AUTONOMIA DOS PESQUISADORES EDUCACIONAIS EM SUAS PRÁTICAS DE USO DE INTELIGÊNCIA ARTIFICIAL

AUTONOMY OF EDUCATIONAL RESEARCHERS IN THEIR PRACTICES OF USING ARTIFICIAL INTELLIGENCE

AUTONOMÍA DE LOS INVESTIGADORES EDUCATIVOS EN SUS PRÁCTICAS DE USO DE LA INTELIGENCIA ARTIFICIAL

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RESUMO

Neste estudo caracterizamos as relações que os pesquisadores educacionais estabeleceram com a autonomia em situações em que eles fizeram uso de Inteligência Artificial (IA) em suas práticas científicas. Os procedimentos metodológicos basearam-se na abordagem qualitativa e na técnica de Análise de Conteúdo (AC), considerando as categorias de um instrumento analítico que elaboramos. Os dados foram provenientes de relatos apresentados pelos pesquisadores a respeito das suas práticas de pesquisa e das suas relações com a autonomia e IA. Dentre os resultados caracterizamos as relações dos pesquisadores com a autonomia, em situações de uso de IA vinculadas ao exercício e não exercício da ética, de habilidades políticas, e do desenvolvimento do próprio conhecimento. As situações de uso de IA envolveram onze tipos de práticas realizadas pelos pesquisadores, condicionadas à critérios relativos à manutenção do rigor científico das suas produções. Concluímos a respeito das caracterizações e contribuições da autonomia e do uso da IA para a formação e trabalho dos pesquisadores educacionais, e da importância do estabelecimento de normas que determinem condições e limites para a aplicação de IA nas práticas científicas educacionais. Por exemplo, regular o uso de IA sob a revisão sistemática das produções, pelos pesquisadores/orientadores, com atenção à autenticidade e veracidade dos dados e do conhecimento produzido, e às exigências da objetividade, do rigor teórico, da coerência lógica e da consistência metodológica. Para finalizar, propomos possíveis encaminhamentos para estudos futuros.

Palavras-chave: Autonomia. Inteligência Artificial. Formação de pesquisadores educacionais. Pesquisa em Educação.

ABSTRACT

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In this study, we characterize the relationships that educational researchers established with autonomy in situations in which they used Artificial Intelligence (AI) in their scientific practices. The methodological procedures were based on the qualitative approach and the Content Analysis (CA) technique, considering the categories of an analytical instrument that we developed. The data came from reports presented by the researchers regarding their research practices and their relationships with autonomy and AI. Among the results, we characterize the researchers' relationships with autonomy, in situations of AI use linked to the exercise and non-exercise of ethics, political skills, and the development of their own knowledge. The situations of AI use involved eleven types of practices carried out by the researchers, conditioned by criteria related to maintaining the scientific rigor of their productions. We conclude with respect to the characterizations and contributions of autonomy and the use of AI for the training and work of educational researchers, and the importance of establishing standards that determine conditions and limits for the application of AI in educational scientific practices. For example, regulating the use of AI through systematic review of productions by researchers/advisors, with attention to the authenticity and veracity of the data and knowledge produced, and to the requirements of objectivity, theoretical rigor, logical coherence and methodological consistency. Finally, we propose possible directions for future studies.

Keywords: Autonomy. Artificial Intelligence. Training of educational researchers. Research in Education.

RESUMEN

En este estudio, caracterizamos las relaciones que los investigadores educativos establecieron con la autonomía en situaciones donde utilizaron la Inteligencia Artificial (IA) en sus prácticas científicas. Los procedimientos metodológicos se basaron en el enfoque cualitativo y la técnica de Análisis de Contenido (AC), considerando las categorías de un instrumento analítico desarrollado por nosotros. Los datos provinieron de informes presentados por los investigadores sobre sus prácticas de investigación y sus relaciones con la autonomía y la IA. Entre los resultados, caracterizamos las relaciones de los investigadores con la autonomía, en situaciones de uso de la IA, vinculadas al ejercicio y no ejercicio de la ética, las habilidades políticas y el desarrollo de su propio conocimiento. Las situaciones de uso de la IA involucraron once tipos de prácticas realizadas por los investigadores, condicionadas por criterios relacionados con el mantenimiento del rigor científico de sus producciones. Concluimos respecto a las caracterizaciones y contribuciones de la autonomía y el uso de la IA para la formación y el trabajo de los investigadores educativos, y la importancia de establecer estándares que determinen las condiciones y los límites para la aplicación de la IA en las prácticas científicas educativas. Por ejemplo, la regulación del uso de la IA mediante la revisión sistemática de las producciones de investigadores/asesores, prestando atención a la autenticidad y veracidad de los datos y el conocimiento producidos, así como a los requisitos de objetividad, rigor teórico, coherencia lógica y consistencia metodológica. Finalmente, proponemos posibles líneas de investigación para futuros estudios.

