

Autopercepción de estudiantes universitarios sobre el uso de tecnologías digitales para el aprendizaje

University students' self-perception on the use of digital technologies for learning

<http://dx.doi.org/10.32870/Ap.v10n2.1401>

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RESUMEN

Palabras clave

Autopercepción,
educación superior, TIC,
motivación

En este artículo analizamos la autopercepción que tienen los alumnos respecto al uso de herramientas tecnológicas para el aprendizaje y hábitos de estudio como parte de su formación académica. Desde el punto de vista pedagógico, la autopercepción del alumno es la manera en que se percibe a sí mismo dentro del proceso educativo. Para ello, analizamos la motivación intrínseca y extrínseca, usos de las tecnologías digitales para apoyar el aprendizaje, forma en que complementan sus estudios y la percepción que tienen sobre las tecnologías. La información fue recabada a través de un cuestionario validado y aplicado a la población estudiantil de una universidad mexicana por medio de una muestra estratificada. El análisis de los datos arrojó que la motivación de los alumnos influye de manera significativa en cómo hacen uso de las tecnologías de la información y la comunicación; además, la autopercepción del alumno depende del objetivo de aprendizaje, ya sea con una finalidad académica o para el aprendizaje informal. El alumno busca la socialización, presencial o virtual, para llevar a cabo el proceso de enseñanza-aprendizaje.

ABSTRACT

Keywords

Self-perception, high
education, ICT,
motivation

In this article, we analyzed the students' self-perception regarding the use of technological tools for learning and study habits, as part of their academic training. From the pedagogical point of view, the self-perception of the students is the way in which they perceive themselves within the educational process. To do this, we analyzed the intrinsic and extrinsic motivation, uses of digital technologies for support learning, how they complement their studies and the perception they have about technologies. The information was collected through a questionnaire validated and applied to the student population of a Mexican university, through a stratified sample. Once the analysis of the data was carried out, we found that students' motivation significantly influences the way in which they use ICT and that the students' self-perception depends on the learning objective, either for an academic purpose or for informal learning. In addition, we found that the student seeks socialization either face-to-face or virtual to carry out the teaching-learning process.

Received: April 14, 2018
Accepted: June 7, 2018
Online Published:
September 30, 2018

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INTRODUCTION

The progress and development of digital technologies in recent years and their progressive use in education have led to the development of didactic-pedagogical strategies to be included in formal education from the basic to the postgraduate levels. The use of information and communication technologies (ICTs) in education is not new and the national education policy has strived to implement programs and strategies for the use of digital resources; e.g., Edusat (Satellite Network of Educational Television), Enciclomedia or the projects for "Teaching physics with technologies" and "Teaching mathematics with technologies" (Vacchieri, 2013).

Mexican higher education institutions play an important role in the use of digital technologies, since they have developed educational programs in non-schooled and semi-schooled modalities and ICTs integration projects in face-to-face contexts (Bosco and Barrón, 2008). This has become an area of interest within the field of educational research, since the integration of technologies in educational practices has allowed a constructivist and student-centered support (Severin and Capota, 2011); hence, ICTs are recognized as enhancers of the teaching process.

In face-to-face modalities, the use of technologies is regularly implied in a hidden curriculum (Gutiérrez, 2007; Gutiérrez, 2015), i.e., it is not formalized or evident, but it has an impact on the educational practices and teaching-learning processes, more specifically on the basic attitudes of people who belong to educational institutions (Gutiérrez, 2015). ICTs allow school interaction that promotes a series of unintended results: "... these results were not foreseen by the institution or the teacher; there was no awareness either of what was being instilled in the students" (Díaz, 2006, p. 12).

In order for the incorporation of ICTs to be successful in the educational context, it is necessary for the student to possess digital skills that help him survive in a society flooded with knowledge (Hernández and Díaz, 2013). The recognition of specific competences or actions is known as the student's self-perception (Cunha *et al.*, 2010), i.e., the student's self-perception allows identifying the results of a competence, e.g., digital competence.

