

# Measuring the attitudes of college students towards the use of ICT

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## Abstract

This article presents the analysis of the attitudes of the student body of the Engineering Department in relation to the use of Information and Communication Technologies ( ICT's) in their academic context as well as in daily life. To achieve this, two questionnaires were applied using the Likert structure. The results were analyzed in the light of using the Classical Test Theory. The principal findings indicate that the students favorably accept the use of ICT's in both contexts.

*Keywords:* ICT, attitudes, university students, Classical Test Theory

## Introduction

This paper aims to analyze the attitudes of students towards the use of Information and Communication Technology (ICT) in the School of Engineering at the Autonomous University of Chiapas, Mexico, in order to infer by empirical methods representations expressed by the students in the use of ICT, both in their academic activities and in their everyday life.

Knowing these attitudes allows educators to build and / or rebuild innovative and transformative teaching and learning methods that are in line with the tendency of the students to act or react- in this case with ICT, in order to improve the quality of the learning process. In order to do this, it is necessary to incorporate new resources and strategies which integrate these technologies into learning environments to support the active process of building knowledge and the development of skills that favor the effectiveness and efficiency of training models (Marcano Marcano, N. & Araujo, 2007).

To fulfill the purpose of this investigation, we designed and implemented a quantitative scale to a representative sample of the study population. A social desirability scale (developed by Montero in 2006) was also applied to measure the bias of the informants. Similarly, we made use of qualitative analysis techniques to establish the theoretical foundation of the study.

In the first part of the document, the methodology used in the investigation is presented, followed by the definition and theoretical underpinnings of the construct, results and finally conclusions.

## Methodology

The study is a quantitative approach that uses two scales to measure students' attitudes towards the use of ICT in both the educational context and in everyday life, and the bias of informants through a social desirability scale. We also used literature review and content analysis to support the theoretical framework of the investigation and interpret the statistical results that were obtained.

The sample size was selected based on the usual criteria of a confidence level of 95 % ( two sigmas ) and an estimation error or sample error of 5 % ( Arnal , Del Rincón & Latorre , 1992 ) . To do this, we used the formula for calculating a sample size for a finite population. From a total of 800 students of the Bachelor program in Civil Engineering, we obtained a sample of 267 students.

To validate the content of the questionnaire called "attitudes of engineering students towards the use of ICT", an expert panel discussion procedure was used where two or more experts are selected to independently judge the validity of the answers on the questionnaire in terms of relevance or congruence of the reagents with the context of the content, the clarity of the writing and the trend or bias in information obtained from the questions ( Ruiz, 2011 ) . The data analysis was conducted from the TCT and was performed using the data program SPSS, version 16.

## Definition and theoretical foundation of the construct

Starting from the purpose of the investigation, we defined a construct that measures attitudes towards the use of ICT for college students, both in their educational context and their daily lives. In this construct students perceptions, beliefs and likes are considered with regard to ICT in 4 variables: perception of ICT in academic and daily life, perception of ICT in classes, and perceived institutional technology infrastructure and perception of ICT by teachers. These variables are registered by 29 items that use the Likert scale , which " consists of a series of items or statements about a specific objective where the respondent has to report their level of agreement or disagreement " ( Colas & Buendia , 1998, p. 216). Similarly, the Likert scale is the most frequently used attitude scale because they acquire high levels of

reliability with fewer items or questions (Morales, 2000). In this sense, Hernández, Fernández and Baptista ( 2006 ) point out that the only basic assumption is that the response is noted in each item depending on the subject's position in the continuum of the measured variable, i.e., greater agreement implies that the subject has more of the measured trait .

In a similar manner, this construct is within the category of feelings and affective dimensions: beliefs and attitudes. According to Moscovici (1988) attitudes are a set of beliefs, feelings and tendencies of an individual that lead to a certain behavior. Attitudes have several components: the cognitive component, which are the beliefs, values and stereotypes about the object of the study; affective component, which intertwines the feelings and emotions that come with the varying frequency of the attitude; and tendency or behavioral trend that has to do with the tendency to act or react in a certain way with respect to the object of study ( Munne , 1986 ) , which in this case is the attitude in the use of ICT in university students.

Based on the previous information, it is considered that attitude can be measured through opinion, which is represented through verbal expression. You could not access the attitude of people directly and solely by observation. It is necessary that the verbal opinion expressed by subjects serve as their indicator of attitude. If you get an indication of acceptance or rejection of opinions, you indirectly obtain a measure of their attitudes ( Ospina , Sandoval , Aristizabal & Ramirez , 2005 ) , which corresponds to the purpose of the construct developed in this investigation .

