217	,087	,343	,175
CONOCIMIENTOS	782	1,00	5,00	4,1756	,03047	,85205	-1,455	,087	2,126	,175
EXPLICACIONEFIC	782	1,00	5,00	4,0921	,02935	,82087	-1,089	,087	1,275	,175
EXPLICACIONDEFIC	782	1,00	5,00	2,7877	,04089	1,14349	,082	,087	-,822	,175
MATERIALES	782	1,00	5,00	4,1621	,02798	,78252	-1,043	,087	,891	,175
ACTITUD	782	1,00	5,00	4,0657	,02983	,83412	-,972	,087	-,596	,175
TRATODEFICIENTE	782	1,00	5,00	2,3525	,04323	1,20890	,592	,087	-,731	,175
ATENCIONDIFICULTADES	782	1,00	5,00	3,8142	,03541	,99024	-,660	,087	-,327	,175
SATISFACCION	782	1,00	5,00	4,2820	,02621	,73304	-1,345	,087	2,071	,175
INSATISFACCION	782	1,00	5,00	2,8664	,03971	1,11037	,058	,087	-,922	,175
CALIDAD	782	1,18	5,00	3,9847	,02606	,72865	-,760	,087	,170	,175
CALIDADDEFICIENTE	782	1,00	5,00	2,2315	,04139	1,15753	,734	,087	-,445	,175
CALIFICACIONFINAL	782	2,42	49,47	34,6726	,32553	9,10312	-,546	,087	-,075	,175
CALIFICACIONFINALPONDERADA	782	1,60	58,47	40,6014	,39031	10,91470	-,555	,087	-,079	,175
N válido (según lista)	782									

5. Conclusions and recommendations

Based on the findings, the following conclusions can be drawn:

1. The scale of the university quality measurement questionnaire and the regression variables that are correlated with it have been validated.

2. It is recommended that the universities and university control organisms massify it at a national level and that it be adopted as a periodic survey to measure student perceptions of their university. It is also recommended that it be considered as an instrument of added value to the national qualification of universities carried out by the Higher Education Council (CES) in conjunction with the Secretariat of Higher Education, Science and Technology (SENESCYT).

3. The universities on average have shortcomings in most of the variables analyzed, especially in the following: Examination information, Deficient explanation, Attention to difficulties, Deficient treatment and Deficient quality.

4. The universities with the best average scores, according to the students' perception are: UEES, ECOTEC, USFQ, ESPOL, UDA and UPS. 5. It is recommended that higher education institutions transfer these results to universities, so that they make an additional effort to improve the quality of education according to student perceptions.

6. An exploratory model was generated in order to visualize the existing regressions between the different perception variables. In this way, university managers will have a general idea of which variables should be improved in order to increase those that follow within the model and move the effects in sequence to improve Quality as the final dependent variable.

7. The low level of some of the perception variables analyzed in a group of universities is a cause for concern, so it is advisable to start by sending letters from the university control institutions, so that they pay attention to the shortcomings and correct them as far as possible, according to their resources and the will of their authorities.

8. In general, the average evaluation of the universities analyzed, according to the perception of the students, is in the level of good to very good, lacking to correct procedures, attitude and will of the professors and directors, in such a way that in a next evaluation an average close to excellence is obtained, obviously from the point of view of the students, who at the beginning and at the end of the university path, are the reason of being of the academy and the university.

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