The self-perception that the student has of himself and of his abilities to use ICTs allows the teacher to make decisions in designing pedagogical strategies that are in agreement with the real needs and abilities of the student for an *ad hoc* integration with the conditions of the context where the students interact.

The Autonomous University of Querétaro (UAQ) is an institution that, within its strategies for the Institutional Development Plan (2018), seeks

to promote the use of digital information resources with adequate technology, and it also wished to incorporate ICTs in 90% of its different educational programs. However, promoting and incorporating the use of technologies within the programs must be in accordance with the students' reality. To do so, the university designed a research based on a quantitative paradigm from a distributive perspective with a descriptive approach to identify the self-perception of UAQ students regarding the use of digital technologies.

THEORETICAL REVISION

This research has two core concepts: self-perception and the use of digital technologies focused on learning. Both concepts allow accounting for the way the student sees himself regarding the use of digital technologies to support his learning. Thus, it is possible to shed light on the design and development of didactic and pedagogical strategies aiming at improving and enhancing learning by taking advantage of available technologies.

Díaz (1992) mentions that individual conceptions one has of oneself and of reality are coherent structures that are produced and reproduced by the individual in the course of a social interaction. Thus, the student is generating an individual self-concept of his role within the educational process and creates an identity based on social acts and their interaction with stakeholders within a context, such as learning and educating in a classroom.

Self-perception is the set of evaluations that a person has about himself in a given field of action and at a given time (Díaz, 1992, Martínez, 2009, Bolívar and Rojas, 2014). It also refers to a set of beliefs, attitudes, desires, values and expectations of the outside world that the individual transforms into his inner world (Martínez, 2009, Villamizar, Becerra and Delgado, 2014). Judgments and personal opinions are influenced by self-perception (Liu, 2015). In self-perception, the individual attributes traits to himself, even more than to other individuals, i.e., he gives himself more values and own characteristics than those he attributes to another group of people.

From a pedagogical standpoint, the student's self-perception is the way in which he perceives himself within the educational process; part of the beliefs, expectations and attitudes that are valued within a predetermined educational context, which allow the creation of the student's role as a social imaginary.

The theory of self-perception maintains an empirical premise that indicates that, by manipulating one's behavior, feelings can be modified (Laird, 2007). Moreover, he mentions that the effect of behavior on feelings is not automatic or invariant, because feelings are based on behavior within the context where the individual develops and, therefore,

feelings are experiences of the relationship between behavior and context. It also indicates that people infer their attitudes based on their behavior and, at the same time, seek the correct self-perception, which is obtained when the self-perception of an individual is consistent with the perception that other individuals have about him (Gaviria, Cuadrado and López, 1995).

Applying the theory of self-perception to the educational field would mean that the student's self-perception affects significantly the way he behaves within the educational context, as well as the feelings and experiences he experiences.

There is evidence that appropriate behaviors in the conducive context are experienced as feelings (Laird, 2007), and these feelings can be positive or negative for the learning objective. Hence, the student's self-perception is based on the behaviors displayed when he learns. Training depends on the habits, behaviors and actions in general that the student develops as a response to the stimuli of the social context.

Liu (2015) points out that self-concept plays a crucial role in academic success and, at the same time, it defines a person's behavior and activities. Underestimating students' abilities can have critical effects on their decisions; e.g., on the choice of the institution in which they will study, the choice of the field of studies and the opportunities to complete their studies (Chevalier, Gibbons, Thorpe, Snell & Hoskins, 2007, Hicks & Sinkinson, 2015). On the other hand, it has been found that self-perception can be modified progressively, but it depends on the student's personality (Bolívar and Rojas, 2014).

The analysis of the student's self-perception regarding the use of ICTs is a topic that has led to the development of several studies; e.g., data have been revealed that show a relationship, albeit weak, between different learning styles and skills with self-perceived ICTs (Verhoeven, Heerwegh & de Wit, 2011). Orozco and García (2017) conducted a research on the self-perception of learning skills in virtual environments as a basis to show the skills required for digital literacy within a higher education institution. Likewise, Ramírez and Sime (2010) studied the role of educational videos in the construction of the student's self-perception.