Palabras clave: Autonomía. Inteligencia Artificial. Formación de investigadores educativos. Investigación en Educación.

INTRODUCTION

Research on the learning processes and professional practices of educational researchers has been expanded and diversified over the years, in response to the demands of training courses, and in correspondence with the development of the "Education" area as a field of research (MACHADO; ARRUDA; PASSOS, 2024).

Among the results, some challenges have been presented regarding essential requirements for the training of researchers, and for the maintenance of the quality of research in Education. For example, training for the ethical performance of researchers and for professional practice with a focus on scientific rigor (ANDRE, 2006; GATTI, 2010; BERKENBROCK-ROSITO, 2019), and in the exercise of autonomy (SEVERINO, 2015).

In this scenario, we have dedicated ourselves to understanding the relationships that educational researchers establish with their own autonomy, ethics, politics, and the development of knowledge; and the relevance of these relationships for their processes of scientific training and production (MACHADO; ARRUDA; PASSOS, 2024).

In these studies, when we analyze the practices of researchers in different contexts, we identify relationships that need more detailed descriptions. For example, the relationships that involve autonomy and the use of Artificial Intelligence (AI) in the practices carried out by researchers for their training and production processes.

In response, we developed this investigative proposal with the objective of characterizing the relationships that educational researchers established with their own autonomy in situations in which they made use of AI as a tool to assist them in their productions.

To communicate our proposal, we have organized this article into five sections. In the first two we present the theoretical assumptions that we have adopted regarding the autonomy of the educational researcher; and AI applied to Education and scientific production practices.

Then, in the Methodology section, we discuss the methodological procedures we adopted for the collection and analysis of research data. Next, in the Results section, we present the analytical instrument that we have developed and communicate the results obtained and our interpretations. Finally, in the Conclusion section, we conclude on the characterizations of the autonomy of researchers in the practices of use of AI applied to training and professional performance, with emphasis on the relevance of the freedom and interest of researchers, the establishment of norms for the use of AI in scientific production associated with the maintenance of scientific rigor and the exercise of ethics; and we end with possible referrals for future studies.

AUTONOMY OF THE EDUCATIONAL RESEARCHER AND THE ANALYSIS OF ITS RELATIONS

From the study of the literature on the relations with the autonomy of educational researchers, in different contexts of action and training (ANDRE, 2006; GATTI, 2010; FARTES, 2014; SEVERINO, 2015; BERKENBROCK-ROSITO, 2019; SAVI NETO; FARE; SILVA, 2020; MAYAN; MEDEIROS, 2021; CAREGNATO; MIORANDO; LEITE, 2022), we define the educational researcher as "[...] the professional who chooses Education as a reference center, the focus of knowledge of his studies; and is dedicated to highlighting, through scientific research, multiple understandings regarding the educational phenomenon" (MACHADO; ARRUDA; PASSOS, 2024).

From this perspective, in order to carry out their practices, the educational researcher participates in various activities, involving different places, people and technologies; and acts under different conditions. For example, under autonomy – a condition of the researcher exercised according to the presence and/or absence of his interest and freedom to think and act (MACHADO; ARRUDA; PASSOS, 2024).

In studies on such processes, we identified that researchers' relationships with autonomy are linked to inherent elements of scientific practice such as ethics (SEVERINO, 2015), political skills, and knowledge (BERKENBROCK-ROSITO, 2019; SAVI NETO; FARE; SILVA, 2020; MAYAN; MEDEIROS, 2021; CAREGNATO; MIORANDO; LEITE, 2022).

In general, the relationship between autonomy and ethics concerns the actions carried out by the researcher based on the fulfillment, or non-compliance, of a set of criteria, rules and ethical norms that govern scientific research. This set is defined by the manuals of Scientific Methodology and by the norms of the institutions, ethics committees, and the councils and groups involved in the projects that the researcher participates in throughout his training and work (SEVERINO, 2015).

Among other reasons, the exercise of ethics by the autonomous researcher may be linked to his concerns with the maintenance of the scientific rigor of his research, that is, "[...] objectivity, epistemological rigor, logical coherence, methodological consistency", associated with attention to the authenticity and veracity of the data and knowledge produced (SEVERINO, 2015, p. 786-787). Consequently, relationships with ethical components also involve the exercise of values such as responsibility (BERKENBROCK-ROSITO, 2019) and truth.

With regard to autonomy and politics, their relations are related to the researcher's actions that depend on the exercise of political skills. For example, the practice of interlocutions to negotiate resources for research, with people, institutions, councils, etc.

Consequently, such relationships demand the exercise of political values, such as dialogue (BERKENBROCK-ROSITO, 2019); and the development of strategies in environments limited by authorities, fundamental for social relations, and problem solving (FARTES, 2014; SAVI NETO; FARE; SILVA, 2020; CAREGNATO; MIORANDO; LEITE, 2022).

