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The Competences from the Perception and Practice of University Students

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Abstract: There is a growing importance of competences as an essential curricular element in higher education since they allow for the transfer of knowledge to diverse academic and professional contexts. For the foundation, taxonomy and classification of this study, we obtained ratings from 543 students at two prestigious Spanish universities. The different competences were grouped by management and planning, higher cognitive skills, quality management and innovation, expression and communication and knowledge acquisition. We evaluated the attitudes of university students regarding competences in a pedagogical design; it was expected that students valued the importance of competencies in pedagogical contexts and the skill in these competences. Students highlighted the importance of management and planning, higher cognitive skills, quality management and innovation, expression and communication, knowledge society and teamwork. A correlation analysis between the importance of and skill in the studied competences was also included. Obtained data detail the importance that students give to competences. The participants also detailed the deficiencies in their skill on most competences. The lack of correlation between importance and skill is detailed, as well as the importance of management and planning competences in curricular design in higher education.

Keywords: competence; higher education; curriculum research

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1. Introduction

In recent decades, a broad educational research program has been developed around the subject of competences. After a deep initial discussion on its conceptualization, the subsequent efforts have focused on the establishment of a map of basic competences in education and the analysis of their incorporation into the curricula of the different educational levels, as well as defining and establishing the most suitable mechanisms for their development, consolidation and evaluation (Araque and Gallego 2019; Blackmore and Kandiko 2012; Domínguez et al. 2018; Villa Sánchez 2020).

The Spanish university context has not been alien to this fact. The reform brought about by the development of the European Higher Education Area (EHEA) has led to the configuration of different curricula around the competences. With this, the students' learning has focused on the competences and not so much on the contents (Ion and Cano 2012), avoiding the disconnection between what is taught in the classroom and the real needs of the professional world. This means, according to Mulder et al. (2009), an alignment of university curricula with the needs of society and the labor market. The implementation of the EHEA has therefore made it possible to bring the university closer to the workplace and adapt the degrees to the European framework, favoring its internationalization (Halász 2013).

This process of European convergence in the training of future professionals, which some authors have defined as curricular Europeanization (Nordin and Sundberg 2016) that aims to establish a common line in the formulation of policies in higher education (Vukasovic et al. 2019), has involved the search for and establishment of a series of common competences that compare the different academic and professional profiles and transfer knowledge to different contexts (Tejada and Ruiz 2016), allowing graduates to develop various work activities, adapting optimally to the possible changing situations of their jobs. In this sense, Koenen et al. (2015) consider that competency-based education is directly connected to the change to a knowledge-based society, in which there are rapid and constant changes to which it is necessary to adapt in a flexible and effective way.

2. Literature Review

Few words are used as frequently in the educational context as that of competences (López-Gómez 2016), so it is not surprising that there is a vast literature on its meaning (Delamare and Winterton 2005; Le Boterf 2010; Perrenoud 2004; Rychen and Salganik 2003; Zabalza 2007). This fact has two implications: on the one hand, it confirms the multidimensionality of the concept (Bentancur and Mancebo 2018); on the other hand, it indicates that its definition is necessarily linked to the history and the specific cultural context in which it was formulated (Halász and Michel 2011; Stoof et al. 2002), given that it "is used in different ways in different countries" (Baartman and Ruijs 2011, p. 386).

In any case, in global terms we agree with Mulder et al. (2009) in defining a competence as "a series of integrated capabilities consisting of clusters of knowledge, skills and attitudes necessarily conditional for task performance and problem solving and for being able to function effectively in a certain profession, organization, job, role and situation" (p. 757). On the other hand, taking as reference the Tuning Tuning Proyect (2003), aimed at favoring the convergence of higher education in the European context, competences would come to integrate knowledge, skills, attitudes and values so as to make it possible for students to develop necessary mechanisms to deal adequately with the various situations and problems that may arise throughout their personal and professional lives.

