







AI in the development of research skills in postgraduate studies

La IA en el desarrollo de competencias investigativas en el posgrado

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Abstract

In the 1970s, technology opened horizons to the educational field, not only to problematize about it and its impact on teaching and learning, but also to expand the resources available to teachers to enhance their pedagogical mediation. However, it would be in the 21st century when the development of digital technology came to enhance the use of ICT for educational purposes, up to Artificial Intelligence, to build bridges that favor its incorporation into teaching at the higher level. Thus, in the field of disciplinary training, the strengthening of knowledge and research skills must include the effective use of technological resources in the training of college students. This article reports some results of a study whose objective was to analyze the attitudes that graduate students have about the use of AI in their education. The study had a quantitative approach with a descriptive transactional non-experimental design, in which 118 subjects participated, distributed in 10 Higher Education Institutions, 5 of them public and 5 of them private. Among its results, the uncertainties that the participants of the study have regarding the use of AI can be appreciated, while recognizing its ease and the attractiveness of a technology that requires specialized skills, responsibility in its use and cognitive processes typical of research.

Keywords: competences, research, training, ICT, Artificial Intelligence, higher education.

Resumen

En los años 70, la tecnología abrió horizontes al campo educativo, no únicamente para problematizar sobre ella y su incidencia en la enseñanza-aprendizaje, sino también para ampliar los recursos de los que podían disponer los y las docentes para enriquecer su mediación pedagógica. No obstante, sería en el siglo XXI cuando el desarrollo tecnológico digital vino a potenciar el empleo de las TIC con fines educativos, hasta llegar a la Inteligencia Artificial, para tender puentes que favorezcan su incorporación a la enseñanza en el nivel superior. Así, en el terreno de la formación disciplinar, el fortalecimiento de saberes y de habilidades investigativas, pasan por el uso efectivo de recursos tecnológicos en la formación de los universitarios. Este artículo presenta algunos resultados de un estudio cuyo objetivo fue analizar las actitudes que los y las estudiantes de posgrado tienen sobre el uso de IA en su educación. El estudio tuvo un enfoque cuantitativo con un diseño no experimental transaccional descriptivo, en el que participaron 118 sujetos, distribuidos en diez instituciones de Educación Superior, cinco de carácter público y cinco de instituciones privadas. Los resultados muestran las incertidumbres que los participantes en el estudio tienen sobre el uso de la IA, al tiempo que reconocen su facilidad y atractivo como tecnología que requiere habilidades especializadas, responsabilidad en su uso y procesos cognitivos inherentes a la investigación.

Palabras clave: competencias, investigación, formación, TIC, Inteligencia artificial, enseñanza superior.

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1. Introduction

This article first presents an approach to the object of study from the historical to the conceptual view, outlining the closure of the introduction with the review on the use of AI in the context of university training; in this perspective, it starts from recognizing metaphorically that since the pencil was present in the classroom, the technology reached Education.

Since the 20th century, technology has shown a potential development and association with programmed education. It was Sidney Pressey's job to design a machine that could facilitate educational processes linked to the design of an intelligence test. At the time, he would argue that "By simply pressing a key, the person tested revealed his mentality or lack of it" (Watters, 2021, p. 38). A few years later in the 1950s, Skinner and his programmed teaching (Correa Cortés, 2021), would make it possible to translate these principles into educational models mediated by technologies. Undoubtedly, the world was going through an important historical juncture due to the arrival of television, a resource that would be incorporated into school classrooms, so that together with distance education, generated conditions to diversify the educational offer in Mexico; a media that was used in the COVID-19 pandemic by the Mexican government to disseminate curricular content (García Aretio, 2022).

However, it would be in the 1970s and 1980s when technology applied to education would transform when analog and digital resources were combined; so that in the 1990s, the advent of the Internet and the emerging digital culture found in Web 2.0 a technological condition conducive to experiencing innovative ways of mediating teaching-learning; during this time the development of teaching skills that favored the innovation of pedagogical practices started being demanded (Muñoz Martínez, 2020; George-Reyes, 2021).

