Adaptación al español del Cuestionario de Usabilidad de Sistemas Informáticos CSUQ

Spanish language adaptation of the Computer Systems Usability Questionnaire CSUQ

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Resumen

Se adaptó el cuestionario CSUQ en una población mexicana donde se habla el español, con el propósito de que pudiera ser utilizado en investigaciones posteriores. Se aplicó el cuestionario CSUQ versión 3 a una muestra de 237 estudiantes de una universidad pública mexicana a través de Internet. Los resultados mostraron que el coeficiente de alfa de Cronbach fue de .96, que indica que el cuestionario tiene una muy buena confiabilidad. El análisis factorial manifestó la presencia de tres factores como se menciona en la literatura, los cuales fueron Calidad del Sistema, Calidad de la información y Calidad de la interfaz, cumpliendo así con la validez de constructo. El cuestionario quedó conformado por 13 ítems. Se concluye que el CSUQ adaptado al español cuenta con la adecuada validez y confiabilidad para ser utilizado como un instrumento apto para medir la usabilidad general de una plataforma.

Palabras clave: usabilidad, CSUQ, adaptación, confiabilidad, validez.

Abstract

Adapted the CSUQ questionnaire in a Mexican population speaking Spanish, with the purpose that could be used in further investigations. The questionnaire CSUQ version 3 was applied to a sample of 237 students from a Mexican public University through the Internet. The results showed that the coefficient of Cronbach's alpha was of 0.96, which indicates that the questionnaire has a very good reliability. The factor analysis said the presence of three factors as mentioned in the literature, which were Quality system, Quality of information and Quality of the interface, thus fulfilling the construct validity. The questionnaire was comprised of 13 items. It is concluded that the CSUQ adapted to the Spanish has adequate validity and reliability to be used as a tool to measure the overall usability of a platform.

Key words: usability, CSUQ, adaptation, reliability, validity.

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Introduction

One of the problems that have faced the Latino researchers in the area of usability evaluation through questionnaires, is that we do not have this type of tools adapted to the Spanish language. This is why the objective of the research was the adaptation of the Computer System Usability Questionnaire CSUQ (Cuestionario de uso de sistema de computadora) in a Mexican town where the Spanish is spoken.

The CSUQ questionnaire arose from other so-called Post-Study of the Usability Questionnaire on Computer Systems PPSUQ (for its acronym in English Post-Study System Usability Questionnaire), (Lewis, 1995). The construction of the items in the questionnaire PPSUQ was from a group of evaluators of usability, where they selected the most suitable according to their contents on the basis of what they considered usability. For this they took into account the characteristics of the system, such as ease of use, ease of learning, simplicity, efficiency, information and user interface.

The PPSUQ instrument was designed to assess the perceived satisfaction of users with their computer systems (Lewis, 2002) and this was an internal IBM project called SUMS (System Usability MetricS), led by Suzanne Henry (Sauro & Lewis, 2012).

From this questionnaire arose three versions, the first version did have 18 items, the second version had 19, and in this same version, Lewis found that three items (3, 5, 13) did not contribute to the reliability of the scale; thus emerged the version number 3, where the PPSUQ questionnaire has only 16 items (Lewis, 2002). Another important point to mention is the fact that this questionnaire was applied in a usability lab, i.e., users had to manipulate the interface through a series of scenarios and ultimately answer this questionnaire. What mentioned literature is that in the first version only managed to apply to 48 participants, since the sample was very small, and this was applied in a usability lab, Lewis in 1995 developed the CSUQ questionnaire, which is almost equal to the PPSUQ applied to 325 participants.

With respect to the factor analysis that was done in the third version of the PSSUQ, were found the same three factors in previous versions (Sauro & Lewis, 2012):

- Quality system: consisting of items 1 to 6.
- Quality of information: formed by items in the 7 to 12.
- Quality of the interface: consisting of items 13 to 15.

The CSUQ was developed to collect a large number of applied questionnaires and observe whether the factorial structure found for PSSUQ in an environment of usability testing (laboratory) was the same for a mailed questionnaire (in the field) (Sauro & Lewis, 2012).