These conceptualizations allow us to affirm that the true value of competences resides, as indicated by López-Gómez (2016, p. 391), "in their possibilities of advancement, integration and continuous search for a comprehensive and integrated knowledge that allows learning and continued learning in a global and globalized scenario". In this sense, the relevance of competences is highlighted as a key aspect for lifelong learning (Pepper 2011). Thus, the Definition and Selection of Competencies Project (DeSeCo) promoted by the Organisation for Economic Co-operation and Development (OECD) at the end of the nineties (Rychen and Salganik 2003) established three groups of key universal competences: (1) Using the tools interactively, (2) interacting in heterogeneous groups and (3) acting autonomously.

Along a similar line, the declaration made by the Council of the European Union (European Commission 2018) on the key competences for lifelong learning, which has its origin in a recommendation approved by the European Parliament and the Council in December 2006, highlights: (1) literacy competence, (2) multilingual competence, (3) mathematical competence and competence in science, technology and engineering, (4) digital competence, (5) personal, social and learning to learn competence, (6) citizenship competence, (7) entrepreneurship competence and (8) cultural awareness and expression competence. In this sense, Chur (2011) indicates that the key competences are an important part of the current curricula of higher education as a prominent element for the formative success of the students since these competences "concern self-regulation and include knowledge, self-reflection and action" (p. 54).

There are multiple categorizations and classifications of competences (Moreno-Olivos 2009; Muñoz-Osuna et al. 2016; Rodríguez 2007). Although, in addition to the key competences already indicated within higher education, taking as reference the Tuning Tuning Proyect (2003), one can speak of generic (or transversal) and specific competences. The generic compe-

tences would come to be those common to most of the degrees. On the other hand, the specific competences are the techniques and knowledge typical of a specific professional field, considered as "the instrument that enables higher education institutions to connect society and the business world" (Salcines et al. 2018, p. 33).

Within the generic competences common to many professions, it is possible to refer to various proposals. The aforementioned Tuning Tuning Proyect (2003) divides these competences, which all university graduates of the EHEA must acquire, into instrumental, interpersonal and systemic. Instrumental competences, referring to cognitive skills and environmental management, include the ability to analyze and synthesize, to organize and plan and to solve problems and make decisions, as well as competences in the basic use of the computer, oral and written communication in their own language and knowledge of a second. In interpersonal competences, understood as the individual capacities of social interaction, it is appropriate to point out critical and self-critical capacity, teamwork, interpersonal skills and appreciation of diversity or ethical commitments. Finally, within the systemic competences, which allow the understanding of the system as a whole, it is important to mention research skills, an ability to learn, creativity, leadership, entrepreneurial spirit and achievement motivation.

Starting from the Tuning Proyect, García-Ruiz (2006) proposed a series of competences that are essential to develop in university students, namely: responsibility, self-confidence, ability to solve problems, communication skills, critical reasoning, flexibility, teamwork, initiative, planning and innovation/creativity. The research carried out by Ramos et al. (2017) on the degree of mastery of basic skills perceived by the new generations of university students considered the following: application of knowledge, problem solving, information analysis, argumentation, communication, autonomous learning, teamwork, creativity, ethical sense and evaluation. Jackson and Wilton (2016) also emphasized the need to train university students in career management competences as a crucial aspect of their subsequent employability and long-term professional success.

A competence-based curriculum also requires a competence-based evaluation (Mulder et al. 2009). Undoubtedly, the issue of competence assessment is another aspect that has generated and continues to generate multiple publications (García-Sanz 2014; Lizitza and Sheepshanks 2020; Rust 2007; Taras 2010; Zlatkin-Troitschanskaia et al. 2018).

A competence that, as stated by Tejada and Ruiz (2016, p. 31) "is only possible to evaluate in the action", is not easily measurable by an event produced punctually. In effect, assessing competences in higher education is a complex and multidimensional task (Zlatkin-Troitschanskaia et al. 2015), so it is necessary to consider different methods, techniques and procedures, being aware that in higher education the evaluation of students must also be eminently formative and oriented toward the development of competences (Ashford-Rowe et al. 2014; Brown and Glasner 2000).

