

WIP: Perceptions of Use and Requirements for Digital Competencies of Engineers According to Employers in Central Mexico

1st Martha P. Robles Gutiérrez
Dept. Mechatronics Engineering
Polytechnic University of
Pachuca
Pachuca Hgo, México
probles@upp.edu.mx
<https://orcid.org/0009-0000-3143-9831>

2nd Noemi V. Mendoza Diaz
Dept. of Engineering Technology
and Industrial Distribution
Texas A&M University
College Station, TX, USA
nmendoza@tamu.edu
<https://orcid.org/0000-0003-1215-1554>

3rd Lourdes E. Del Razo Robles
Dept. of Software Development
Engineering
Universidad Abierta y a
Distancia de México
Pachuca, Hgo, México
lourdes.delrazorob@nube.unadmexico.mx
<https://orcid.org/0009-0008-5655-8026>

4th Ana Maria Jimenez Romero
CONALEP
ana.jimenez_013@conalepmex.edu.mx

Abstract— This research WIP paper on innovative practices aims to identify the digital competencies required by graduates to strengthen their graduate profile, with the components of these competencies including the labor requirements of employers. The research is mixed, it started with a diagnosis of 132 digital questionnaires directed to students. The structure of the questionnaire took as a reference the digital competence frameworks proposed by researchers on the subject. The second step consists of the analysis of interviews with 5 employers from various productive sectors and 10 specialized teachers to finally determine the proposal for Digital Competencies. **Keywords—** Digital Competencies, Industrial Systems, Admission profile.

I. INTRODUCTION

Educational institutions have been affected in all their processes by the use of Information and Communication Technologies (ICT) and by society in general. Universities must equip their students with sufficient skills to ensure that their graduates have the profile and tools to develop professionally upon completing their academic training and thus adapt to the new organization of work. Employers need to be assured that the digital proficiency of their workers does not make them vulnerable. Universities face a new reality and new educational requirements that go beyond the knowledge indicated in the curriculum and the scope established in the graduate profile.

This paper analyses the use of ICT by students in study and work activities to make a proposal for reinforcement in higher education institutions that strengthen the graduate profile to develop professionally upon completion of their vocational training, with a focus on the new organization of work.

A. Motivation

To propose a structure of digital competencies that leverages the digital skills of higher education students and identifies new skills with an emphasis on responsibility, equity, and inclusion for full development upon graduation. Digital competencies in higher education have been addressed by prestigious

universities, primarily under the name of Frameworks, to compare with the standards that have been developed with language proficiency levels. Mexican universities have explored this topic with little depth, but it is important to initiate proposals with new visions.

B. State of the Art

In Mexico, approximately 96.87 million users are reported to have internet service on all types of digital devices [1]. The current use of the internet represents growth over the past 8 to 9 years among the population over 6 years old [2]. INEGI published that, in the first quarter of 2023, of the Mexican population of 129 million, usage is distributed as 52% women and 48% men [3].

Some educational institutions have undertaken studies and proposals to establish Digital Competency Frameworks that have application and recognition in other entities and countries. The academic proposals that have addressed the topic of digital competencies are:

Common Framework of Digital Teaching Competence, which establishes areas of digital competence in Information, Communication, Content Creation, Protection, and Problem Solving as basic axes on which the digital competence axes can be established both linearly and transversally [4].

ICT Competencies and Standards Framework from the pedagogical dimension, integrates the Con-TIC-Go training route, which consists of six phases; the methodological resources that support the training route and the scope and limits of the proposal [5].

European Digital Competence Framework for Citizens (DigComp), the development of digital competencies was proposed by the European Parliament in 2018, defined by key competencies for citizens in their lives for their full development [6].

UNESCO ICT Competency Framework for Teachers, which consists of a guide for pre-service and in-service teacher training on the use of digital technologies in formal and informal settings, mainly covering basic education [7].

In the document **Digital Competencies: A Literature Review and Their Applications in the Workplace**, dimensions in which various authors agree by name or structure were classified, indicating that there is no comprehensive framework or definition of digital competencies in the workplace [8]. Hence, the importance of proposing digital competency approaches to participate in society in study and work activities.