With regard to autonomy and knowledge, their relations involve the researcher's actions carried out from epistemic activities with the purpose of expanding his own scientific knowledge, the interpretations of his objects of study and research, and developing strategies that enable him to carry out the activities mentioned in relation to ethics and politics. and the other activities involved in their productions and in their own training.

Among such epistemic activities, the practices of individual reflection stand out; and the development of modes of reasoning characteristic of scientific research, such as moments of individual isolation for the interpretation and adequacy of projects, and for problem solving (BERKENBROCK-ROSITO, 2019; SAVI NETO; FARE; SILVA, 2020; MAYAN; MEDEIROS, 2021).

Furthermore, in contexts in which researchers act as teachers (researcher-teachers), the relationships with autonomy and scientific practice are also considered, in activities and reflections that they carry out from the exercise of teaching (FARTES, 2014; MAYAN; MEDEIROS, 2021).

The study of these relationships regarding autonomy, ethics, politics, knowledge and teaching, enabled us to develop an instrument for analyzing the autonomy of the educational researcher. Details about its composition can be analyzed in Chart 1.

Note in Chart 1 that the proposed analytical instrument is composed of a 3x3 matrix – with 3 rows and 3 columns, in which the categorized data are interrelated. In other words, the relations organized along the lines of the instrument – ethics, politics and knowledge, can establish connections with the relations organized in column 3, with interest and freedom.

As a result of these connections, 12 descriptive combinations or 12 categories of a priori analysis can be considered to characterize the autonomy of the researcher. They are:

a) Line 1 – autonomy and its relations with ethics under the presence of interest (1), and freedom (2), and under the absence of interest (3), and freedom (4).

b) line 2 – autonomy and its relations with politics under the presence of interest (5), and freedom (6), and under the absence of interest (7), and freedom (8).

c) line 3 – autonomy and its relations with knowledge under the presence of interest (9), and freedom (10), and under the absence of interest (11), and freedom (12) (Machado; ARRUDA; Passos, 2024, p. 13).

Chart 1 – Instrument for analyzing the autonomy of the educational researcher

Elements related to the autonomy of the researcher	Descriptions of the elements	Variables: interest and freedom and their descriptions
Ethics	It concerns the researcher's relations with his autonomy, established under the exercise and/or non-exercise of ethics; the compliance/non-compliance with the ethical norms that regulate scientific research (SEVERINO, 2015); the ethical values that the researcher must have in his formative and productive process (BERKENBROCK-ROSITO, 2019). Relationships can be observed in activities, such as the collection and treatment of data, the processes carried out to publish the works produced, the dealings with the advisor and other superiors (SEVERINO, 2015).	It involves the researcher's relations with autonomy under the presence/absence of interest and freedom about research practices with ethical components.
Politics	It concerns the researcher's relationships with his autonomy, established from dialogues and strategies of interlocution, to build teams, research projects, negotiate with supporters, funders and research councils (SAVI NETO; FARE; SILVA, 2020); to build a favorable environment for research, limited by authorities (CAREGNATO; MIORANDO; LEITE, 2022); negotiate needs, spaces, times, resources. They can also be linked to the researcher's teaching practice (FARTES, 2014).	It involves the researcher's relations with autonomy under the presence/absence of interest and freedom about research practices with political components.
Researcher's knowledge	It concerns the researcher's relationships with his autonomy relative to the practice of individual reflection, modes of reasoning characteristic of scientific research, such as moments of individual isolation for the interpretation and adequacy of research projects, and for the resolution of problems (MAIA; MEDEIROS, 2021; BERKENBROCK-ROSITO, 2019; SAVI NETO; FARE; SILVA, 2020). It may involve the development of the researcher's reflections based on teaching practice; modes of reasoning characteristic of research articulated with teaching (MAIA; MEDEIROS, 2021).	It involves the researcher's relations with autonomy under the presence/absence of freedom and interest in research practices that refer to the researcher's knowledge.

Source: Machado, Arruda and Passos (2024).

To analyze the data that make up this study, we considered the 12 categories organized in Chart 1 regarding autonomy. And, with regard to the analysis of the relationships of researchers with the practices of AI use, we consider the following theoretical assumptions, and the emerging categories presented in the continuity.

ARTIFICIAL INTELLIGENCE IN EDUCATION AND IN THE PRACTICES OF THE EDUCATIONAL RESEARCHER

Artificial intelligence, or AI, has been described in the literature for quite some time, with historical milestones in the 1940s to the 1950s. For example, the article by Warren McCulloch and Walter Pitts (1943), on the first computational model of networks of neurons; the work of Allan Turing (1950), on the sufficiency of machine actions through tables of configured behaviors, and the Imitation Game (Santo, 2019); and the discussions and presentation of the term "artificial intelligence" in 1956, at the first AI conference at Dartmouth College (IBM, 2024).