There are several techniques and procedures related to the evaluation of competences in higher education. A particularly important technique is self-observation by the student. In light of the current university context that emerged with the development of the EHEA, the student has become the fundamental axis of the teaching–learning process and, therefore, the main actor for taking self-awareness and valuing the skill that it has over the different competences that are the object of development (Medina et al. 2013).

In recent years, there have been various studies, both national and international, that have focused on the perceptions that higher education students have about competences and their skill (Baartman and Ruijs 2011; Pérez et al. 2019; Serrano et al. 2016). At the same time, various research programs have been launched to develop reliable evaluation tools that assess the degree of mastery that higher education students acquire in the established competences. Note, for its relevance, a German program, Modeling and Measuring Competencies in Higher Education (KoKoHs), aimed at assessing the generic and specific competences acquired by students of higher education (Zlatkin-Troitschanskaia et al. 2017).

The aforementioned research by Ramos et al. (2017), in which 1285 students from the University of Valencia (Spain) participated, concluded that the students were less capable in

the competence of autonomous learning and creativity. On the other hand, the two studies, developed by Mah and Ifenthaler (2018) that reviewed 872 German first year students affirmed that of the five proposed academic competences (time management, learning skills, technology proficiency, self-monitoring, and research skills (p. 120)), students had a lower self-reported confidence in the competence of research skills. In the research carried out by Muñoz-Cantero et al. (2014) in Spain, in which 55 students in the last year of a degree in primary education participated, it was verified that the valuations that referred to the relevance and importance attributed to the competences were always superior to the degree of mastery of the same.

In short, knowing the global perception that higher education students have about the competences, their importance and degree of skill, will allow future decisions to reorient curricula and make methodological changes that contribute to consolidating the adequate competence development of new generations. This research was done with the purpose of making a greater approximation between the level of mastery acquired by students during their university training period and the level required by the labor market (Rodríguez et al. 2019), as well as equipping them with the necessary mechanisms for optimal adaptation to the continuous social and labor changes of the current globalized world.

3. Materials and Methods Results

The main objective of the study was to analyze the competences in higher education, highlighting the importance given by university students to certain competences as well as the skill that students have in the mentioned competences in pedagogical contexts. The specific objectives were:

- Evaluate the attitudes of university students regarding competences in a pedagogical design.
- Analyze student ratings regarding their competence skill.
- Verify the importance of certain competences to university students.
- Evaluate the relationship between importance and skill that students emphasize in their training process.

The research process focused on an intervention using mixed and complementary methods based on quantitative and qualitative data and instruments (Table 1).

Table 1. Dimensions, techniques and instruments.

Dimensions	Indicators	Instruments
1. Importance and skill of competences	Management and planning Higher cognitive Quality management and innovation Expression and communication Knowledge society Teamwork	Questionnaire Descriptive analysis
2. Correlation between importance and skill of competences		Questionnaire correlational research
3. Qualitative assessment of competences		Data triangulation Stimulation scale Open questions

Dimension 1: Importance and skill of the competences. Descriptive information was analyzed, so this dimension is based on descriptive hypotheses, which were general statements to try to predict values or data in the variables to be observed in a context.

Hypothesis 1 (H1). *University students consider planning skills, higher cognitive skills, quality management and innovation, expression and communication, knowledge society and teamwork important.*

Hypothesis 2 (H2). *University students prioritize planning skills, higher cognitive skills, quality management and innovation, expression and communication, knowledge society and teamwork.*

Dimension 2: Correlation between the importance of and skill in competences focused on the correlation between the importance and mastery of competences. By identifying relationships between various factors, a situation and subsequent action, guidelines are better understood. The correlations report the mutual relationships between variables, their degree and sign, but do not identify the cause-and-effect relationships. In this dimension we studied the relationship between students' perception of the importance of competence.

