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Mexican students' perspectives on ICT competencies. A gender-based analysis

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Abstract
Introduction: Today, human beings live in ever-changing environments that demand Higher Education Institutions (HEI), in México and the world, to innovate and respond to the demands of the labour market. HEI need to update their curricula to include the effective management of Information and Communication Technologies (ICT), which require students to possess certain competencies to achieve meaningful learning. **Methods:** This research study is based on information collected from students participating in the XI National Marathon of Knowledge organised by Mexico's National Association of Faculties and Schools of Accounting and Administration (ANFECA). **Results and discussion:** The data show that female students' perceived level of competence in ICT is higher than that of their male counterpart. The most representative differences were detected in the comparison between the geographical zones in which the ANFECA is divided.

Keywords
Education; ICT competencies; perspective.

Contents

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1. Introduction

Today, human beings are living in environments that are always in motion and whose common denominator is change. This situation highlights the need for Higher Education Institutions (HEI) to

innovate to be able to respond to the demands of the labour market. Innovation requires a lot of effort to generate a change through the creation and modification of a product or service (Velenti Nigrini, 2018, p. 12). In the case of HEI, they provide a service and, thus, they must change, transform, evolve and make new things.

In this sense and to respond to global needs in the planet, human capital in enterprises and organisations requires competencies in Information and Communication Technologies (ICT). Thus, HEI must undertake actions to achieve this objective, which is key in the generation of knowledge.

However, although HEI have made investments in hardware, according to Sing (2010), they have not provoked a significant change in the generation of knowledge due to professors' limited time, access, availability of resources, administrative structures, and knowledge and competencies.

So the challenge of HEI is to provide people with the necessary competencies to meet the challenges of postmodernism, which are visible in all the activities carried out by human beings, including education (Bozna, 2017),

> ... which derives from the Latin words *educare*, which means "to bring up", "to nourish", "to guide", and *educere*, which can be defined as a "educate" "instruct" through various languages; and it is present in the actions, feelings and attitudes of people" (Andrade, Martínez & Méndez, 2012, p. 4).

It is for this reason that education is defined as "a social process determined by a context and by the worldviews of its actors, professors, students and institutions, and is being currently modified by new socialisation and communication dynamics" (Guzmán, 2008). Therefore, ICT are a transformative agent of society and can be used to generate knowledge (Falco, 2017).

Humans acquire knowledge in new ways; with globalisation and the knowledge-based society, the needs of students have changed, and HEI need to include in the curricula those competencies related to the management of knowledge and the application of technology as main tool, rather than focusing on its instrumental use (Rivera Gómez, Lau, Esquivel Gámez & Martínez Olvera, 2017, p. 98). HEI need to restructure, mix and find new connections and this requires competencies that can be developed and built upon the internal motivations of each individual (González Dueñes & Castillo Elizondo, 2017), which can be defined as "the capabilities that a person uses to cope, use, act on or mobilise a set of cognitive resources and perception and evaluation schemes to resolve a complex situation" (Guzmán Ibarra, Marín Uribe & Inciarte González, 2014). In addition, the European Commission (2007) defines competencies as "a combination of knowledge, capabilities and attitudes appropriate to the context and as those that all people need for their personal realisation and development".

Digital competence involves the safe and critical use of ICT for work, leisure and communication. It relies on competencies such as the use of computers to obtain, assess, store, produce, present and exchange information, communicate and participate in collaboration networks (European Commission, 2007).

Arras-Vota, Torres-Gastelú and García-Valcárcel (2011, p. 3) conceive ICT competencies as "the abilities, skills, knowledge and attitudes applied to the use of information and communication systems". In the same line, Arras-Vota, Bordas-Beltrán and Gutiérrez-Díez (2017) classify ICT competencies into basic competencies, application competencies, specialised competencies,

collaborative-work competencies, lifelong-learning competencies, and ethical competencies, which are described below:

> "Basic competencies refer to the knowledge required to manage technologies, which involves the use of productivity applications such as Microsoft Word, Excel and PowerPoint, as well as digital tools for the obtaining of information, the production of academic work and its presentation through diagrams and videos.
>
> Application competencies refer to the productive use of applications for information management and professional development through digital resources and networking. Thus, the use of scientific databases to build knowledge and the use of productivity applications such as Word to insert references automatically can be considered as indicators of this category.
>
> Specialised competencies involve the capacity to solve problems, create original works, plan and organise activities related to a particular project and communicate what people learned effectively through digital tools.
>
> Collaborative-work competencies involve the individual and social dimensions of education, which includes community learning and being able to interact and collaborate to build knowledge.
>
> Ethical competencies are configured by actions subjected to moral principles and values that are based on respect, responsibility, honesty, and professional and personal ethics. In the case of ethical competencies in ICT, it means that a person understands and demonstrates the ethical, legal and responsible use of ICT. This refers to using information sources properly: recognising copyright and avoiding piracy and plagiarism, i.e., to recognise the authors of the sources of knowledge and, from this, develop new knowledge or support personal ideas."

This classification was used to advance knowledge and expand the horizon to be able to analyse the perception of students regarding their ICT competencies, based on a sample of students from various states of Mexico.

It is essential to identify the needs of users, in this case students, and examine the way they interpret reality and learning (Arras-Vota, Bordas-Beltrán and Gutiérrez-Díez, 2017, p. 1190). Hence the importance of establishing the concept of perception, which according to Moreno Tello, Nelly Prado and García Avendaño (2013), "in addition to being a cognitive process, is a way of knowing the world, which is a complex process that depends on the information that the world generates, on physiology and on the experiences of those who perceive it". People use their senses to process what they see or the reasons that make them expect them to see or observe certain things, and always make a selection, so it can be said that individuals "construct" the object that they see or observe (Martínez, 2006). Assessing ICT competencies in absolutist terms, without taking into account the perception of students, and measuring them without students, would mean continuing in a state of myopia (Duke Oliva & Chaparro Pinzón, 2012, p. 163).

1.1 Justification

HEI must be attentive and take into account the perceptions of students regarding ICT management and make sure they are coherent with what organisations are demanding. Students occasionally consider they have developed a competence, but it has been proven that during the course of their professional education they do not become experts on the competencies that are required for the current context of digital transformation (Álvarez-Flores, Núñez-Gómez and Rodríguez-Crespo, 2017). For this reason, it becomes important to find areas of opportunity and build knowledge on different communities that form Mexico and the world. One of these communities is Mexico's National Association of Faculties and Schools of Accounting and Administration (ANFECA), which is composed of 274 HEI. Based on the previous, the objective is to study the perspective of the students of the HEI that belong to the ANFECA regarding their ICT competencies. Otherwise, according to Duke Oliva & Chaparro Pinzón (2012, p. 163),

> "There is a risk that the quality of education is defined, developed, and evaluated only from the perspective of managers, professors and administrators of academic institutions and even of the government, without taking into consideration the point of view of students, or the risk of giving students minor importance, and of taking them into account but only as a mere requisite".

1.2. Research objective

Analyse from a gender perspective, the perception of students who participated in the XI ANFECA National Marathon of Knowledge regarding the development level of their ICT competencies; and compare the results between the 7 areas in which the ANFECA is divided.

1.3. Research question

Are there any differences in students' perception of their competence level in ICT between the 7 areas of the ANFECA and between gender groups?

1.4. Research hypothesis

1. There are differences in students' perception of their competence level in ICT between the 7 of the ANFECA and between gender groups (Arras-Vota, Torres-Gastelú and García-Valcárcel, 2011).
2. There are differences in students' perception of their competence level in ICT between the 7 of the ANFECA (Jaramillo, Hennig and Rincón, 2011).

2. Methods

The study is based on an analytic, synthetic and theoretical, deductive method. In addition, the research is quantitative, applied, descriptive, field-work-based, and bibliographic.

2.1. Techniques

The data collection tools used for this study were literature review, surveys and statistical analysis.

Bibliographic techniques were used to collect information for the construction of the theoretical framework and to build a framework to interpret the results.

The survey was composed of items relating to the perception of students and professors regarding the development of students' ICT competencies, based on a four-point scale; where: 1 is Not Competent; 2 is Moderately Competent; 3 is Competent; and 4 is Very Competent.