It is important to note that for this study, attitude is defined as the perceptions, beliefs and interests that students have towards the use of ICT, both in their academic activities and in their daily lives.

It is also considered important to study the attitudes of students in the use of ICT , due to the understanding that their inclusion in the educational context is framed by the attitude the students and teachers have to the introduction of such technological tools. In other words, technologies can be included in the classroom by teachers and students as long as they want to use them. The personal component represents a very important role because the cognitive, affective and behavioral aspects can be displayed in the management of these technological tools , and it is under this parameter of beliefs that the assessment of emotions and behaviors can determine an attitude of acceptance or rejection ( Marcano, Marcano N. & Araujo . , p . 2007 ) .

The social desirability scale developed by Montero in 2006 is comprised of 10 items. These types of scales try to measure the positively biased descriptions that the informants make to assess their preferences on the subject of interest, which in this case are attitudes towards the use of ICT in the context of education and everyday life. Social desirability, according to Ledesma, Forestry & Poó "is a factor that can affect the validity of self-reports. For this reason, it is necessary to evaluate its presence and possible effects." (2010, p. 299)

The results of these scales are analyzed in light of the Classical Test Theory. This theory describes the influence of measurement errors in the observed scores and their relationship to the true scores. This model assumes that certain assumptions are true, and if these beliefs are reasonable, the results are likely to be as well. Otherwise it will lead to false conclusions (Martinez, 2005).

Two very useful concepts in the analysis of results are their validity and reliability. In this sense, Messick (1980) indicates that when it comes to validity, the validity of the construct is the one that integrates the considerations of content validity and the criteria of a common framework for testing hypotheses about theoretically relevant relationships. In addition, there is the valuable contribution that validity gives in terms of the consequences in the use of the information.

Regarding reliability according to Muñiz (2003), this measure is considered reliable from a coefficient of 0.80, which reflects the degree to which the items that make up the test would fit. Therefore, it is considered an indicator of the internal consistency of the test.

## Results

Based on the statistical analysis, the results indicate that the scale called "Attitudes of engineering students towards the use of ICT" has a Cronbach's alpha index of .895 and social desirability scale value of .807. This shows that the internal reliability that the instruments possess are within the parameters established for educational research.

The correlation between these scales is determined using the Pearson correlation. The value of this coefficient is .053, which means that there is a significant linear relationship between the scales of "Attitudes towards the use of ICT and social desirability". In other words, there is no correlation between the variables of both instruments.

An argument for the poor correlation between the scales could be the lack of interest on the part of respondents to answer the social desirability questionnaire because it was applied after answering the 29 items corresponding to the attitude scale. However, the instruments have the necessary validity needed to collect the information from the study.

Also, the descriptive analysis of the scale of students' attitudes, which is the focus of this investigation, indicates that of students between 18 and 29 years of age, 22.5% are women and 77.5 % men, and they are enrolled in the pre university period or in high school and the first, fourth, fifth, sixth, seventh, eighth, ninth and tenth semesters of the Bachelors program in Civil Engineering.

Table 1 shows the gender distribution of the students.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	woman	60	22.5	22.5	22.5
	Man	207	77.5	77.5	100
	Total	267	100	100	

Table 1. Distribution of student gender. Source: personal (2013)

Regarding perceptions of ICT in academic and daily life, most students consider that they have the skills to use ICT both in their academic activities and in everyday life. In reference to academic activities, they believe that ICT's help to supplement their education, improve their academic performance , speed up the development of their tasks, facilitate and enhance learning, and provide valuable elements for independent learning . Similarly, students think that ICT's facilitate the search of information for academic work, are a means to foster personal relationships with their classmates, and are interested in taking courses in ICT for their areas of study.

The use of ICT in everyday life manifests itself by the interest in using computers in habitual activities, as well as when considering that these technologies have favorably changed their daily lives. The previous statement can be seen in Table 2.