When the correlational hypotheses of two or more variables are associated, they can reach a predictive and partially explanatory level. The order of the variables is not relevant since there is no causal relationship and no variable precedes another variable. In this study with bivariate correlations, the hypothesis in this dimension was:

Hypothesis 3 (H3). *The greater the importance of the competence, the greater the student's skill in that competence is.*

Dimension 3: Qualitative assessment of competencies evaluated the information on the dimension with an open survey and an estimation scale. In this dimension, the evaluation was based on a naturalistic assessment model approach that was carried out with the collaboration of participating students and teachers (Guba and Lincoln 1981). Data triangulation ensured that there was evidence to support the validity of the results and minimize the variance of the error (Goetz and LeCompte 1988). The data triangulation approach of Cohen et al. (2000) was implemented using quantitative information collected in tests and scales.

The triangulation of the data was developed from the results of the tests of the different dimensions that were administered to higher education students.

The non-probability and intentional sample of the study consisted of 543 students in higher education from two prestigious Spanish universities: The National University of Distance Education (UNED) and the University of Murcia. The sample was representative of the population of Spanish university students and was normal; 56.2% represented students of the UNED and 43.8% were students of the University of Murcia. Regarding gender, 75.5% were women and 24.5% were men, while 61.9% were between 18 and 30 years old and 38.1% were over 30 years old. Fifty-six percent of the sample combined studies with a job. The contingency analysis (chi-squared) is not detailed here because there were no significant differences with respect to gender, age and type of education or university. Dimension 2 compared the correlation between the perception of competences and their skill. Dimension 3 provided qualitative assessments regarding the importance of competencies.

The intervention design was a key feature of the quality and results of the research project. The application was carried out in the aforementioned universities during the academic years 2017–2018 and 2018–2019 in different subjects offered by the faculties of education in the degrees of Social Education, Primary Education and Pedagogy. Management and planning competences, superior cognitive skills, quality management and innovation competences, communication skills and competences in the use of resources of the knowledge society were analyzed. Teamwork and ethical commitment were also evaluated.

4. Results

In the present study, mixed research methods were applied using a variety of tools and techniques in the intervention according to the research design. Different techniques and instruments highlighted similar results in several categories. The study proposed three dimensions to address the objectives of the research.

4.1. Dimension 1: Importance and Skill of Competences

The first dimension detailed descriptive information regarding the perceptions and skill of the competences (Table 2). An assessment of the qualitative validity of the content provided by seven expert judges provided a value of Aiken's V ($V = S/[n\ (c - 1)]$ greater

than 0.8 for all items. The construct validity was examined by exploratory factor analysis using the criterion of extraction of eigenvalues > 1 and the varimax rotation method. The value of 7.23 for Cronbach's reliability was acceptable (Hair et al. 1998).

Table 2. Descriptive values of competencies according to their importance (i) or skill (s).

		Importance (i)		Skill (s)	
Competences	**Items**	**M [1]**	**M [2]**	**M [1]**	**M [2]**
Management and planning	1. Initiative and motivation	3.70	3.66	3.17	2.97
	2. Planning and organization	3.69		3.01	
	3. Appropriate management of time	3.59		2.75	
Higher cognitive skills	4. Analysis and synthesis	3.43	3.55	2.89	2.94
	5. Application of knowledge to practice	3.65		2.90	
	6. Solving problems in new or unfamiliar environments	3.54		2.8	
	7. Creative thinking	3.47		2.86	
	8. Critical thinking	3.63		3.12	
	9. Decision-making	3.62		3.08	
Quality management and innovation	10. Monitoring and evaluation of own work or of others	3.23	3.40	2.75	2.81
	11. Application of improvement measures	3.45		2.83	
	12. Innovation capacity	3.51		2.87	
Expression and communication	13. Communication and written expression	3.64	3.45	3.21	2.71
	14. Communication and oral expression	3.59		3.02	
	15. Expression in other languages (with special emphasis on English)	3.12		2.28	
	16. Communication and mathematical, scientific and technological expression	2.99		2.35	
Knowledge society	17. Competence in the use of Information and Communications Technology (ICT)	3.42	3.33	2.96	2.96
	18. Competence in the search for relevant information	3.54		3.10	
	19. Competence in the management and organization of information	3.55		2.99	
	20. Competence in data collection, management and presentation	3.44		2.80	
Teamwork	21. Ability to coordinate with the work of others	3.53	3.41	3.13	3.02
	22. Ability to negotiate effectively	3.36		2.98	
	23. Ability to mediate and resolve conflicts	3.57		3.16	