MetaRed Digital Teaching Competencies, developed by the EdTech Group of MetaRed Mexico (ANUIES-tic), through the collaboration of various universities, applied the Check-in DigCompEdu instrument focused on higher education teachers, based on the European common frameworks [9].

II. THEORETICAL FRAMEWORK

The theoretical foundation of this project is Genetic Constructivism through the concepts of Assimilation and Accommodation of knowledge (Piaget). The use of technology has part of this effect on students and teachers. From Vygotsky's perspective, he considered that the social and cultural environment are key components for learning. Thus, spaces outside the school influence the learning of graduates and the media. Universities must promote key learning to understand social needs and focus on proximal development zones. Ausubel considers that the relationship between new information and prior knowledge through perception and discovery generates meaningful learning. Today, students must have the ability to adapt and use technology responsibly and effectively [10].

Torres argues that professionals, in their actions and reasoning, imprint values and philosophies to focus their ethics and ground their daily activities in the face of social problems that require attention and seriousness. Therefore, any proposal must be based on solid foundations of values [11].

Higher education in Mexico and the application of Competency-based Educational Models generate the vision of teaching centered on learning for real-life situations, oriented towards the development of flexible curricular projects [12].

Regarding labor approaches, students must put into practice the competencies acquired in learning environments in real settings, that is, work competencies. [13] references the SCANS report where the need to establish a common language between employers and higher education institutions is established. It represents a challenge because the competencies of graduates do not align with the needs of work environments from their training.

From the perspective of Resilience, the development of global citizenship is understood as raising awareness and taking actions that enrich human understanding and, consequently, the planet. Thus, 21st-century generations must empower their knowledge, attitudes, skills, and values to make informed decisions in an interconnected world in all areas [14].

At the United Nations Summit on the Transformation of Education, new educational approaches were reflected upon. It was affirmed that the current global situation is characterized by continuous challenges and changes, and the recommendation was made to train people as change agents to face digital and green economies [15].

III. DEVELOPEMENT

A. Problem Statement: Progress (Development)

The research design began with the following analyses:

Clear Research Question: How will the Digital Competencies defined by [16] strengthen the graduate profile of the Systems Engineering and Industrial Technologies educational program to respond to new technology-supported labor trends?

Hypothesis: The proposed Digital Competencies for graduates of Systems Engineering and Industrial Technologies will strengthen their profile in technical, methodological, and humanistic axes, enabling broad professional and academic development in light of new labor trends.

The general objective of the research is: To define the Digital Competencies to strengthen the profile of graduates of Systems Engineering and Industrial Technologies to respond to new technology-supported labor trends.

IV. METHODOLOGY

The research strategy is mixed method, incorporating elements designed to address the research question [17]. Initially, a survey-questionnaire (quantitative) was applied to 132 students and teachers, which formed the first report. Followed by a semi-structured interview (qualitative) were then conducted, with the subjects being teachers, and employers as reported in this document. The research consists of four phases.

FIGURE 1. RESEARCH PROGRESS



The current progress corresponds to Phases 1 and 2 (Figure 1).

A. Phase I: Participants

The quantitative research (students and teachers) will be contrasted with the qualitative research (employers and teachers). The research began with the application of a digital questionnaire based on Digital Competency Frameworks to establish a starting point with preliminary findings from 106 (80.3%) students and 26 (19.7%) teachers from the Systems Engineering and Industrial Technologies educational program. The information obtained from the surveys provided a diagnosis that guided the development of the phases proposed in the methodology and the corresponding validations. The sample consisted of 132 participants, with the criterion being to include only students nearing graduation from a total population of 487.