The PPSUQ and CSUQ questionnaires presented high levels of reliability over time, which is evidence of good stability in its internal consistency across different versions (v1 PPSUQ .97, .96 PPSUQ v2, v3 .94 PPSUQ and CSUQ .95) (Lewis, 1995, 2002; Sauro & Lewis, 2012).

It has been observed in investigations of Lewis (1995), which both CSUQ PPSUQ questionnaire and show a very good construct validity. Therefore, these results demonstrated that you can use these two questionnaires for evaluations regarding overall satisfaction with users with an interface. Therefore, the questionnaires are PPSUQ CSUQ and evaluating overall user satisfaction.

In a comparative study between different instruments usability evaluation, Tullis and Stetson (2004) found that the CSUQ has a good performance by measuring the reactions of the participants to a website, compared with other instruments, such as: the Words (Benedek & Miner, 2002), the QUIS (Chin, Diehl, & Norman, 1988), the SUS (Brooke, 1996) and one developed by Tullis and Stetson (2004). In addition, they found that valid assessments

performed even with small samples. This demonstrates the ability of the instrument in the field of usability studies.

The difference that makes Lewis (1995) between the two questionnaires is that the PPSUQ is suitable for use in situations of usability testing in a controlled laboratory environment, while CSUQ is suitable for use in field trials, ie where the participant can answer the questionnaire without needing to perform any tasks with the interface, it is only required that previously interacted with her.

Another important thing with the two questionnaires, point is that there are small changes in the wording of the items, since the PPSUQ concerns usability testing situations, while CSUQ makes no reference to it, but the quality the system and overall satisfaction.

The scale used by the authors in the present investigation was to CSUQ Version 3 (Sauro & Lewis, 2012), which is in the appendix. In this research were asked participants to rate the NEXUS platform, which is used to facilitate communication and collaboration between students and teachers in the process of teaching and learning, the three modes are: classroom, distance and mixed .

Method

Participants

It was applied to 237 participants, 129 females and 108 males, with an average age of 21 years. They were obtained from four races, 119 Engineer Systems Administrator (IAS), 3 Engineering Software Technology (ITS), 26 Mechanical Engineering Option (IMA) and 89 Degree in Psychology.

Instrument

The CSUQ version 3 which consists of 16 items (Sauro & Lewis, 2012), which presented a .89 reliability and construct validity of three factors (system quality, information quality and quality of the interface) was applied. Back translation procedure was used, with three bilingual usability experts, where two of them translated into Spanish the questionnaire, after these two collated its translations and the third expert conducted the English translation of the translated questionnaire for adaptation. Then the three experts collated versions to reach an agreement, to obtain the final version.

This translation was implemented online through Google Forms platform, with the intention to capture the participants' responses. A Likert scale of 7 levels of response, where they ranged from strongly disagree (1) to strongly agree (7) was used, although in the questionnaire in English upside was used, fully agree 1 Strongly Disagree 7 (Lewis, 1995, 2002; Tullis & Stetson, 2004; Sauro & Lewis, 2012). Sauro and Lewis (2012) indicated that the scale used in the questionnaire is capable to be invested in their responses without compromising its effectiveness. The decision to change the order of scale by the familiarity that has in our cultural context, where it is customary for the far right is agreed and disagreed leftmost took.

Some questions to the data section of the participants related to their age, length of experience in using the platform and the degree they were studying were added.

Procedure

attendees by email are encouraged to voluntarily participate in the research through the Facebook network, as well. Through these electronic media they were sent a web address from which they accessed the Google Forms platform where the items were to answer. To answer this questionnaire participants took less than ten minutes.

Results

The following results were obtained CSUQ questionnaire. In the global survey of 16 items was found that Cronbach's alpha coefficient was .97 in Bartlett sphericity test out significant p <.001 and index Kaiser-Meyer-Olkin (KMO) was .95, which means that it is feasible to perform the factorial analysis. He then proceeded to perform the exploratory factor analysis (EFA) and one factor was found; the percentage of explained variance was 66.98%. Lastly, the AFE to three factors forcing this analysis was performed as in literature mark their existence, so they wanted to see. In AFE we found that other factors mentioned above (see Figure 1) are presented, and the explained variance was 77.48%. Exploratory factor analysis on three factors with their respective items were found, which can be seen in Table I.