Below are examples of the items that compose the survey applied to students from the 30 universities that are part of ANFECA:

"We are collecting information that will allow us to assess your perception of your ICT competencies. Thus, please answer this questionnaire, in accordance with the following values:"

(1) Not competent (2) Moderately Competent (3) Competent (4) Very Competent

Competencies	1	2	3	4
1. I am open to ways of thinking that are different to mine and allow me to enrich knowledge.				
2. I have the ability to learn something new every day.				
3. I have the ability to learn from all my experiences.				
4. I am open to ways of thinking that are different to mine and allow me to enrich knowledge.				

Source: Authors' own creation.

The application of this survey was carried out when students registered to participate in the XI National Marathon of Knowledge, held on 12 October 2017, at the School of Accounting and Administration of the Autonomous University Chihuahua.

The statistical analysis of data was performed with the Statistical Package for the Social Sciences (SPSS version 20.0), which is an application of predictive analytics (IBM, 2017).

2.2. Universe of study

The National Association of Faculties and Schools of Accounting and Administration (ANFECA) is a Mexican academic institution that represents and brings together higher education institutions that offer Accounting and Administration degrees to improve the substantive functions of the faculty at the national and international levels, which are: teaching, research and knowledge dissemination.

The ANFECA was founded in April 1959 in Torreon, Coahuila, by 13 institutions. Today, the association has 274 affiliated institutions distributed in seven zones across Mexico.

The ANFECA has 12 national co-ordinations: academic certification, academic, social entrepreneurship, curricula and study programmes, research, post-graduate, national marathons, history, national and international outreach, university-private sector, professional academic development, and university social responsibility.

The National Marathon Coordination organises the National Marathon of Knowledge, which is a contest about information and competencies on a specific area that aims to promote the comprehensive

study of curricular discipline common to the members of the ANFECA. The specific objectives of these events are to become meeting points for students from the different HEI, promote knowledge exchange; review the contents of the subjects that make up the curricula of the different schools and faculties of accounting and administration comprising the ANFECA, and tighten the bonds between students and teachers (ANFECA, 2018). The functions of this coordination include issuing the call for the national marathons of knowledge. In 2017, it issued the call for the XI National Marathon of Knowledge, which involved regional knowledge marathons that were hold in April and August. The top two contestants of these marathons went to participate in the National Marathon of Knowledge held on 12 and 13 October 2017, in Chihuahua. This national marathon had the participation of 30 schools and faculties of accounting and administration affiliated to the ANFECA. These institutions participated in specific areas of knowledge, such as taxes, management, auditing, finance, management technology and marketing.

The following table shows the HEI that participated in the XI National Marathon of Knowledge and the zone to which they belong:

Table 1. HEI participating in the XI National Marathon and the ANFECA zone to which they belong

ANFECA zones	HEI involved
Zone 1. Northwest Directorate	Autonomous University of Baja California Autonomous University of Chihuahua Autonomous University of Sinaloa Technology Institute of Sonora Technology University of Tijuana
Zone 2. North Directorate	Autonomous University of Nuevo León Autonomous University of Tamaulipas Autonomous University of Coahuila
Zone 3. Centre Directorate	Juárez University of Durango Technology Institute of Durango Autonomous University of San Luis Potosí Pan-American University Autonomous University of Aguascalientes Autonomous University of Querétaro
Zone 4. Centre-west Directorate	University of León University of Valle de Atemajac Technology University of Southwest Guanajuato Autonomous University of Nayarit University of Guadalajara Higher Education Technology Institute of Zamora University of San Nicolás de Hidalgo, Michoacán
Zone 5. Centre-south Directorate	Autonomous University of Hidalgo Autonomous University of Morelos Autonomous University of Mexico state Autonomous Juarez University of Tabasco
Zone 6. South Directorate	Marist University of Merida

	University of Veracruz Autonomous University of Yucatán Autonomous University of Campeche
Zone 7. Mexico City Directorate	Banking and Business School

Source: Authors' own creation.

The universe of study is the composed by the 228 (out of 242) students who participated in the marathon. Other 14 students did not attend the marathon for various reasons.