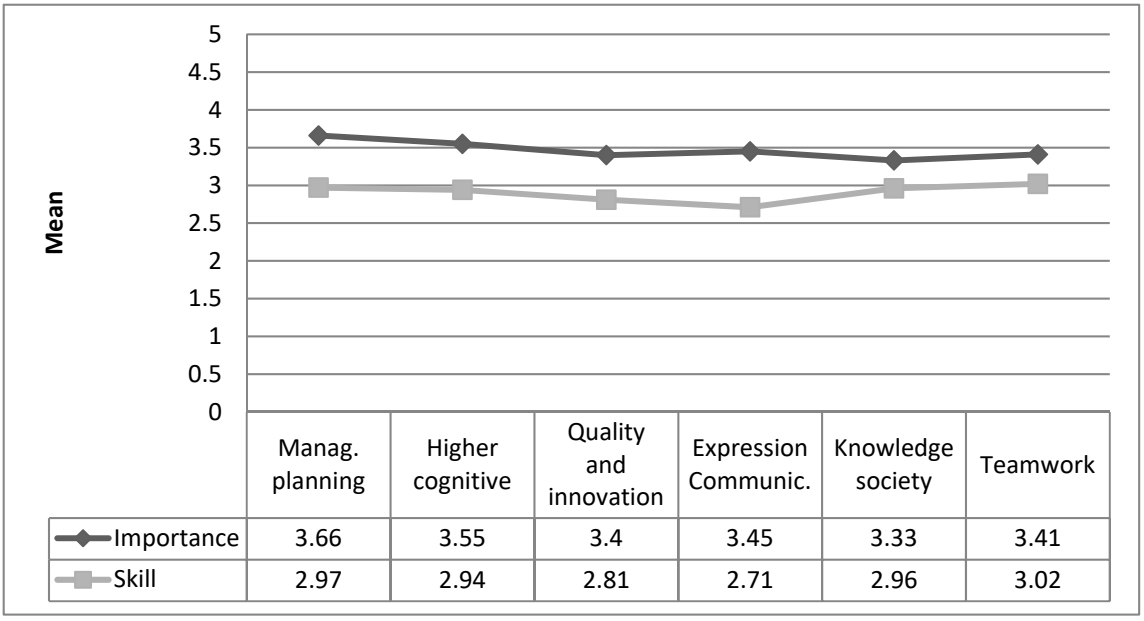
[1] Arithmetic mean of competence; [2] Arithmetic mean of taxonomy.

The results obtained in the questionnaire show values higher than 3.00 related to the importance (i) of the competences detailed in the study. They obtained especially high values with respect to the perceived importance of the following competences: initiative and motivation, planning and organization, application of knowledge to practice, communication and written expression, critical reasoning, decision making, adequate management of time, ability to mediate and resolve conflicts, competence in the management and organization of information, competence in the search for relevant information, resolution of problems in new or unfamiliar environments and the ability to coordinate with the work of others (i1, i2, i3, i5, i6, i8, i9, i13, i18, i19, i21 and i23). The rest of the competences obtained lower values but nevertheless had good ratings above 3.00 in the ratings related to importance (i). In Table 2 we detail the importance given in their training on a scale of 1 to 4, where 1 means "not important", 2 means "important", 3 means "very important" and 4 means "extremely important". We also detail skill, which is the degree of development (mastery) that they reported on a scale of 1 to 4, where 1 means "not at all

developed", 2 means "little developed", 3 means "considerably developed" and 4 means "highly developed".

