The research competencies of university teachers and the scientific production of studentss

Las competencias investigativas de los docentes universitarios y la producción científica de los estudiantes

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Abstract

The objective was to determine the relationship between the research competencies of university teachers and the scientific production of students. The methodology was typified as basic, adopting a quantitative approach, with a descriptive correlational level, non-experimental and cross-sectional design. A survey was used as a technique and a structured questionnaire with 48 items was used as an instrument, applied to 32 teachers and 98 undergraduate and graduate students. The results reveal a Spearman correlation coefficient of 0.814, indicating a very strong positive correlation between the research competencies of the teachers and the scientific production of the students. This finding highlights that teachers with more developed research competencies tend to have more prolific students in the generation of scientific articles. In conclusion, the positive correlation observed supports the idea that a faculty trained in research contributes directly to the formation of more committed and successful students in the generation of scientific knowledge.

Keywords: articles, competencies, research competencies, university education, scientific production, research competencies, scientific production.

Resumen

El objetivo consistió en determinar la relación entre las competencias investigativas de los docentes universitarios y la producción científica de los estudiantes. La metodología se tipificó como básica, adoptando un enfoque cuantitativo, con nivel descriptivo correlacional, diseño no experimental y transversal. Se empleó como técnica la encuesta y como instrumento un cuestionario estructurado con 48 ítems, aplicado a 32 docentes y 98 estudiantes de pregrado y postgrado. Los resultados revelan un coeficiente de correlación de Spearman de 0,814, indicando una correlación positiva muy fuerte entre las competencias investigativas de los docentes y la producción científica de los estudiantes. Este hallazgo destaca que los docentes con competencias investigativas más desarrolladas tienden a tener estudiantes más prolíficos en la generación de artículos científicos. En conclusión, la correlación positiva observada respalda la idea de que un cuerpo docente capacitado en investigación contribuye directamente a la formación de estudiantes más comprometidos y exitosos en la generación de conocimiento científico.

Palabras claves: artículos, competencias, competencias investigativas, educación universitaria, producción científica.

Introduction

The intrinsic relationship between the research competencies of university professors and the scientific production of students has acquired a significant role in the contemporary academic environment. In this context, González *et al.* (2022) indicate that educators' ability to develop research competencies becomes the driving force behind the growth and intellectual development of university students. Similarly, Chávez *et al.* (2022) point out that research not only es-

tablishes itself as a fundamental component of the teaching-learning process but also as a bridge that connects theory with practice, equipping students with the necessary skills to explore, understand, and contribute to scientific knowledge.

In this scenario, Yangali *et al.* (2020) emphasize the need for educators committed to scientific advancements, guiding their knowledge and practices to promote scientific production and the generation of theories that contribute to the scientific community. Furthermore, Reiban (2018) expresses the relevance of deepening the vital connection between university professors' research competencies and students' scientific production. In this regard, Nolazco *et al.* (2022) highlight the importance, in the context of modernity, of developing teachers' capacity to lead research and cultivate an environment conducive to critical thinking, as this directly influences the development of research skills in students, stimulating their participation in generating new knowledge.

Following this line of thought, Reiban (2018) underscores that the research competencies of university professors worldwide encompass various aspects, necessitating a solid cognitive foundation that includes mastery of scientific fundamentals, from theories and concepts to research methods. Castellanos *et al.* (2022) assert that teachers must understand research processes, from formulating questions to interpreting results, and adhere to the ethical standards governing scientific research.

According to Perdomo (2021), it is essential for teachers to develop metacognitive competencies that allow them to reflect on their research practice, identify areas for improvement, and adjust their approaches. Moreover, it is crucial for them to possess the ability to effectively communicate research findings, another vital competency, whether through publications, conference presentations, or broader dissemination. Collaboration with other researchers is also highlighted as a key competency, as science advances through teamwork and the synergy of knowledge.

On the other hand, Salazar *et al.* (2018) consider research ethics a fundamental pillar, emphasizing that teachers must respect ethical standards, apply scientific methods, and transparently report results. Continuous training is essential to develop these competencies, encompassing courses, workshops, and practices in scientific research. Participation in academic activities, collaborations, publications, and conference presentations also contributes to strengthening these competencies.

