

Professors digital situation measurement: the case of a Colombian private university

Medición de la situación digital de profesores: el caso de una universidad privada colombiana

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ABSTRACT:

This paper presents an experience addressed to determine the digital situation of professors in a Colombian Private, by integrating an index proposed by Vega, with the dimensions of digital literacy by Rangel and Peñalosa that prove similar results with a few differences; as regards to handling and use of ICT by the professors. Similar tendencies observed in other institutions point out the need to establish strategies, addressed to the development of digital competences by the professors.

Keywords: Measurement of digital divide, University Professors, Digital competence

RESUMEN:

Este artículo presenta una experiencia orientada a determinar la situación digital de profesores de una universidad privada colombiana, mediante la integración del índice propuesto por Vega con las dimensiones de alfabetización digital de Rangel y Peñalosa, con resultados similares a antecedentes, en cuanto a su manejo y uso de TIC. Las tendencias observadas señalan la necesidad de establecer estrategias dirigidas al desarrollo de competencias digitales por parte de los profesores.

Palabras clave: Medición de brecha digital, Profesores universitarios, Competencia digital

1. Introduction

It is irrefutable that the influence that Information and Communication Technologies (ICT) have among the different sectors of society nowadays, has reached to transform different individual and group behaviors. In the case of the academic sector, the progressive incorporation of ICT takes place mainly in the teaching-learning process. For this reason, Marqués (2013) considers the following functionalities in the educational institution: -Digital literacy among the members of a teaching community, -Personal use

in the access to information, communication, management and data process, - Communication with the families through the institutional web, -Communication with the environment, -Relation among teachers from different centers through the web and virtual communities.

For Cañón, Grande and Cantón (2016), the relation between the education level and the development of a country is obvious, thus it allows you to build a society- current and future- in its values and professional competences. Nevertheless, according to Unesco (2016), although the projects in different countries of Latin America and the Caribbean have contributed to democratize the access to technologies, the educational results in the region are far from it is expected, proving that most without of initiatives were mainly centered on technology. This implies more investments in the equipment than in the sustainable accompaniment of professors, towards an effective appropriation and a progressive use in the classroom: so, Corbett, Carbonaro and Boechler (2017) say the challenge for teachers is to create learning environments that can foster the development of computational thinking in their students, as part of their pedagogical practice.

The introduction of ICT implies alterations in the status quo, because

The widespread availability and use of ICT in society, in general, is leading teachers and students to use these tools to complement their teaching and learning processes outside the traditional classroom context. However, the evidence shows that many students and teachers lack the digital skills needed to make effective use of these tools; which limits their potential impact, can have negative consequences for students' learning, and can increase educational inequalities, especially in developing countries (Hinostroza, 2018, p. 99).

The current article makes a short theoretical substantiation of the digital divide and digital inclusion, followed by a compilation of initiatives guided towards the measuring of the digital divide in the academic field to present. This will be followed by the experience of the determination of the current digital situation among professors in a private university in Colombia.

2. Theoretical foundation

2.1. Digital divide and digital inclusion

The reflection about the social impact of ICT starts with the digital divide, when you notice the differences in the access and the possibilities they imply. Although a single definition cannot be established, this paper will follow the approach given by Vega (2014) that refers to the different capacity of use among individuals, communities or countries. This is result of the inequality of possibilities to access and use ICT, in a conscious and systematic way, in a daily basis. This distance, according to Castells (2001), is promoted by the centrality of Internet that turns into the source of exclusion for those who lack completely access to the web or are unable to take advantage of it. To this, the barrier of the predominance of the English language in digital content is added (Meerza and Beauchamp, 2017, p. 35).

As a response to this phenomenon, digital inclusion appears, which Vega (2014) assumes as the group of policies and strategies that tend to eliminate the obstacle that limit or prevent from an active participation and the use of ICT in everyday life, in pursuit of improving the standard of living. For its consolidation, a process of digital inclusion, overcome three stages: the access to ICT, the use of ICT and the appropriation of ICT (Vega 2010). The last stage, although it is the main objective, is not clearly seen in many initiatives, since its implementation and measurement implies greater difficulty and complexity than in the previous stages.

