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Perception of college students regarding the use of ICT: A case study in Monterrey, México

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ABSTRACT

We often take for granted that students have the basic skills and mastery of Information and Communication Technologies (ICT), however, it has been confirmed that not all students are equally competent in this regard. From the theories of socialization and acceptance of the technology, a structural equation model (SEM) is built to explore the variance in basic ICT skills levels of students at a business school. With the application of a questionnaire that measured in detail ICT skills of new students in a higher education institution in Mexico, the main findings show that according to the tables of impact value between constructs and the significance between constructs, the skills have a significant and significant negative impact on the side of anxiety / behavior and on the side of the utility there is a strong, significant impact.

Keywords: higher education, students, digital skills, self-perception.

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Introduction

Today, new technologies contribute to the development and the emergence of genuine knowledge society and information (Chen & Dahlamn, 2005; UNESCO, 2005). Notably, one of the most significant applications of ICT is its impact on teaching and learning for its character of providing universal access to information and knowledge for all and equally (UNESCO, 2008; ECLAC, 2013).

Studies have shown that teaching methods schemes involving computer-assisted learning have a positive influence on the transfer of knowledge to students in general (Donnelly, O'Reilly & McGarr, 2013; Ridgewell & Exley, 2011; Chen Chang, Lai, & Tsai, 2014). In addition, a better mastery of basic ICT skills has a positive effect with respect to the acceptance of mobile learning (Mac Callum & Jeffrey, 2013; Mac Callum, Jeffrey & Kinshuk, 2014).

Therefore, it is reasonable to say that computers play an important role in professional life of graduates, as well as training students in business schools. From this, one would expect that students generally have a good knowledge of basic ICT skills, because they will need for their studies and their future professional life. Despite the expectation that most students have already mastered the basic ICT skills to study in school, it has been shown that not all students are equally competent in this regard (Kaminski, Switzer, & Gloeckner, 2009; Verhoeven, Heerwegh & De Wit, 2010; De Wit, Heerwegh and Verhoeven, 2012).

Is this special contemporary student's educational experience that inspired us to focus on the educational situation to master basic ICT skills. For this reason, the purpose of this paper is to propose a model to explore the differences between students in the domain of ICT (self-perceived). Based on the theories of socialization and acceptance technology, the structural equation model was used to develop a model explaining the level of ICT skills as the dependent variable. Therefore, the present

study analyzes the perception regarding the mastery of basic skills in ICT.

The study is divided into four aspects: the first presents the theories of socialization and acceptance of technology that give support for the construction of the model; the second refers to the methodology; in the third section are aspects to the evaluation and usefulness of the proposed model to explain the differences in levels of ICT skills (self-perceived) and the fourth section the findings are discussed and conclusions are shown regarding the usefulness of the model.

ICT skills

In order to construct the model that could explain the differences in levels of ICT skills among students, started by the theory of socialization pragmatist Shibutani (1986) and the theory on the acceptance of new technologies (TAM) suggested by Davis (1989). These theories provides a clear path for the empirical study of ICT skills levels of self-reported by students. We focus on the meaning of socialization, the meaning of digital literacy, and the meaning of family, gender, school competition in basic ICT skills.

From the newspaper accredited Prensky (2001), several authors think that children born in this century are "digital natives". The educational scenario of contemporary youth is characterized by being constantly surrounded by a multitude of digital devices. Young people grow up in a world in which personal computers (PCs), smartphones, MP3 players, tablets, etc., are ubiquitous. From a sociological point of view, education can be seen as a process of socialization. Simmel (1910, p. 387) considers that the "conscience of association or socialization" is essential to enable society. Other prominent sociologists also gave the concept of socialization an important place in their theories; for example, the social behavioral Mead (1972), the funcionalista Parsons (1964) and, in phenomenology, Berger & Luckmann (1966).

