

# Investigative competences: A cross-cutting analysis in higher education teachers

## Competencias investigativas: Un análisis transversal en docentes de educación superior

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### Abstract

The investigative competences of the teachers of the Architecture program of the Francisco de Paula Santander University are established under a comparative scheme between the years 2017-2020. A quantitative methodology was used, under a measurement dimension, under non-experimental, cross-sectional, descriptive and comparative research. The importance of the development of investigative competences in Higher Education was established and the progress of the teachers in the program with respect to investigative competencies was highlighted, highlighting the dimension of Knowledge dissemination.

**key words:** higher education, architecture, investigative competences.

### Resumen

Se establecen las competencias investigativas de los docentes del programa de Arquitectura de la Universidad Francisco de Paula Santander bajo un esquema comparativo entre los años 2017-2020. Se utilizó una metodología cuantitativa, bajo una dimensión de medición, bajo un investigación no experiemntal, transversal, descriptiva y comparativa. Se establecio la importancia del desarrollo de competencias investigativas en la Educación Superior y se evidenciaron los avances de los docentes del programa con respecto a las competencias investigativas resaltando la dimensión de Divulgación del **conocimiento**.

Palabras clave: educación superior, arquitectura, competencias investigativas.

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## 1. Introduction

Higher Education is currently undergoing a process of change derived from factors such as the socio-cultural exchanges characteristic of globalization, as well as the internal crises of the territories, advances in technology, research and communication, and the organizational structures that are part of of the reality and daily life of societies, bringing as a consequence the need for the processes within higher education not to be alien to the social function of the context in which they are developed, promoting the generation, production and effective dissemination, and indeed knowledge (Ollarves Levinson y Salguero, 2009).

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In the Colombian context, over the years, Higher Education has presented significant changes that go hand in hand with the research processes that take place within its academic-research units. Within the policies established by the Ministry of National Education, the importance of linking, developing and producing investigative processes is contemplated, bearing in mind that they are presented as the perfect setting for the production, generation and transmission of new knowledge for future generations, in order to improve the quality of life conditions of the population and obtain a more participatory Colombia in terms of research and innovation.

The foregoing becomes relevant when taking into account that within the National Development Plan 2018-2022 "Pact for Colombia, pact for equity" it is established that in order to promote sustainable development and equity in accordance with the Sustainable Development Goals raised together with more than 130 nations, it is necessary to propose at the national level policies and strategies aimed at improving research at the national level, through the implementation of a dialogue between the different types of knowledge, through which they are generated articulations that give rise to new scenarios where research can help build an effective response capacity aimed at improving people's quality of life (Ministerio de Ciencia, Tecnología e Investigación, 2020).

The generation and promotion of investigative competences within Higher Education starts from the premise that knowledge occupies an important place within the development of humanity and that it contains social, political, cultural and economic implications, giving rise to the birth of societies and economies based on knowledge, understood as those that conceive of increased productivity and competitiveness as a response to creation, production and therefore the application of knowledge (David & Foray, 2002; Robles Peiro, 2006). Thus, the Higher Education Institutions in Colombia must assume the research processes as a means through which responses can be provided and strategies that lead to the generation of valid and relevant content regarding priorities in matter of social, economic, technological and cultural demands of the country.

Thus, the Higher Education Institutions within their academic training processes should strive for the promotion of investigative activities and projects, through cross-disciplinary work teams in which the problems and realities of the national, regional, or regional context are addressed. local, as well as the promotion of competences in the research, planning and management of new technologies in order to promote scientific development and other knowledge from innovation (Colina Colina, 2007). Within this process, the teaching factor assumes an important role, taking into account that its function in the Higher Education Institutions is structured by a set of interconnected activities associated with teaching, research and social projection; therefore, within its profile, it must assume competencies that include articulated teaching and research processes. This taking into account that the teacher from his research role builds knowledge and from his teaching role transmits knowledge to students (Tesouro y Puiggali, 2015).

In this way, a relationship between research and teaching is framed, through which the quality of education can be promoted by linking the processes and results of research in teaching, thus generating positive relationships that reinforce teaching, through constant learning in which teachers continually strengthen their research and teaching competences based on their academic-investigative work (Vidal & Quintanilla, 2000; Coate et al., (2001).

It is important to note that competition is understood as the union between individual characteristics and the qualities necessary for the fulfillment of professional tasks, recognized as the abilities, skills, knowledge, behaviors, values and attitudes through which productivity, quality and innovation are positively promoted; The foregoing determines that teachers must establish pedagogical practices that integrate investigative competences in order to promote training processes focused on the organization of ideas, activities and decision-making that imply reflection and innovation (Levy-Boyer, 2000; Aular de Duran et al., ( 2009).

Thus, it is important to note that the competences are made up of elements of a cognitive, metacognitive, attitudinal and motivational order; through which an efficient logical-scientific process can be carried out within

a given context, bearing in mind also that this process includes integrated attributes of knowledge, skills, qualities and values; by means of which effective learning processes can be completed (Proyecto Tuning América Latina, 2007; Castellanos et al., {2003).

However, it is important to keep in mind that in practice and university pedagogical work there are currently changes derived from the renewal of educational paradigms, changes in curricular designs and changes in evaluation models, directly related to disciplinary and investigative competences of teachers, a fact by which the university teacher must operate in three scenarios: the general context (socio-professional and cultural), the institutional context (faculty, program, department) and the microcontext (classroom, seminar, laboratory) through which You have the possibility of strengthening your academic research work from your teaching role and under a profile made up of competencies, established from the development of skills, knowledge, conceptualization, learning and experience (Mas Torello, 2011).

### **1.1. University teachers with investigative competences**

The changes derived from the conception and the formative process within the Higher Education Institutions have been permeated by the need of the new generation "Generation of knowledge" to be at the forefront and constantly promote education. This has been strengthened through the incursion of processes associated with computing, communication, technology and innovation within education; since through the implementation of investigative pedagogical practices, this generation has recognized and promoted the importance of establishing links between training and participation or timely response to the needs of social life; thus establishing autonomous individuals provided with "basic competences" according to their profile or performance area relevant to the problems and characteristics of their immediate environment (Delgado Gomez, 2012).

Teachers are a fundamental pillar within the professional education and training process, since through their academic-investigative work they have the possibility of generating, obtaining, transmitting and promoting knowledge. For this reason, it is pertinent that it is immersed in dynamics of formative updating and investigative projection, through which it can deepen and innovate with respect to its areas of interest, under a critical-argumentative perspective, with an ethical criterion and a pedagogical, technological and humanistic training that allows the implementation of pedagogical practices for formative research purposes (Nowalski Glazman, 2003). In other words, teachers can strengthen their investigative competences and promote these skills in their students. (Hernandez et al., { 2019).