2.2. The education institution in the digital inclusion

Vrabie and Tirziu (2017) point out that, in the context of globalization and current

demands, priority must be given to education in terms of quality, equal opportunities and lifelong learning, including ICT skills. In the processes of digital inclusion, it is essential to consider academic institutions, because they are responsible for preparing citizens for society. Therefore, they must be the pioneers of introducing and promoting ICT (Gutiérrez, 2014), besides of betting for the digital competence, because technology fosters economy and promotes social participation (Cañón, Grande and Cantón, 2016). In other words, González and Ugalde (2016) consider that at present, the efforts are not focused on the use and access to ICT, but that importance is given to digital competence, especially in terms of its effective use.

The relation between ICT and education is a reality that is constantly adjusting and accommodating, responding to the factors planned from the academic research and execution, and to the demands and perspectives of a globalized and digitalized world. There are numerous studies on ICT integration into the education sector, to understand the factors of its successful implementation. Meerza and Beauchamp (2017) consider attitudes of users towards the use of ICT as a decisive, especially when they depend on other factors.

The role of the professor is the fundamental axis. He has to be in the position of creating / using technologies, taking into account specific pedagogical designs and specially, understand the changes that take place in education when new technologies are introduced (Gutiérrez, 2014). According to Rangel (2015) and Silva (2016), its new function emphasizes more on creation, management and regulation of learning situations rather than on learning. They support themselves on ICT in a social responsible frame, which requires a suitable integration of their didactic and technical preparation, a common lack among professors (Alenezi, 2017). On his part, De Pablos (2010) states that the professor has to foster the student's abilities to search for information, analyze it and select it efficiently, organize it appropriately, use it and communicate it efficiently, in an ethical and legal way, with the purpose of building knowledge.

Collis and Moonen (cited by Mendoza et al., 2014), state that the transformation of teaching practice must be taken into consideration, prioritizing the flexibility, reflexivity and self-reference, which transcends the classroom and is installed in electronic devices, in the teaching practice communities, in the institutions and families. This is supported by the concept of digital competence, addressed by different organizations and authors, who in the case of professors without it is stated as their ability to use digital technologies [5], according to Redecker (2017), not only to enhance teaching, but also for their professional interactions with the academic community and the common good. In other words, for Ghorbani, Mirshah and Sharifian (2018), the digital competence of teachers involves the development of: - Educational-cognitive competences or the sum of abilities and skills of cognitive activity, - Informational competences, or abilities to search, analyze, select, and process the information with the help of information technologies, and - Communicative competences or mastery of the skills to interact with the people.

2.3. Measurement of the digital situation

Due to current dynamism, measurement processes are a need, as a diagnostic tool and a support to take decisions, specially related to planning and implementation of strategies and politics. However, according to Olaya and Peirano (2007), this process is not fully understood due this topic requires maturity and assimilation and then for their design, execution and analysis. In the case of the higher education a constant assessment of the results and the impact of the incorporation of ICT to optimize the process of inclusion is required (Ávila and Riascos, 2011). Vrabie and Triziu (2017), indicate that the digital divide might be measured by technical indicators such as: mobile telephone subscriptions, internet users, etc. However, strong financial, social and education factors will be considered in its measurement.

For Castaño, Martín and Martínez (2011), there are several indices, composed of different types of indicators, that whether organized or not, in dimensions or categories,

they are carefully balanced and added to obtain a comparable final value, corresponding to the degree to participate and benefit from the development in ICT. Among them, one of the most popular is the IDI (Index to Develop ICT), designed by the ITU (2013), that classifies 157 countries according to their level to access, the use and ICT knowledge and compares annual classification.

Morales and Ramírez (2015), when evaluating the access to ICT by the teacher of various programs for academics, recognize that teachers have overcome the access divide, however it is necessary to study their skills to differentiate the degree of use and appropriation of ICT, according to the discipline of teachers.

Specifically, in the academic field, some of the initiatives below are listed to measure the digital divide in American countries (Table 1).