The primary objective of this article was to see how well students dominate the business school some basic ICT skills. Ask this question suggests that students belong to a group that could be called digital literacy. It is assumed that students of today's societies should be socialized in the role of a digital literacy and play this role properly; and not only in universities but also in the labor market as pointed out by the work of Summers & Vlosky (2001) and Graham (2001).

Studies such as the OECD (2005, 2010), UNESCO (2009) Miliszewska (2008) Area, Gutierrez and Vidal (2012) Heerwegh, Wit & Verhoeven (2016) indicate that all top-level student must be prepared to show at least the following two categories on basic skills in ICT:

- Using software tools and hardware, including: windows, word processing, presentations related software, spreadsheets, databases, websites, mobile devices, hardware and software installation and basic principles of networks); and the
- Responsible use of internet services: e-mail, web browsing, digital and electronic authoring, and basic principles of digital communication.

However, studies such as Caverly, Nicholson and Radcliffe (2004), Lei (2009), Monereo (2009); Sotelo, Ramos and Tanori (2009); Spain and Corrales (2014); ECDL Foundation (2014) and Carrasco Sanchez and Carro (2015) conclude that despite believing that most students for being a digital native sufficiently master basic skills in ICT. They reveal that there is a low and insufficient level of these digital skills, skills shortages operating systems, and even difficult to take courses in distance mode.

The TAM model

Based on the theory of Technology Acceptance Model known by its acronym in English TAM (Technology Acceptance Model) presents the theoretical basis for predicting the use of information systems, according to the attitude or behavior of people. That is, the TAM model refers to how people accept and use new

technologies according to certain aspects that influence their decision to use them for the purpose of facilitating the development of their daily activities.

The TAM model described by Davis (1989), distinguishes two variables as determinants of user acceptance on the use of ICT: perceived usefulness (PU), which points out the degree to which the person believe that using technology contributes to a best performance of his work; and perceived ease of use (PEOU) -the degree to which the person is using the technology feasible without too treasury and mental effort. Davis (1989) points out that the objective of TAM is to explain the reasons for the acceptance of technologies so users; thus, the TAM suggests that perceptions of a user are given by the usefulness and perceived ease of use to use technology optimally as automation tools in work or academic aspects.

According to Ajzen and Fishbein (2005, cited by Okyere-Kwakye, Md Nor & Ologbo, 2016) indicate that the attitude is the way a person reacts to a certain situation, which generates positive or negative feelings to take certain actions. For example, if a person shows a negative attitude (such as stress or anxiety) toward using computers most likely not use technology to their advantage; On the other hand, if you notice that computer use is easy, you can show a positive attitude to use technological equipment and have skills in handling applications.

Digital literacy vs. socialization.

Digital literacy received many definitions and many names. A literature review, Ilomäki, Paavola, Lakkala and Kantosalu (2014) concluded that digital competence must refer not only to the technical competence and ability to use digital technologies, but also the competence to critically evaluate these technologies and motivation for participate in this culture of ICT in this article, we focus on the competence to use basic ICT skills. However, this concept also lacks a generally accepted definition. Therefore, we follow the opinions of

two accredited institutions, the Literacy Committee on Information Technology of the U.S. (National Research Council, 1999) and the ECDL Foundation (European Computer Driving License, 2010), to define what a digital literate is supposed to achieve with ICT tools.

To become a digital literate, a student progresses through a socialization process that begins in the nuclear family. In recent decades, it has become common for a lot of families have a computer at home and, more recently, even have tablets and smartphones. Therefore, many young people learn at an early age how to use computers and other ICT tools. They learn by experience, and imitate their parents, siblings or friends. This could mean that students have been socialized from an early age to become digitally literate.

Because digital devices are present to a greater extent now than three decades ago, you can expect young people to get higher scores for mastering ICT than older people; to mention some studies, are those of Aslanidou & Menexes (2008), Kubiato & Vlckova (2010), Chowdhury, Gibb & Landoni (2011) and Van Deursen & van Dijk (2015). These authors agree that the younger actors have better knowledge and management of ICT, so we can deduce that age might have some influence on the mastery of ICT skills.