B. Demographic data of the Student Population

The total population of Hidalgo is 3,082,841 inhabitants, distributed across 4,514 rural localities and 176 urban ones. The majority of students come from nearby municipalities such as Pachuca, Mineral de la Reforma, Actopan, El Arenal, Atotonilco el Grande, Epazoyucan, Mineral del Monte, Epazoyucan, Mineral del Monte, Omitlán, San Agustín Tlaxiaca, Omitlán, Tizayuca, Villa de Tezontepec, Zapotlán, and Zempoala, most of which are rural areas. The majority of students' parents support their households with the minimum wage [18].

C. Demographic data of the Employers Population

100% of the interviewees are male production executives, aged between 36 and 45 years.

D. Instruments

Surveys - The questionnaire design defined 7 dimensions: Information and Data; Communication and Collaboration; Content Creation; Protection and Security; Digital Environment; Location and Positioning; and Entrepreneurship. Specific questions were asked for each dimension to delve deeper into the topic. A total of 132 were administered. The information obtained made it possible to generate a diagnosis. This is presented in the Appendix.

Interviews - The first version of the semi-structured interview for employers aims to understand which dimensions of digital competencies graduates need to master as future employees. The first version underwent analysis by *subject teachers who also work in companies to assess validity through third-party judgment*; observations suggested reducing the number of items and focusing on the students' graduate profile [19]. The final version of interviews underwent validation through expert judgment with criteria of *clarity, coherence, and relevance*, focusing on Mora's proposal; full-time faculty researchers participated [20].

TABLE I. DESCRIPTION OF THE DIMENSIONS THAT WERE INCLUDED IN THE QUESTIONNAIRE

Dimensions	Concept
1.- Information and data	Generation, search and management of information and data
2.- Communication and collaboration	Digital media development, communication and collaboration.
3.- Content creation	Generation, use and adaptation of digital content
4.- Protection and security	Application and generation of security criteria for personal information and work environments.
5.- Digital environment	Construction, use and adaptation of digital environments for study and work
6.- Location and location	Using digital media to locate or search for a site
7.- Entrepreneurship	Search and use digital media to start a business

The description of the dimensions was analyzed within the structure of the questionnaire.

The analysis of interviews used the open coding method [21] to iteratively generate themes so that categories were generated and reviewed as more interviews were conducted. A table instrument was used to determine the categorization and grouping of terms. Table II served as the development source.

Interview responses were contrasted in the analysis matrix integrated into Table III, combining the responses to each question, indicating whether they integrate any dimension or not the substantive functions and on what activity the use of technology is based.

V. ACHIEVED RESULTS

After completing the open coding of the interviews, the themes found and associated dimensions were **Location and positioning; Content creation; Entrepreneurship; Digital environment, Information and data, Protection and security, and Communication and collaboration.**

Employer interviews provided data about the requirement of dimensions such as **Information and data; Communication and collaboration; Content creation; Protection and security; Digital environment; Location and positioning; and Entrepreneurship** in activities corresponding to the substantive functions of the graduate profile of the educational program in systems engineering and industrial technologies. Teacher interviews showed how students carry out activities focused on the graduate profile using the dimensions. Three dimensions stood out, and one was eliminated. The results of the two types of interviews have similarities and different perspectives, but it is important to contrast them because ultimately the learning that students obtain is guided by the graduate profile, and it is the employer who requires it.

VI. ANALYSIS OF THE INFORMATION GATHERED

The interviewed companies belong to various business sectors. The profile of the graduates is relevant and they have the capacity to carry out activities in **Protection and Hygiene, Production Processes, and Information Systems and Industrial Technologies**. Graduates will apply the dimensions of Digital Competencies in a transversal manner. Upon graduation, they face two scenarios: either proposing with the resources at hand or adapting to the systems implemented in the companies.

TABLE II. COMPANY CHARACTERISTICS

No. company	Business sector	No. Employers
1	Specialized and oversized transportation	150
2	Bus and truck manufacturers	200
3	Carbonated beverage bottling company	250
4	Marketing and Manufacturing of Construction Products	170
5	Glass products factory	45

These companies have received graduates from the educational program for professional internships and their first jobs.