The foregoing, highlights the importance of recognizing that the teaching function has been modified, since within its formative task at present it must have the capacity to offer pedagogical tools designed for multiple learning, focused on constant questioning and the resolution of problems of reality. In this way, teachers in higher education must transmit the bases of basic research competencies through which students can develop the processes of selection, synthesis and processing of information characteristic of the research role (Delgado Gomez, 2012). This approach to training in higher education contributes to the acquisition of significant learning through which it is possible to opt for the development of research aimed at generating real, effective, timely and pertinent solutions that respond to the city's problems, through innovative practices that feed back the professional, academic and investigative work in a local, regional and national context (Alvarez Villar et al., (2011).

Within the investigative approach, the development of competencies associated with skills such as observation, argumentation and systematization is promoted, through which the cognitive and intellectual spheres are enriched within the training and academic-investigative projection processes. For authors like Pérez Rocha (2012) the teacher-researcher relationship should focus on the generation of pedagogical strategies that allow the strengthening of the teaching-learning process and in turn promote the development of research

competences focused on knowledge; understood as those of a cognitive nature that allow the identification, search, selection and systematization of information that allows the establishment of processes of understanding, analysis, synthesis and evaluation of knowledge based on specific knowledge.

The investigative competences must be consistent with the pillars of education, referenced in the processes associated with knowing, knowing how to do and being; since in this way comprehensive academic-investigative processes are promoted in which disciplinary knowledge is strengthened, as well as reflective and critical thinking (Losada y Moreno, 2011). The investigative competences of *knowledge* correspond to those that are associated with the cognitive, rely on the selection of data and information and therefore build logical relationships within a field of knowledge such as processes derived from science, technology and technique, research methods, recognition and understanding of results, independent and creative thinking, discipline and rigor, interdisciplinary and transdisciplinary knowledge; among others.

The *know-how* competences are those focused on a formative experience and a social praxis; within which stand out capacities, abilities and skills such as: being purposeful, having organization and planning capacity, writing ability, comparison, synthesis and abstraction, management capacity, critical, creative and innovative thinking; and finally, the competencies of being that are included by the attitudes necessary for personal growth, among which stand out solidarity, cooperation, motivation, adaptation, handling of emotions, the capacity for frustration, amazement, curiosity ; through abilities, capacities and skills such as the ability to perceive research as a life project, the capacity for teamwork, criticism and self-criticism, the ability to assertive communication, respect for diversity and multiculturalism, as well as compression of ethics (Perez Rocha , 2012, pp. 15-21).

The investigative competences are related to the development of activities that strengthen the capacities, abilities and skills of the human being necessary for the construction of knowledge; These are the scenarios through which the academy can provide plans, projects, strategies and guidelines that contribute to the quality of life of society. The above also taking into account that investigative competences are configured as essential elements within the basic competences of teaching (teaching, training and evaluating) (Ochoa, 2013), since its development is framed in the methodological, social, epistemological and technical dimensions, through which the investigative action from the Higher Education Institutions can disclose and make visible the set of concepts, ideas, descriptions and research results, build forms, modes and networks among researchers, propose solutions, theories and models for complex contexts through a critical and autonomous position (Maldonado et al., ( 2007).

Within Higher Education Institutions, teachers should strive to implement an interrelation between their teaching and research functions, since in this way scenarios can be promoted where innovation is seen as a strategy that strengthens the most relevant aspects of reality. of the academic, investigative, social, cultural, economic, political, environmental and physical context that is part of the dynamics of the city and therefore of society (Marreno y Perez, 2014; Salazar Botello et al., ( 2016).

Due to the importance of the generation of activities associated with research, as well as the training and acquisition of investigative competences by teachers in Higher Education Institutions, this research aims to establish the investigative competences of the teachers of the Program of Architecture of the Francisco de Paula Santander University, in order to contribute to the self-evaluation process of the program with the purpose of High Quality Accreditation, and in turn with the encouragement that its results may be taken into account within the improvement plan through research and teaching factors.

This research contains comparative tables of the level of investigative competences manifested between the years 2017-2020 by teachers. This research is part of the macroproject called "Scientific productivity: attitudes for the generation and dissemination of knowledge in higher education" led by the Research Group in Pedagogy and Pedagogical Practices GIPPEP of the UFPS, which in alliance with the Group of TAR\_GET research on

architecture through its research line Strategic Planning and Institutional Strengthening, reflect on issues regarding the importance of quality in the Research component of Higher Education. The first part of the results of this research can be seen in the article *Investigative competences in university teachers. The case of the architecture department of the Francisco de Paula Santander University* (Ayala Garcia y Barrera Prieto, 2018).

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## 2. Methodology

This research was developed under a quantitative approach, which allows analyzing and interpreting data in order to answer a research question or hypothesis, under a process of numerical measurement and statistical analysis that allows establishing patterns of behavior within a population group (Hernandez et al., (2003). The methodological framework corresponds to a measurement dimension, it is of a non-experimental type, which allows observing and analyzing phenomena or situations that already exist within their natural context without manipulating their variables and subsequently providing a description (Hernandez Sampieri, 2014), It is a cross-sectional investigation, because the data collection is carried out in a single moment and its purpose is the description and analysis of variables (Hernandez et al., {2003) and it is descriptive-comparative, because it analyzes how a specific phenomenon, event or case is and how it manifests itself within a given population group through variables or concepts that allow specifying the most important characteristics of a group of people or a community, allowing comparisons to be made between different phases of the study (Tamayo y Tamayo, 2004).

The population corresponds to the teachers who work in the Architecture program of the Francisco de Paula University of Santander in the city of Cúcuta, Norte de Santander Colombia. The research was carried out under simple random probability sampling with a 95% confidence margin and 5% error made up of 25 teachers. The information collection technique used corresponded to the survey through which one or more variables can be measured by means of questions that in the case of this research are associated with investigative competences. The developed instrument is designed based on a Likert scale and the socio-educational profile of the teachers. This research establishes the levels of investigative competences through indicators such as: Identification and organization of information, scientific generation of knowledge, dissemination of knowledge.

The data was analyzed through descriptive correlation techniques and analysis of variance, the statistical software SPSS Statistics 25 and Microsoft Excel were used for data processing. This under a univariate analysis that allowed to obtain percentage frequencies and a regrouping of categories in some tables in order to make visible and facilitate the interpretation of data by the reader. The data presented in this study correspond to two applications (year 2017 and year 2020), which allowed establishing the level of investigative competences of the teachers of the Architecture program and making a comparison that allows identifying if the results of the first application presented a better performance for the phase corresponding to the year 2020.