Following this line of thought, Díaz and Cardoza (2021) highlight that in the Latin American region, student scientific production has experienced a significant increase in recent years. The authors also add that, according to a study conducted by the Red de Indicadores de Ciencia y Tecnología Iberoamericana e Interamericana in 2021, students in the region published a total of 22,612 scientific articles in Scopus-indexed journals, marking a significant 30% increase compared to 2020.

According to the Scimago Index 2022, the leading countries in student scientific production in

Latin America are Brazil, Mexico, Argentina, Chile, and Colombia; meanwhile, Venezuela ranks eighth out of a total of 50 countries in the region. Regarding research fields, medicine ranks first, followed by natural sciences, social sciences, engineering, mathematics, and computer science.

However, Hernández *et al.* (2022) point out that, despite this growth, student scientific production in Latin America still lags behind other regions of the world such as Europe, Asia, and the United States. Nevertheless, these advances indicate progress in developing a scientific culture among university students in the region. This increase is attributed to various factors, including increased investment in higher education, improved education quality, the growing internationalization of research, and the development of programs supporting student research. These elements have contributed to strengthening participation in generating scientific knowledge in the region.

For Acosta (2023), the influence of Venezuelan university professors on the limited scientific production of students is influenced by several factors. Many lack the necessary research training, either because they did not have the opportunity to participate in projects during their studies or because student research is not a priority in Venezuelan universities. Additionally, the lack of incentives for research in Venezuela contributes to this unfavorable scenario. The absence of resources, recognition, and opportunities for publication in high-impact journals discourages university professors from prioritizing research in their work. This lack of research impetus translates into a lack of support for student participation in research projects.

According to Blanco (2021), another crucial challenge is the time limitation faced by Venezuelan university professors due to their overwhelming workloads. Between teaching, research, and administrative tasks, they have little time to dedicate to student research. This temporal restriction prevents professors from providing the guidance and support necessary for students to carry out high-quality research.

Finally, Canquiz *et al.* (2023) argue that the negative perception of research in Venezuela as an elitist and impractical activity also influences students' limited interest. The idea that research lacks practical utility can discourage student participation in research activities, thereby contributing to limited scientific production. It is essential to address these challenges to foster a conducive environment for the development of student research in the Venezuelan university context.

Therefore, the underlying causes of this issue may lie in teachers correcting papers without providing meaningful feedback to the student. Additionally, they do not explain in detail how research processes should be approached. In many cases, there are also differences of opinion among teachers about how these processes should be carried out. Furthermore, the delay in providing corrections exacerbates the problem, given the limited time available to students to conduct research, as deadlines are aligned with the academic calendar. Therefore, the objective of this study was to determine the relationship between the research competencies of university

professors and the scientific production of students.Methodology

The study adopted a quantitative approach, which, according to Acosta (2023), focuses on obtaining numerical data and their statistical analysis. Likewise, the research type was basic, pure, or fundamental, which, according to Arias (2016), focuses on creating new theories or improving existing ones. Similarly, the level was descriptive, which involves the characterization of a fact, phenomenon, individual, or group, and correlational in scope, which, according to Hernández and Mendoza (2018), seeks to determine relationships between variables without manipulating them, simply by measuring and analyzing their link. In the case of the study, it allowed for the analysis of the relationship between the variables of research skills of teachers and the scientific production of students. The design was non-experimental, characterized by data collection in natural environments without planned intervention, and cross-sectional, as information was collected at a single point in time.

The study population consisted of 32 teachers and 98 undergraduate and graduate students from the following universities: University of Zulia - LUZ, Dr. Rafael Belloso Chacín University - URBE, José Gregorio Hernández University, and Rafael Urdaneta University - URU. It is noteworthy that the information was not classified by university, as it is not necessary to know the behavior of the phenomenon by educational institution, but rather seeks a general perspective of what happens regarding the problem posed, so there was no classification between teachers and students either. The sample selection was random, with criteria for inclusion being diverse disciplines and academic levels (undergraduate and graduate) and active involvement in research.

The participation of universities with recognized academic programs, trajectory, and varied approaches to research was prioritized to ensure diversity in students' scientific production. The research experience of teachers was also considered, including those with a history of directing research projects and making significant contributions to the development of research skills among students. The inclusion of university students was based on their active participation in research projects, scientific publications, or conference presentations.