Our hypothesis is that the younger you are a student, be more competent in ICT. However, not only the age itself, but also age or even more at the time of the first PC experience could influence the domain of ICT. Therefore, we assume that students who had their first experience in ICT at an early age have a higher score on ICT skills that students who started later.

In short, we investigated whether students evaluate their efficacy in ICT skills when they think a PC is useful for study or work, believe they have control over a PC, are not eager or reluctant to use the computer or see the advantages of ICT for academic and professional performance.

Methodology

The purpose of this study, once the TAM model is validated and dimensions related to technological skills are identified, is to launch a structural equation model (MES) to measure the level of mastery of technology skills of students as a variable dependent model, with its latent and observed variables. This model was tested using the results of a questionnaire in person.

Sample of Research

He invited freshmen aged 17 and 21, of the 4 races degree taught at the business school of Northeastern University of Mexico: Certified Public Accountant (CP), Business Administration (LAE) International business (LNI) and Information Technology (LTI) to answer the questionnaire, during the semester January-June 2018; This method gave 303 usable questionnaires 340 applied.

Instrument and Procedures

The instrument focused on the self-perceived ICT skills domain in the explanatory variables mentioned above, according to the structure developed by Heerwegh, Wit and Verhoeven (2016) The instrument was made based on four dimensions: word processing, database, presentation software and Internet browsing. Each dimension had several questions, applying a five-point Likert scale range, in which "1" is equivalent to never; the "5" long, and at an intermediate point "3" sometimes; in order to know in detail the perceptions of respondents about the frequency of use of a computer, ICT tools and software; however, the total of these results is not discussed in this article. We opted for freshmen to make sure that information on how to come from this experience of their previous studies and on the understanding that already have had some experience in the use of ICT and possess idea of the implications of this competition would get the academic development. The main group of these students is female and the highest proportion of students have parents who graduated in higher education. To determine the sample stratified

sampling technique we were used to obtain the number of students from each of the races (see table 1). The main group of these students is female and the highest proportion of students have parents who graduated in higher education. To determine the sample stratified sampling technique we were used to obtain the number of students from each of the races. The main group of these students is female and the highest proportion of students have parents who graduated in higher education. To determine the sample stratified sampling technique we used to obtain the number of students from each of the races (see table 1).

Results

Structural equation model (Skills in Information Technology and Communications, SICT)

It is defined the dependent variable structural equation model (MES) as the level of technological skills and four latent variables lower order: skills in word processing (Word), skills database (BD), skills management presentation software (PowerPoint) and Internet navigation skills.

In figure 1, a model of basic skills ICT defined in this study is presented, using a structural

equation model it shows the structural equations, the most significant indicators, their regression coefficients, for this the SmartPLS software was used V2 .0, it is a specialist in statistical data analysis software.

Specification and Evaluation Model

The approach of this model is that the dependent variable "technology skills" is influenced by the two latent variables which in turn are influenced by four observed variables, so the observed variables have a direct effect on technological skills. That is, the latent variables as intermediate variables were taken, located between observed variables and the latent variable dependent. Also aspects of Anxiety / behavior and perceived utility are the variables TAM (Technology Acceptance Model) that were significant user acceptance of the computer use.

The evaluation model for the same situation of impact assessments of each coefficient is applied, as listed in Tables 2 and 3. Moreover, In Tables 4, 5 and 6 the compound reliability is shown as well as the impact value between SICT model constructs.

In Figure 2, we can appreciate the significance of these model coefficients used in the run on SmartPLS.