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## 3. Results

### 3.1. Research in the UFPS Architecture Program

The Francisco de Paula Santander University (UFPS) within its Development Plan 2011-2019 considers the research factor as a strategic institutional axis in the process of consolidation due to the High Quality Accreditation processes that have initiated several of its programs undergraduate. For this reason, the dimensions of the research component, as well as the policies for promoting research, are linked to the mission, vision and institutional policies regarding quality. The university has made significant progress in the development and consolidation of its research groups over the last ten years, highlighting the significant achievements in calls 781 of 2017 and 387 of 2018 (Universidad Francisco de Paula Santander, 2018). In the report presented for Factor 6. Research, innovation and artistic and cultural creation, developed for the High Quality Accreditation process of the Architecture program It is mentioned that currently the UFPS Architecture Program has two research

seedbeds and three Research Groups endorsed by the Assistant Vice-Chancellor for Research and Extension, through which it promotes the generation and transmission of new knowledge (Jaimes Ramirez & Ayala Garcia, 2020).

The research seedbeds: Ecohabitat and City Planning Workshop, correspond to the research training cycle within the Architecture program. These are directed by a professor-researcher attached to a Research Group of the Program, who through his leadership develops and promotes activities related to the basic competences of research, the beginning of management of scientific bases, writing texts, formulation of preliminary projects, preparation of oral presentations and scientific poster, aspects that are strengthened by the subjects of the curriculum of the program where aspects associated with the research are contemplated. It is noteworthy that the research seedbeds of the program have evidenced success stories associated with the active participation of the students assigned to them in calls, trainings, meetings, presentations, articles in indexed journals and socializations through knowledge networks.

The Research Groups of the UFPS respond to the characteristics stipulated by MinCiencias (formerly Colciencias), where it is defined as a group of people who articulate themselves to undertake research towards defined topics, through the development of a strategic plan that allows obtaining results. in the short, medium and long term. Your results must be tangible and verifiable (Colciencias, 2018). The UFPS Architecture program has three research groups, institutionally recognized and endorsed and categorized by Minciencias. These are the Research Group in Alternative Architecture and Materials- GRAMA (Category C), the Research Group Territory Architecture and Management Workshop TAR\_GET (Category B) and the DLab Research Group (Category C). It is important to highlight the significant advances regarding the scientific production developed by the groups and evidenced by Colciencias in the Calls 781 of 2017 and 833 of 2018.

It is also important to highlights that the lines of the Research Groups of the UFPS Architecture program are related to those established in the study called *Diagnosis on concerns of the measurement model, science and technology in art, architecture and design innovation* (Ayala Garcia y Villate Matiz, 2018) where it is determined that the Research Groups attached to the programs enrolled in the Colombian Association of Faculties of Architecture ACFA, present topics and lines of research described below in Table 1:

**Table 1**  
Lines and topics Research Groups- Academic Programs ACFA

<b>National lines and topics of research</b>	<b>Territory:</b> Environment, Region, Territorial Management, Regional Development, Territorial Dynamics, Ecology, Landscapes, Water Resources
	<b>Urban Planning:</b> City, Government, Governance, Public Spaces, Population, Community, Citizen Culture, Urban Management, Planning, Territorial Planning, Infrastructure
	<b>Habitat:</b> Housing
	<b>Project:</b> Architecture, Architectural Object, Design, Space
	<b>Theory and History:</b> Memory, Heritage, Criticism
	<b>Sustainability:</b> Bioclimatic, environment, ecology, Environment, Sustainability
	<b>Construction:</b> Materials, Technology, Prototypes, Technique, Products
	<b>Teaching:</b> Education, Learning, Pedagogy, Didactics, Training
	<b>Communication:</b> Representation, virtuality, Image, Audiovisual
	<b>Aesthetics:</b> Art
<b>Creation:</b> Valuation, entrepreneurship and creativity	

Source: self made.

Table 2 highlights that the Research Groups of the UFPS Architecture program in recent years have worked in tune with the parameters established by Minciencias in compliance with the indicators: Generation of new knowledge, Technological Development and Innovation, Social Appropriation of the Knowledge and Training of

Human Resources: for which from the results of the Colciencias Co-call 833 of 2018 it can be established that the groups present the following indicators:

**Table 2**  
Historical productivity Research Groups 2013-2015

Research Group	Creation Year	Researches	Category	Generation New Knowledge	Social Appropriation of Knowledge	Technological Development and Innovation	Human Resource Training
TAR_GET	2015	11	B	16 Published articles 6 Gray work literature article 2 Book chapters	21 Knowledge communication strategies 8 Generation of printed content 3 Generation of virtual content 40 scientific events 4 Research consultancies creation in art, architecture and design 4 Scientific-technological consultancies 4 final investigation reports 2 citizen participation in CTI projects 12 Pedagogical strategies for promoting CTI	32 Technical Reports 2 Technical concepts 3 Regulations, standards or legislation	22 Undergraduate Thesis 10 Research and development projects 2 Extension and social responsibility projects CTI 1 Master Thesis
GRAMA	2013	14	C	2 Patents 9 published articles 6 article gray work literature	1 Edition in scientific journal or book resulting from research 1 working paper 11 Pedagogical strategies for promoting CTI 1 Specialized Knowledge Network 1 Final Research Report 1 Knowledge Communication Strategy 2 Artistic Events 63 Scientific Events 6 Generation of Printed Content	2 Industrial Designs 2 Technical Reports	1 Master thesis 1 Research-creation project 2 projects with training ID+I 3 Extension projects and social responsibility in CTI 2 Support for program creation 1 Support for the creation of academic courses 6 Research and development projects
DLAB	2016	6	C	4 published articles	1 Network of specialized knowledge, 1 Creation Workshop 6 Artistic Events 28 Scientific Events		3 Research-creation projects 1 Research-development project

