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Psychometric Properties of Academic Reading-writing Scale in Postgraduate

Propiedades psicométricas de escala de lectura-escritura académica en posgrado

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ABSTRACT

Science generates information that is transformed into innovation, which is reflected in technological development and materializes in economic growth for a country. Every researcher, whether expert or novice, must possess a high level of academic literacy that enables them to consume scientific reports and effectively communicate the results of their research. Therefore, the objective of this work was to construct a scale with psychometric properties to measure scientific reading and writing competence, based on the perception of research professors in research-oriented graduate programs. A mixed sequential (which-which-which) study was conducted. In the qualitative phase, 51 research professors from four higher education institutions in northwestern Mexico participated in a semi-structured interview about the competencies that every researcher should have to adequately practice the profession, regardless of the discipline in which he/she works. Based on the teachers' responses, items were generated, and a scale to measure academic reading and writing competency was developed. In the quantitative phase, the psychometric properties of the developed scale were analyzed; 323 students from different educational programs participated. The scale consisted of two factors (academic reading-writing and second language proficiency) with 16 items in total. It is concluded that this scale is valid and reliable to measure the construct under study.

RESUMEN

La ciencia genera información que se transforma en innovación lo que se refleja en desarrollo tecnológico y se materializa en crecimiento económico para un país. Todo investigador, experto o novel, debe poseer un alto nivel de alfabetización académica que le permita ser un consumidor de reportes científicos y comunicar adecuadamente los resultados de sus investigaciones. Por ello, el objetivo de este trabajo fue construir una escala con propiedades psicométricas para medir la competencia de lectura y escritura científica, a partir de la percepción de los profesores investigadores de programas de posgrado orientados a la investigación. Se realizó un estudio mixto secuencial (cual-cuan). En la fase cualitativa participaron 51 investigadores de cuatro universidades del noroeste de México, a quienes se les aplicó una entrevista semiestructurada acerca de las competencias que todo investigador debe tener para ejercer adecuadamente la profesión, independientemente de la disciplina en la que se desempeña. A partir de las respuestas de los docentes se generaron los ítems y con ello se elaboró la escala para medir la competencia de lectura y escritura académica. En la fase cuantitativa, se analizaron las propiedades psicométricas de la escala desarrollada, participaron 323 estudiantes de diferentes programas educativos. La escala quedó conformada por dos factores (lectura-escritura académica y dominio de segundo idioma) con 16 reactivos en total. Se concluye que dicha escala es válida y confiable para medir el constructo objeto de estudio.

KEYWORDS | PALABRAS CLAVE

Academic Writing, Research Training, Reading, Scientific Communication, Postgraduate, Competence.
Escritura académica, formación de investigadores, lectura, comunicación científica, posgrado, competencia.

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1. Introduction

Currently, information management and knowledge generation are considered paramount within the productive processes of various economic, social, political, and cultural realms. This is because a country's development is closely linked to the educational level of its population, as societal convergence occurs within a knowledge-based economy (Guo, Chen, & Zheng, 2021; Leshchenko et al., 2021; Xiao & Mao, 2021). Consequently, education and training are crucial tools for ensuring development, particularly in an era marked by unprecedented information production and accessibility. However, given the massiveness of available information, individuals immersed in the knowledge society must possess the competencies to utilize it effectively (Chois-Lenis, Guerrero-Jiménez, & Brambila-Limón, 2020; Garay-Argandona et al., 2021). In response to this need, current educational paradigms focus on providing experiences that enable students to acquire knowledge for practical interventions in societal issues while also instilling values and ethics for individual and collaborative actions (Carrera Morales, Mesa Carpio, & Padilla Cuellar, 2022; Sulistyaningrum, 2024).

Specifically, within the framework of competency-based education at the postgraduate level with an emphasis on scientific training, students must be equipped with the three forms of knowledge within each competency required to function as researchers. This is essential as postgraduate students need to acquire competencies that not only ensure academic success but also facilitate professional positioning within their disciplinary community (Shamida, Sidhu, & Md Nawi, 2021; Wallace & Wray, 2021). For a long time, research education was characterized by a scholastic approach, with a traditional instructional process centered on research methodology training and theoretical knowledge predominating. However, recent trends in researcher training have adopted a dialectical orientation, wherein students work directly with a group of researchers to immerse themselves in scientific culture. Nevertheless, this type of education may inadvertently perpetuate patterns and biases, with each student's training potentially influenced by the beliefs and skills of assigned researchers, leading to varying preparation levels (Quintero-Sepúlveda, Ospina-Nieto, & Cubillos-González, 2023; Yunus et al., 2023).