After a pandemic that forced the implementation of distance and virtual educational models, Artificial Intelligence (AI) has allowed to expand resources to generate learning environments mediated by Information and Communication Technologies (ICT) that require teachers skills to profile them as facilitators of educational processes linked to the diversified use of technologies, by allowing the mana-

gement of content demanded by the courses taught by teachers through different supports.

In this perspective, talking about ICT and Artificial Intelligence (AI) applied to teaching and the development of skills for research allow problematizing and reflecting academically on the challenges that a university teacher has to make technological resources attractive in the accompaniment process for developing research skills.

So if the academic and epistemic communities would ask themselves about the type of skills, knowledge and attitudes that should be promoted for the development of research competences, the first thing to reflect is the attributes that must be met by those who teach at the university, especially those who teach courses in research methodology, because disciplinary profiles, pedagogical knowledge, didactic skills, research and digital competences, would have to define their teaching attributes.

This is proposed after reflecting on the main challenges faced by those who study at the university and require developing research skills; hence, the institutions of higher education have a commitment that goes from the curricular to the pedagogical and the implementation of an infrastructure to innovate and generate learning environments where ICT and AI are means and resources that enhance training in skills for research.

The objective of this article is to assess the attitudes of postgraduate students, from ten Mexican higher education institutions (five public and five private), who agreed to participate in a descriptive study, whose research question was: what is the attitude of postgraduate students regarding the use of AI tools in their training process as researchers, for which the online questionnaire *Artificial Intelligence and Research Training* was applied.

Talking about the background of artificial intelligence is taking different paths to locate the starting point of this technology. From the philosophical to the mythical, from mathematics to technology developers, there is information that allows us to recognize that the search of the human to have someone to assist him has a long story to tell.

In education, in the 30's with the teaching or programmed education, there was an approach to use technology to assist the teaching and learning processes. In Mac Culloch and Pitts, this journey would have to recognize two pioneers through history, since

in 1943 they presented a model of artificial neurons that is already in the field of AI (Chandra, 2021). Turing would come with a machine capable of operating and having unlimited memory, a researcher who also designs a test to see if a machine can think like a human being. It was in the 1950s, when McCarthy used the term artificial intelligence in a lecture at Dartmouth University (Oliver, 2020). Since then, together with a technological development observed in the 90s, the generic acronym TIC has become part of the narratives of innovation and transformation in many orders of human work, including education.

However, it would be in the second decade of a new millennium, when digital technologies and, particularly, AI would become resources to promote learning environments through mediation strategies for teaching, learning and evaluation in higher education. It is in 2023 when Microsoft and Google present their *chatbot* models. However, it would be the company *OpenIA* with its GPT Chat (*Generative pre-trained transformer*) that would achieve the greatest impact, since it would be the application that would best position itself among users eager to experiment with an AI that facilitates their productive tasks.

There were scientists and university academics who also discussed the scope of a resource that facilitates research-related activities by allowing large volumes of information to be handled and content to be produced for knowledge dissemination. The dilemmas are also analyzed, because much of what this technology allows, inhibits the development of some skills that every student – even the university teacher – must acquire and strengthen.

When talking about research training, the authors recognize the role that ICTs, including AI, can play for research training. This educational context includes understanding the role that research plays in the curriculum and the graduation profile as part of the disciplinary attributes to be achieved, according to the educational program.

This leads to distinguishing research in various meanings: *research training vs. formative research, the investigative competencies of research skills*, for example, being that –according to the training discipline– the educational level in which a student is prepared determines the degree of acquisition, the levels of proficiency and the role that disciplinary research plays in his profile. Therefore, it is considered necessary to make a brief conceptual exercise to situate the view

from which research training and research competence are understood in the university context.