Source: self made

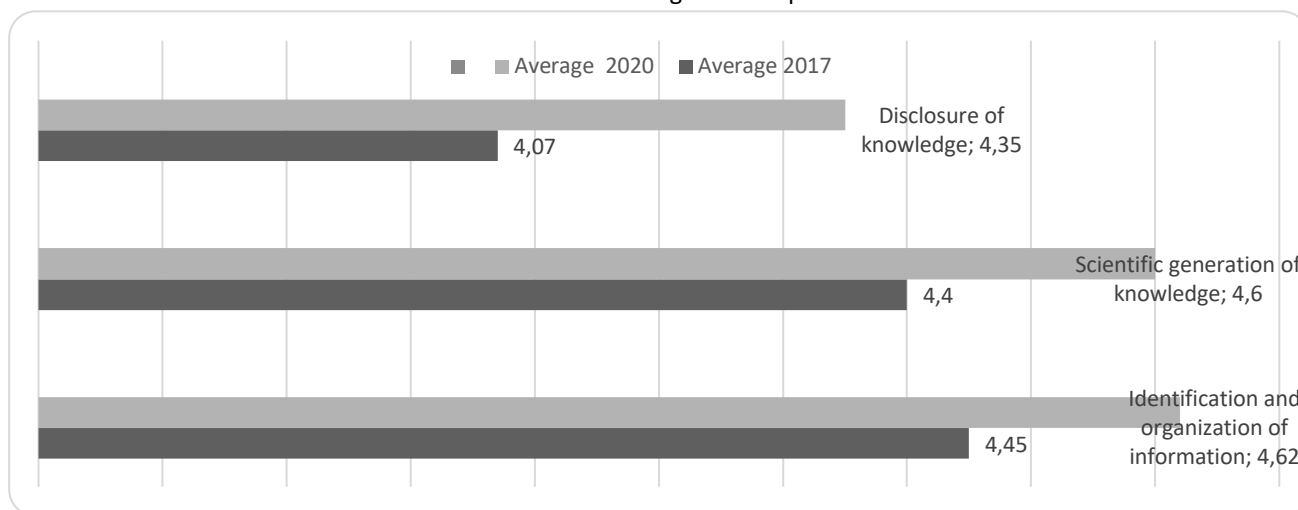
### 3.1. Competency levels assessment

The results obtained from the application of the instrument during the periods 2017 and 2020 to the teachers of the Architecture program of the Francisco de Paula Santander University allow a comparison to be made through which significant changes can be evidenced with respect to the level of competences investigative. The survey instrument used is made up of three categories, the first of them called *Identification and organization of information* is made up of 12 items, which allow establishing the abilities and competences that teachers have regarding the processes and procedures typical of the *The Scientific generation of knowledge* category is made

up of 14 items that make it possible to demonstrate the level of appropriation and performance with respect to the management and construction of information for the generation of new knowledge. In this category, the basic components of the research process are measured of a scientific nature. Finally, the *Knowledge Disclosure* category, made up of 9 items through which the strategies used by teachers can be established in order to carry out a knowledge transfer through processes and tools of visibility, socialization and dissemination of results.

As can be seen in Graph 1 according to the dimensions of competencies established for this research, it is observed that the averages established for the years 2017 and 2020 show that the teachers of the program present a level of competencies adequate to the standards required within the research component for Higher Education Institutions; However, it is pertinent to note that this level of competencies has been strengthened according to the data obtained for the year 2020; These results are consistent with the postgraduate training process for teachers and the process of preparation for High Quality High Accreditation, which has been developing the program for approximately 2 years. It is also worth noting that within the three dimensions of the investigative competence studied for 2020, the scientific generation of knowledge presents the most significant values

**Graph 1**  
Dimensions of investigative competence

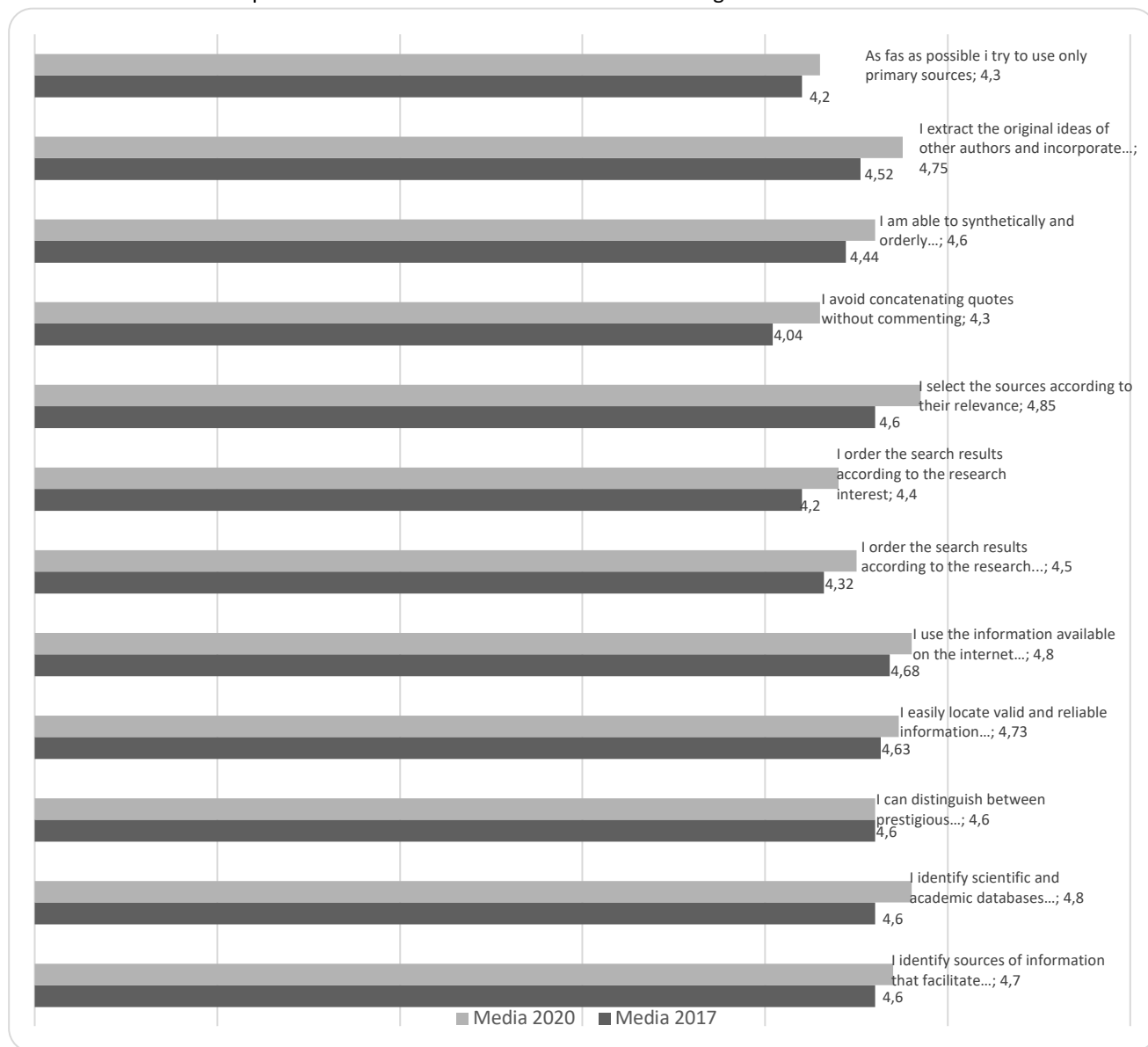


Source: self made

In the dimension of identification and organization of information, as can be seen in Graph 2, the teachers of the architecture program show significant improvements with respect to the level of competences evaluated for the year 2017. Among the items that present the greatest evolution under the relationship For comparison (2017/2020) the following stand out: I select sources according to their relevance and affinity for the study (4.85/4.6), I use the information available on the Internet with a critical and reflective attitude (4.8/4.68), I identify scientific and academic databases to support my research processes (4.8/4.6), I extract the original ideas of other authors and incorporate them appropriately to support my arguments (4.75 4, 52), I easily locate valid and reliable information available on the internet (4.73/4.63) and I identify sources of information that facilitate my research processes (4.7/4.6). The results obtained are consistent with the positions developed by authors such as Perez Rocha (2012), for whom this type of abilities and skills are framed within the competences associated with knowledge, since they are focused on logical and methodical processes regarding search, selection and systematization of information, which allow the generation of scenarios of processes of understanding, analysis, synthesis and evaluation of knowledge within the academic and investigative work.