Hence, postgraduate programs must encompass all skills comprising scientific competency (Kabuye & Mukasa, 2020; National Postdoctoral Association, 2019; Swank & Lambie, 2016) and incorporate them into their curriculum to provide comprehensive training. This includes both generic professional skills and discipline-specific competencies. This study specifically focuses on scientific reading and writing, which are fundamental competencies for graduates of research-oriented postgraduate programs. Emphasis on these skills is warranted due to the crucial role language plays in learning, knowledge construction, dissemination, and application in specific contexts (Baba & Affendi, 2020; Lin & Morrison, 2021; Shamida et al., 2021). Moreover, it is essential to recognize that both teaching and research activities require a significant portion of the workday to be dedicated to reading and writing academic documents. Thus, skills such as science consumption, knowledge generation, mastery of various languages, argumentation, abstraction of valuable information from vast knowledge sources, and understanding of specialized vocabulary are integral to the daily work of researchers and must be cultivated during postgraduate education (Saeed, Mohammed H. Al-Ahdal, & Al Qunayeer, 2021; Vivero-Domínguez, 2021).

Given the above, there is a clear need to equip master's and doctoral students with academic reading and writing skills, which are intricately linked to deepening their understanding of research topics and knowledge construction—the ultimate goals of scientific work (Rhead & Little, 2020; Wallace & Wray, 2021). These skills are indispensable from postgraduate education to professional demands, as scientific work entails reading and comprehending a vast array of academic texts, critically engaging with them, and selecting only relevant information for study. This process allows individuals to internalize valid arguments, take a stance to defend their research, and remain open to improvements (Baba & Affendi, 2020; Lin & Morrison, 2021; Ricetto et al., 2021).

1.1. Problem Statement

The difficulties encountered in the area of language are a concern for all stakeholders in the educational process at different school levels. These difficulties begin in basic education, as evidenced by the results achieved by Mexican students in international assessments such as the PISA test, which demonstrate that students lack skills to locate and use information in a text, as well as the ability to interpret, reflect, and take a critical stance towards them (Badah et al., 2024; Bartolucci, 2021; Shahsavar & Kourepaz, 2020).

Such deficiencies that occur throughout schooling have repercussions on the knowledge with which students arrive at university. From this phenomenon emerge currents of studies such as academic literacy and literacy. These models coexist and focus on studying all those actions that need to be carried out to read and write, viewing them as a social practice framed within a specific context. That is, they consider the elements required to participate in the discursive cultures specific to each discipline and necessary for learning at university (Chois-Lenis et al., 2020; Moreno Mosquera, 2019).

Specifically, in graduate studies, the linguistic skills required are not only related to those necessary for learning but also for positioning oneself in the field as a generator of knowledge through the communication of their findings. Therefore, it is important to highlight the need to develop in future scientists the ability to write, communicate, presentation of research, and their findings. In this sense, graduate education should encourage its students' capacity to transmit their ideas appropriately, through a deep mastery of language levels, summarizing information and adapting it to particular requirements, explaining the purpose, objectives, and conclusions, and adapting texts to the needs and level of knowledge of a particular audience. In general, having linguistic mastery to communicate with other scientists in their field either orally or in writing (Kabuye & Mukasa, 2020; Rhead & Little, 2020; Vivero-Domínguez, 2021).

The objective of this work was to construct an instrument with psychometric properties to measure the competence of academic reading and writing in graduate students. This instrument was built based on the perceptions that researchers have about these competencies, framing them within what they consider necessary for professional performance.

2. Methodology

To carry out this work, a mixed-method study was conducted, sequentially integrating qualitative and quantitative methodologies, respectively. In the first part, qualitative data were collected through the application of semi-structured interviews with graduate professors from the main universities and research centers in the northwest of Mexico. The purpose of the interviews was to obtain information that would allow the generation of indicators to develop the items of the scale and thus evaluate the competencies of academic reading and writing in graduate students. The qualitative data analysis was conducted from a phenomenological perspective to understand the construct from the perspective of those responsible for training future scientists and also practicing the profession of researcher (Creswell, 2013). In the second part of the study (quantitative), items were developed based on the responses of the professors in the interviews, the scale was constructed and applied to graduate students, and the psychometric properties were analyzed.