Regarding skills, the results obtained in the questionnaire show values higher than 2.00 (lower than in importance). They obtained especially high values, above 3.00, with respect to the following competences: communication and written expression, ability to mediate and resolve conflicts, ability to coordinate with the work of others, critical reasoning, competence in the search for relevant information, decision making, ability to coordinate work groups, and communication and oral expression (s8, s9, s13, s14, s18, s21, s23, and s24). The rest of the competences obtained lower values (below 3.00) but nevertheless had good valuations above 2.00 in the valuations related to skills.

If we compare the competences globally according to the taxonomy that we present in Figure 1, there is a remarkable difference, with values considerably higher in importance than in the skill in the following groups of competences: management and planning, higher cognitive, quality management and innovation, expression and communication. In the competences of knowledge society and teamwork, the distance between importance and dominance was lower; however, values that emphasized the importance of skill in these competences were maintained.



	Manag. planning	Higher cognitive	Quality and innovation	Expression Communic.	Knowledge society	Teamwork
Importance	3.66	3.55	3.4	3.45	3.33	3.41
Skill	2.97	2.94	2.81	2.71	2.96	3.02

Figure 1. Values in scales. Questionnaire and structured observation.

Similar results were obtained from the application of the questionnaire and structured observation. The values in all the scales were positive, with particularly high values with respect to fun, utility and computational concepts.

4.2. Dimension 2: Correlation between Importance and Skill of Competences

In the second dimension, the correlations between students' perceptions of the importance of competences and their skill in competences were analyzed. Correlation studies tried to find and establish the relationships between two or more factors or variables that occurred in a situation.

In the nonparametric Spearman's correlation (Table 3), the variables were required to have an ordinal measurement scale and the correlations were calculated based on ranges with qualitative variables of an ordinal measurement scale or quantitative variables without a normal distribution.

Table 3. Spearman's rho correlations, importance and dominance.

		Importance	Skill
Importance	Correlation Coefficient	1.000	0.086
	Significance (two-tailed)		0.872
Skill	Correlation Coefficient	0.086	1.000
	Significance (two-tailed)	0.872	

There was no correlation between the importance of competences and skill of competences, with a very low correlation of 0.086 that was not significant (p = 0.872) at a level of 0.05. In short, there was no correlation between importance and skill (Figure 2).

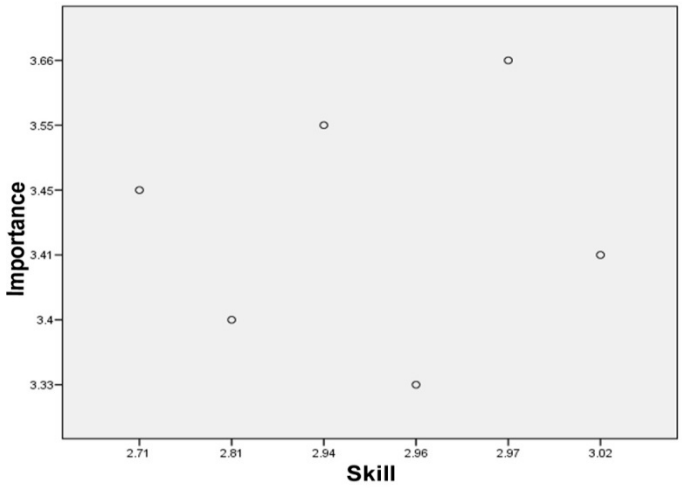


Figure 2. Spearman's rho, importance and skill.

In the study, there was no correlation between the two variables, so the null hypothesis was accepted; the points did not form a diagonal, and they were distributed throughout the graph.