Table 1
Some experiences to measure the current digital situation in the higher education field

Country	Experience	Description	Source
Colombia	Factors associated to the disposition of online working between professors	Survey to 118 Colombian professors, considering individual aspects, tele-working activities, perception, ability, and attitude towards the use of ICT, and working environment	Tapasco and Giraldo (2016)
	Integrated model to assess the digital divide in high education	Meets the context conditions, measurement of the elements to access and the motivation of its use. 566 surveys undertaken in 4 phases with students of three universities in Bogotá.	Berrío and Rojas (2014)
	Impact of ICT in teacher education at higher education	Determination of the way how the use and appropriation of ICT foster the effective measurement in the teaching-learning processes, exploring three key aspects: - identifying and use of ICT on the professor's part, - relations established between ICT and teaching processes, - systematize significant experiences.	Mendoza et al. (2014)
Ecuador	Relation between the income in the household of the student and the use of internet	Survey with 31 variables divided into: income in the household, knowledge and access to Internet, academic and social uses, perceptions of 4897 students of 5 institutions, as regards to Internet utility.	Torres and Infante (2011)
	Inequality in ICT Access and its Influence on Media Competency	To identify if there is inequality in the use of and access to ICT according to the variables: institutional funding and age, influence the degree of media competence of students and faculty members. Surveys were applied to high school students and teachers in Southern Ecuador.	González and Ugalde (2016)
	Level of acquisition and use of ICT in a university environment	Study focused on the students registered in the TI degree in the state of Tamaulipas, in the northern part of Mexico.	Tello (2014)
	Influence of the possession of portable devices and academic digital	Tool applied to students who attend the degree of Pedagogy at the University of Veracruz with 44 closed questions Likert based and dichotomic, besides of two open questions, organized in 5 sections: Devices,	Aguilar et al. (2014)

Mexico	literacy	Socialization and Cooperation; Communication; Academic Digital Literacy and Socioeconomic Level.	
	Professor's rating about the integration of ICT in the classroom	Study with a mixed character, addressed to value the advantages and disadvantages of the use of ICT in teaching activity, through a questionnaire, data was processed through SPSS v22 and Atlas TI v6.2.	Marín, Ramírez and Maldonado (2016)
	Tool and scale to measure student's cyberculture	Followed the cyberculture student model= (Access to ICT + Use of ICT + technological and social appropriation of ICT + empowering + social innovation and human development).	Romo et al. (2014)

3. Methodology

With the aim of defining the current digital situation in the higher education field, particularly among professors, the Teaching Digital Situation Index, TDSI (ISDD, for its abbreviations in Spanish: Índice de Situación Digital Docente), a composite index, is designed, integrating INSIDIR-JES and the states of digital inclusion:

- INSIDIR-JES developed by Vega (2016a and 2016b), takes the states of digital inclusion presented by Vega (2010), to define three subscripts: - Access to ICT Index, ICTAI (IATIC in Spanish) which are related to the services and infrastructure, both in the educational institution, at home, in public places, which they have access to; - ICT Use Index (IUTIC in Spanish) collects what, for and how are ICT used, the frequency with which they are used and the difficulties that arise when you do it, which allows you to evaluate the use and appropriation (understood as a value added use that transforms) what turns into the differentiating factor of the proposal and -Favorable Factors towards ICT Index (IFFTIC in Spanish) that approach those determining circumstances for the access and use of ICT, including family, economic, geographic and personal aspects.
- The dimensions of digital literacy contemplated by Rangel and Peñalosa (2013): - Technological (basic knowledge of ICT and networks, the use of productivity programs and aspects related to the installation, use and security of computer equipment), - Informational (knowledge and ability needed for the processing of information), - Axiological (personal measures to integrate ICT to the curriculum and to keep updated values and principles that assure a correct use of information and technology) - Pedagogical (knowledge about the consequences of the use and the possibilities to apply ICT in education, knowledge and abilities to design resources and learning environments using ICT), -Communicative (necessary knowledge and abilities to establish and keep contact with students, experts or colleagues, with the purpose of sharing ideas, knowledge and experiences that enrich the educational process).

The process implies two moments:

- Information acquisition: A tool is created, survey-type with mainly closed multiple choice questions with one or several answers, some using Likert based scale, where items used in consulted indices are complemented with proper aspects of the context. The online survey, built in Google forms, was shared through the institutional email account to all university teachers (the total population is considered due to the size of the institution, however, if it were to be replicated in universities of large size should be sampled), accompanied by the objective of the project and the request to respond within a maximum period of three weeks. At the end of this period, 82 completed surveys were obtained.
- Organization and data process to obtain the index: The data organized in a worksheet (Microsoft Excel), where you assign different weights to each component, between 0.000 and 1.000, to calculate dimension and stage, based on previous experiences and the analysis with experts (Table 3), that allows you to obtain the assessment of each

feature, dimension and stage, apart from the Index of the Individual Teaching Situation. Additionally, to ease the holistic and collective view of the results, a scale of situation was established, with five levels: Critical (C): between 0.0000 and 0.2000; Poor (P): between 0.2001 and 0.4000; Acceptable (A): between 0.4001 and 0.6000; Good (G): between 0.6001 and 0.8000; Outstanding (O): between 0.8001 and 1.0000.