Serrano et al. (2024) talk about the importance of basic research skills for a teacher in training, among which are knowing how to ask, observe, reflect, propose. These skills are essential for employing technologies and improving interpersonal, cognitive, procedural and communicative relationships. Therefore, they suggest that educational research should be a means to problematize and thus better know the field of training and how to intervene in it.

For its part, *educational research* refers to studies for the search for knowledge that contribute to explaining and understanding certain phenomena or disciplinary problems (Navas-Aparicio, 2021), from a theoretical-methodological rigor that allows to investigate sufficiently grounded objects of knowledge to be able to approach educational phenomena provided with disciplinary knowledge but also with a set of principles that must be distinguished by the person who learns to investigate.

In this regard, it is worth noting that “Research ethics is increasingly known as an important element in the professional training and development of all types of researchers—in the academia, government and industry—and at all levels, from students to professional researchers” (Knight, 2023, p. 1).

As seen from any discipline, academic communities can inquire about ICT applied to teaching on their objects of interest in an educational context: teaching practice, the teaching-learning-evaluation process.

The concept *investigative competencies* is a category linked to the acquisition and development of disciplinary knowledge that allows a student to build and base objects of his discipline, as well as to skills related to the methodological for the planning, design and the collection of empirical data; all this with values and attitudes that allow university students to size, understand, reflect on the importance of research (Juárez Popoca & Torres Gastelú, 2022), to contribute to the understanding of problems linked to the training disciplines.

Therefore, those teachers who promote the learning of research require having research, pedagogical or didactic skills. With research they refer to:

The ability to mobilize a set of resources (knowledge and know-how), in a defined context, i.e.

to articulate knowledge, skills and behaviors to integrate them [into their pedagogical practice], supported by the methodology that implements it. (Balbo 2015, p. 29)

Thus, pedagogical competencies are skills to plan, design and intervene strategically in the teaching-learning-evaluation processes; areas where the didactic allows the teacher to know how to use resources to address curricular contents. As said by Kanobel et al. (2023), digital teaching skills in university teachers would mean recognizing the possibilities of technology for designing environments that innovate teaching and learning; these authors also point out the way in which its use has been revitalized after the lived pandemic.

Nowadays, at the higher level and particularly in the postgraduate programs, the use of technological resources has been incorporated from an infrastructure that provides its university students with Internet access, the provision of educational platforms and computer equipment. This has required teachers to develop digital skills to effectively manage information. In addition, a pedagogical practice linked to the use of technologies has involved the transformation of education, favoring active and innovative methodologies that “achieve a functionality of learning” (De la Cruz Campos, 2023, p. 3), and where the teacher is key.

In this perspective, when talking about technological competences, it is to recognize capabilities “to select and use a variety of technological tools in a relevant, responsible and efficient way” (Ministerio de Educación Nacional, 2013, p. 31) that favor innovative educational practices; therefore, a university teacher who teaches research, must have broad attributes that allow him to: know disciplinary objects of study, know the use of ICT for curricular contents, design technology-mediated learning environments, as well as the way in which AI can facilitate the design of learning strategies such as the production of knowledge and acquired skills in the context of research training.

A common point among education experts is that ICT innovates education by enabling the construction of novel learning environments (Ministerio de Educación y Formación Profesional y Administraciones Educativas de las Comunidades Autónomas, 2020; Martínez, 2020; Castañeda et al., 2020). Hence, Artificial Intelligence demands advanced

digital competences, in teachers as in university students, to enhance experiences that favor the integral formation of university students; for which it is important that both educational agents have digital domains (SEP, 2020).

In the educational field, Moreno (2019) proposes the analysis of AI from three approaches: “intelligent conversational software agents or more commonly called chatbots, the creation of Online platforms for self-learning and, finally, educational robotics” (in Macías Moles, 2021, p. 15). In the first case, it is a technology that allows interaction between users and conversation, from the generation of instructions (*prompts*). Chatbots (generative AI) would be the best example. For example, a teacher can teach with online platforms, while a student learns in a guided or autonomous way. Finally, robotics promotes a relationship with the student that allows him to develop his creativity and imagination (Macías Moles, 2021).