Furthermore, although the student feels motivated to use ICTs in the classroom, and despite identifying its benefits in the teaching-learning process, he is incapable of recognizing the importance of his digital skills to perform tasks (Moreno de Diezmas & Dondarza, 2016), i.e., the student's self-perception influences the way in which he uses the technologies for his learning. The self-perception of a competence allows him to be aware of his success, especially if he feels at ease with his group and in his classroom practices (Bernabé, 2008).

The importance of the student's conception of self-perception and his ability to achieve an expected result lies in self-efficacy (Bandura, 1982), hence, there is a direct relationship between attitude and the feeling of self-efficacy (Ramírez, Cañedo and Clemente, 2012; García *et al.*, 2014), which is a competence that has a significant impact on virtual education or the creation of personal learning environments (PLEs). Similarly, the self-perception of specific skills helps recognize the level of appropriation (Crovi, 2008), e.g., digital appropriation.

In order to identify the aspects related to self-perception in the learning process and use of ICTs, we considered motivation and decision making to supplement learning in class, the assessment of the effort to learn and the digital knowledge that the student has (Guerrero, 2002, Gutiérrez, Sánchez and Prendes, 2016, Sierra, López, Gutiérrez and Prendes, 2017).

However, it is also important to know the students' behavior and feelings when they use digital technologies to learn; hence, their experience is created from context and self-perception.

METHOD

Objectives

This research has a quantitative approach with a descriptive scope, and its objective is to identify the self-perception of UAQ university students regarding the use of digital technologies as part of their academic training. To meet this objective, we propose the following specific objectives:

- Identify the students' motivation of students in using digital technologies in their learning process.
- Recognize the uses and the perception students give digital technologies as their learning support.
- Know how students supplement their academic training with the use of digital technologies.

From the review of the variables of digital technology used and of the study habits, we will address the way in which students conceive themselves as users of digital technologies.

Population and Sample

The research was conducted among the UAQ student population that attends the undergraduate level and is enrolled in the 2017-2 school year. To do this, we specifically take the UAQ faculties of the metropolitan campuses where the student community amounts to 16,114 students.

We selected a representative sample with a $\geq 5\%$ error, and a $\leq 95\%$ reliability since it allows reducing the variance and the standard deviation

of the sample size (Kish, 2005). The sampling was carried out by strata represented by the 13 faculties of the University located in the metropolitan area. As a technique, we used a probabilistic model-based clustering and the groups of each faculty were set up at random (See Table 1).

Table 1. Population and sample data per metropolitan campus and faculty, frequency and percentage

Faculty	Population		Sample
	Frequency	Percentage	Frequency
Fine Arts	1 261	7.8	29
Political and Social Sciences	533	3.5	13
Accounting and Administration	3 243	18.6	69
Law	2 329	15.0	56
Nursing	952	6.7	25
Engineering	1 928	12.7	47
Psychology	911	5.7	21
Chemistry	790	5.6	21
Natural Sciences	1 167	6.4	24
Informatics	740	4.6	17
Philosophy	722	4.6	17
Language and Literature	547	3.2	12

Medicine	991	6.1	23
TOTAL	16 114	100.0	374

Sourced: Self development based on data offered by the UAQ [Queretaro Autonomous University].

Instrument

As instrument we used the questionnaire developed by Prendes-Espinosa *et al.* (2016) for the project "Competence for lifelong learning based on the use of PLEs" (CAPPLE). This questionnaire is a reliable instrument validated through expert judgments, cognitive interview and piloting. The questionnaire is quadripartite and analyzes the dimensions of self-perception, information management, administration of the learning process and communication. In this research, considering the stated objective, we limited ourselves to analyze the self-perception section, which was validated with a .861 Cronbach's alpha.