4. Results

In Figure 1 individual TDSI (among 82 professors who took part in the research: P1... P82) is presented, as well as the indices which comprise it (ICT Access Index, ICT Use Index and ICT Appropriation Index). That one complements with Table 2, where you can notice that the majority of surveyed professors are placed between the levels good and outstanding (87.80, 86.58, 68.29 and 64.63% for the access, use, appropriation and ISDD, respectively), without ignoring the need to improve the situation in the appropriation of around 30% of professors. It is also interesting to highlight the concentration of the obtained results, being the ICT appropriation index the one that shows more variability, with incidence in the general index, which orients on the institutional improvement strategies to be implemented.

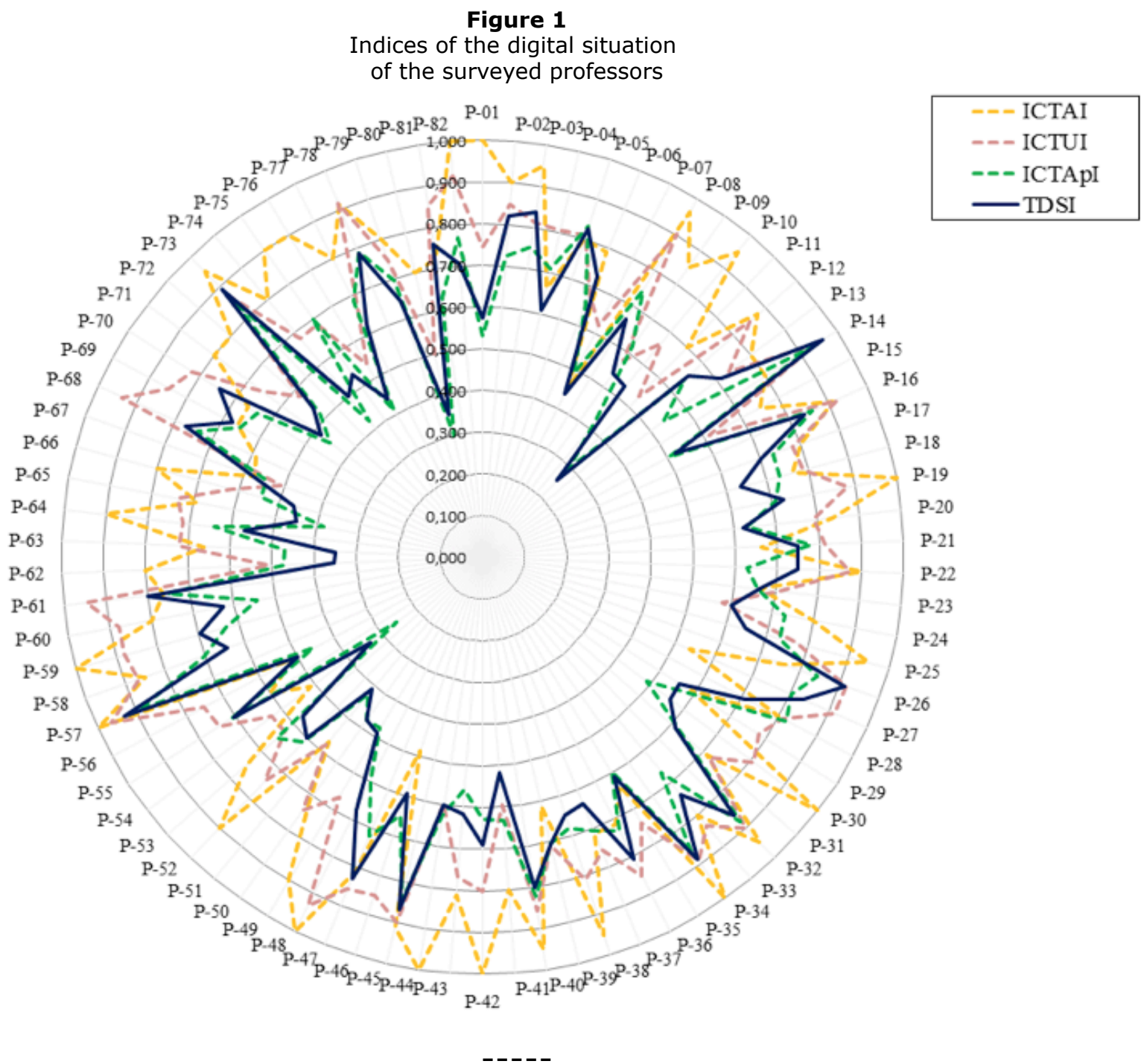


Table 2
Summary of the obtained results

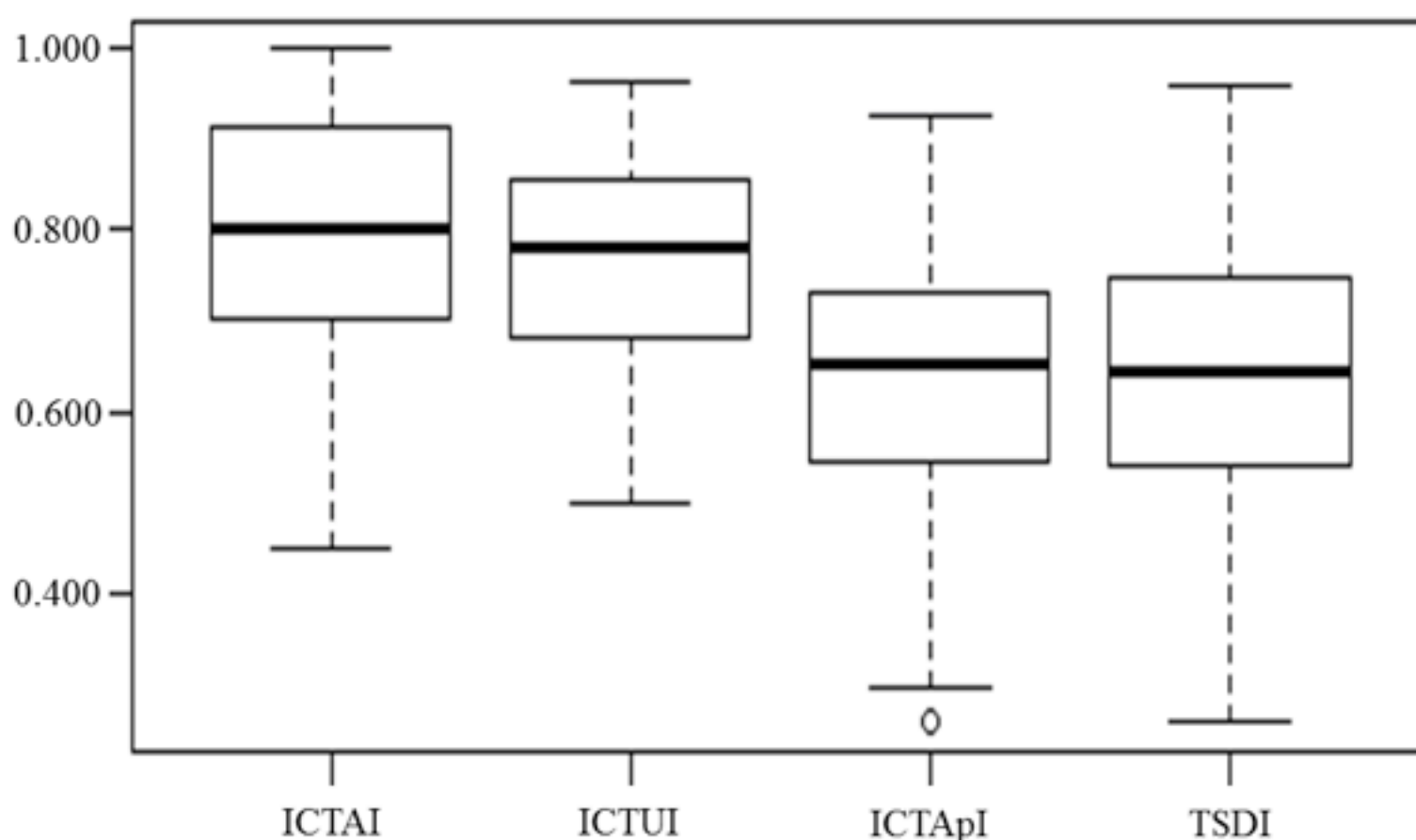
	ICTAI	ICTUI	ICTApI	TDSI
Maximum	1.000	0.966	0.927	0.960