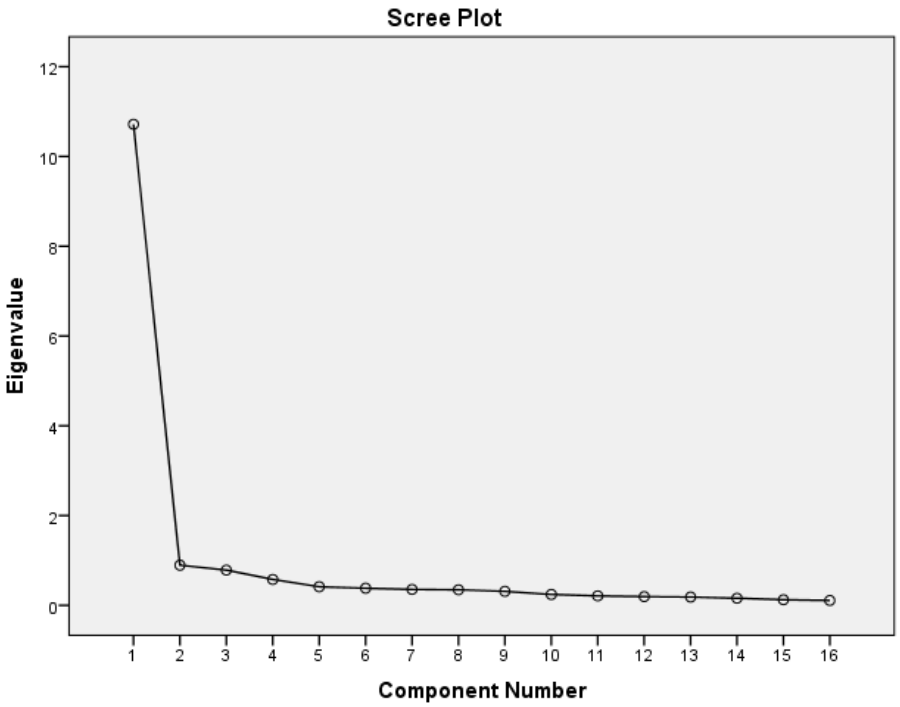

Figure 1. Graph of sedimentation CAQ Questionnaire of 16 items

Table I. rotated components matrix with 16 items

Matriz de Componentes Rotados			
	Componentes		
ÍTEM	FACTOR 1	FACTOR 2	FACTOR 3
2	.30	.43	**.71**
5	.35	.27	**.81**
6	.34	.23	**.79**
7	**.74**	.30	.22
8	**.73**	.36	.21
9	**.74**	.29	.41
10	**.69**	.34	.42
11	**.70**	.35	.42
12	**.70**	.42	.36
13	.46	**.71**	.23
14	.35	**.81**	.28
15	.55	**.63**	.20
16	.47	**.73**	.34
1	.29	**.59**	.58
3	.23	**.62**	.52
4	.35	**.70**	.39

In the factor 1 (quality of information) Cronbach's alpha coefficient was 0.93, in factor 2 (data quality) coefficient alpha was .94 and factor 3 (quality system) coefficientIt was .88.

Therefore, it was found that three items (1, 3 and 4), according to background (Lewis & Sauro, 2012), are grouped in factor 3 (quality system) and in our study these three items loaded on factor 2 (quality of the interface). This can be seen in Table II of the correlation matrix, where items 4 and 14 show a correlation of 0.78 and items 4 and 16 have 79 correlation (bold).