**Graph 2**  
Comparative results dimension: Identification and Organization of Information

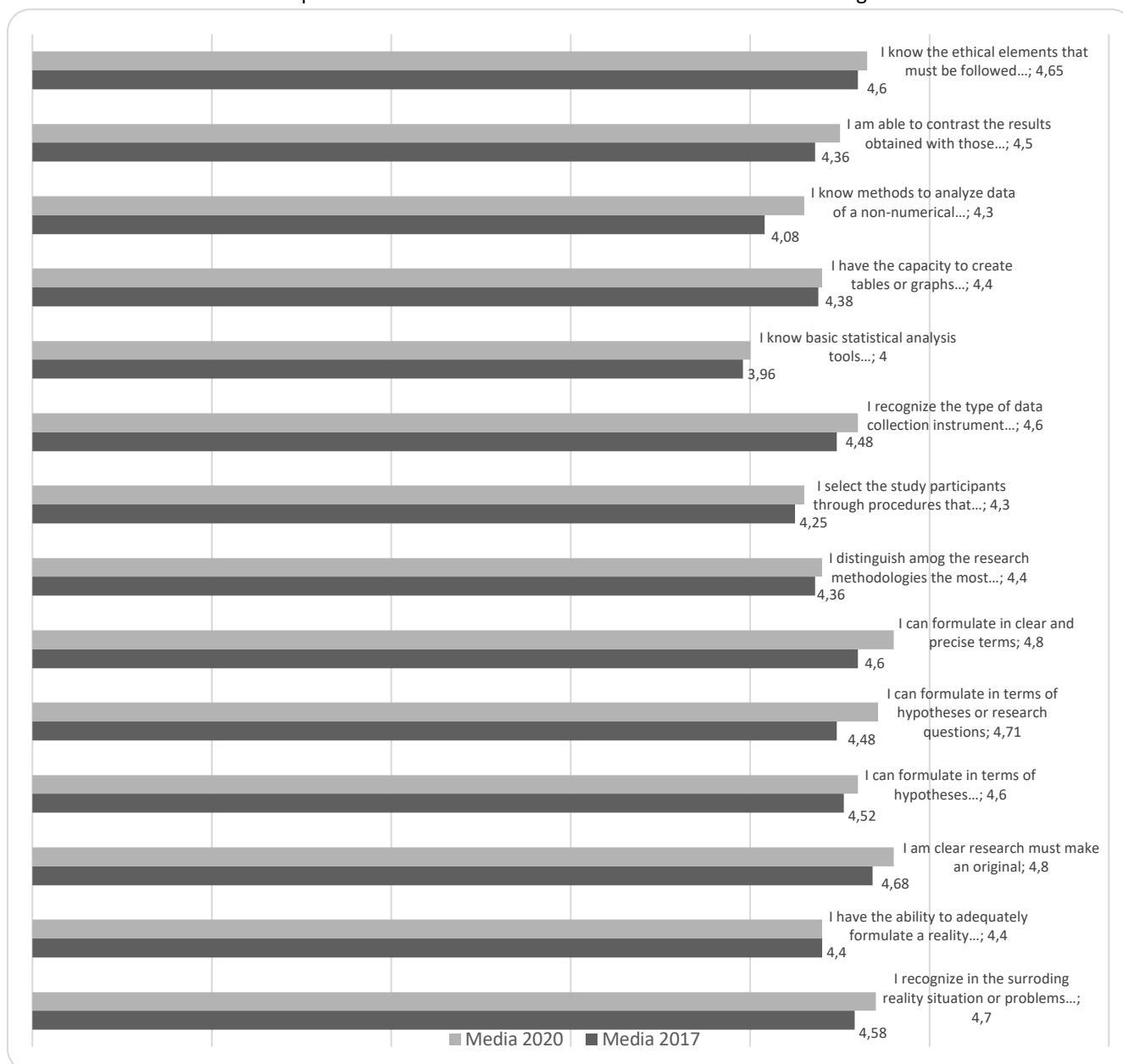


Source: self made.

In the dimension of *Scientific Generation of Knowledge*, the teachers of the architecture program improved their level of investigative competences for the year 2020. As can be seen in Graph 3, among the skills, abilities and abilities that present the best performance index are: I am clear that all research must make an original and relevant contribution to a specific area of knowledge and I can formulate in clear and precise terms the purpose of an investigation; each one with an average of 4.8, followed by I can base ideas from other authors to build an argument with an average of 4.71 and I recognize in the surrounding reality situations or problems that may be the relevant object of an investigation with a average of 4.7. These results are presented as pertinent because the *know-how* operational competences are indispensable within the investigative processes, since they have the knowledge and the adequate handling of the structural elements that allow to approach the investigation in a comprehensive way (Balbo et al., (2015).

It is important to highlight that with respect to the level of competences referring to this dimension corresponding to the years 2017/2020, the teachers of the architecture program must strengthen relevant aspects within this dimension because they did not present significant improvements in some items within the which are: I know basic statistical analysis tools for the treatment of the results obtained in investigations (3.96/4), I select the study participants through procedures consistent with the methodologies used (4.25/4.3) , I have the ability to adequately formulate a reality situation (4.4/4.4) as a research problem and I can formulate a scientific problem in terms of hypotheses or research questions (4.52/4.6). The above taking into account that within the research process the identification of the problem, the formulation of research questions or hypotheses and the understanding of the methodological framework in order to establish the techniques and tools necessary for the development of the projects, correspond to relevant aspects within the fundamental research process for the generation of new knowledge and innovation (Hernandez et al., (2003)