After this period, several studies were presented adding up to decades of productions and technological advances related to the use of AI. As a result, one can find several definitions and applications attributed to AI in different areas of knowledge.

In general aspects, with regard to its technological definitions, we can consider AI as a set of differentiated technologies, developed from advanced forms of programming and data processing models, which enable computers and machines to simulate the ability to solve problems, and other forms of human action and thought (BOSTOM; YUDKOWSKY, 2018; ARRIETA ET AL., 2020; BENGIO; LECUN; HINTON, 2021; LECUN; 2022; BENGIO; MALKIN, 2023; GOODFELLOW; CHEN; SHLENS, 2023; IBM, 2024).

In Education, these technologies have been used, among other applications, as educational support, to assist students and professionals in their learning processes. Investigations into its uses present, for example, the positive and negative aspects of AI for learning, and the relationships of learners in activities related to academic, professional, and social training (LEVY, 2016; 2021; BANNEL ET AL., 2016; CEVHER; YILDIRIM, 2023; ALMEIDA; SANTOS, 2021; WEHR; BALUIS, 2023; COSTA; SANTOS; JUNIOR, 2024; LOPES; FORGAS; CERDA-NAVARR, 2024).

Considering the objective we proposed for this investigation, we discuss AI in the practices of educational researchers based on the study by Cevher and Yildirim (2023), regarding the use of AI by undergraduate students, in research activities and textual production; and the research by Lopes, Forgas, and Cerdà-Navarr (2024), on the use of AI in graduate studies, by researchers in training, in their processes of producing articles, dissertations, and theses.

In the study by Cevher and Yildirim (2023), reports from undergraduate students were analyzed regarding their practices of using AI in research on academic topics, translations, and text production. At the time, the students' practices were carried out exclusively in an AI-based application, which had its functions and limits of use previously configured by the teachers.

According to the authors, students highlighted positive aspects of using AI, such as ease of use; access to quick, comprehensive, detailed, and clear answers; and quality of personalized information (CEVHER; YILDIRIM, 2023).

However, they also pointed out negative aspects related to the lack of naturalness of the AI's responses, failures to indicate the theoretical references that supported some of the responses presented by the AI – absence of bibliographic citation, low number of sources of information, and lack of autonomy of the students to configure the AI in order to meet the needs that arose during their research practices (CEVHER; YILDIRIM, 2023).

Considering these results, the authors concluded that, although AI needs improvement to improve the quality of information offered in the academic area, it contributed to learning in various activities carried out by students, which involved the translation and production of texts, search for theoretical references, and general research on academic content (CEVHER; YILDIRIM, 2023).

And, they defined AI in academic learning as technological tools, applications, based on AI, capable of interacting with students to provide support from personalized information, and contribute to learning (CEVHER; YILDIRIM, 2023).

In the study by Lopes, Forgas and Cerdà-Navarr (2024), analyses were carried out of the answers to questionnaires applied to researchers in training, in Master's and Doctoral courses. According to the authors, the deponents pointed out positive and negative aspects about their experiences of using AI, related to scientific rigor and ethical and institutional standards.

Among the positive aspects, the authors highlighted the contributions to creativity, accessibility, and time savings in activities related to the translation of texts; search for theoretical references; and the creation, organization, and written production of academic texts and scientific articles (LOPES; FORGAS; CERDA-NAVARR, 2024).

The negative aspects reported involved the fear of using AI and generating a text of low descriptive and essay quality, citing non-existent or inaccessible references indicated by AI, and engaging in the practice of plagiarism (LOPES; FORGAS; CERDA-NAVARR, 2024).

Based on these results, the authors considered that most researchers demonstrated prior willingness to use AI under "conditional admissibility" – they admitted the possibility of using AI as long as certain criteria were met.

Examples of these criteria are the partial production, and not in whole, of scientific articles with the use of AI – hybrid text (AI and human – produced by AI and reviewed by the researcher); and the use under due attention to the moral, ethical and normative principles of educational institutions. Among the principles and norms, the authors

highlighted attention to avoid plagiarism and self-plagiarism; and the practice of communicating, in the work, that its production involved the use of AI.

Based on these assumptions, we analyze the relationships with autonomy and AI established by the researchers we investigate. Details about the methodological procedures we adopted for the analyses are presented below.

METHODOLOGY

In this study we aimed to characterize the relationships that educational researchers established with their own autonomy in situations in which they made use of AI as a tool to assist them in their scientific productions.

The participating subjects were nine educational researchers linked to Higher Education Institutions (HEIs), in which they worked as teachers and researchers, and/or as doctoral students in graduate courses in the area of Science Teaching and Mathematics Education.