Data from employer interviews revealed that the dimensions of **Communication and Collaboration; Protection and Security; and Information and Data** are the most highly required by employers for job activities related to the substantive functions of the graduate profile. The dimensions of **Digital Environment; Entrepreneurship; and Content Creation** are identified as useful and complement the requirements in the companies.

TABLE III. ANALYSIS STRUCTURE FOR DESIGNING INTERVIEW QUESTIONS FOR EMPLOYERS

Egress Profile Substantive Functions	Components Digital competences	Interview questions
Supervise, prepare, and implement Protection and Hygiene Plans in various production and/or service systems.	Information and data	For proposing, implementing, and managing Protection and Hygiene Plans in the company, do you consider that engineering graduates can reinforce Protection and Hygiene responsibility with the mastery of digital tools? by: <ul style="list-style-type: none"> Searching for and controlling key information to support decision-making at the managerial and team levels, with responsibility and creativity. Generating and proposing creative communication spaces to facilitate the integration of multidisciplinary work teams that foster communication and collaboration.
	Communication and collaboration	
Analyze and evaluate industrial processes and/or production systems using appropriate tools, methods, and techniques related to engineering.	Communication and collaboration	To analyze and evaluate industrial processes and/or production systems , does the company you represent require engineering graduates in its work teams, who propose: <ul style="list-style-type: none"> Creative digital structures that facilitate communication and collaboration among work teams, based on Protection and protection criteria with a focus on professional ethics. Define criteria for safeguarding company documents and evidence in accessible digital sites and protected with appropriate copyright for decision-making support, as evidence of the company's intellectual capital.
	Digital environment	
	Protection and security	
Develop information systems and industrial technologies that contribute to business development, the creation of new companies, and the improvement of organizations and industrial processes in various productive sectors	Content creation Protection and security Entrepreneurship	To develop information systems and industrial technologies focused on improving the company, do you believe that the company you collaborate with would be strengthened if an engineering graduate had the ability to perform: <ul style="list-style-type: none"> Global information searches in databases and scientific research to support decision-making that allows the company to improve and seek new growth opportunities. Design methodologies for identifying social and business needs that allow the generation of solutions through entrepreneurship using digital means to validate innovation proposals and new products.

The table integrates dimensions highlighted in the diagnosis that are applied to carry out the substantive functions.

The dimension that did not show relevant information is **Location and Positioning**, which will be eliminated in the final definition of the Digital Competencies structure. The information is shown in the table IV.

TABLE IV. COMPARISON OF RESULTS

Teachers		Employers	
Dimension	Total	Average by dimension	Total
Location and Positioning	0	Location and Positioning	0
Content Creation	12	Communication and Collaboration	15
Entrepreneurship	12	Entrepreneurship	30
Digital Environment	14	Information and Data	40
Information and Data	17	Protection and Security	40
Protection and Security	20	Digital Environment	40
Communication and Collaboration	22	Content Creation	60

Comparative table of results for dimensions chosen by teachers, employers, and their overlap.

General comments obtained from employer interviews correspond to attitudes and values of **initiative, creativity, and**

teamwork in most cases. General aspects they commented on include the importance of the ability to seek **new techniques or developments, look for business opportunities, and facilitate the implementation of technical standards.**

Data from teacher interviews showed that the dimensions of **Content Creation; Digital Environment; Protection and Security; and Information and Data** are the most developed by students in academic activities as evidence of learning that indicates the graduate profile. The dimensions of **Entrepreneurship and Communication and Collaboration** received lower scores from the teachers, as these are not indicated in the curriculum design. The dimension that did not show relevant information is **Location and Positioning**, which will be eliminated in the final definition of the Digital Competencies structure.

The teachers argued that students have the **capability and abilities**, but they are limited because the educational institution does not plan to teach robust software, and in professional internships, employers do not take this activity seriously to evaluate the students' proposals.