Table II. Correlation matrix

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	-															
2	.77	-														
3	.70	.67	-													
4	.69	.63	.70	-												
5	.68	.73	.61	.62	-											
6	.61	.67	.58	.60	.78	-										
7	.57	.54	.52	.60	.52	.47	-									
8	.58	.58	.52	.60	.49	.53	.70	-								
9	.63	.63	.57	.63	.68	.58	.68	.64	-							
10	.61	.62	.60	.64	.65	.64	.62	.65	.75	-						
11	.64	.62	.62	.62	.66	.61	.63	.62	.78	.78	-					
12	.66	.64	.59	.67	.63	.61	.63	.69	.73	.77	.81	-				
13	.65	.61	.61	.67	.57	.52	.58	.60	.62	.70	.66	.68	-			
14	.70	.65	.64	**.78**	.59	.57	.55	.60	.62	.64	.66	.68	.79	-		
15	.59	.54	.63	.62	.57	.55	.57	.63	.68	.67	.67	.69	.72	.74	-	
16	.76	.67	.68	**.79**	.66	.60	.62	.64	.70	.71	.73	.78	.77	.83	.80	-

Todos los valores tienen una $p < .001$

So we proceeded to perform the same analysis, but eliminating these three items, being in the questionnaire only 13 to evaluate.

The results of the questionnaire of 13 items were that the coefficient alpha was .96, the Bartlett test of sphericity out significant p <.001 and KMO index was .95. In exploratory factor analysis came one factor with 67.9% of explained variance, then carried out a factorial analysis of three factors (see Figure 2), which resulted in 79.7% of explained variance. In this analysis the three factors with their respective items, which can be seen in Table III were found.

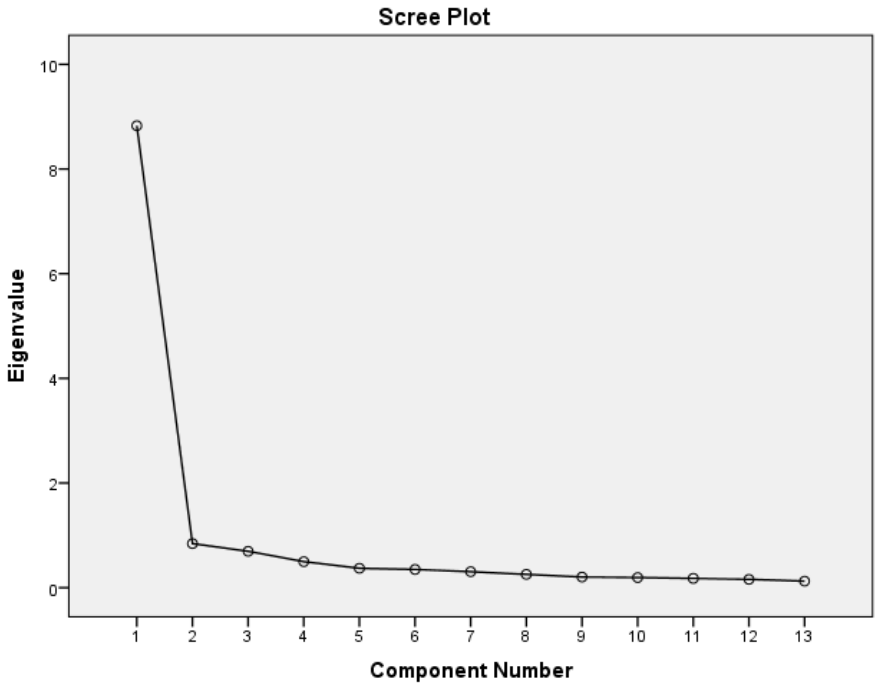

Figure 2. Graph of settling the CAQ 13-item Questionnaire

Table III matrix components rotated 13 items

Matriz de Componentes Rotados			
ÍTEM	Componentes		
	FACTOR 1	FACTOR 2	FACTOR 3
2	.38	.32	**.70**
5	.29	.28	**.84**
6	.26	.25	**.83**
7	.25	**.82**	.21
8	.36	**.76**	.22
9	.35	**.68**	.45
10	.43	**.59**	.47
11	.44	**.61**	.46
12	.50	**.61**	.41
13	**.79**	.35	.28
14	**.82**	.27	.34
15	**.74**	.41	.26
16	**.75**	.40	.38

In the factor 1 (quality of information) alpha coefficient was 0.93, in factor 2 (data quality) coefficient alpha was .93 and factor 3 (quality system) coefficient was. 88.