To carry out this investigation, we adopted a qualitative approach guided by the descriptions of Bogdan and Biklen (2003). Accordingly, we consider the free consent of participants, the right to anonymity and protection from harm; the formation of the *corpus* from predominantly descriptive data; and analyses under techniques capable of representing the perspectives of the participants.

Under these guidelines, the data were composed of researchers' reports on their research practices, in situations that involved their own autonomy and the use of AI.

Data collection consisted of the application of an *online* questionnaire, available on the *Google* Forms platform. The questionnaire consisted of an introductory part, which informed the interviewees about the characteristics and objectives of the research[4], and the condition of free participation. And by an interrogative part, composed of mixed questions (closed and open).

The closed questions dealt with the Informed Consent Form (ICF), and general information about the deponents. For example, I accept/do not accept to participate in the study, training, and institutional bonding. The open questions required the interviewees to present a fictitious name to be identified in the study, in order to preserve their identities; and questioned them about their relationships with their own autonomy and their practices of using AI for scientific training and production.

[4] This article is part of the postdoctoral project entitled "The autonomy of the researcher under characterizations of the reports of researchers in Science and Mathematics Education", supervised by the researcher Sergio de Mello Arruda, and approved by the Ethics Committee in Research Involving Human Beings, of the State University of Londrina, CAAE 68485223.7.0000.5231 (CEP/UEL opinion 6.060.079).

Data analysis was carried out using the Content Analysis (CA) technique, based on the descriptions of Fiorentini and Lorenzato (2012). Therefore, the stages of reading and rereading the data were considered under the qualitative approach; establishment of meanings, their relationships and organization of data into categories; and interpretation.

The stage of organization into categories was composed of 11 emerging analysis categories regarding the use of AI (related to column 4 of Chart 2, presented in the next section of this article), and 12 *a priori categories* (related to Chart 1, presented in the previous section).

RESULTS

The analyses enabled us to characterize the relationships of educational researchers with autonomy involving different practices of AI use. These practices were mentioned by the interviewees in the context of their processes of scientific training and production, linked to the exercise of ethics, political skills, and the development of knowledge itself.

To present them, we organized the data in the analytical instrument that we developed for this study (Chart 2). Note that this instrument was developed from Chart 1, but resulted in a 4x3 matrix, with an additional column to organize eleven types of AI use practices identified in the researchers' reports about their activities (column 4, Chart 2).

Chart 2 – Instrument for the analysis of researchers' relationships with autonomy and AI

Elements related to the autonomy of the researcher	Descriptions of the elements	Presence/absence of interest and freedom	Practices of using Artificial Intelligence in the researcher's actions
Ethics	It concerns the researcher's relations with his autonomy established under the exercise/non-exercise of ethics; compliance with the ethical standards that regulate scientific research; to the ethical values that the researcher in his formative and productive process is concerned. Relationships can be observed in activities, such as data collection and processing, the processes carried out for the publication of papers, negotiations with the advisor and other superiors (Severino, 2015; Berkenbrock-Rosito, 2019).	It involves the researcher's relationships with autonomy and the use of artificial intelligence under the presence/absence of interest and freedom about research practices with ethical components.	1 – General surveys; 2 – Literature review; 3 – Text Translation; 4 – Plagiarism and self-plagiarism scanner; 5 – Production of images; 6 – Video production; 7 – Preparation of a script for the presentation of scientific papers; 8 – Elaboration of instruments for data collection. For example, questionnaires; 9 – Textual production – in whole
Politics	It concerns the researcher's relationships with his autonomy established from dialogues and interlocution strategies, to build teams, research projects, negotiate with supporters, funders and research councils; to build a favorable environment for research, limited by authorities; negotiate	It involves the researcher's relations with autonomy and the use of artificial intelligence under the	

	needs, spaces, times, resources, etc. They can be linked to the researcher's teaching practice (Savi Neto; Fare; Silva, 2020; Fartes, 2014. Caregnato; MIORANDO; Leite, 2022).	presence/absence of interest and freedom about research practices with political components.	or in parts of articles, theses, etc. For example, the elaboration of research objectives to compose an article; paraphrases – rewriting of texts authored by the researcher himself, and/or texts by other authors; 10 – Data transcription; 11 – ABNT Formatting;
Knowledge	It concerns the researcher's relations with his autonomy related to the practice of individual reflection, modes of reasoning characteristic of scientific research. For example, moments of individual isolation for the interpretation and adaptation of projects, and for problem solving. It may involve the development of the researcher's reflections based on teaching practice; (Maia; Medeiros, 2021; Berkenbrock-Rosito, 2019; Savi Neto; Fare; Silva, 2020).	It involves the researcher's relations with autonomy and the use of artificial intelligence under the presence/absence of freedom and interest in research practices that refer to knowledge.	