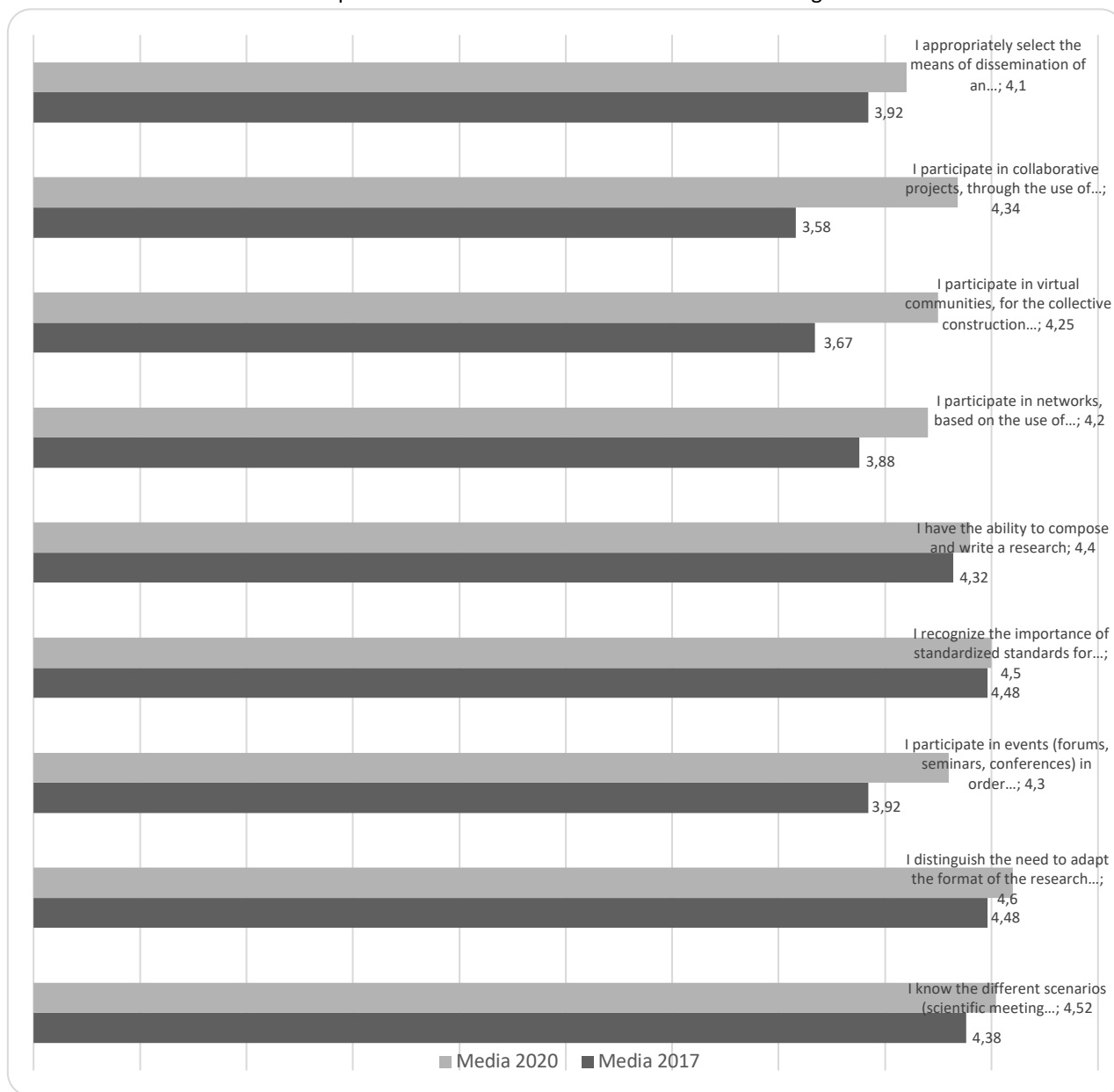
**Graph 3**  
Comparative results dimension: Scientific Generation of Knowledge



Source: self made

In the *knowledge dissemination* dimension, the teachers of the architecture program show significant advances in relation to the 2017/2020 average with respect to the capacities, abilities and skills associated with activities that can be seen in Graph 4; such as: I participate in collaborative projects, through the use of Information and Communication Technologies, for the collective construction of knowledge (3.58/4.34), I participate in events (forums, seminars, congresses) in order to publicize the results of my research (3.92/4.3), I participate in virtual communities, for the collective construction of knowledge with the support of Information and Communication Technologies (3.67/4.25), I participate in networks, based in the use of technologies, for the collective construction of knowledge (3.88/4.2). It is noteworthy that improvement in this dimension is considered a significant success that contributes to the strengthening of the competences and the research component of the program.

**Graph 4**  
Comparative results dimension: Disclosure of knowledge



Source: self made

This is because within the academic-investigative processes typical of Higher Education Institutions, the transmission of knowledge is considered as a transversal activity that allows the recognition, socialization, and dissemination of investigative processes that take place within the research groups and seedbeds of the program, this being also a determining factor for the positioning of the program at the local, regional, national and international level. For this reason, indicators such as: I distinguish the need to adapt the format of the research results to the space in which they are presented (blogs, scientific articles, papers and social networks) (4.48/4.6), I know the different scenarios (scientific meetings and publications) for the dissemination of research (4.38/4.52), and, I recognize the importance of standardized standards for scientific publications (4.48/4.5) represent the interest of teachers of the program on the various scenarios and tools that can contribute to improving the dimension of the investigative competence associated with the dissemination of knowledge, a fact that is coherently articulated to the investigative competences envisaged within the teaching practice, for which the communicative competence addresses as a fundamental purpose of the investigative task the exchange of experiences through different media and related (Ollarves & Salguero, 2009).

As can be seen in Table 3 for the year 2020, the socio-academic profile of the professors of the Architecture program of the Francisco de Paula Santander University who participated in this research, is represented mainly by the male gender (57%) , with an average age of 37.6 years. The predominant type of recruitment is the professorship (74%), which presented a decrease with respect to the data corresponding to the year 2017, the above due to the increase in the hiring of occasional teachers as established in the Document for obtaining the Registration Qualified before the Colombian National Ministry of Education year 2018 (Universidad Francisco de Paula Santander, 2018). In response to the comparative approach of this study, it is consequent to observe an increase in the years of experience in teaching and research and, finally, it can be observed at the postgraduate level of training specifically for the master's level.