In this perspective, the development of mobile devices has been key, because through them, there is access to virtual learning environments, such as the AI applications of Google, Microsoft and ChatGPT, technologies that favor real-time interactivity, access and appropriate information related to teaching and disciplinary learning; resources, also available to produce teaching materials in audio, image, video or text.

The UNAM (2023) has just published a notebook with a series of considerations for the responsible use of AI, recognizing the important progress and its inclusion in university educational processes, for which it demands to promote a critical and reflective attitude towards it, starting from familiarizing with its language, the uses that can be given, the way in which it should influence the evaluation, as well as the ethical in its use.

It is worth noting that there are also divergent views ranging from proposals to ban these tools to advocating for changes in curricula and assessment formats. Agencies like UNESCO seek to address the various challenges and opportunities presented by AI by developing multifaceted guides and recommendations. These include AI planning, AI management for education, the use of AI for learning and assessment of learning, AI with gender equity and for gender equality, and AI to support teaching and teachers, among others (UNESCO, 2019).

In this perspective, the student must be an active subject, especially when using the IAGen,

since it allows interaction and feedback between him and the resource, where teaching mediation must be key, being able to make suggestions about the type of information that his learning requires; in the understanding that the “IAGen concentrates knowledge of various areas of study, so that it can be asked to behave as a reviewer, advisor or issuer of recommendations instantly” (UNAM, 2023, p. 25).

1.1 Approaches to a state of knowledge

Like all new technology, AI has caught the attention of epistemic communities, particularly among those trained in graduate programs, some of which have academic backgrounds. Therefore, it is particularly interesting the documentary investigations that have been published, on AI, in the educational context (Carbonell-García et al., 2023), where sources that have addressed AI in education are systematized, emphasizing its importance to innovate educational practices and the improvement of teaching. On the other hand, there are studies where the human and its relationship with the machine are analyzed in the light of digital skills that can enhance the use of educational platforms (Bonani, 2020, p. 43).

Chávez Solís et al. (2023) highlight the role of AI in handling large volumes of information, which greatly facilitates academic work, when it comes to systematizing and appropriating information linked to research projects. Meanwhile, Melo Hanna et al. (2023), carry out a documentary study whose objective was to show the role that AI can play in education. They take as theoretical constructs: online platforms, personalized education, *Deep learning*, educational robotics, *machine learning* and *chatbots*. Recognizing the thematic breadth of AI, they underscore the importance of AI in transforming the experiences of teaching and learning around the world (2023).

The interest in AI—as an object of knowledge—finds in engineering its natural field. For example, Alonso Astruga (2021), motivated by the design of a *chatbot* that responded to the needs of the user, aims to make a “methodological proposal for analyzing the requirements and design of *chatbots*, of questions and answers” (p. 2), for which he implements a methodology that allows him to develop a system and a *chatbot* prototype. As an author, he observes that, although he achieved the objectives, he recognizes the lack of information that fed the prototype to facilitate “certain

functions” (2021, p. 87), to the user. As for education, he says: “the roles that the *chatbot* can take in communicating with students have been demonstrated” (p. 91), where the questions and answers are the generators of interactive learning.

For his part, Martínez Díaz (2021), develops a *chatbot* and a Web application for child learning. The goal was to create the conversational interface for both technologies that would explain meteor classification to children. For this author, AI for educational purposes has played an important role, as a result of communication and interactivity in its use; which is why *chatbots* have a potential to promote learning, without this supposing the replacement of the teacher, but student learning focused on questions that allow the consultation of concepts and dialog on various topics. Martínez Díaz (2021) points out that an AI also contributes to inclusive, equitable and quality education.