To supplement the analysis, we added two questions from the questionnaire structured by Córdoba (2013) that have to do with the extended user's experience (UxE), which obtained a .893 Cronbach's alpha. These items measure the prospection constructs of utility, usability and satisfaction of digital technologies that students use in their academic training. The questions pose to know the feelings the use of digital tools triggers and the reasons of the student's choice.

Data Collection and Analysis Procedure

To obtain data, we went to the 13 UAQ faculties to apply, through cluster sampling within each stratum, questionnaires to groups of students from the Bachelor's degree selected at random. The questionnaires were applied between September and November 2017. In each of the institutions, we informed the directors of the faculties of the ongoing research. The students participated voluntarily and signed an informed consent. Once the questionnaires were answered, we registered them with numerical codes.

We obtained a total of 374 questionnaires, which are representative of the population and this helped us obtain statistically significant results according to the central limit theorem, which does not interfere in fulfilling the objectives of the investigation.

After collecting the data of the total sample, we perform the statistical analysis with the SPSSMR software.

RESULTS

Students' motivation in using digital technologies in their learning process

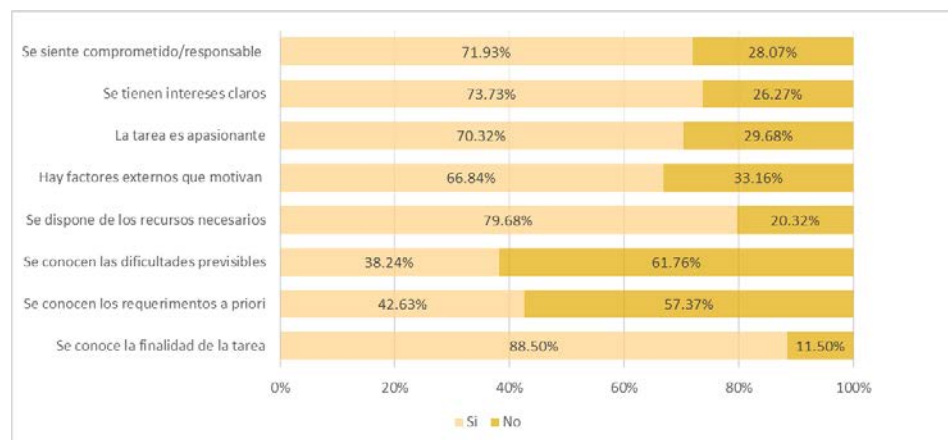
- Situations that increase the interest to learn

The main intrinsic situations that motivate students to use digital technologies to learn are those in which they have a closer approximation with people with the same objective ($\bar{X} = 4.19$ and $\sigma = 1.13$) or in those where they access digital multimedia applications ($\bar{X} = 3.63$ and $\sigma = 1.41$). When performing a variance analysis between faculties and intrinsic motivation variables, we identified significant differences between faculties, mainly with the Nursing Faculty, with the exception of the variable referring to participation or reading on conversation topics in forums on the Internet, which also generated less motivation ($\bar{X} = 2.37$ and $\sigma = 1.44$) among the students.

In regard to the extrinsic motivation, we found that the situation that increases the interest to learn something is reading or listening to programs through traditional media ($\bar{X} = 3.43$ and $\sigma = 1.20$) and the one that least motivates is reading through *timeline* or Twitter ($\bar{X} = 1.47$ and $\sigma = 1.73$).

- Factors that increase the motivation to perform tasks

In order to increase the motivation of students' performance, we found that it is important to make known the purpose of the task (88.50%) and to have the resources to develop it (79.68%). An interesting fact is that knowing the difficulty of the task is irrelevant (38.24%), as shown in Graph 1.



Graph 1. Motivations that increase task performance.

Source: Personal development.

- Factors that limit the number and variety of network tools being used

The reasons why students choose to use a diversity of technological tools depends, to a larger extent, on the relevance they may have in learning ($\bar{X} = 4.27$ and $\sigma = 1.00$), while the impact on the network is not important ($\bar{X} = 2.45$ and $\sigma = 1.73$).