2.1. Participants

In the qualitative phase, 51 graduate professors oriented toward research participated, of which 62.74% were men and 37.25% were women. These participants included both experienced and novice teacher-researchers, all of whom were members of the National Researchers System (SNI by its acronym in spanish). In the quantitative phase, the sample was conveniently probabilistic, and 323 students from various graduate programs of Higher Education Institutions (IES) in the northwest of Mexico participated, corresponding to the same institutes to which the interviewed professors belonged in the previous phase (48.29% men and 51.70% women); ages ranged from 21 to 60 years with a mean of 27 years.

2.2. Data Collection Techniques

In Phase 1, information was obtained through a semi-structured interview consisting of 4 questions aimed at understanding the competencies that every researcher (regardless of disciplinary area) must have to practice the profession and the factors associated with their development.

From the obtained responses, four indicators were generated, which were used to develop the 16 items and construct the scale to measure the competence of academic reading and writing. This was measured on a Likert scale with 4 response options (a lot, quite a bit, a little, or not at all).

2.3. Information Collection

In the first phase, coordinators of postgraduate programs from various institutions and research centers were contacted to request information about the characteristics of the research professors who would be

part of the postgraduate program, as well as their authorization to conduct the research. Once suitable candidates were identified, a personal invitation was sent to them, informing them that the interview would be recorded, explaining the use of the data, and requesting their signature on the informed consent form.

For phase 2, authorization was requested from the coordination of each program to access the students of the participating postgraduate programs. Once permissions were obtained, voluntary participation of student groups was requested; at that time, they were informed about the criteria for data confidentiality, and if they agreed to participate, they were also asked to sign the informed consent form. The instrument was provided in physical form, and a digital version was also available (which could be completed from a computer or cell phone) for students who were not in the same physical space as the rest of their peers at the time.

2.4. Data Analysis

For the qualitative phase, the ATLAS.ti software was used. From this analysis, codes, quotes, and emerging categories associated with the reading and writing skills of scientists in training were obtained. For the quantitative phase, the Statistical Package for the Social Sciences (SPSS) program was used to validate the internal structure of the instrument using the multivariate technique of Exploratory Factor Analysis (EFA). Subsequently, the *Amos software* was used to confirm the measurement model using confirmatory factor analysis (CFA) to obtain the goodness-of-fit criteria proposed by Hu and Bentler (1999).

3. Results

The results of the phases comprising this study are presented. For Phase 1 (qualitative), the findings from interviews with teacher-researchers are reported. Subsequently, the quantitative results derived from the construction of the instrument and its metric properties (Phase 2) are shown.

3.1. Phase 1. Interview with Teacher-researchers

The internal structure of the scale measuring academic reading and writing competencies was constructed using the information obtained from interviews conducted with graduate-level teacher-researchers. For this purpose, citations containing relevant information were identified, from which codes and emerging categories were generated.

3.1.1. Academic Reading and Writing Competency

Based on the responses of the teachers regarding reading and writing competency, eight codes and 58 quotes were formed; according to the responses of the teacher-researchers, this competency refers to the set of skills required for writing scientific texts, those necessary to be a reader of complex texts, the ability to obtain information from those texts, oral skills, to be able to discuss ideas with other researchers and to master other languages.

The scientists affirmed that every researcher, regardless of the disciplinary area in which they work, must have skills for writing; that is, mastery of writing, communicating in writing, and producing scientific texts that are suitable. In this regard, from the perspective of academic literacy, writing is a central practice that not only enables the construction of ideas but also influences thinking and knowledge construction (Mardones, Alarcón Silva, & Santibañez Bravo, 2023; Pozzo & Rosso, 2023).

Some relevant quotes from teacher-researchers regarding academic reading and writing competency were:

- *Ability to write (*female, expert*).*
- *Must be a good writer (*female, expert*).*
- *Being good at scientific writing (*female, novice*).*
- *Basically, one must know how to write appropriately (*male, novice*).*
- *I believe that in general, one must have many competencies related to writing (*male, expert*).*
- *Ability to produce texts (*male, expert*).*
- *Another very important one is scientific writing (*male, expert*).*
- *Competencies are needed to write articles primarily; in other words, because we have little skill in writing, in communicating in writing (*male, expert*).*
- *Another competency is writing to report the research findings (*female, expert*).*

- *Ease of transmitting those findings through writing (*male, novice*).*
- *Knowing how to write for an audience with certain characteristics (*female, expert*).*

Likewise, the teacher-researchers mentioned that one must be a skilled and avid reader; as they indicated that every researcher must be a regular consumer of scientific literature; therefore, daily reading practices and comprehension of complex texts are required. For literature, reading in the academic context represents a means to understand the organization of knowledge; likewise, it is a skill that involves linguistic and idiomatic domains, attention, and analysis capabilities to comprehend the reality of each text (Nunez Flores & Ramirez Mercado, 2022; Pozzo & Rosso, 2023).