Pedraza Caro (2023) investigates AI in its social dimension. Recognizing its advantages and the dilemmas involved, the objective is to “Identify the main risks, challenges and opportunities of Artificial Intelligence in society, in the coming years” (p. 2). After a documentary review of its evolution, the author highlights the impact that AI has had in various professional and disciplinary fields. In the conclusion the author speaks of the “imminently powerful opportunity” (p. 43) of AI, but also of the dilemmas and risks if an ethical attitude is not assumed in its employment and areas of use. On the challenges, the author refers to “the labor and gender gap” (p. 46), seen in industry 4.0.

Meanwhile, Akgun and Greenhow (2022) and Wang and Cheng (2021) agree on their studies on the application of AI in K-12 educational environments (primary and secondary), with the former in the United States and the latter in Hong Kong. Both groups of researchers highlight the ethical and social concerns related to the implementation of AI and the need for teachers to have a solid pedagogical understanding of this technology. However, while Akgun and Greenhow view AI as a positive resource that enhances teachers’ educational experiences, Wang and Cheng identify first- and second-order barriers. These barriers include the pedagogical integration of AI into the curriculum, resistance to change by teachers, and the perception of AI as a threat rather than an educational tool. Liu et al. (2023) conclude that most Chinese scholars support the careful inte-

gration of AI tools into education, viewing them as a tool for personalized learning.

Finally, the work “Artificial Intelligence as an educational resource during the initial training of teachers” (Ayuso-del Puerto & Gutiérrez-Esteban, 2022) recognizes the way in which AI facilitates the personalization of learning. The methodological design was mixed for which authors used a closed questionnaire and open interviews. 76 initial training teachers participated. Among its results, it is highlighted that in items on the ease of using AI, as well as its importance for the development of educational projects, the participants showed indifference (52.6% and 43.4%, respectively), while 42.1% said they felt insecure to design academic projects with this tool, which does not prevent 55.3% from accepting the possibility of using it in future projects. The authors conclude by talking about the redefinition of the teaching role, linked to the creation of resources and the development of technological skills. They note that, although there are uncertainties about the ease of using AI, those who participated in the study ended up positively assessing its use, considering “its pedagogical potential, coming to recognize the usefulness of AI in the teaching process and recommend its use to other teachers” (2022, p. 354).

After reviewing the literature, it is pertinent to know that students who are trained in research face challenges to master different competencies related to the design of the research, its theoretical foundation, data analysis, interpretation, as well as the partial or total presentation of the results. However, there are processes that can be facilitated with ICT.

Cárdenas (2023) points out that AI allows to reduce the time in the conduction of different activities so that students can focus on those that favor the development of higher order skills: processes of analysis, interpretation and reflection of results. However, there is also a risk of employing AI tools that weaken cognitive skills, which has generated an

academic debate about the use of this technology in research training.

In the coming decades, AI is expected to have a significant impact on scientific creativity and the way in which social phenomena are addressed, which is why researchers in training must take advantage of the opportunities implied by using different technologies (Torres-Gómez, 2023).

In this sense, the variable *research competencies* and attitudes to the use of AI by graduate students (Specialty, Master’s and Doctorate) are particularly interesting, since the use of applications linked to AI does not depend only on their access, but on the attitudes of the students towards their use in training processes and in the development of research competencies.

This has been the focus of the research reported here, considering relevant to analyze the attitudes of postgraduate students against a complex and dialectical dynamic that involves using ICT in their research training at the graduate level.

2. Methodology

The research was carried out from a non-experimental descriptive design, with a quantitative approach, the objective to analyze is the attitude of graduate students in Social Sciences and Humanities to use AI as an educational resource in their research training process.

For developing the research, the online questionnaire *Artificial Intelligence and Research Training* was designed, which allowed generating information that answered the question: What is the attitude of postgraduate students in the use of AI tools during their training as researchers?

The instrument was organized in five dimensions based on different authors (Table 1) and constituted with Likert scale indicators with five response options ranging from 1. Totally disagree, 2. Disagree, 3. Neutral, 4. Okay and 5. I totally agree.