Characteristics of the ANFECA zones under study

This section describes each of the seven zones (directorates) that make up the National Board of Directors established in the General Statutes of the National Association of Faculties and Schools of Accounting and Administration (ANFECA, 2018). The following table presents the Mexican states that make up the zones:

Figure 1. Distribution of ANFECA zones and the states that comprise them

Source: Authors' own creation.

1.2. Instrument reliability

The Cronbach's alpha was used in this research to estimate the reliability of our scale (Landero Hernández & Gonzalez Ramirez, 2006, p. 156), providing a value of 0.903, which indicates that the results are reliable, since 0.7 is acceptable, 0.8 is good and 0.9 is excellent (Frías-Navarro, 2014). (See table 2)

Table 2. Statistical reliability of the instrument

Year	Cronbach's alpha	Number of items in the questionnaire
2017	0.903	21

Source: Authors' own creation.

3. Results and discussion

This section presents a comparison of the perception of the development of competencies in ICT in average values. The Student's t-test was performed in each case to examine the differences between two independent and small samples that have a normal distribution and homogeneity in their variances (Sánchez Turcios, 2015).

The first group of competencies consists of 3 items that make up basic competencies related to the management of office suite and other programs; the use given to digital tools and the use of videos to complement or improve students' presentations.

The students of the 7 ANFECA zones do not present significant differences across gender groups. It can be said that the perception of the two gender groups coincides in terms of the development of the basic competencies: both groups consider themselves to be competent. Women's perceived competence level is higher than that of men in the three items, with an average value of 3.46, which is consistent with the results presented by Arras-Vota, Torres-Gastelú and Garcia-Valcárcel (2011), whose study found that the development of the basic competencies is perceived better by women than by men, with average values of 2.92 and 2.88, respectively. The competence level in the use of videos in presentations is rated by men and women with average values of 3.21 and 3.08, respectively. This suggests that both groups perceive themselves to be competent. This differs with the results presented by Jaramillo, Henning & Rincón (2011), whose study found out that students do not use images and/or videos in their homework.

Table 3. Basic competencies of students, by gender groups

	Average women	Average men	T value
1. I effectively manage Word, Excel, Power Point and other productivity applications.	3.49	3.42	0.287
2. I use digital tools in my academic presentations.	3.69	3.55	0.027
3. I use videos in my presentations.	3.21	3.08	0.131

Source: Authors' own creation.

The following table presents the results regarding the six items about application competencies, which includes the use of models and situations to explore complex issues, the use scientific databases and whether their HEI gives them access to these databases, as well as the use of the Google and Google Scholar search engines, and the integration of bibliographic references through Microsoft Word or similar software.

As shown in table 4, both women and men considered themselves to be little competent in the use of models and simulations to explore complex issues, which is the item with the lowest rating in both groups. This should be a red light for academic and educational authorities since the use of models and simulations is of great help to achieve the desired competencies. As Centella and Hornero (2017) point out, training with simulators reduce the learning time and allows users to repeat training sessions as many times as necessary to achieve the required skill level. Therefore, it allows a better acquisition of

competencies necessary in education than normal training conditions which may require months or years.

The results reflect, on average, a positive evaluation by students, although it is still necessary to increase the use of search engines with academic rigor and to be trained in the use of Word to incorporate references and bibliography (Arras-Vota, Bordas-Beltrán and Gutiérrez-Díez, 2017).

The comparison of students' evaluations shows only one significant difference in the competence to use Google Scholar to get information, which was differently rated by women and men, with average values of 3.44 and 3.12, respectively. This indicates that women's perceived competence level is significantly higher than that of men.

Table 4. Students' application competencies, by gender groups

	Average Women	Average Men	T value
1. I use models and simulations to explore complex themes.	2.85	2.74	0.26
2. I use scientific databases to be better informed / in search for answers to the questions arising from the subjects we study.	3.21	3.18	0.69
3. I use scientific databases available in my university to find information to write academic papers.	3.26	3.05	0.03
4. I use Google's search engine to find out information needed to write academic papers.	3.48	3.42	0.48
5. I use Google scholar to find out information needed to write academic papers.	3.44	3.12	0.00
6. I integrate references and bibliography in academic papers automatically with Microsoft Word.	3.53	3.44	0.31

Source: Authors' own creation.