Table 2. Reasons that influence the use of technological tools for learning

Number and variety of tools used to learn, depends on ...	Use Frequency (Number of students)							Media ($\bar{X}$)	DS (σ)
	Totally agree	Agree	Does not agree or disagree	Disagree	Totally disagree	Does not use/ does not apply	Mode		
The importance given to learning	193	124	38	8	5	6	5	4.27	1.00
Time available for learning	153	142	56	14	3	6	5	4.10	1.01
Academic or professional assessment given to learning	139	144	6	12	13	5	4	3.99	1.09
The impact the student's prestige will have on the net	62	60	60	63	59	70	0	2.45	1.73

Source: Personal development.

Activities that students do when they access digital technologies

- Purpose with which the internet is accessed

When identifying what is the purpose of students accessing the Internet, we observe that they are connected mainly to communicate ($\bar{X} = 4.52$ and $\sigma = .94$), to obtain or share information ($\bar{X} = 4.42$ and $\sigma = .90$) and to socialize ($\bar{X} = 4.07$ and $\sigma = 1.22$). On the other hand, the use of the Internet is far from being an element for the organization ($\bar{X} = 2.58$ and $\sigma = 1.27$), work ($\bar{X} = 3.45$ and $\sigma = 1.58$) and training ($\bar{X} = 3.51$ and $\sigma = 1.29$).

By taking into account the characteristics of the sample and based on the results obtained from the Levene test ($p\text{-value} > .05$), we performed a one-factor ANOVA parametric test with Welch correction and *post-hoc* tests to identify if there are any differences between faculties in regard to the Internet uses, and we found differences between different faculties (See Table 3).

Table 3. ANOVA *post-hoc* tests. “Faculty” group factor

Dependent variable			Means differences (I-J)	Standard error	Sig.	95% Reliability Interval	
						Lower limit	Upper limit
Communication	Engineering	Medicine	-.423*	.119	.037	-.83	-.01
Social Relations	Nursing	Accounting and Administration	-1.620*	.447	.048	-3.23	-.01
	Language and Literature	Accounting and Administration	-.754*	.191	.020	-1.44	-.07
		Law	-.673*	.186	.048	-1.34	.00
	Medicine	Nursing	1.765*	.454	.025	.13	3.40

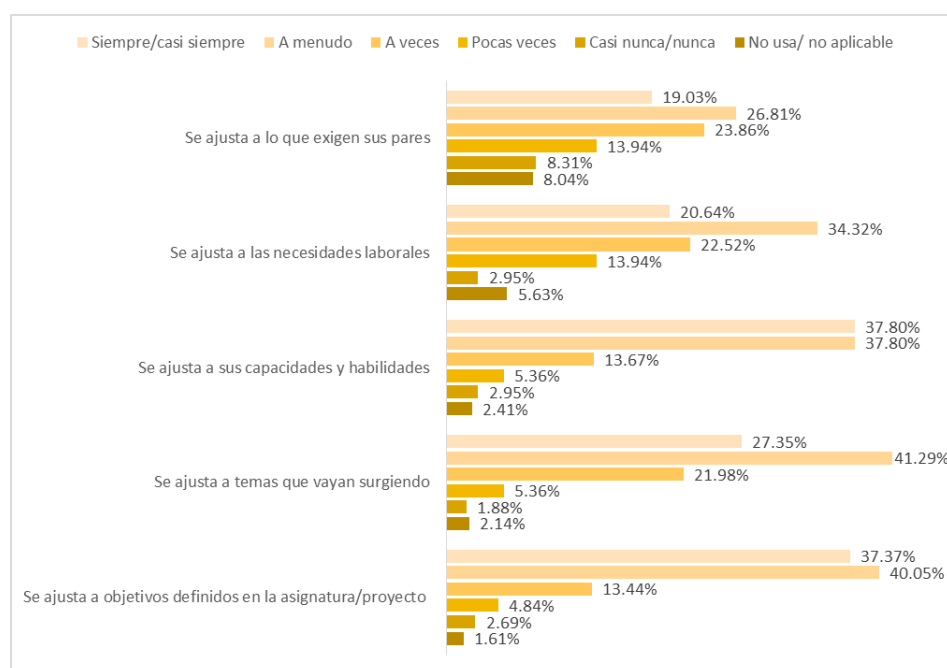
	Engineering	.799*	.232	.049	.00	1.60
	Language and Literature	.899*	.208	.008	.15	1.64

Source: Personal development.