Table 1. *Dimensions of AI and Researcher Training*

Dimension	Concept
Perception of AI in Research	Learning uses of AI to promote learning situations that strengthen research processes (Ng et al., 2023).
Applicability of AI in Teaching – Learning and Evaluation processes	Some of the applications that have been used in the teaching-learning process through AI enhance the personalization of learning, automated evaluation, intelligent tutoring (González-González, 2023).

Ethics of AI in Research	Fundamental issues and principles based on responsibility, privacy, equity and explicability must be addressed (Villas and Camacho, 2022).
Future of AI in research	Among the possible scenarios of the use of AI in research processes in the future are: a) greater access to a variety of tools, b) training and c) acceptance of the use of AI by academics; while highlighting some barriers such as the misuse of AI, increasing inequalities, lags in digital matters (Cárdenas, 2023).

2.1 Sample frequency and characteristics

The research was carried out in August-October of 2023 in ten institutions of higher education that offer postgraduate programs related to the Social Sciences and Humanities, five of them public and 5 private, in which 118 subjects participated. The student population consisted of 72 women (61%) and 46 men (39%). In terms of age, it ranged from 23 to more than 53 years, with the range representing a greater percentage of those aged 23 to 27 years with 24.6% and the lowest being over 53 with 6.8%. The studies that take 44.9% are master's degrees, 32.2% doctorates and 22.9% at specialty level.

In terms of availability and access to technology, 100% have their own devices to access the internet, the place of connection is 73.7% at home, 23.7% at work, 1.7% at the University and 0.8% in another

space. As for their connection time, 61% report more than nine hours a week; 28% between four to nine hours a week and 11% one to three hours a week.

The types of content that the student seeks in these hours is linked to the area of disciplinary training 37.3%, to general information 27.1%, to the research project 22%, to entertainment and leisure 13.6%.

3. Results

The data processing was carried out through the SPSS V25.0 *software*, and the normality of the results was verified with the *Kolmogorov-Smirnov* test for selecting the type of statistic to be used.

Table 2 integrates the processing, the proportion of AI applications or sites that reported knowing and using key informants.

Table 2. Distribution of known and used applications

Application	Have knowledge		Use it	
	Cases	Percentage	Cases	Percentage
Open IA playground	28	23.7 %	28	23.7 %
Rytr.me	4	3.4 %	4	3.4 %
Elicit.org	3	2.5 %	3	2.5 %
Tldr.this	3	2.5 %	3	2.5 %
Boomy	10	8.5 %	10	8.5 %
CALL-E	7	5.9 %	7	5.9 %
Chat GTP	74	62.7 %	74	62.7 %
Synthesia.ai	5	4.2 %	5	4.2 %
Research Rabbit	11	9.3 %	11	9.3 %
ChatPDF	21	17.8 %	21	17.8 %
No	16	13.6 %	33	28.0 %

Table 3 describes the items, organized by dimension. To determine the internal consistency, the *Cronbach* alpha statistic was used, obtaining a high overall coefficient (Alpha = .987) for each dimension, as shown in table 3.

Likewise, the *Spearman rho* statistic was used to find the levels of association between the dimen-

sions, since the data did not follow a normal distribution. As seen in table 3, the correlation coefficients have a medium-high level and have very high significance for their level of association.

Table 3. Descriptive, internal consistency and dimension association coefficients

Dimension	Average	Typ. Dev.	Cronbach Alpha	2	3	4	5	6	
1	Perception of AI in Research	3.64	1,122	0.935	.771**	.658**	.665**	.538**	.764**
2	Training and use of AI in research	3.61	1,042	0,927		.730**	.733**	.556**	.754**
3	Application of AI in the teaching-learning process – assessment	3.75	1,055	0,950			.732**	.707**	.737**
4	Benefits and challenges of AI in Research	3.60	1,053	0,965				.636**	.697**
5	Ethics and responsibility in the use of AI in research	4.02	1,189	0,983					.636**
6	Future of AI in Research	3.71	1,137	0,965					

** = p < .01

Additionally, after generating the scales by dimension and global, the case distributions for the three levels were obtained, as shown in table 4.