Minimum		0.450	0.500	0.257	0.255
Average		0.797	0.765	0.642	0.645
Standard deviation		0.142	0.121	0.146	0.151
Level of digital situation (%)	Critical	0.00	0.00	0.00	0.00
	Poor	0.00	0.00	4.88	6.10
	Acceptable	12.20	13.41	26.83	29.27
	Good	46.34	40.24	53.66	46.34
	Outstanding	41.46	46.34	14.63	18.29

To ratify the results of the calculated indices, Figure 2 represents the boxplot, obtained in R, with its corresponding data. It needs to be said that according to Frende, Biedma and Arana (2017), the box pools 50% of the values of every variable, corresponding to the first and third quartile, besides being divided by the mean. Furthermore, the values under the first quartile and the values over the third quartile correspond to boxplots, which cannot exceed 1.5 the length of the box, being non-standard the values that are out of these segments.

Figure 2
Diagram of boxplots of the calculated indices

	ICTAI	ICTUI	ICTApI	TDSI
Min.	0.4500	0.5000	0.2570	0.2550
1st Qu.	0.7033	0.6813	0.5443	0.5427
Median	0.8000	0.7815	0.6510	0.6425
Mean	0.7974	0.7649	0.6415	0.6449
3rd Qu.	0.9097	0.8575	0.7320	0.7472
Max.	1.0000	0.9660	0.9270	0.9600



When you discriminate the dimensions of the three states (Table 3), you can observe that the surveyed professors overcome chiefly their basic competences, especially as

regards access and use, but when it is about the appropriation, this is, the use with meaning and added value, more variability is presented. The study does not detect the causes, but possibly associated to visible factors in previous investigations in different countries (age, disciplinary formation, performance area and trust in technology).

Table 3
Digital situation of surveyed professors (percentage of participation)

Stage	Dimension	Feature	TDSI	Level of digital situation (%)				
				C	P	A	G	O
Access to ICT	Technological		0.797	0.00	0.00	12.20	46.34	41.46
			0.797	0.00	0.00	12.20	46.34	41.46
		Access type	0.797	0.00	0.00	12.20	46.34	41.46
Use of ICT	Technological		0.765	0.00	0.00	13.41	40.24	46.34
			0.761	0.00	0.00	6.10	53.66	40.24
		Frequency of use	0.739	0.00	0.00	18.29	54.88	26.83
		Period of use	0.745	0.00	2.44	15.85	43.90	37.80
		Use of automation tool	0.795	0.00	1.22	9.76	31.71	57.32
		Download files	0.734	0.00	6.10	18.29	34.15	41.46
	Informational		0.751	0.00	1.22	25.61	36.59	36.59
		Conventional navigation	0.910	0.00	0.00	1.22	20.73	78.05
		Leisure activities	0.645	2.44	8.54	35.37	20.73	32.93
			0.791	0.00	2.44	9.76	41.46	46.34
		Academic activities	0.825	0.00	1.22	7.32	28.05	63.41
		Production of automation files	0.758	3.66	8.54	12.20	19.51	56.10
	Communicative		0.749	0.00	4.88	15.85	42.68	36.59
		Conventional communication online	0.816	0.00	0.00	9.76	36.59	53.66
		Use of online social networks	0.650	12.20	2.44	28.05	12.20	45.12
Appropriation of ICT	Technological		0.642	0.00	4.88	26.83	53.66	14.63
			0.576	6.10	14.63	32.93	36.59	9.76
		Use of automation online tools	0.736	4.88	4.88	15.85	20.73	53.66
		Use of specialized software	0.396	23.17	36.59	26.83	3.66	9.76
		Customization of technological tools	0.601	7.32	17.07	23.17	28.05	24.39
		Tools of specialized interaction	0.579	10.98	9.76	34.15	26.83	18.29
	Informational		0.623	1.22	13.41	28.05	40.24	17.07
		Cooperative online work	0.552	10.98	25.61	18.29	20.73	24.39
		Search and organization of scientific information	0.785	0.00	3.66	9.76	35.37	51.22
		Academic divulgation and promotion	0.521	15.85	20.73	30.49	28.05	4.88
			0.587	3.66	18.29	29.27	30.49	18.29
	Pedagogical	Courses on virtual environments	0.518	6.10	40.24	12.20	23.17	18.29
		Online consultancy	0.640	3.66	17.07	20.73	24.39	34.15
		Academic online activities	0.540	15.85	17.07	18.29	31.71	17.07
		Academic sessions through ICT	0.649	2.44	20.73	12.20	39.02	25.61
			0.816	0.00	1.22	12.20	26.83	59.76
	Communicative	Processes of accompaniment and online feedback	0.745	1.22	12.20	6.10	36.59	43.90
		Option of communication with technologies	0.921	0.00	0.00	9.76	12.20	78.05
			0.763	0.00	1.22	6.10	47.56	45.12
	Axiological	Respect and promotion of intellectual property	0.856	1.22	0.00	4.88	13.41	80.49
		Ethic and legal online activities	0.451	18.29	31.71	25.61	13.41	10.98
Promotion of the conscious and rational use of ICT		0.866	0.00	0.00	14.63	8.54	76.83	
Interest for technology		0.799	2.44	0.00	20.73	26.83	50.00	
Productive		0.516	4.88	15.85	48.78	26.83	3.66	
	Electronic trade	0.498	19.51	19.51	12.20	36.59	12.20	
	Citizens online participation	0.483	12.20	31.71	23.17	20.73	12.20	
	Online academic events	0.319	48.78	9.76	26.83	3.66	10.98	
	Online training	0.596	7.32	15.85	36.59	28.05	12.20	
	Incorporation of ICT in their productive measures	0.585	2.44	12.20	41.46	31.71	12.20	