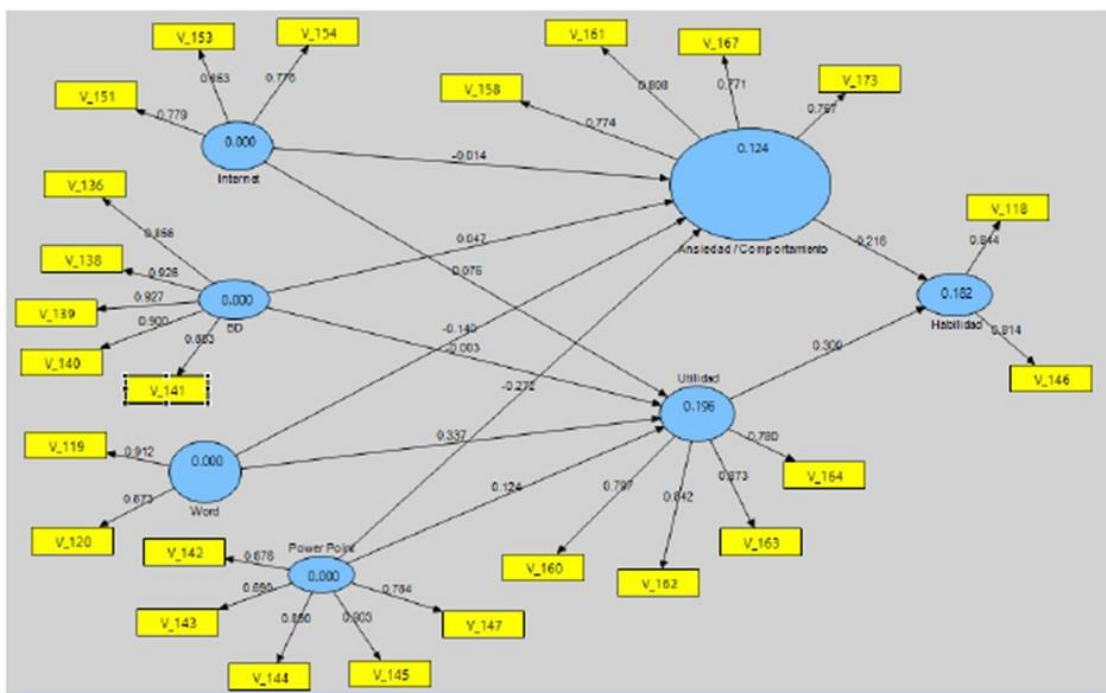


Fig. 1. PLS algorithm.

Table 1. Calculation of the sample strata.

Stratum	Identification	Nº of subjects in the stratum	Proportion	Stratum Sample
1	LTI	120	10.0%	30
2	LAE	413	34.5%	103
3	LNI	240	20.1%	60
4	CP	424	35.4%	106
N=		1197		299

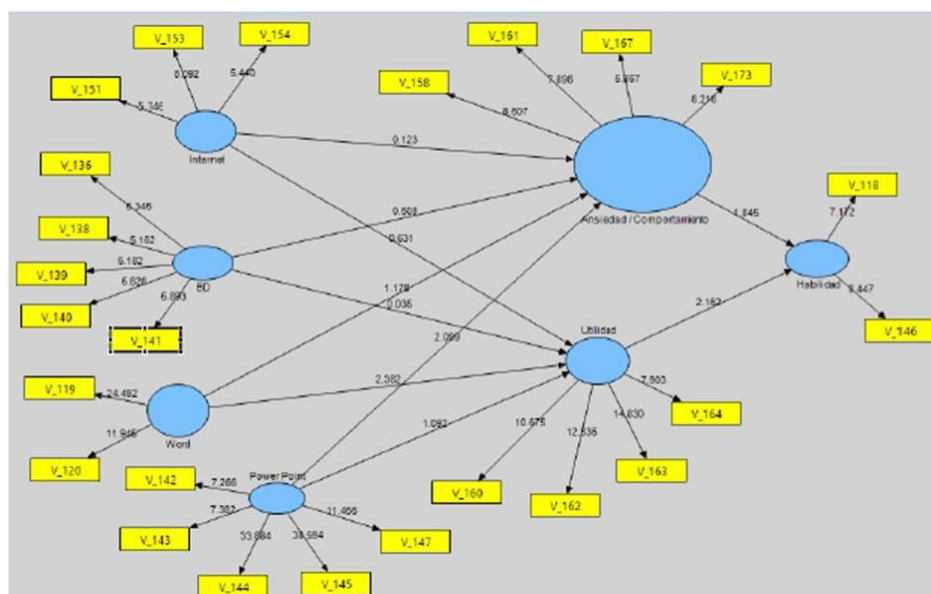


Figure 2. Bootstrapping Algorithm.