- *I believe that the most important of all competencies is knowing how to read, it is very important (*male, novice*).*
- *Reading comprehension ability, but of complex texts (*female, expert*).*
- *Reading comprehension (*female, novice*).*
- *Being a researcher requires practicing reading because it is an endless source of knowledge (*male, novice*).*
- *Being daily readers; I mean, consuming research (*female, novice*).*

Within the processes involved in academic reading, teachers also believe that one must have the ability to build models or mental frameworks; that is, abstraction ability. In this sense, cognitive processes in reading comprehension and information processing have been explained from different disciplines, referring to the capacity to generate ideas based on others, model processes, interpret problems to plan solutions, and extract meanings or conceptual features from a given topic (Nunez Flores & Ramirez Mercado, 2022).

- *Abstraction ability is something you have to acquire; it has to be part of the competencies you need to have (*teacher, expert*).*
- *You need to have a very specific skill, which is abstracting information; so, you have to be able to select segments of information from texts and appropriate that knowledge to work with it in an orderly and systematic way (*teacher, expert*).*
- *Abstraction ability and the ability to link it to concrete thinking (*teacher, novice*).*

Another category formed within this competence was called oral expression, which researchers specified as a determinant of the ability to speak in public and to participate in academic events, and this participation occurs through adequate oral communication.

- *Ability to present at conferences and publicly expose the findings of our work (*professor, expert*).*
- *Public speaking (*professor, novice*).*
- *Appropriate oral communication at the level in which they are developed (*professor, novice*).*

The following code corresponds to argumentation; the interviewees consider that every researcher should know how to discuss their findings with others, generate their ideas, and support them by demonstrating their assertions. Literature on the subject affirms that argumentation in research papers requires skills for discursive coherence so that writing reflects one's ideas on any phenomenon of study or theory while maintaining a balanced stance towards information and data, which is essential for the scientific community (Blanco Rosado & Acosta Faneite, 2023).

- *You need to have the ability to generate your ideas, which is what is sought in any program or research. In other words, your ideas, ideas that you develop with solid arguments, whether they are statistical, logical, and so on (*professor, novice*).*
- *The goal is to ensure that as you progress in your profession, you can discuss with other colleagues, demonstrate your assumptions, and know how to defend and explain them (*professor, expert*).*

The sixth category alludes to knowing how to communicate; for teachers, a researcher must know how to transmit and exchange messages with the community. Here it is not specified whether it refers to oral or written form; only the communicative skill is determined as an important competence in the profession.

- *They must know how to communicate their findings clearly (*teacher, expert*).*

- *Being able to inform their results to the scientific community (*professor, novice*).*
- *Communication competence (*professor, expert*).*
- *Communication in the field where one operates (*professor, expert*).*
- *Skills for communication (*professor, expert*).*
- *Knowing how to express ideas (*professor, expert*).*
- *You must know how to explain (*professor, expert*).*
- *Just as we must think in a structured way, we must also communicate in that manner; since our main task is to explain both to our students and our colleagues what we are doing in research; so, we have to communicate properly (*teacher, novice*).*

The code "technical vocabulary" was associated with a quote where the graduate teacher considers that a researcher must use technical language to achieve communication within this work.

- *We must use correct technical language appropriate to our profession; not only to the discipline, but that language is understood among researchers, and from there come technical works that are highly specialized (*teacher, novice*).*

Finally, one of the codes with the most citations in this category was related to language proficiency. The interviewees affirm that a researcher must be capable of understanding and communicating in multiple languages, with English considered elemental (Ricetto et al., 2021).

- *They must master languages (*teacher, novice*).*
- *Different languages (*teacher, expert*).*
- *A researcher nowadays also needs to know English, adequate proficiency in the English language if possible, along with other languages, but English is fundamental (*teacher, expert*).*
- *Understanding of the English language (*teacher, novice*).*
- *Languages, mainly English because the majority of knowledge on all topics is primarily in the English language (*teacher, novice*).*
- *They must have language competence, English language or now French or Portuguese (*teacher, expert*).*

3.2. Phase 2. Scale Design

With the information gathered in the interviews and derived from the qualitative analysis, indicators were established (writing, reading, language proficiency, technical vocabulary, argumentation, explaining skills, communication skills, abstraction ability, and oral expression) and items were drafted to form the scale that measures the academic reading and writing skills of graduate students.