Item	Strongly Disagree	Disagree	Unsure	Agree	Strongly Agree
1.- I have the necessary preparation to make use of ICT's for my academic activities.	4	9	57	135	62
2.- The ICT's help me as a compliment to my learning/knowledge	3	7	12	118	127
3.- The ICT's help me to improve my academic results	0	8	33	140	86
4.- The ICT's allow me to refine the preparation of homework	2	4	24	96	141
5.- I have taken classes through ICT	38	53	77	72	27
6.- ICT's facilitate and improve my learning.	2	9	35	158	63
7.- The ICT's provide valuable elements for my independent learning	2	10	37	138	80
8.- I enjoy my academic activities using ICT.	3	17	51	121	75
9.- The ICT's are a help when searching for information for my academic activities.	1	5	20	120	121
10.- The ICT's are a useful tool in the elaboration of my academic work.	1	3	20	139	104
11.- ICT's are an essential aid in my studies.	7	16	64	136	44
12.- I welcome the inclusion of ICT's in my educational context.	2	11	45	148	61
13.- I'd like to take courses on ICT for my area of study.	3	5	22	89	148
14.- I want to know more about technology or specialized software for my area of study.	1	1	7	58	200
15.- ICT's are a means to foster personal relationships with my classmates.	6	31	64	127	39
16.- I like to use a computer for my daily activities.	5	26	54	120	62
17.- I use ICT's in my daily activities	4	24	73	126	40
18.- ICT's favorably change our daily lives.	1	14	57	115	80

Table 2. Items related to the perception of ICT in academic and daily life. Source: personal (2013)

In relation to the perception of ICT in classes, most state that they can be fulfilling, innovative and dynamic thanks to the opportunities

that technological tools provide, and that they are a complementary element to their training outside of class. This can be seen in Table 3:

Item	Strongly Disagree	Disagree	Unsure	Agree	Strongly Agree
19.- Classes can be enriched by the opportunities provided by ICT's.	0	6	34	133	94
20.- Classes with ICT's are innovative and dynamic.	1	14	41	131	80
21.- ICT's are a complimentary element for my learning outside the classroom.	2	6	32	154	73

Table 3. Items corresponding to the perception of ICT's in classroom activities. Source: personal (2013)

Regarding institutional technological infrastructure, students state that they do not know if the computer laboratories of the Engineering School have specialized engineering software, as presented in Table 4.

Item	Strongly Disagree	Disagree	Unsure	Agree	Strongly Agree
22.- The computer laboratories have specialized programs in Civil Engineering.	28	47	99	69	24

Table 4. Items related to the perception of the academic technological infrastructure. Source: own (2013)

Finally, the perception of the use of ICT by teachers indicates that most students think that they like that their teachers use ICT in class, that they are a means to communicate with them outside of class, and they can be a complement to the explanations of teachers and believe that further study in the use of ICT should be done in the area. However, students are not sure if the teachers are trained in the use of ICT and if they like to use ICT in their classes. Table 5 presents the items corresponding to this paragraph.



Item	Strongly Disagree	Disagree	Unsure	Agree	Strongly Agree
23.- ICT's are a medium that allow me to communicate with my professors outside of class	19	41	83	100	24
24.- I like that my professors use ICT in class.	4	11	47	156	49
25.- My professors are trained in the use of ICT.	9	28	118	89	23
26.- My professors encourage academic activities using ICT.	9	47	90	99	22
27.- My teachers like to use ICT in their classrooms.	15	47	125	73	7
28.- I believe that ICT can be a complement to the explanations of my teachers.	3	12	37	162	53
29.- I consider that my teachers need to provide further study in the use of ICT in my area.	4	8	39	135	4

Table 5. Items related to the perception of teachers using ICT Source: own (2013)

## Conclusions

Overall, results indicate that the attitudes of the students are accepted as in favor of the use of ICT, both in their academic activities and in their daily lives. However, perceptions that they have of their teachers in the use of ICT in lessons is uncertain. Students do not know if their teachers are trained in using these technological tools, if they like to use ICT in their classes, and do not know if their professors encourage academic activities using these technologies.

According to the results of the items related to block which refers to the perception of students about their teachers and ICT, there is a very limited use of technology by university professors of the Engineering School in their teaching practice. Teachers are not taking advantage of the favorable attitude manifested by the students for the integration of these technologies in their educational context, ignoring the expectations of their students to use them.

Another trend that indicates a limited use of ICT in the Engineering program is the lack of students awareness that specific engineering software is available in the computer labs.

In regards to the statistical results, we can say that TCT scales meet an acceptable internal consistency, since in both scales the alpha was

above .80. In other words, from the TCT statistically based empirical evidence was found that students' attitudes towards the use of ICT are favorable and improve the quality of the learning process.

As stated above, it is important to reflect and develop studies on the actual use of ICT by teachers in their academic activities since the UNACH has participated in projects supported by the Federal Government , which has resulted in the establishment of a solid technological infrastructure ( Garzón , 2009 ). There is also a favorable attitude on the part of students to integrate technology into their learning.

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