Table 2. Coefficients and its impact on the model.

Range for coefficient	Impact evaluation
0.00 to 0.09	Unnoticeable
0.10 to 0.15	Noticeable (barely)
0.16 to 0.19	Considerable
0.20 to 0.29	Important
0.30 to 0.50	Strong
Greater to 0.50	Very strong

Source: guide comprising by Rositas (2005).

Table 3. Bootstrapping and its impact on the model.

Rating range	Significance	P value
T high or equal to 3.1	Highly Significant	.0001
T high or equal to 2.33 and less than 3.1	Medium Significant	.01
T high or equal to 1.68 and less than 2.3	Significant	.05
T less than 1.68	No significant	Greater than .05

Source: Guide comprised by Rositas (2005).

Table 4. Reliability model consists SICT (Skills in ICT).

Constructs	Coefficient determination of square)	of (R	Coefficient (Alfa of Cronbach)	Average Extracted	Variance (AVE)	Composed Reliability (CR)
Internet			0.726	0.646		0.845
Data Bases			0.940	0.808		0.955
Word			0.747	0.797		0.887
Power Point			0.860	0.631		0.894
Anxiety/Behavior	0.124		0.785	0.605		0.859
Utility	0.196		0.842	0.679		0.894
Ability	0.182		0.545	0.687		0.815

Table 5. Effects between Constructs (Algorithm-PLS).





















Constructs			Coefficient or Beta	Impact assessment
Internet		Anxiety/behavior	-0.014	Imperceptible
Data Bases		Anxiety/behavior	0.047	Imperceptible
Word		Anxiety/behavior	-0.140	Perceptible
Power Point		Anxiety/behavior	-0.272	Important
Internet		Utility	0.076	Imperceptible
Data Base		Utility	-0.003	Imperceptible
Word		Utility	0.337	Strong
Power Point		Utility	0.124	Perceptible
Anxiety/behavior		Ability	-0.216	Imperceptible
Utility		Ability	0.300	Strong

Table 6. Significance between constructs (Bootstrapping).

Constructs			Coefficient or Beta	Impact Valor
Data Bases		Anxiety/behavior	0.508	Not significant
Internet		Anxiety/behavior	0.119	Not significant
Power Point		Anxiety/behavior	1.824	Significant
Word		Anxiety/behavior	1.150	Not significant
Data Bases		Utility	0.030	Not significant
Data Base		Utility	0.642	Not significant
Word		Utility	0.944	Not significant
Power Point		Utility	2.480	Considerably significant
Anxiety/behavior		Ability	2.844	Significant
Utility		Ability	2.207	Significant

Reliability

To assert the validity of content was specified as a first step to identify the items or questions that have been used in preliminary field investigations and as pleasant and developers have statistically been estimated to personify the conceptual model variables. For reliability analysis indicator Alfa Cronbach access show whether each question measures the same and if the answer tends to co-vary, for example, if the study participants manifest themselves in a consistent manner and thus handled can conclude that the reagents are varied in the same direction. The closer the value of Cronbach Alfa be considered admissible if it is at least 0.70 (Nunnally, 1967; Cronbach & Meehl, 1995).

We can assert after completing the assessment that the sampling instrument used for this research is reliable because it establishes mostly acceptable levels of Cronbach's alpha. Table 4, we say that reliability coefficients for each criterion achieved in this research ranged between 0.726 and 0.940 except the skill construct was 0.545.

Average Variance Extracted

Average Variance Extracted (AVE) which estimates the amount of latent variance captured by the indicators together explored. Convergent validity of the indicators together and averaged for each construct (AVE) must be greater than 0.50; this symbolizes that each construct is reached more than 50% of its variance, exceeding therefore, the proportion unexplained (Chin & Newsted, 1999).