* The means are significant at the .05 level.

- Decisions the student makes when learning on the Internet

When students access the Internet to learn, we found that they do so mainly based on the objectives defined in the course or project on which they are working (77.3%). We also observed that the requirement of colleagues and peers (30.29%) is not an element considered relevant (See Graph 2).



Graph 2. Considerations the student takes into account to perform a task on the Internet.

Source: Personal development.

- Importance of establishing objectives to make the most of the time spent on the Internet

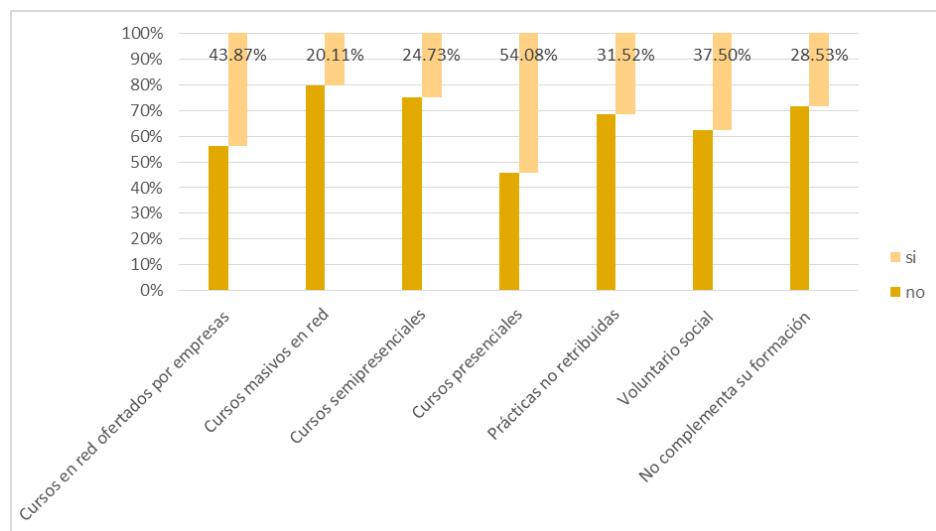
Students agree that setting goals helps them to make the most of the time they spend on the Internet ($\bar{X} = 3.96$ and $\sigma = 1.02$), while also analyzing their strengths and weaknesses when they are online. There is a high correlation between the student's self-assessment and determining the objectives for the preparation of the task (See Table 4).

Table 4. Pearson correlation analysis between two variables

		Establishing objectives help make the most of the time spent on the Internet
Analyze the strengths and weaknesses with the purpose of assessing the effort necessary to perform a task	Pearson Correlation	.413*
	Sig. (bilateral)	.000
	N	370
Source: Personal development. * The correlation is significant at level 0,01 (bilateral).		

Ways to supplement and support the student's academic education

Students, as part of their continuous learning and in a different way to formal face-to-face education, make use of alternative resources that allow them to learn, whether as support for their academic preparation or on their own initiative. Figure 3 identifies the ways to supplement academic training.