Table 4. Scales for each dimension

Level	Perception of AI in the research		Type and use of AI in the research		Use of AI in the teaching – learning process - assessment		Benefits and challenges of AI in the research		Ethics in the use of AI in the research		Future of AI in the research		Global		Perceptiof the AI in the research	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
High	68	57.6	74	62.7	77	65.3	71	60.2	83	70.3	67%	56.8	80	67.8		
Medium	32	27.1	27	22.9	23	19.5	30	25.4	21	17.8	34	28.8	23	19.5		
Low	18	15.3	17	14.4	18	15.3	17	14.4	14	11.9	17	14.4	15	12.7		

Discussion and conclusions

Based on the data presented, it is worth mentioning that the master student is interested in the knowledge and use of AI applications, focused on tools such as *OpenAI Playground*, *ChatGPT* and *ChatPDF*. These platforms represent a differentiated set of resources that make it easier to explore and experiment with AI in research training from different didactic perspectives.

In the case of *OpenAI Playground* it represents an interactive environment that students them to experiment with AI models, modifying parameters and observing how these changes affect the model's performance in real time. In this sense, it is a useful tool to understand fundamental concepts of AI and

experiment with machine learning algorithms in an accessible and practical way.

As for *ChatGPT*, by its nature as a language model, master students use it to interact with AI, providing them with coherent and contextual responses from given instructions. This is an opportunity for graduate students to explore the potential of AI as a virtual assistant, content creation, and dialog generation. Meanwhile, *ChatPDF* allows them to automate reading, synthesizing important ideas, and generating document summaries in PDF format.

The favorable attitude of master students towards the diversity and ease of access to applications reflects their recognition of the development and presence of AI in any academic and professional field, i.e. “virtual interaction, regulated by the parameters of AI allows to ease learning, since support mechanisms will be available, when neces-

sary, regardless of the time and space of the user” (Ocaña et al., 2019, p. 538). These digital alternatives allow them to familiarize themselves with key concepts, experiment with information, communication, knowledge and digital learning technologies (TICCAD) (SEP, 2020) and explore their potential applications, providing them with a range of resources in support of research in their fields of knowledge.

It is appropriate to highlight the measurements associated with the ethical dimension and responsibility in the use of AI in research, in the understanding that UNESCO (2022, p. 34) demands “to encourage research initiatives on the responsible and ethical use of AI technologies in teaching, teacher training and e-learning...”. Those who have participated in this study, consider relevant the practices of data and information collection, processing and critical analysis, as well as the integration of research results and reports of information or data, attached to the reliability and codes of academic honor essential for a scientific investigation.

In this context, one of the contributions of this study is to recognize that, beyond the use of AI as tools for the management of large volumes of information and the production of content, the contributions of AI must be harmonized with the necessary conviction of substantiating valid argumentative-discursive inputs, with sufficient scientific solidity and depth, typical of the competencies and metacognitive attributes of those who are formed in the university and its postgraduate courses. In this sense, it is confirmed the relevance of ICT to facilitate comprehensive educational processes (Chávez Solís, 2023), in which the training itinerary lived by the graduate student is transformed by the way in which it is taught and learned, and it presents evidence of learning typical of research, but assisted by AI, which allows strengthening research skills among university students (Juárez Popoca & Torres Gastelú, 2022).

One of the limitations of this study is that it focuses on postgraduate training in Social Sciences and Humanities in Mexico, so other fields of knowledge could be incorporated in later studies to assess the attitudes that students with other different epistemic trajectories may have about the use of AI in their research training; including teachers who teach courses in research methodology.

Finally, it is urgent that university teachers strengthen their disciplinary, pedagogical and digital domains to enhance the use of ICT in TICCAD (SEP, 2019), where AI offers alternatives to transform the teaching of research as the development of research skills.

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