Source: the authors.

To insert the data in this instrument and present them in this section, we accommodated the fragments of analysis – excerpts extracted from the testimonies' reports – in column 1. And we organized tables corresponding to the categories of analysis, related to the relationships with autonomy and the elements: ethics and AI (Chart 3), politics and AI (Chart 4), and knowledge and AI (Exhibit 5).

In order to facilitate the reference to the data presented in these tables, we assigned identification codes to each of the analysis fragments. This coding was composed of the attribution of the initials of the deponents, followed by the number of the fragment analyzed. For example, regarding the deponent Laerte – fragment 1 of his report, we coded as (Laerte1); and fragments 1 and 2 of his account, we coded (Laerte1-2).

Under these premises, we begin with Chart 3, composed of 4 columns and 5 lines, in which the fragments of the researched's reports are organized (column 1); the descriptions of the category of analysis: ethics (column 2); the sentences contained in such fragments, relating to the presence/absence of interest and freedom (column 3); and the practices of using AI (column 4).

Chart 3 – Descriptions of the researcher's autonomy and ethics in AI use practices

Analysis Fragments	Description of the elements	Presence/absence of interest and freedom	Practices of use of Artificial Intelligence
I don't understand this bias with the use of AI. They keep talking about lack of ethics, but we have already used it. We all have the freedom to use it. Who doesn't Google a research topic, collection method? Or, about an author, an article, do you make a translation? Google's new search engine is AI-based. (Laerte1).	It concerns the length and non-compliance with the ethical norms that regulate scientific research	Presence of freedom to act. "[...] we all have the freedom to use it".	General Searches Literature review.
Google translator is an AI too. We are all using	It concerns the	Presence of	Text

them and having these tools helps us to have autonomy, emancipates us to access another language and articles. The problem is the researcher who uses and does not even cite in the methods of the article, which implies ethics. (Laerte2).	ethical values that the researcher must have, such as responsibility	freedom to act. “[...] it helps us to have autonomy, emancipates".	Translation. Literature review.
I use AI to detect plagiarism in the articles I write. Sometimes we can plagiarize unintentionally or self-plagiarize. People will think that you do it because you want to, [...] and all your work will be compromised. We can use this type of tool to create the new, so we always have to take care that our productions are unprecedented and responsible, and AI helps with that. (Sandra1).	It concerns the length/non-compliance with ethical standards; to the ethical values that the researcher must have.	Presence of freedom to think and act. "We can use [...] to create the new	Plagiarism and self-plagiarism scanner.
At my University we have autonomy to access AI. I used it to generate a representative image of data [...] and it represented the results well [...] I cited the source, my advisor gave ok, so everything is within the ethical criteria. I also used it to build a script and record a video for a Congress. (Vane1).	It concerns the length of the ethical norms that regulate scientific research.	Presence of freedom to act "At my University we have the autonomy to access AI".	Image production. Video production. Preparation of presentation.
[...] using AI to write an entire article without changing what the AI writes doesn't roll. It is a way that goes against ethics, although I have not seen any specific norm that clearly delimits the use of AI in research. [...] due to the lack of a standard, there are researchers who think they can't use it and others think they can do anything. It is not known for sure if it can (Renê1).	It concerns the length/non-compliance with ethical standards; to the ethical values that the researcher must have.	Absence of freedom to act “[...] due to the lack of a standard, there are researchers who think they cannot use it".	Textual production of scientific articles.

Source: the data.

Based on the data organized in Chart 3, we characterized the relationships with autonomy, ethics and AI established by the researchers under the presence and absence of freedom to think and act (Laerte1-2, Sandra 1, Vane1, Rene1).

These relationships involved positive and negative aspects of the use of AI linked to the following research activities: data collection (Laerte1), text production (Laerte1-2, Sandra1, Renê1), publication and presentation of papers, and dealings with advisors (Vane1).

Such activities were related to the following practices of AI use: general research, literature review (Laerte1), text translation (Laerte2), plagiarism scanner (Sandra1), image and video production, preparation of script for presentations (Vane1), and textual production of articles (Renê1).

In the relations with autonomy and ethics under the presence of freedom, the interviewees emphasized prejudice and freedom to use AI (Laerte1), and highlighted positive aspects of its use to carry out research activities (Laerte1-2, Sandra1, Vane1).

In these excerpts, the deponents also reflected on the use of AI and compliance with the rules that regulate scientific research. They are: the obligation to communicate, in the

work, that its production involved the use of AI (Laerte2), to have prior authorization from superiors for use (Vane1), and responsibility and commitment to the authenticity of the articles produced (Sandra1).

These results allow us to corroborate Cevher and Yildirim (2023), regarding the characterization of AI as a technological tool capable of contributing to learning, in activities that involve the translation and production of texts, search for theoretical references, and research on general issues about academic content (Laerte1-2).