VII. DISCUSSION

The dimensions being analyzed are seven. In the interviews with teachers and students, there is agreement on three

dimensions, as indicated in Table IV. These are highlighted with the same color in the top three positions by the number of selections in the questions from both employer and teacher interviews. This aligns with the ANUIES proposal regarding Digital Competencies from the EdTech Group of MetaRed México, which assumes that the participants have knowledge and skills in the use of digital tools when conducting the questionnaires, but it also examines the extent to which these tools are focused on the educational field [22].

The data provided by the interviews confirm which dimensions are useful and which are not. Another interesting aspect corresponds to the fact that, as indicated in Table I, the dimensions are embedded in activities inherent to the substantive functions of the graduate profile. When determining the final version of digital competencies in the engineering educational program, these dimensions should be integrated as fundamental. Dimensions with fewer selections are considered complementary in a preliminary analysis. During the interviews, respondents did not suggest integrating an additional dimension from the perspective of their current activity and growth plans.

Conducting interviews at the workplaces is important to observe the environment and achieve a better interpretation. It is necessary to expand the range of interviews with employers to validate the results obtained so far. The study was limited to 5 companies, but it is challenging to schedule interviews as they are often mistaken for questionnaires or surveys. The interviews with teachers are also limited because the educational program does not have more faculty members. The information collected in the first and second phases forms the basis for phases 3 and 4 of the methodology, which will conclude the ongoing research and lead to a final version.

VIII. CONCLUSIONS

The requirements and realities of digital competencies and the dimensions they encompass must be addressed taking into account the needs of teachers and employers. Validity and reliability cannot be overlooked. Mixed research is comprehensive and provides data that can be contrasted to reach conclusive results.

Interviews with employers are important for guiding the development of proposals to strengthen the students' graduate profile. Upon graduation, students face challenges due to lack of experience, but also because of the need to adapt to company policies and customs. The efforts made through research promote continuous improvement. It was important to focus on current habits first and then strengthen them by adding new skills.

In this research, 132 digital questionnaires were previously conducted to have a diagnosis that guides the direction and structure of the methodology. Subsequently, interviews were conducted with teachers and employers to validate whether the dimensions are relevant for carrying out activities in companies and to focus students' skills on the effective use of information and communication technologies.

The conclusion of this research requires determining the final version of the structure of digital competencies and the level of mastery, to address aspects that need reinforcement. The structure of the dimensions must integrate attitudes and values

that employers appreciate as valuable to take advantage of the digital resources currently available in a transversal manner.

The categorization of the proposed dimensions of digital competencies in this document was interesting and unforeseen. The information generated at the end of this research will reveal important insights that can be further strengthened through dialogue in forums such as the FIE 2024 and even replicated in other educational institutions to address the new challenges that graduates will face at the end of their training. Another important aspect is to understand that as a result of the COVID-19 pandemic, directions were taken that were already being manifested due to the effects of globalization, but which have now accelerated and universities must assume that through research, they will implement proposals with an academic focus and theoretical foundation.