To collect information, the survey technique was employed. Questions were formulated to a group of subjects with the purpose of obtaining specific data. A Likert-type structured questionnaire composed of 48 items (24 for each variable) presenting five response alternatives was used. The questionnaire was transcribed into the digital format of Google Forms and sent to respondents via WhatsApp and email for completion.

It is worth noting that the instrument underwent evaluation by specialists before its implementation. Additionally, its validity was determined using Cronbach's Alpha reliability coefficient, obtaining values of 0.875 for the "research skills" variable and 0.915 for the "scientific production of students" variable. Finally, the results were analyzed using the statistical software SPSS, version 27. Frequency tables were generated for descriptive statistics, and a correlation table resulted from the inferential statistical process.

Results

Below are the tables detailing the research results on the research skills of teachers and the scientific production of students.

Table 1
Research Skills of Teachers

Levels	Methodological Processes Mastery		Teaching Skills		Management Skills		Communication Skills	
	f	%	f	%	f	%	f	%
Low	83	69,1	21	17,5	19	15,8	12	10,5
Medium	10	8,23	87	72,5	73	60,8	88	73,3
High	27	22,5	12	10,5	28	23,3	20	16,6
Total	120	100	120	100	120	100	120	100

Source: Authors' elaboration (2024).

The results presented in Table 1 provide a detailed assessment of the research skills of teachers. Regarding the "mastery of methodological processes," the low level is predominant, covering 69.1%, indicating a need for strengthening in this domain. This is followed by the high level at 22.5%, suggesting a significant presence of skills, while the medium level is more limited, representing 8.33% of the total.

Regarding "teaching skills," participants' perception shows that 72.5% rate these skills at a medium level, reflecting a solid but not exceptional foundation. In contrast, 17.5% perceive them at a low level, suggesting areas for improvement, and only 10.5% evaluate them at a high level, indicating a smaller presence of exceptional skills in this aspect.

Regarding "management skills," 60.8% of respondents position them at a medium level, denoting a balance in these competencies. On the other hand, 23.3% recognize them at a high level, indicating a prominent presence of management skills, while only 15.8% categorize them at a low level, indicating areas for improvement.

Finally, when analyzing "communication skills," it is highlighted that 73.3% place them at a medium level, indicating widespread communicative competence. On the other hand, 16.6% rate them at a high level, highlighting the presence of exceptional communication skills, and only 10.5% position them at a low level, indicating specific areas for improvement in this aspect.

From the results, it is concluded that there are areas where teachers need to improve to strengthen research skills. The low level observed in the "mastery of methodological processes" suggests a need for improvement in this aspect. Although "teaching skills," "management skills," and "communication skills" are perceived at a medium level by most respondents, this indicates that they could still be improved to promote the development of research skills in students.

Table 2
Causes of low scientific production among students

Levels	Guidance		Timely feedback		Time management		Methodológical direction accuracy	
	f	%	f	%	f	%	f	%
Deficiente	89	74,1	93	77,5	87	72,5	84	70
Moderate	20	16,6	17	14,1	23	19,1	20	16,6
Efifcient	11	,1	10	8,33	10	8,33	16	13,3
Total	120	100	120	100	120	100	120	100

Source: Authors' own elaboration (2024).

The results in Table 2 provide a detailed insight into the causes attributed to the low scientific production among students, focusing on the "guidance" provided by teachers. According to the respondents, 74.1% receive little guidance from teachers, hence perceiving it as deficient. A moderate rating is assigned by 16.6%, indicating some balance, while only 9.1% consider it efficient, pointing out areas where more effective guidance is evident.

Regarding "timely feedback," 77.5% of participants rate it as deficient, indicating a lack of prompt response from teachers. A moderate rating is perceived by 14.1%, and only 8.33% classify it as efficient, suggesting the presence of more effective practices in this dimension.

Concerning "time management," 72.5% of respondents express it as deficient, indicating challenges in effective time management by teachers. A moderate rating is given by 19.1%, denoting some balance, and only 8.33% evaluate it as efficient, highlighting areas where time management stands out.