And to ratify Lopes, Forgas, and Cerdà-Navarr (2024), regarding the possibility of using AI by researchers under "conditional admissibility", linked to the criteria of compliance with ethical and institutional standards, attention to scientific rigor, and prior communication to superiors and readers about the use of AI in productions (Laerte2, Sandra1, Vane1).

Other relations with autonomy and ethics were identified under the absence of freedom, in conducts that were coherent and not coherent with ethics, in the report of researcher Renê. At the time, the researcher pointed out that it is not possible to make use of AI "[...] to write an entire article" without revisions and improvements made by the researchers. And, he emphasized that the practice without revisions "[...] it is a form that goes against ethics" (Rene 1).

In addition, the deponent Renê explained that he does not recognize, in the contexts of his performance, a specific norm that delimits the use of AI in scientific productions. And he considered that the absence of a specific norm prevents the use and confuses researchers about possibilities and limits (Renê1). Renê's considerations expose the current need for actions by teaching and research institutions to regulate the use of AI in scientific production and guide researchers.

This excerpt also confirms Severino (2015), about the components that make up the researcher's code of ethics – which involve the knowledge that students acquire from the study of Scientific Methodology manuals, from dialogue with their peers and professors in training courses, at work, and in research groups; and on the relevance of the code of ethics and well-defined institutional norms to direct the researcher's work.

In the axiological field, we identified relationships in Chart 3 regarding ethical values involved in scientific production processes, such as responsibility (Berkenbrock-Rosito, 2019), in compliance with ethical norms involving the authenticity of articles (Sandra1, Renê1); and the truth about the descriptions presented to the partners and readers about the methods adopted in the research (Laerte2, Vane1).

In the analysis of other fragments, we identified relationships involving autonomy and the use of AI in political skills practices, organized in Chart 4.

Chart 4 – Descriptions of researcher autonomy and policy in AI use practices

Analysis Fragments	Description of the elements	Presence/absence of interest and freedom	Practices of use of Artificial Intelligence
I've been using it to generate specific research objectives from an overall objective that I create and report to the AI. Then I will [...] improve what it proposes. [...] I have the approval of my coordinator to do it with AI, because everything was talked about before, with criteria that we defined together. (Rene 2).	It concerns the relations with autonomy established from dialogue and interlocution strategies to negotiate needs and resources.	Presence of freedom to act. "[...] I have the approval of my coordinator to do it with AI".	Textual production - Elaboration of research objectives.
I want to use it for many things, for example, to rewrite sections of articles and create texts for new articles without self-plagiarism. But I have to check if I can in my Research Group. (Orchid1).	It concerns the relations with autonomy established from dialogue and interlocution strategies to negotiate resources.	Presence of interest to act. "I want to use it for many things."	Textual production of articles – Writing and rewriting of scientific articles.
It would be a new methodology [writing with AI] and every new method or new tool has to have the Group's scrutiny in the meeting. Without their approval I can't use it. We don't have any formal guidance on this yet, and I don't know at the Institution where I teach how this will be too. (Orchid2).	It concerns relations with autonomy, based on dialogue and interlocution strategies to negotiate favorable resources and environments. Includes relations with teaching	Absence of freedom to act. "[...] it has to have the Group's scrutiny at the meeting. Without their approval I can't use it"	Textual production of scientific articles
I'm using it to produce an article in English. I'm using *Google* Translate and *Grammarly*. The latter I met in our research group, a colleague used it and shared his experience with us. As our superiors did not censor, and even encouraged the use, we are using it to produce more quality articles in a foreign language. (Milo1)	It concerns the relations with autonomy established from dialogue with authorities, and strategies of interlocution to negotiate needs and resources; construction of a favorable environment for research.	Presence of freedom to act. "As our superiors did not censor [...] we are using it to present articles"	Text translation
I apply AI to transcribe data recorded in interviews, and from classes I teach and that are part of my research project. I also used it to create a data collection questionnaire. All within the criteria, indication of source, and seal of the group. I have autonomy to use it and this gives me more free time, which means autonomy for other project activities. (Match1).	It concerns the relations with autonomy established from dialogue and interlocution strategies to negotiate needs and resources and environments for research. It includes relationships with teaching practice.	Presence of freedom to act. "I have autonomy to use it"	Data transcription Elaboration of instruments for data collection – questionnaire.

Source: the data.

In the analysis of the data grouped in Chart 4, we identified that the researchers expressed their relationships with autonomy, based on reflections on positive aspects of the use of AI in their research practices, linked to the presence and absence of freedom, and the presence of interest in thinking and acting.

Such relationships were linked to the activities related to the dialogues and interlocution strategies that the researchers developed (Renê2, Milo1, Match1), and that they planned to develop (Orquídea1-2), to establish criteria, agreements, and permissions for the use of AI in articles and research projects; and to build a favorable environment for the use of AI in the spaces of their research groups (Milo1, Orquídea2).