4.3. Dimension 3: Qualitative Assessment of the Most Important Competences

The third dimension highlights the qualitative information and the competences that the participants considered fundamental and essential. For 180 students, the most important competence was initiative and motivation (1), while 47 students noted planning and organization (2) as the most important competence. For 45 students, the most important competence was the application of knowledge to practice (5). The frequencies highlighted in the qualitative analysis highlight units of analysis favorable to these three items with regard to importance.

For 113 students, the competence in which they had the greatest competence skill was initiative and motivation (1), while 57 students stood out with the competences that prioritized planning and organization (2). For 27 students, the competence they most prioritized was creative thinking (7). The frequencies highlighted in the qualitative analysis highlight units of analysis favorable to these three items with respect to the skill.

This type of research was intended to describe individual experience in particular environments (Creswell 2003). The methodological and data triangulation was consistent with a Design-Based Research (DBR) and provided data from different sources, techniques and instruments in order to increase validity. It is recommended to use more than one method

to improve the validation process. The inter-method, multi-method and independent measures reached the same conclusions, providing validity and reliability.

In this dimension, the evaluation was based on a naturalistic assessment model approach, which was carried out with the collaboration of the participating students (Guba and Lincoln 1981). Therefore, the suggested evaluation was an applied synchronized field survey that combined qualitative and quantitative evaluation methods and structured observations.

5. Conclusions

Based on this research in which we analyzed 543 students from two universities, the attitudes regarding competences in pedagogical design were evaluated and the students' evaluations were analyzed with respect to their competence domain and the relationship between importance and skill. From the analysis of data in the different dimensions, this research concludes:

1. University students consider planning skills, higher cognitive skills, quality management and innovation, expression and communication, knowledge society and teamwork important. The research hypothesis (H1) was accepted from the data obtained in dimension 1 and in dimension 3 (i1, i2, i3, i5, i6, i8, i9, i13, i18, i19, i21 and i23).
2. Regarding the statement (H2) that university students prioritize planning competences, higher cognitive skills, quality management and innovation, expression and communication, knowledge society and teamwork, from the data obtained, the descriptive research hypothesis was rejected, and the null hypothesis was rejected. However, on the other hand, students emphasized that they prioritize communication and written expression competences, ability to mediate and resolve conflicts, ability to coordinate with the work of others, critical reasoning, competence in the search for relevant information, decision-making, ability to coordinate work groups and communication and oral expression (s8, s9, s13, s14, s18, s21, s23, s24).
3. Regarding H3, the greater the importance of the competence, the greater the student's skill in the competence is. The correlational hypothesis of investigation was rejected, and the null hypothesis was accepted. For this reason, it was concluded that there is no correlation between the importance and skill of the competences from the perspective of the students (dimension 2).
4. The students pointed out that the most important and essential competences in the context of higher education are initiative and motivation and planning and organization (dimension 3), which is consistent with the high values obtained in the competences of management and planning in the previous dimensions.

The values obtained in the study indicate the importance of the skills for students; however, there are shortcomings in the domain of certain skills, so it is essential to create a pedagogical plan for students to acquire the necessary professional knowledge, skills and attitudes in higher education.

The study has some limitations due to its descriptive nature. In the future, an experimental or causal study could be proposed. Attitudes or information from university professors could also be included in future research, taking advantage of this synergy and research approach.

Students highlighted the following competence categories as important: management and planning, higher cognitive skills, quality management and innovation, expression and communication, knowledge society and teamwork—with special emphasis on management and planning. It is estimated that students have less knowledge of general competences in relation to their importance, with minor differences in the competences related to knowledge society and teamwork. We hope our conclusions will be taken into account in the implementation of university studies by university agencies and institutions. Our recommendations and data could serve as a reflection in future proposals in higher education.

In summary, the importance of an educational design that includes adequate work by competences is considered fundamental for university students. It is essential to strengthen the actions that bring that attitude and importance to the students' skills and knowledge they need in their teaching activity.

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Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

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