Regarding specific aspects, you can notice that the ICT use, the informational dimension, Leisure activities (0.645), as well as the communicative dimension, the Use of online social networks (0.650), including the Pedagogical characteristic, the Production of automation files (0,758), that show critical and poor levels that imply the need of an intervention to overcome the encountered situation. It is displayed a good domain in the academic activities and the production of documents, which eases the access to teaching materials (books, notes, presentations and others), that Escobedo y Arteaga (2015) point out, these are the aspects where ICT ensure a greater support for students.

Furthermore, noted that the ICT appropriation, the different dimensions, from their features, deficiencies are observed originated from the low importance of the use of ICT

in the educational environment. This fact, points out the need to establish corporate strategies, addressed to improve computer and informational literacy among the teaching community since, according to Marín, Ramírez and Maldonado (2016), the introduction of ICT in the classroom is not automatic, but it is specially related to the use and value that professors will give to these resources.

Although professors take part in multiple academic events, there is a low score in online environments, maybe fostered by a lack of technological lead, the belief of the low quality of these events and the lack of stimulus to move and the direct interrelation with their peers. An online academic event, according to Crespo (2015), can be considered as a space that generates a learning community through cooperative work, allowing to debate, generating proposals and sorting out conclusions but in reality few accomplish these expectations and end up being of a more informative than formative nature.

The low rate of online cooperative work can be due to the small size of the university, where direct communication between professors is possible. However, it coincides with the finding of Cabezas, Casillas and Martín (2016), with professors of Castilla y León, where the culture of cooperative work mediated by ICT is scarce when it is about working cooperatively with other colleagues.

The participation of the teachers surveyed in the virtual processes is worrisome (such as the orientation of the courses, the participation in academic events with this form, counseling, online skills), due to lack of domain or interest, which leads to the wasting of the options of ICT and installed capacity ... and that, as Marcelo et al. (2016), the teacher is ultimately responsible for the incorporation of ICT, both in their activities and incentivizing to students in their proper use.

Equally important, it is remarkable the low relation with the aspects of the information and knowledge society like citizen participation and digital economy, which implies to turn away to current realities and with these depriving students from identifying options as a social entity.

Added to this, it is displayed a basic lack of knowledge about aspects of security and behavior in the net, that could propitiate inappropriate actions when interacting, especially when you access through the public and wireless nets. However, results display an interesting value of the Promotion of the conscious and rational use of ICT. This situation worths a deeper look, because as Martínez and Ramírez (2018) highlight from specific data, the worry among students for the security of their information is really low, as well as the responsibility towards the information being published on the Internet is nonexistent.