Specialised competencies consisted of 7 items that address the reading of scientific articles, the breaking down of the article's elements as well as the application of critical thinking in reviews, and the development of research projects using ICT.

In relation to the specialised competencies, women's perceived competence level is higher than that of men. Women have a significantly higher perception of their competence level than men in relation to the items relating to the ability and knowledge to generate research projects and the ability to generate and formulate, clearly and precisely, key questions and problems. Thus, it is necessary to generate strategies that allow men to improve this perception and further develop these competencies. Both women and men perceive they have a good level in academic competencies such as: identifying and defying relevant research topics, and properly use sources to contribute to the generation of knowledge; structuring complex knowledge in a consistent manner; critically understand and interpret an environment and find and manage information in a digital environment; with average ratings of 3.88, 4.12, 3.99 and 4.12 respectively. These results are consistent with those presented by Besalu-Casademont, Schena and Sánchez-Sánchez (2017). Other

authors highlight students' lack of knowledge about the use of digital media and technologies to solve conceptual problems and contribute to the creation of knowledge by participating with others in creative and innovative actions (Álvarez-Flores, Núñez-Gómez and Rodríguez Crespo, 2017).

Table 5. Specialised competencies, by gender groups

	Average Women	Average Men	T value
1. I read at least five scientific articles, using ICT, to write academic papers.	3.08	2.84	0.014
2. I can breakdown the elements of articles and make comments to enrich my academic work.	3.29	3.07	0.018
3. I create original works as a means of personal expression, using ICT.	3.36	3.13	0.014
4. I have ability to solve problems using ICT.	3.41	3.33	0.345
5. I have the capacity to build my own concepts based on other authors' definitions.	3.59	3.48	0.149
6. I have the skills and knowledge to carry out a research project using ICT.	3.48	3.25	0.004
7. I can clearly and precisely generate and formulate key questions and problems.	3.52	3.31	0.007

Source: Authors' own creation.

The section on collaborative work competencies is made up of items about whether students work as part of a team, whether they consider important to work as a team, and whether they use ICTs in this process.

Table 6. Students' collaborative-work competencies, by gender groups

	Average women	Average men	T value
1. I can carry out academic teamwork using a variety of digital resources.	3.57	3.43	0.101
2. I can participate in groups that develop projects on work production and problem solving.	3.26	3.08	0.046
3. I can perform collaborative work with colleagues using ICT.	3.44	3.24	0.02
4. I think it is important to work as a team using ICT.	3.66	3.57	0.204

Source: Authors' own creation.

There are no significant difference in the responses of women and men, which indicates that their' perceived competence level is similar. It should be noted that women's perceived competence level is higher than that of men. The highest ranked item among women is "I think it is important to work as a team using ICT". These results coincide with those presented by Besalu-Casademont, Schena and Sánchez-Sánchez (2017), whose study found out that students ranked their competence level with 4.62, on scale of 1-5, the importance of using ICT in teamwork in different environments, communicate their own ideas and integrate on a common project. Other authors mention the importance of incorporating participatory processes of knowledge generation so that students can connect information in a community and achieve greater learning, and highlight that it requires the commitment of teachers and students (Arras-Vota, Bordas-Beltrán and Gutiérrez-Díez, 2017).

The section on lifelong learning competencies includes three items on whether students are open to different ways of thinking, whether they have the ability to constantly learning and whether they learn from all of their experiences, as shown in table 7.

The analysis of these competencies shows that both women and men perceive they have developed these competences at a good level. There is no significant difference across gender groups. It was observed that women's perception of their competence level in all these items is higher than that of men. This is consistent with the study of Arras-Vota and Bordas-Beltrán (2017, p. 1198), in which students perceived their competence to be very high. The results of other authors also indicate that students have acquired their knowledge in an experimental fashion, essentially on a trial-and-error basis (Álvarez-Flores, Núñez-Gómez and Rodríguez Crespo, 2017).