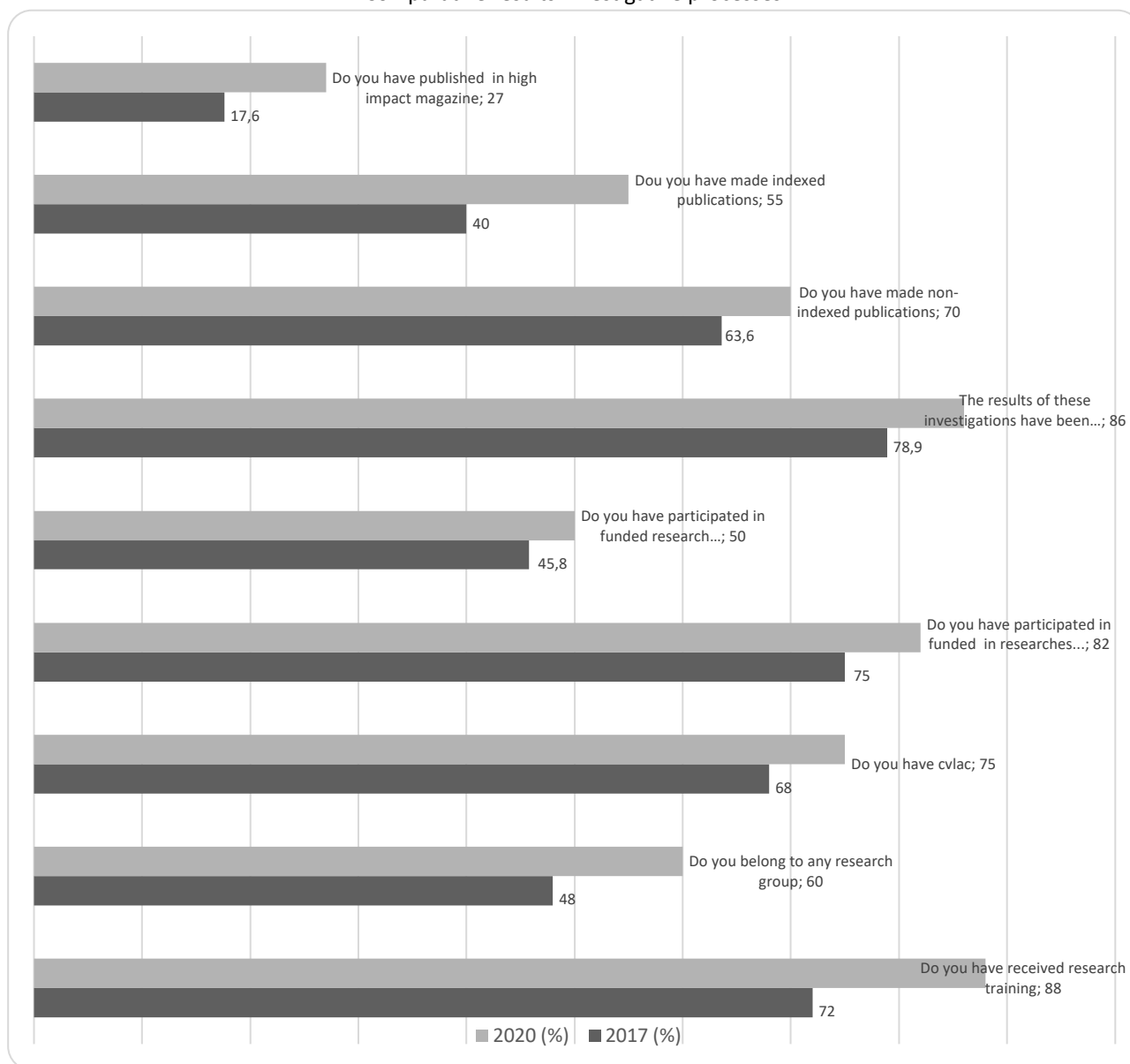
**Table 3**  
Comparative results Socio-academic profile

Variable	Scale	2017 (%)	2020 (%)
<b>Gender</b>	Female	44	43
	Male	56	57
<b>Age</b>	Average	38,2	37,6
<b>Contract Type</b>	Definite term	76	74
	Occasional	8	10
	indefinite term	16	16
<b>Teaching ladder</b>	Assistant	42,9	42,9
	Associated	23,8	23,8
	Assistant	23,8	23,8
	Headline	9,5	9,5
<b>Teaching experience</b>	Average	6,6	7
<b>Research experience</b>	Average	5,1	5,6
<b>Training</b>	Specialization	37,5	36
	Master's degree	56,5	58
	PhD	6	6

Source: self made

The results obtained within this research have allowed us to establish the significant improvements that architecture teachers have developed with respect to investigative competencies. As can be seen in Graph 5, the data reveals a positive growth that allows the architecture improve its standards in research and profile itself as a competitive program and relevant to the different contexts with which it interacts. The above is consistent with the stipulations regarding research within the National Development Plan 2018-2020, which establishes that through research Higher Education Institutions can help contribute to the improvement of the quality of life of societies (Ministerio de Ciencia, Tecnología e Investigación, 2020). This through the promotion of investigative competences that include planning processes and technology management that allow promoting scientific development and innovation in the country (Colina Colina, 2007). Among the most representative advances in the Architecture program with respect to the years 2017/2020 are: Has received training in research (72/88), The results of these investigations have been published (78.9 / 86), Has participated in research projects (75/82); among others, where a commitment to improving this component can be evidenced.

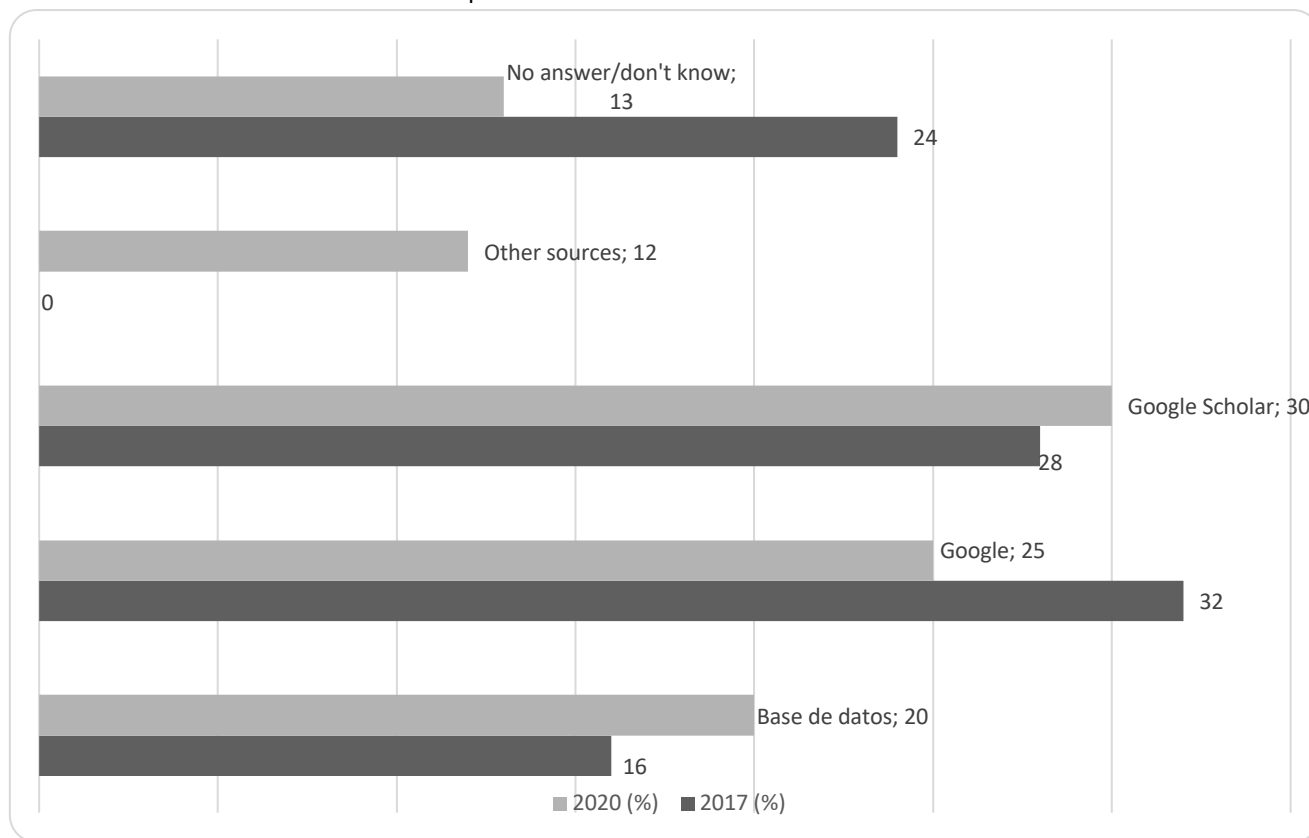
**Graph 5**  
Comparative results Investigative processes