Finally, regarding "methodological direction accuracy," 70% respond that it is deficient, indicating difficulties in the precise application of methodologies. A moderate rating is perceived by 16.6%, suggesting a balance, and 13.3% classify it as efficient, indicating areas where more precise methodological direction is evident.

Based on the results obtained, we can conclude that the low scientific production among students can largely be attributed to the lack of guidance provided by teachers. Most respondents expressed experiencing limited guidance, insufficient feedback, poor time management, and imprecise methodological direction. These factors significantly contribute to a general perception of deficiency in the quality of teacher guidance.

The results suggest an urgent need to improve teacher guidance to foster greater scientific production among students. It would be beneficial to address specific areas identified, such as the lack of adequate guidance, timely feedback, efficient time management, and precise methodological direction. This improvement could be achieved through the implementation of training programs for teachers, the creation of additional educational resources, and the establishment of effective practices that promote an environment conducive to research and

academic production. Furthermore, constant feedback from students could be valuable for adjusting guidance strategies and ensuring that their specific needs are met. Ultimately, these improvements could have a positive impact on the quality and quantity of students' scientific production.

Table 3
Correlation Coefficients of Variables

			Research skills of teachers	Scientific Production of Students
Spearman's Rhon	Research skills of teachers	Correlation Coefficient	1,000	,814
		Sig. (bilateral)		,000
		N	120	120
	Scientific Production of Students	Correlation Coefficient	,814	1,000
		Sig. (bilateral)	0.000	
		N	120	120

Source: Authors' own elaboration (2024).

Table 3 shows that the Spearman's correlation coefficient between the research skills of teachers and the scientific production of students is 0.814. This value is very close to 1, indicating a very strong positive correlation between the two variables. In other words, the analysis results show that there is a very close relationship between the research skills of teachers and the scientific production of students. This indicates that teachers with higher research skills tend to have students who produce more scientific articles.

The results demonstrated that the research skills of teachers can have a significant influence on the scientific production of students. The effectiveness of teachers as researchers seems to be crucial for guiding students in the development of their research skills, which in turn, can result in higher scientific production. It would be beneficial for teachers to share their experiences and research methods with students, thus fostering the development of skills that contribute to a more robust scientific production.

Discussion

When contrasting the obtained results with the theoretical postulates of this study, weaknesses are observed in the vast majority of indicators regarding the "mastery of methodological processes in teachers". Barros and Turpo (2022) emphasize its importance by stating that this skill is fundamental to provide the necessary foundation in the development of research skills in students. Mastery of methodological processes implies the teacher's ability to guide students in the effective application of research methods and techniques. According to Blanco and Acosta (2023), this skill not only influences the quality of teaching but also plays a crucial role in the

development of critical, analytical, and argumentative skills in students, essential aspects for their active participation in subsequent research processes, as well as in their academic and professional training.

According to Blanco (2021), a teacher with a solid methodological mastery can guide students in the effective application of research methods, promoting a deep understanding of scientific processes. According to Acosta (2023), this facilitates students acquiring the necessary skills to carry out autonomous research, which, in turn, contributes to greater scientific production by boosting students' ability to address scientific questions and issues systematically and rigorously.

Regarding "teaching skills" in teachers, Castellanos *et al.* (2022) suggest that they are of great significance in fostering scientific production among university students since a teacher with effective pedagogical skills can inspire interest and scientific curiosity in students. For Cardoza *et al.* (2023), the ability to transmit knowledge clearly and motivates facilitate the understanding of complex scientific concepts while stimulating critical thinking and creativity.

According to Dávila *et al.* (2022), a pedagogical approach that advocates for active participation and scientific exploration emerges as a key element in developing research skills in students. This type of approach goes beyond mere knowledge transmission and fosters an educational environment in which students are encouraged to engage directly in the process of discovery and analysis. By providing opportunities for inquiry and the practical application of scientific principles, this approach not only strengthens conceptual understanding but also lays the groundwork for the training of future researchers and knowledge generators in the scientific field.

Fostering active participation involves creating opportunities for students to explore and apply scientific methods in problem-solving or the investigation of specific phenomena. This not only enhances their understanding of concepts but also nurtures their ability to formulate questions, design experiments, and critically analyze data. It also promotes independent thinking and intellectual autonomy, fundamental aspects for the development of strong research skills.