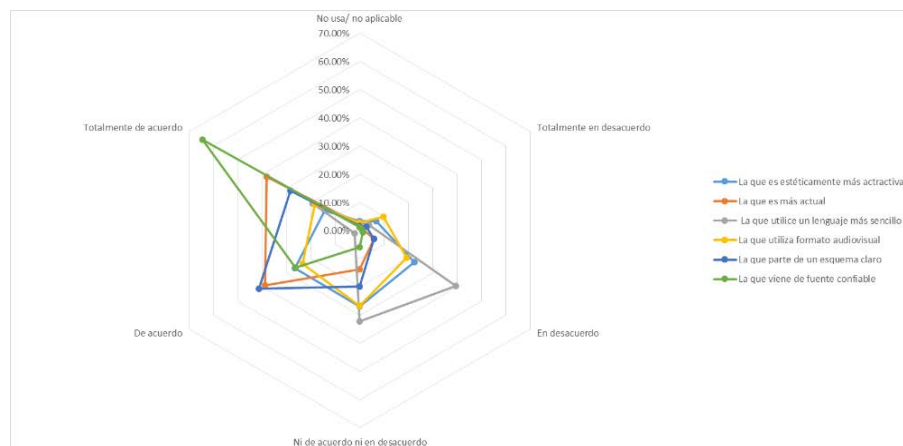
Graph 3. Ways to supplement the student's academic training.
Source: Personal development.

Most students prefer face-to-face courses (54.08%) and online courses offered by companies, while mass network courses (MOOCs) are not considered options to supplement information (20.11%).

Perception of the use of digital technologies for learning

- Criteria for the selection of information

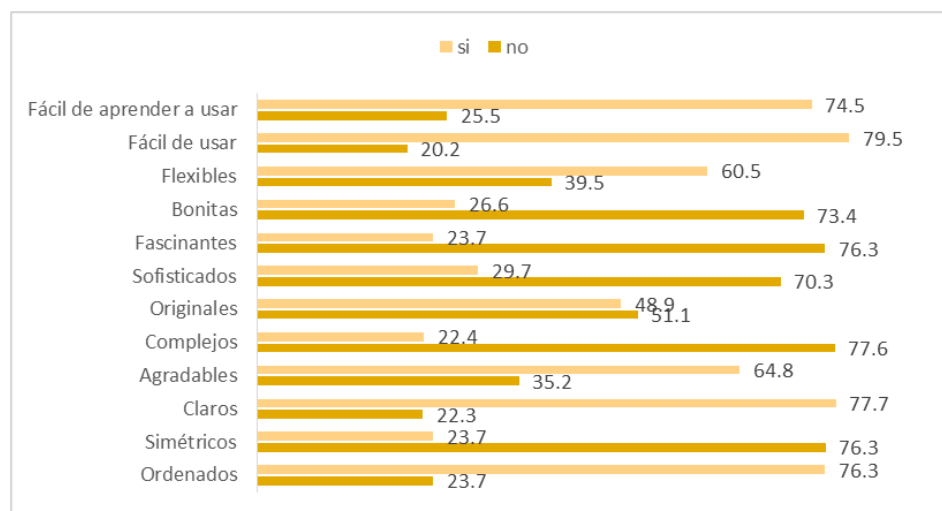
Students select their information mainly if it comes from reliable sources (90%) and if it is up to date (77.2%); however, the fact that the information is attractive or is in alternative formats to the conventional ones is irrelevant.



Graph 4. Characteristics that determine the choice of information for learning.
Source: Personal development.

- Criteria for the selection of tools and applications for learning

We recognized which were the elements that the students considered as determinant for the use of an application or virtual tool; hence, we identified characteristics and elements proper to virtual applications.



Graph 5. Reasons to choose a tool or application to learn.
Source: Personal development.

Graph 5 shows that the elements considered important for learning are mostly those that have to do with the use. Moreover, students choose applications that are very easy to use (79.5%), well arranged (76.3%) and clear (77.7%). The least important elements are those related to aesthetics.

- Feelings that trigger the use of tools and applications when learning

After making the correlation that exists between the feelings that students show when using a tool or application for learning, we found that there is a correlation between all the variables that refer to the feeling of efficiency, positive experience, enjoyment to learn, satisfaction, pleasure and benefits of learning. However, there is no correlation between the feeling of enjoyment and the feeling that it is useful for learning (See Table 5), which helps us understand that these two variables are independent.