Table 7. Students' lifelong-learning competence, by gender groups

	Average women	Average men	T value
1. I am open to ways of thinking that are different to mine and allow me to enrich knowledge.	3.73	3.68	0.444
2. I have the ability to learn something new every day.	3.75	3.71	0.566
3. I have the ability to learn from all my experiences.	3.75	3.72	0.639

Source: Authors' own creation.

Ethical competence was assessed with an item about the capacity to acknowledge the work of others by citing them, as shown in table 8.

Table 8. Students' ethical competencies, by gender groups

	Average women	Average men	T value
1. I always I acknowledge the work of others by citing them.	3.73	3.57	0.03

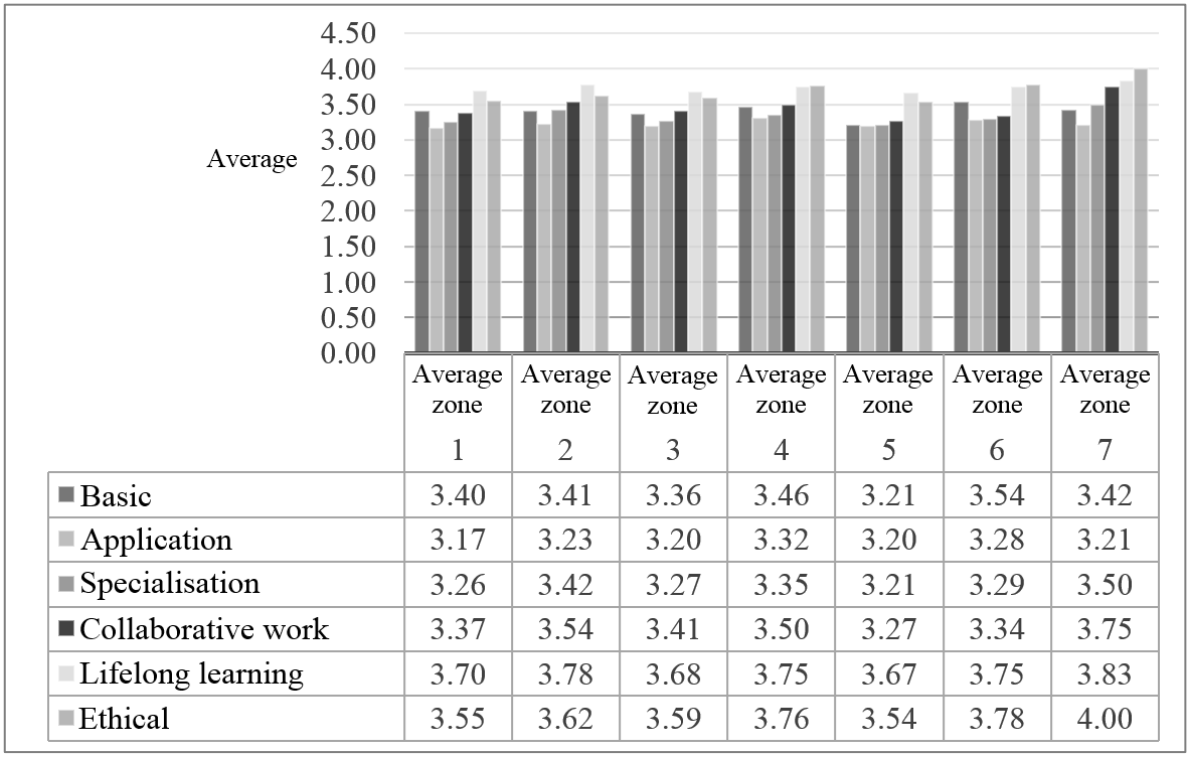
Source: Authors' own creation.

The perception of the competence level for this item is high, which is consistent with the results of other authors such as Arras-Vota, Torres-Gastelú and Garcia-Valcárcel (2011), who found out that female and male students rated their competence level as 3.08 and 2.96, respectively. It is important to highlight the need to empower students so they can learn to cite the research works they use to develop their own, this may be through tools such as Microsoft Word, which allows users to quote the works of other authors with ease.

ICT competencies: differentiated by ANFECA zone

The students who participated in the XI National Marathon of Knowledge organised by the ANFECA in 2017 perceived the level of their ICT competencies as shown in Figure 2.