It is accepted that the beliefs about the usefulness and pedagogic value of ICT as Marcelo et al. (2016) highlight, supported by several authors, influence in a decisive way in its use in the classroom. Maybe this factor explains the achieved score in Ethic and legal online activities, because it is common to assume that what is published on the internet is free to use, restricting respect to intellectual property, scarcely quoted in the new documents without considering that actions of distribution, copy and modification could infringe it.

5. Conclusions

The ideal globalization of the access to ICT and its use, is a challenge for society nowadays; however, it is undertaken in a differential and unfair way, leading to the distinctions (for example, *info-rich* or *info-poor*) with different opportunities to take advantage of the options given for those technologies. This situation is not oblivious to the academic sector, that tactically has turned into an important responsible for the digital situation of those components of the teaching community, not only on the academic exercise but, especially, to do adjustments in order to give sense to the appropriation of ICT incorporation.

It is evident that ICT has been overcome by the surveyed professors due to the infrastructure of the institution as well as a tendency of relying on these devices at home. And it is that,

As society has become more and more digitized, the demand for digitally competent teachers has evolved, imposing the need for new approaches when it comes to integration of technology in education. (...) Being able to integrate and use technology for educational purposes involves having a set of generic skills suitable for all situations, both personal and professional, as well as specific teaching-profession skills. This is what is referred to as professional digital competence for teachers (Instefjord and Munthe, 2017, p. 37).

Although ICT offer professors a wide array of possibilities for the professional update, the increase of educational coverage, the increase of educational environments, collective work and interaction between peers, you can notice, in the line with Torres and Jaimes (2015), a substantial part of professors have an emerging digital culture, therefore, prioritizing the conventional forms of scholar work. In coherence with Durán, Gutiérrez and Prendes (2016), there are several antecedents that point to the need to establish appropriate strategies for the development of digital and informative competences, so that teachers can integrate ICT effectively, weighing its implications.

The abovementioned is ratified by Rangel (2015), when he highlights that the professor should be in a position to make a correct and effective use of technology in the teaching-learning process, through critical and applicative activities seeking for students to be able to face autonomously the demands of a knowledge-based society. For that,

The development of competences allowing teachers to use ICT efficiently is not enough to achieve an important change into the teaching and learning process. Furthermore, teachers are required to have an ethical position concerning their profession. This ethical position of teachers is synonym of a change in their subjective position enabling them to transform the simple transmission of knowledge into a creative act (Navés, 2015, p. 239).

To this end, it is essential that professors change from the ICT use in education to the appropriation of ICT in education, this is ICT to educate and to transform. Therefore as Ramírez, Mena and Rodríguez (2017) highlight, changes in teaching methodologies demand qualified professors from the technical and the didactic perspective, to do a suitable integration- which could be easier for new generations of teachers-although the training programs are not preparing them enough for the effective use of ICT in the classroom. However, an adequate incorporation of ICT in the educational process is related with a complex interaction between the knowledge, the aims or objectives and the beliefs of a teacher, together with other aspects like infrastructure and institutional infrastructures.

The incorporation of ICT in education requires that teachers develop sufficient skills to facilitate the student's development in a globalized and digitized world, which, according to Martínez and Ramírez (2018), includes citizen participation in a reflective and effective manner, with clear knowledge of the ethical and moral implications of their actions in a digital environment.

The TDSI index presented, will allow to determine the teacher's digital situation, with regards to the ICT appropriation. It provides a tool that would help to measure this situation in a university, compare with other universities or other implantation phases in the same university and take actions to improve the digital inclusion in education environment. In view of the index has only been implemented in one university, as a pilot test, we expect to carry out a comparative study among different institutions with a significant group of universities in the Latin-American field.

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5. 1: Professional Engagement (Using digital technologies for communication, collaboration and professional development), 2: Digital Resources (Sourcing, creating and sharing digital resources), 3: Teaching and Learning (Managing and orchestrating the use of digital technologies in teaching and learning), 4: Assessment (Using digital technologies and strategies to enhance assessment), 5: Empowering Learners, and 6: Facilitating Learners' Digital Competence (Enabling learners to creatively and responsibly use digital technologies for information, communication, content creation, wellbeing and problem-solving) (Redecker, 2017).

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