Source: self made

Finally, regarding the tools used to search for information through Graph 6, it can be established that the teachers of the architecture program also improved their performance in the relationship (2017/2020). The above because there was a significant drop in the item corresponding to No answer/don't know (24/13). Thus, the teachers claimed to use more tools such as: Databases (16/20), Google Academic (28/30) and databases (17/20).

**Graph 6**  
Comparative results Information search tools



Fuente: Elaboración propia

#### 4. Conclusions

The development of this research has allowed us to establish, firstly, the importance of investigative competences within Higher Education Institutions, since through them the basic competences of knowledge Saber, Know-how and Being, which are found, are strengthened. intrinsic within the curricula that accompany the undergraduate programs in the national order and also acts in tune with the policies issued by the national government regarding the promotion and improvement of research and innovation, as well as compliance with the Sustainable Development Goals.

Within this research, the advances in investigative competences that have been achieved by the teachers of the Architecture program, through a comparative exercise between the years 2017-2020, are evident. The above shows that both the program and the teachers are working hard on continuous improvement from their professional, academic and investigative tasks. This is reflected in the results obtained for the year 2020, where the Diffusion of knowledge dimension obtained the greatest positive growth.

The positive growth of the Research Groups are a reflection of the activities and strategies that have been taken with respect to improving research, these have a direct impact on pedagogical practice and the improvement of

the architecture curriculum. The generation and dissemination of knowledge obtained from research projects or processes are relevant to the missionary axes of the University Teaching, Research + Social Projection (Extension) through which it can contribute to the improvement of the quality of life of society .

Changes are also evident regarding the socio-academic profile of the teachers in the program; the increase in occasional teachers can positively influence the development of research projects, and also; It shows that teachers with a defined term contract are interested in their development and in the improvement of their investigative competences. Another factor that positively affects investigative competences is related to the improvement of the educational level of teachers, it is noteworthy that the postgraduate level of the program has shown consensus and is represented mainly by the Master's degree.

The Architecture program of the Francisco de Paula Santander University is a competitive and efficient research program, this is evidenced from the results of the call for Group Measurement and researchers 833 of 2018 from Colciencias, The three research groups of the program were categorized as follows: TAR\_GET (categories B), GRAMA and DLaB (category C), in addition a considerable number of research products were endorsed.

As a recommendation, it is proposed to establish a strategic route of investigative approach that allows determining processes, projects and strategies that can contribute to strengthening research within the program. In addition, it is recommended to work on preventive and corrective actions for the indicators of the Identification and organization of information dimension, taking into account that it has not presented very significant changes with respect to what was evaluated for the year 2017. In this way, it will be possible to strengthen relevant aspects regarding fundamental know-how within research processes with the aim of generating new knowledge and innovation.

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## Annexes

<b>Identification and Organization of Information</b>
I identify sources of information that facilitate my research processes
I identify scientific and academic databases to support my research processes
I can distinguish between prestigious scientific publications (refereed and indexed) and non-scientific publications
I easily locate valid and reliable information available on the internet
I use the information available on the Internet with a critical and reflective attitude
I use specialized platforms (repositories, databases, scientific software) to support my research
I order the search results according to the research interest
I select the sources according to their relevance and affinity for the study
I avoid concatenating quotes without commenting or relating them to each other
I am able to synthetically and orderly expose previously published knowledge related to research
I extract the original ideas of other authors and incorporate them appropriately to support my arguments
As far as possible I try to use only primary sources

<b>Scientific Generation of Knowledge</b>
I recognize in the surrounding reality situations or problems that may be the relevant object of an investigation
I have the ability to adequately formulate a reality situation as a research problem
I am clear that all research must make an original and relevant contribution to a specific area of knowledge
I can formulate in terms of hypotheses or research questions a scientific problem
I can base ideas from other authors to build an argument
I can formulate in clear and precise terms the purpose of an investigation
I distinguish among the research methodologies the most appropriate for a given problem
I select the study participants through procedures that are consistent with the methodologies used
I select the study participants through procedures that are consistent with the methodologies used
I know basic statistical analysis tools for the treatment of research results
I have the capacity to create tables or graphs that summarize the product of my research
I know methods to analyze data of a non-numerical nature
I am able to contrast the results obtained with those of other investigations and theoretical positions
I know the ethical elements that must be followed in research involving human beings

<b>Disclosure of Knowledge</b>
I know the different scenarios (scientific meetings and publications) for the dissemination of research
I distinguish the need to adapt the format of the research results to the space in which they are presented (blogs, scientific articles, papers and social networks)
I participate in events (forums, seminars, conferences) in order to disseminate the results of my research
I have the ability to compose and write a research report appropriately
I participate in networks, based on the use of technologies, for the collective construction of knowledge.
I participate in virtual communities, for the collective construction of knowledge with the support of Research and Communication Technologies.
I participate in collaborative projects, through the use of Information and Communication Technologies, for the collective construction of knowledge
I appropriately select the means of dissemination of an investigation according to the relevance of the results obtained to the editorial line