3.2.1. Metric Properties of the Scale

It consisted of 16 Likert-type items. Reliability was determined using Cronbach's Alpha (α) and Omega (Ω) statistics; indices for which the values obtained were α= .914 and Ω=.936. All items that showed correlations above .40 with the scale were retained. Regarding construct validity, an Exploratory Factor Analysis (EFA) was conducted using the maximum likelihood method with varimax rotation. The Kaiser-Meyer-Olkin (KMO) measure obtained was .912, and Bartlett's test of sphericity yielded a significant result (X^2= 2635.36, p≤.000) allowing to determine the adequacy of the data for analysis. Two factors were obtained that explain 54.89% of the variance.

Additionally, CFA was performed to determine the goodness of fit of the model. All items comprising the scale obtained values to remain in the final model. The indices obtained suggest that the model fits the empirical data X^2 = 184.076, p = .000; CMIN/DF = 2.0; CFI= .96; GFI= .93; NFI= .93; RMSEA = .05; SRMR = .0424. In Table 1, the items comprising the final scale, descriptive statistics, asymmetry, and kurtosis indices, and the communality of each item are shown.

In Table 2, the name and description of the final version of the scale are presented, along with each factor that comprises it. For this final scale, the factors were: scientific reading and writing, and second language. Additionally, the number of items included and the level of reliability obtained for each factor are shown. By not losing items, the scale maintained the high-reliability values that were presented in the initial description.

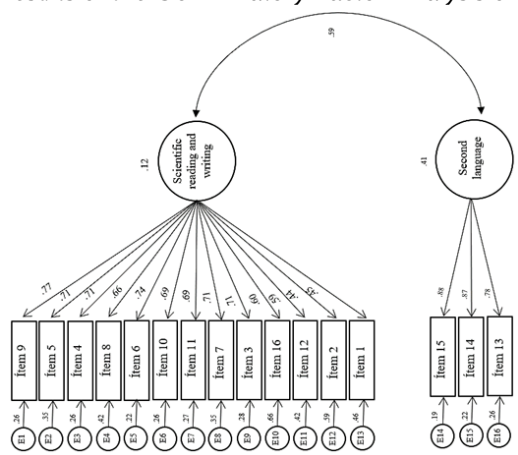
Table 1: Means, Standard Deviations, Asymmetry, Kurtosis, and Communality of the Items that Comprised the Final Scale of Language Skills.					
Items	M	DE	Asymmetry	Kurtosis	Communality
9. Construct argumentative texts (defend the central idea of the study)	3.05	.794	-.446	-.570	.604
6. Communicate ideas clearly in written form	3.15	.701	-.417	-.418	.576
5. Communicate research results to a scientific audience	2.94	.847	-.527	-.335	.516
4. Master the technical vocabulary of the discipline	3.20	.728	-.591	-.143	.484
8. Adjust written texts to a scientific writing style (APA, MLA, AIP, AMS, Harvard, Chicago, Vancouver)	3.05	.856	-.559	-.597	.472
7. Construct scientific documents without grammatical errors	3.00	.836	-.387	-.698	.507
3. Communicate ideas clearly and orally	3.18	.750	-.659	-.146	.473
11. Capture relevant information in texts for study purposes	3.23	.726	-.702	.217	.489
16. Publish research results in articles, chapters, presentations, etc.	2.67	1.00	-.210	-1.06	.370
10. Understand scientific texts	3.24	.705	-.725	.406	.481
2. Prepare technical reports	2.72	.858	-.109	-.806	.211
1. Know the grammatical rules	3.23	.755	-.578	-.538	.222
12. Understand appropriate methods for data presentation, especially effective graphics and statistical tables	3.06	.805	-.487	-.575	.365
15. Communicate in writing in a second language	2.86	.918	-.330	-.849	.813
14. Communicate orally in a second language	2.62	.946	-.049	-1.01	.737
13. Understand texts in a second language	3.15	.818	-.523	-.790	.589

Table 2: Factors Comprising the Linguistic Ability Scale.				
Factor	Description	Items	α	Ω
Scientific reading and writing	It includes indicators related to mastery and proper use of Spanish grammar, technical vocabulary specific to the discipline in which one operates, skills for clear communication of ideas orally and in writing, for constructing and supporting arguments, understanding scientific texts, and writing texts suitable for the required scientific writing style format by the discipline.	13	.906	.906
Second language	The items questioning communicative skills in a second language were formed.	3	.879	.882

3.2.2. Factor Description and Reliability

This scale consists of two factors that group the linguistic knowledge required within scientific work (see Figure 1). The first one, "Scientific reading and writing," relates to all those indicators associated with the skills to report and communicate research results, such as the correct use of grammar, the construction of clear and objective ideas, the ability to communicate results to others, to engage with complex texts, and to grasp rigorous arguments through them. The second factor, "Second language," is associated with the language proficiency required of a scientist.