Table 5. Pearson correlation analysis between variables on feelings when using applications

		Enjoyment feeling
It is useful for work	Pearson correlation	.036
	Sig. (bilateral)	.486

Source: Personal development.

Similarly, feelings that prevail the most in students when they use technologies to learn are: not having problems with the tools, feeling more efficient in using them, and that the tools used are useful and beneficial for their work, but it is not pleasant.

DISCUSSION

In the teaching-learning process, digital technologies are support tools. However, several factors intervene that permeate the benefits they can offer. Hence, the analysis of the results reveals important aspects that give indications about the perception the student has about himself and the technologies, as well as the possible reasons that cause them and the situations that can be unleashed as a consequence.

First, we analyzed the factors that motivate the student to learn and we identified two main aspects: the device and the practice or learning objective. The value of technological devices is substantial in the culture if we consider that learning is an experience and, this in turn, generates culture (Lave and Wenger, 1991). However, reading, whether through traditional or digital media, ceases to play a fundamental role in the

teaching-learning process; this could give evidence of the relevance of the diversification of multimedia and traditional contents and formats as well as digital convergence (Vivanco, 2015).

On the other hand, when learning is based on tasks, the most important thing is for students to know the clear objective of the activity they are going to carry out, since the success of the didactic process designed depends on it. In addition to this element, a significant role is also given to the available resources, which provides evidence of the impact of open educational resources in the educational process (Salado, 2011), as well as human resources as teachers and finance experts.

It is necessary to consider that the difficulty of the task is not relevant to the students; however, they do often question their strengths and weaknesses. Although they pass judgment on their abilities, when carrying out an activity it is not important if it is complex or difficult. There are other factors that consider the resources one has for example; hence, it is recommended to implement authentic problem-case activities that seek a real solution when working with different variables, disciplines and conditions.

The choice of tools depends mainly on the learning objective or the task that the students will perform; therefore, the personal impact it has on the network is left aside. This aspect could give indications of the lack of self-conception of the individual in the learning process in a virtual context and the importance to focus on the completion of tasks, aspect that permeates not only in the educational process, but in the conceptualization of the digital citizen and its consequences due to ignorance (Castrillón and Álvarez, 2015). Thus, the students are not clear about their self-perception of the network, which could be one of the reasons for dropping out or lack of consideration for learning at distance or mixed educational programs.

The main function of digital tools is to communicate, share and socialize, which makes it clear that the Internet is used to maximize interaction dynamics. This is based on the fact that both the virtual and face-to-face worlds generate dynamics that influence the student's self-perception. However, the student considers the source of the information he selects on the Internet to be important (Kriscautzky and Ferreiro, 2014), which demonstrates the perception of others of the network.

Lastly, the feelings of the student when selecting digital tools help us to recognize that the aspects of the user's usability and experience are significant; hence the learning experience is determined by the behavior of the student and the activities that he develops. Moreover, we found that there is no relationship between the feeling of pleasure and the feeling of usefulness of learning. We then infer that for the student, fun learning or work or learning benefits are not important. Therefore, if the student considers something fun on the net, he will deduce that it is not

appropriate for the work he is developing or that, pleasant and appropriate, are independent one from the other.

CONCLUSION

This research revealed that the use of digital technologies revolves around the factors that define and conceptualize the student's self-perception. The success of the use of digital technologies in the learning process depends on the experience that the student has when using technology, as well as his previous experiences with or without educational purposes.

One of the aspects to consider in the student's self-perception in using digital technologies is that the student focuses on the accomplishment of tasks and activities but leaves aside his virtual presence. Thus, the student creates his self-perception within the classroom, but it is unknown if the perception he has of himself within the digital environment is the same or it differs from that he has outside the virtual world. It would be pertinent to delve into this subject.

While the student has a vision of himself within the teaching-learning process, the truth is that his self-perception about the use of digital technologies depends, to a large extent, on the objectives for which he uses them, whether for education as a response to a stimulus from the formal educational institution or as a response to the natural interaction with the digital device.

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