REFERENCES

- [1] Expansión, "La cantidad de usuarios de internet en México alcanza su pico máximo", 2023. <https://expansion.mx/tecnologia/2023/05/17/los-usuarios-de-internet-en-mexico-alcanzan-su-pico-maximo#:~:text=En%20M%C3%A9xico%20hay%2096.87%20millones,la%20Asociaci%C3%B3n%20de%20Internet%20MX>
- [2] SCT, ¿Cuántos usuarios de internet somos en México? Encuesta Nacional sobre Disponibilidad y Uso de Tecnologías de la Información en los Hogares?, 2020. [https://www.gob.mx/sct/articulos/cuantos-usuarios-de-internet-somos-en-mexico#:~:text=En%20M%C3%A9xico%20hay%2080.6%20millones%20de%20usuarios%20de%20Internet%2C%20que,2015%20\(57.4%20por%20ciento\)](https://www.gob.mx/sct/articulos/cuantos-usuarios-de-internet-somos-en-mexico#:~:text=En%20M%C3%A9xico%20hay%2080.6%20millones%20de%20usuarios%20de%20Internet%2C%20que,2015%20(57.4%20por%20ciento))
- [3] INEGI, "Comunicado de prensa (Reporte n.º 395/23)", 2023. https://www.inegi.org.mx/contenidos/saladeprensa/aproposito/2023/EA_P_DMPO23.pdf
- [4] INTEF, "Marco común de competencia digital docente". Instituto Nacional de Tecnologías Educativas y Formación del Profesorado, 2017.
- [5] Serna, Collazos, Ochoca, Chávez, Valencia, Montes and Caicedo, "Competencias y Estándares Tic Desde La Dimensión Pedagógica.", 2016, <http://eduteka.icesi.edu.co/articulos/javeriana-estandares-tic>.
- [6] Digital Academy by Nexian. "Competencias Digitales: Marco Europeo para los ciudadanos", 2019 <https://nexiandigitalacademy.es/competencias-digitales-marco-europeo-para-los-ciudadanos/#:~:text=Esencialmente%2C%20el%20marco%20identifica%2021.es%20utilizar%20muchas%20herramientas%20digitales>
- [7] UNESCO, "Marco de competencias para docentes en materia de TIC de la UNESCO", 2023, <https://www.unesco.org/es/digital-competencies-skills/ict-cft#:~:text=El%20Marco%20de%20Competencias%20de,nivel%20inicial%20hasta%20el%20terciario>
- [8] Oberländer, M., Beinicke, A. and Bipp, T., "Competencias digitales: una revisión de la literatura y sus aplicaciones en el lugar de trabajo", 2020, <https://www.sciencedirect.com/science/article/abs/pii/S0360131519303057>
- [9] ANUIES (2021). "Competencias Digitales México, MetaRed México. Estudio", 2021, <https://estudio-tic.anui.es.mx/CompDigDocMetaredMexico2021.pdf>
- [10] Bodrova, E. & Leong D. J., "Herramientas de la mente". SEP; Pearson, 2004.
- [11] Torres, "Axiología", 2020, <https://significado.com/axiologia/>
- [12] Ruiz-Larraguivel, E., "La educación superior tecnológica en México. Historia, situación actual y perspectivas", 2011, <http://www.scielo.org.mx/pdf/ries/v2n3/v2n3a2.pdf>
- [13] Argudín, Y., "Educación Basada en Competencias. Nociones y Antecedentes", 22. Trillas, 2006.

- [14] Martínez-Rodríguez and Benitez, “La resiliencia en la ciudadanía del siglo XXI: Una perspectiva integradora”, Newton, 2020
- [15] NACIONES UNIDAS, “Cumbre de las Naciones Unidas sobre la Transformación de la Educación, Vía de acción 2 sobre aprendizaje y competencias para la vida, el trabajo y el desarrollo sostenible”, 2022, <https://www.un.org/es/transforming-education-summit/action-tracks>
- [16] Robles, M. P., Mendoza, N. V., and Del Razo, L. E., “Digital Competences of Industrial Systems and Technologies Engineering Graduates in a Central Mexico Institution”, In 2023 IEEE Frontiers in Education Conference (FIE) (pp. 1-5). IEEE, October 2023.
- [17] Creswell “Qualitative inquiry and research design investigación cualitativa y diseño investigativo”, 2019, <https://academia.utp.edu.co/seminario-investigacion-II/files/2017/08/INVESTIGACION-CUALITATIVACreswell.pdf>
- [18] INEGI, “Cuéntame, información por identidad”, 2022, <https://cuentame.inegi.org.mx/monografias/informacion/hgo/poblacion/educacion.aspx?tema=me&e=13>.
- [19] Borjas, “Validez y confiabilidad en la recolección y análisis de datos bajo un enfoque cualitativo: Validez y confiabilidad en la recolección y análisis de datos bajo un enfoque cualitativo”, 2020, <https://www.scielo.org.mx/pdf/tcg/v5n15/2448-6388-tracender-15-79.pdf>.
- [20] Mora, “Cómo validar una entrevista de preguntas abiertas: una propuesta para investigación filosófica empírica”, 2023, <https://sabereseducativos.uchile.cl/index.php/RSED/article/view/71389/73709>
- [21] Lincoln, Y. and Guba, E., “Investigación naturalista”, 1985, [https://doi.org/10.1016/0147-1767\(85\)90062-8](https://doi.org/10.1016/0147-1767(85)90062-8)
- [22] ANUIES, “Competencias Digitales México, MetaREd México. Estudio 2021.”, 2021. <https://estudio-tic.anuies.mx/CompDigDocMetaredMexico2021.pdf>

IX. APPENDIX

TABLE V. DIGITAL QUESTIONNAIRE BASED ON THE DIGITAL COMPETENCE FRAMEWORKS.