Figure 2. Level of ICT competencies by ANFECA areas



	Average zone 1	Average zone 2	Average zone 3	Average zone 4	Average zone 5	Average zone 6	Average zone 7
Basic	3.40	3.41	3.36	3.46	3.21	3.54	3.42
Application	3.17	3.23	3.20	3.32	3.20	3.28	3.21
Specialisation	3.26	3.42	3.27	3.35	3.21	3.29	3.50
Collaborative work	3.37	3.54	3.41	3.50	3.27	3.34	3.75
Lifelong learning	3.70	3.78	3.68	3.75	3.67	3.75	3.83
Ethical	3.55	3.62	3.59	3.76	3.54	3.78	4.00

Source: Authors' own creation.

Figure 2 delves into the analysis of the ICT competencies of the Marathon's participants distributed across the 7 areas in which ANFECA is divided. The analysis of the average values of all participants' perceived level of competencies indicates that all of them consider themselves to be competent, with ratings ranging from 3.17 to 4. Zones 1, 2, 3 and 5 perceive that the lifelong learning competence is the one they have developed the most; in Zones 1, 2, 3, 4, 5 and 7 the ethical competence is the second best valued competence; the application competence is the lowest-ranked competence of all.

Table 9. Highest and lowest developed competencies, in the 7 ANFECA zones

	Highest perception	Lowest perception
Application	Zone 4	Zone 1
Specialisation	Zone 7	Zone 5
Collaborative work	Zone 7	Zone 5
Basic	Zone 6	Zone 5
Ethical	Zone 7	Zone 5
Lifelong learning	Zone 7	Zone 5

Source: Authors' own creation.

As shown in table 9, of all zones, number 7 has the highest perception of the development of their specialisation, collaborative work, ethical and lifelong learning competencies. Meanwhile, zone 5 has the lowest perception of the development of specialisation, collaborative work, basic, ethical and lifelong learning competencies. Zone 4 gave the highest ranking to the development of application competencies; zone 6 gave the highest ranking to basic competencies; while zone 1 gave the lowest average value to the application competencies.

4. Conclusions

As mentioned, the guiding research question of this study was: Are there any differences in students' perception of their competence level in ICT between the 7 areas of the ANFECA and between gender groups?

This question was provisionally answered with the following two hypotheses:

1. There are differences in students' perception of their competence level in ICT between the 7 of the ANFECA and between gender groups (Arras-Vota, Torres-Gastelú and García-Valcárcel, 2011).

2. There are differences in students' perception of their competence level in ICT between the 7 of the ANFECA (Jaramillo, Hennig and Rincón, 2011).

The first hypothesis has been proven partially since there are competencies such as application competencies (item: I use Google scholar to find out information needed to write academic papers, with a significance of 0.00) in which women's perceived competence level is significantly higher than that of men. Moreover, there are specialisation competencies (items such as: "I have the skills and knowledge to carry out a research project using ICT" and "I have the skills to clearly and precisely generate and formulate key questions and problems") with a significance of 0.004 and 0.007 in favour of women who perceive a higher level of competence than men.

With regards to the differences between gender groups, although they are rare, they are statistically significant in two of the ICT competencies; women's perception of their competence level is higher across all ICT competencies. These findings reinforce those presented by authors such as Arras-Vota, Torres-Gastelú and García-Valcárcel (2011, p. 23), whose research also found out that women's perception of their competence level was higher than that of men.

The comparative study between the 7 areas of the ANFECA yields interesting results such as the perception of zone 7 which, based on the averages rankings, perceived a higher competence level in specialisation, collaborative work, ethical and lifelong learning competencies. On the other hand, it is concluded that based on average responses, zone 5 perceived the lowest ICT competence level in specialisation, collaborative work, basic, ethical and lifelong learning competencies. Zone 1 perceived the lowest competence level in the application competencies.

Academic authorities in HEI must be attentive of students' development of competencies in ICT, since as Arcila Calderón, López and Pena (2017, p. 591) point out, in recent years "ICT have become one of the most important communication tools for institutions, people and brands..." and students can use ICT to transform information into knowledge. This is a task that must be shared by teachers and students.

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