When analyzing "management skills" in teachers, Leyva *et al.* (2022) consider them vital for creating an environment conducive to the scientific production of students. This is because efficient management of research projects involves proper planning, resource allocation, and progress monitoring, which directly influences the quality and success of scientific work. Additionally, according to Mejía *et al.* (2020), management skills enable the creation of a collaborative environment where teachers can facilitate student participation in joint research projects, promoting interaction and knowledge exchange, crucial elements for the development of meaningful research.

Continuing with the analysis, regarding "communication skills" in teachers, Molina (2023) states that they are fundamental for the scientific production of students since they facilitate the effective transmission of knowledge and ideas. This indicates the ability to clearly communicate scientific concepts, findings, and methodologies, which is important for guiding students in pre-

senting their research results.

According to Nolazco *et al.* (2022), effective communication skills contribute to creating a collaborative environment where teachers can effectively communicate their expectations and provide constructive feedback, thus improving the quality of scientific projects developed by students. Meanwhile and Reiban (2018) points out that communication skills in teachers are a key facilitating element for the successful dissemination of research and the impact of scientific production on the academic community.

On the other hand, when analyzing the causes of the low scientific production of undergraduate and graduate students, regarding "guidance," Aponte (2022) points out that when there is little guidance from teachers, scientific production of students is significantly affected. In this regard, Beigel *et al.* (2022) consider effective guidance to be fundamental in providing adequate guidance and support during the research process.

According to Cantabrana *et al.* (2020), a deficit in this aspect can result in disoriented students, facing difficulties in structuring and developing research projects. Hence, according to Romero (2023), lack of direction can also lead to the choice of inadequate approaches or lack of clarity in objectives, hindering the development of research skills and limiting students' ability to contribute significantly to scientific knowledge.

Regarding "timely feedback," Biagioli and Lippman (2020) highlight the idea that this plays a critical role in students' scientific production, and its absence can have significant negative consequences because when teachers do not provide real-time feedback on students' progress, they face difficulties in correcting errors, improving methodologies, and adjusting their approaches. According to León *et al.* (2022), the lack of adequate feedback can demotivate students and affect the quality of their research since they are deprived of the opportunity to learn from their mistakes and progress in their projects effectively.

When analyzing "poor time management" by teachers, González *et al.* (2022) suggest that this directly impacts students' scientific production because research requires careful planning and efficient allocation of temporal resources. In this regard, Ruiz *et al.* (2020) state that when teachers do not manage the time allocated to research projects properly, students may face tight deadlines, stress, and a lack of time to conduct thorough research. This affects the quality and depth of scientific work, limiting students' potential to address research questions comprehensively and contribute significantly to the scientific field.

Finally, the lack of accuracy in methodological direction by teachers, according to Beigel *et al.* (2022), has a substantial impact on students' scientific production, as imprecise direction can result in incorrect application of methodologies, misinterpretation of data, and lack of rigor in research execution.

This compromises the validity and reliability of results, negatively affecting the overall quality of

research projects. Likewise, Several Llontop *et al.* (2023) affirm that the lack of direction can also influence students' ability to develop research skills and apply appropriate methodologies, thus significantly limiting their contribution to scientific knowledge.

Conclusions

The results reveal a significantly high Spearman correlation coefficient, reaching the value of 0.814, indicating a very strong positive correlation between the research competencies of teachers and the scientific production of students. This strong correlation suggests that the quality of research competencies in teachers is directly related to students' scientific performance. In other words, teachers with more developed research skills tend to have students who generate a greater quantity and quality of scientific articles.

This finding also underscores the importance of teachers' research competencies in the training and development of students in the scientific field since, by possessing research skills and knowledge, teachers act as models and facilitators to inspire students to engage in research projects. The observed positive correlation highlights that a faculty with research competencies significantly contributes to cultivating a research culture among students, thus promoting a more prolific and high-quality scientific production.

Therefore, these results support the idea that investing in the development of teachers' research competencies can have a direct positive impact on promoting and improving students' scientific production. This close relationship between both aspects highlights the importance of designing strategies and professional development programs for teachers focused on strengthening their research skills, which will translate into a more enriching and productive educational environment for students.

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