Reliability composite (Composite Reability, CR) which calculates the internal consistency of the reagents that measure the constructs were used to calculate the reliability and consistency of latent variables considered. Values less than 0.70 indicate that the reagents may be unrelated or might be more than one construct (Chin, 1998).

In Table 5, we can see that in this model constructs range from 0815 and 0955, which

indicates that there is a good internal consistency between the reactants and the average variance of between 0.605 extracted and 0808.

In the first figure related to model estimation in its execution PLS, the model output, where the regression coefficients which for being standardized variables also correspond to correlation variables is presented. The coefficient of determination model is also presented. As 12% of anxiety / behavior can be observed is determined by Internet = -0.014, Database = 0.047, processing of words (Word) = - 0.140 and presentation software (PowerPoint) = - 0.272.

We can also see the first figure that the utility has a 19% and is determined by Internet = 0.076, Database = - 0.003, word processing (Word) = 0.337 and presentation software (PowerPoint) = 0.124.

The skills are determined in 18% Anxiety / behavior and utility in a - 0.216 and 0.300 respectively. According to tables impact value (6 and 7), enter constructs and significance between constructs skills have an important and significant negative impact on the side of Anxiety / behavior and the part of the utility exists a strong impact and significant.

Conclusions

In this article, the construction and testing of a structural equation model for exploring the differences in self-reported level of basic ICT skills of the students said. Both the construction of the month in which competition is explored in basic ICT skills of students as well as the use of an instrument for measuring the level of ICT skills, focused on students has been any effort in order to decipher the ICT skills of students. ICT skills were measured using an instrument that asks students to evaluate in detail whether they can perform a particular task using a computer or the Internet. This measure confirms the expectation that students would get a high score on this scale.

Overall, the model explains much of the variation

in the domain of ICT skills of students. The model also shows that different socialization conditions do not explain much of the ICT skills of this sample of students.

Similarly, we found no impact on whether they followed a course of ICT in school compared to not having attended the course. In addition, men and women have the same opinion on the need for ICT for un-academic endeavor. The strongest impact on attitudes toward computers and self-perception of ICT skills is related to the age at which a first computer experience was had. The younger students were when they had the experience of PC for the first time, had higher scores on utility and control computers, and ICT considered necessary. Conversely, anxiety about using a computer is higher among students who had their first experience with PC later in life.

Self-perceived competence in ICT skills is higher for students who see computers as useful and necessary for their development. From this we can deduce that promote the use of computers and the need for ICT for academic performance could improve student proficiency in ICT skills. Have the feeling of having control of a computer has a greater impact on competition informed ICT skills. Looking back on our observations, it is reasonable to say that the development of a sense of control over computers can help improve competition in ICT skills, although the observations of other researchers encourage some caution. The same is true for reducing anxiety about computers.

Although one would not expect to see that anxiety is a factor that affects a student to use a computer this time, our research shows that it is still a problem for (some) students. Again, it is important to note that, although the conditions of socialization not take into account the differences in the mastery of basic ICT skills, if any influence in such circumstances.

Given the design and results of this research, we see at least two avenues for future research. First, it would be interesting to apply the instrument and the structural model to other

groups of students from other disciplines to assess its robustness equations. Second, the future qualitative research could delve into the diversity of the socialization process in the conditions and contexts of students and cover all types of ICT instruments (not just computers in the strict sense, but also tablets, smart phones, smart TVs).

The recommendation worldwide brand as a matter of pressing concern skills should have a professional of the century, which states that to be competitive in the workforce must participate in an increasingly heterogeneous society, using ICT and contend with labor worlds are changing rapidly, this should be a reason to pay attention to our students to develop skills across the board that demands a technological world. Bolstad (2011) stated that "students must develop skills that enable them to give meaning to new situations and environments, including those characterized by a high degree of complexity, variability and uncertainty."

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