Questionnaire structure		Answer			
Dimension		Always	Almost always	Raely	Nerver
1.- Information and data					
1.1.- When you are interested in a topic, both personal and work Do you search and monitor information in digital media?		59.88	40.2	0	0
1.2.- Within your personal and work activities, do you make or manage data in digital media?		34.8	53.8	7.6	3.8
2.- Communication and collaboration					
2.1.- For your work and study activities, do you interact with other people on digital media?		39.4	47	12.9	0.8
2.2._ In your professional and academic development, do you share and publish information in digital media?		37.1	31.8	23.5	7.6
2.3.- To develop works, do you collaborate with other people using digital media?		37.1	47.7	14.2	0.8
3.- Content creation					
3.1.- In content creation, do you develop your own documents using a word processor, spreadsheet and digital presentations?		38.6	45.5	14.4	1.5
3.2.- In the content creation, do you develop multimedia documents with texts, audio, video and images?		33.3	42.4	22.7	1.5
3.3.- When needed, do you do programming activities or utility adaptation?		19.7	45.5	33.3	1.5
4.- Protection and security					
4.1.- Do you generate digital environments whit security criteria such as communication groups or social media?		22.7	47.7	23.5	6.1
4.2.- Do you protect personal data and privacy, both own and third party, when you require to interact with other people?		48.5	41.7	9.1	0.8
4.3.- In digital environments, do you safeguard data and documents of the organization where you work or study with security criteria?		31.1	50.8	15.2	3
5.- Digital environment					
5.1.- When you use digital environments, do you solve basic technical connectivity or application usage issues?		32.6	50	15.2	2.3
5.2.- When needed, do you build digital environments for study and work?		26.5	45.5	22	6.1
6.- Location					
6.1.- When needed, do you use digital media to identify a location?		40.9	41.7	16.7	0.8
6.2.- When needed, do you use digital media to search for a site, street, or locality?		47	41.7	9.1	2.3
7.- Entrepreneurship					
7.1.- When you have the interest in entrepreneurship, do you use digital tools to research and analyze information?		48.5	44.7	6.1	0.8
7.2.- In your new developments, do you use digital tools to potentiate new entrepreneurships?		36.4	43.9	15.9	3.8

The results in the table have been marked in colors to identify the highest percentages of each type of response and to allow visualization of the domains and interests of the respondents.

The information in the table shows the responses to the 132 digital questionnaires in percentages. The Likert scale was used to have elements that allow for an in-depth analysis of the information. The reliability of the questionnaire was verified using Cronbach's Alpha coefficient, the score obtained was 0.874, which indicates high reliability, Díaz de la Rada (1999).

- The data obtained from the questionnaire reflect that teachers and students identify with the 7 dimensions. In the interview phase, it will be deepened if they use a method or criteria for use. The findings, in general, at the moment are the following:
- Teachers and students do have use in the 7 dimensions to carry out teaching and educational activities and mastery of technology.
- They identify the difference of each one of the Dimensions, which shows that the use they have of information technologies is diverse and is not limited to the role of user, they have an influence as a generator of products.

- With the information provided, it cannot be affirmed that they are carried out effectively to take full advantage of the potential of information technologies, but they are aware.

This analysis was carried out in a previous report, presented at FIE 2023.- *Digital Competences of Industrial Systems and Technologies Engineering Graduates in a Central Mexico Institution. Et al (Robles, Mendoza &Del Razo, 2023).*