Figure 1: Results of the Confirmatory Factor Analysis of the Scale.



4. Discussion and Conclusion

Scientific research in various disciplinary areas is fundamental for community transformation and progress, as it contributes to improving people's quality of life, shaping new professions and professionals, understanding events, and driving technological development. Therefore, the required training for this endeavor is very specific. Being a researcher necessitates possessing the skills to reach the highest level in an educational taxonomy since their primary function is to create new knowledge or adapt existing knowledge to generate better outcomes.

Specifically concerning language, it has been assumed that those entering graduate studies are the best candidates, students who are fully aware of the commitment they have made, enjoy reading and writing practices or know how to do so, and thus, no instruction is necessary (Solimine & Garcia-Quismondo, 2020). However, it has been observed that the academic level does not determine mastery of these skills; problems arise for all students in analyzing information, organizing ideas, retrieving valuable information, and expressing their ideas in a new text (AlMarwani, 2020).

Furthermore, graduate students do not undergo training alone; the guidance of one or more researchers leading the research project and their general instruction is one of the main strategies in shaping scientists. However, assuming that the graduate professor possesses all the skills to teach students all the competencies required for the level of studies they are pursuing is one of the main errors. While the professor is an expert in the field and their training and experience have advanced their career, recognition may correspond to their deep understanding of the disciplinary area and the scientific method, rather than mastery of all the knowledge required by future researchers (Fonseca Gutierrez, 2020; Parrado-Martínez & Sánchez-Andújar, 2020; Winarni & Purwandari, 2020).

Moreover, transitioning from the learner status to a consolidated researcher does not only correspond to obtaining the degree; it also requires other achievements to crown that process, such as mastery of scientific discourse and the production of written documents that disseminate research findings. These activities cannot be achieved without mastery of academic reading and writing (Rhead & Little, 2020; Tavera & Lovón, 2023).

In this study, a scale was constructed to measure the academic reading and writing skills of scientists in training based on interviews with teacher-researchers, who are already engaged in scientific work and are also educators during graduate studies. Reviewing existing literature on the topic revealed some studies that included indicators of language skills but omitted others mentioned by interviewed researchers.

The National Postdoctoral Association (2019) outlines a set of basic competencies to guide students in seeking relevant training experiences. This document mentions communication skills as a determining component to acquire mastery of a broader construct called scientific competence. Likewise, Swank and Lambie's study (2016) reports six domains to consider to be competent in research, one of which is the ability to engage in academic writing for scientific dissemination.

On the other hand, regarding deficiencies in reading and writing among graduate students, studies like the one conducted by Jiménez Marata (2021) show how students in a Social Sciences and Humanities program consider scientific writing to have been scarcely present in their professional training. It is also reported that teachers also need training in this area so they can effectively guide their students and improve their skills, as they are evaluated based on the quality of their scientific output (Chen & Wei, 2023).

Shamida et al. (2021) argue that innovative approaches and methods are required to develop critical reading and writing skills in graduate students, as their study results do not indicate having the ability to critically read, synthesize, and draw inferences from academic materials. In addition, Castillo-Martínez & Castillo-Martínez and Ramírez-Montoya (2021) consider that there are no studies on research skills to develop academic literacy through innovative models.

While ensuring educational quality at all school levels is the concern and objective of all countries, this concern should not be different in graduate studies. Ensuring the quality of scientists will position countries competitively with the rest of the world, especially within a dynamic that sees knowledge as a means of change for resolving global conflicts (UNESCO, 2020). Therefore, educational programs should consider these types of knowledge to develop within their curricular proposals.

Therefore, it is considered that this study makes a valuable instrumental contribution to the current literature. The scale developed here is a tool that serves to evaluate such competence and can be used by all educational actors to identify strengths and areas for improvement in the human capital entering and exiting their educational programs.

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