As it can be seen that the 13-item questionnaire showed better results both in the explained variance, and the distribution of the items with their respective factors as stated in the literature. It is noteworthy that the item 16, changed the factor 2 to 1, however, its content is of an overall assessment, making it possible to accept this change in placement without affecting the final result.

Conclusions

As could be seen from the results of the corresponding analysis questionnaire CSUQ, there were very good coefficient alpha, which means that the questionnaire has good reliability, both made up of 16 items (original) as made up of 13 items.

In addition, factor analysis showed evidence of a single factor, with high loads and explained variance. But, following the background, he was forced to three factors, which showed a very similar to what makes the literature distribution. However, three of the items presented

inconsistencies regarding his membership in the factors. In reviewing the content of these items (1, 3 and 4) it was observed that its wording is very similar to that of the items 14 and 16, where the perception of pleasure or satisfaction with the evaluated platform is expressed. The authors propose that this situation is responsible for changing the factor structure, where these items could be included in any of the factors, either 2 or 3 (items 1 and 3). On the other hand, if item 4, its content is very similar to the item 14, why they appear together. This is supported by statistical analysis, particularly the correlations between these items, which were of very high values, indicating the proximity of the responses (see Table II).

The opinion of the authors of this research is that the original wording of these items induce participants to such a response and, therefore, to be grouped in the factor analysis. Therefore, we propose reduced to 13 items that assesses, similarly to the original English, usability scale. This would be supported by high levels of reliability of statistical analysis.

In short, we can say that the adaptation of the Spanish language CSUQ scale was shown to be statistically reliable as adequate construct validity, making appropriate use for the evaluation of the various web platforms. Therefore, we reaffirm that in our opinion, the wording of some items (1, 3, 4, 14 and 16) of the original scale (English), inducing participants to give the same response, making it redundant It uses. We therefore propose a reduction in the number of questionnaire items, without affecting the reliability and validity of the instrument.

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Apéndice

CUESTIONARIO DE USABILIDAD EN SISTEMAS INFORMÁTICOS (CSUQ)

		Totalmente en desacuerdo						Totalmente de acuerdo
		1	2	3	4	5	6	7
1	En general, estoy satisfecho con lo fácil que es utilizar este sitio web.	○	○	○	○	○	○	○
2	Fue simple usar este sitio web.	○	○	○	○	○	○	○
3	Soy capaz de completar mi trabajo rápidamente utilizando este sitio web.	○	○	○	○	○	○	○
4	Me siento cómodo utilizando este sitio web.	○	○	○	○	○	○	○
5	Fue fácil aprender a utilizar este sitio web.	○	○	○	○	○	○	○
6	Creo que me volví experto rápidamente utilizando este sitio web.	○	○	○	○	○	○	○
7	El sitio web muestra mensajes de error que me dicen claramente cómo resolver los problemas.	○	○	○	○	○	○	○
8	Cada vez que cometo un error utilizando el sitio web, lo resuelvo fácil y rápidamente	○	○	○	○	○	○	○
9	La información (como ayuda en línea, mensajes en pantalla y otra documentación) que provee este sitio web es clara.	○	○	○	○	○	○	○
10	Es fácil encontrar en el sitio web la información que necesito.	○	○	○	○	○	○	○
11	La información que proporciona el sitio web fue efectiva ayudándome a completar las tareas.	○	○	○	○	○	○	○
12	La organización de la información del sitio web en la pantalla fue clara.	○	○	○	○	○	○	○
13	La interfaz del sitio web fue placentera.	○	○	○	○	○	○	○
14	Me gustó utilizar el sitio web.	○	○	○	○	○	○	○
15	El sitio web tuvo todas las herramientas que esperaba que tuviera.	○	○	○	○	○	○	○
16	En general, estuve satisfecho con el sitio web.	○	○	○	○	○	○	○