In these activities, the practices of using AI carried out by the researchers were: elaboration of research objectives (Renê2), textual production of scientific articles (Orquidea1-2), translation of texts (Milo1), collection and transcription of data (Match1).

The relationship with autonomy regarding the presence of freedom to use AI included permissions for use for textual production (Renê2, Milo1), data collection and transcription (Match1), and translation of texts in English (Milo1), with criteria established from dialogues between researchers and their superiors, and with research groups.

In the reflections on the practices for text production, the deponent Renê clarified that he is free to generate specific research objectives, based on a general objective previously written by him (Renê2).

In the words of the deponent "[...] I create and report it to the AI. Then I will [...] improve what she proposes" (Renê2). In other words, the researcher Renê already produces in a hybrid way (AI and researcher), similar to what is proposed by the researchers interviewed by Lopes, Forgas, and Cerdà-Navarr (2024), as an intention/possibilities of use for the future.

Regarding the practices that involved the translation of texts, we identified that the interviewee Milo attributed quality to the results generated by AI in his learning process (Milo1), in a similar way to the positive aspects pointed out by those researched in the work of Cevher and Yildirim (2023). However, in this study, the interviewee Milo, in addition to being concerned with the learning of the English language, dedicated himself to maintaining the scientific rigor of his articles.

Regarding the relationships established with autonomy under the absence of freedom to use AI, the interviewee Orquídea exposed her interpretations regarding not having permissions to use AI in her research, and talked about possible practices considering AI a new method, or a new research tool (Orquídea2).

On the occasion, the deponent also clarified that for the use of AI in her practices, the following strategy of dialogue with her research group is necessary: present the AI and the work plan to the group, so that the members can dialogue and decide on the permissions and limits of this use, as a new method applied in the stage of analysis of scientific data (Orchid2).

The relationships explained in this fragment refer to the use of AI under "conditional admissibility" (Lopes; Forgas; Cerdà-Navarr, 2024) to the authorization of superiors and the seal of the research group. And, ratify Fartes (2014); Savi Neto, Fare, Silva (2020); and Caregnato, Miorando, and Leite (2022), on the presence of interlocution strategies developed by educational researchers in situations where they need to negotiate, with supporters, the important resources for the development of their projects, and for the exercise of their autonomy.

Regarding the relationships with autonomy and the presence of interest, we identified other excerpts from the report of the researcher Orquídea, about her desire to use AI for the production of articles. In his words: "I want to use it for many things, for example, to rewrite sections of articles and create texts for new articles without self-plagiarism, with maximum revision" (Orquidea1).

Note that in this fragment, the deponent highlighted that her productions with AI would be carried out under the criteria of self-plagiarism verification, and hybrid production (AI and the researcher) "with the maximum review". These manifestations express the researcher's concern with the quality of her publications, and allow us to reaffirm the considerations of André (2006) and Gatti (2010) about the present dedication of researchers in Education to meet the scientific rigor in their research.

In the axiological field, the data analyzed in Chart 4 showed dialogue as a political skill, and individual and collective activity. And, also, as a political value of the researchers, linked to other values such as respect and truth; and essential for dealings with superiors, and for the practice of autonomy, as observed by Berkenbrock-Rosito (2019).

In reference to the relationships established with teaching, autonomy and the use of AI, we identified reflections presented by two researchers in the data organized in Chart 4. In the first report, the deponent Orquídea clarified her intentions to use AI for the production of articles, in relationships established under the absence of freedom. And she justified that her freedom to act with AI depends on the formal orientation of the institution where she works as a researcher-teacher (Orquídea2).

In a different context, under the presence of freedom to act, the researcher Match detailed the norms he has already established, based on dialogues with his research group, to collect data and transcribe the classes he teaches, and which are part of the corpus of his research (Match1).

Other relationships regarding autonomy and the use of AI in the practices of the interviewees were identified as linked to the development of their knowledge, and organized in Chart 5.

Chart 5 – Descriptions of autonomy and knowledge in AI practices

Analysis Fragments	Description of the elements	Presence/absence of interest and freedom	Practices of use of Artificial Intelligence
[...] now has tools with Artificial Intelligence available to use in writing scientific articles. I'm testing it and I'm interested in using it the way I'm thinking is correct. I think it contributes to help in reflections, in syntheses, as long as it does not hinder our autonomy to think and produce with originality. (Joker1).	Individual reflection practices; Modes of reasoning characteristic of scientific research linked to the use of artificial intelligence	Presence of interest to act and think. "[...]I'm interested in using it the way I'm thinking."	Textual production of scientific articles
You can build the text with it [AI app]. He learns your style, your vocabulary and you correct it. Provide the quotations to him, part of his interpretation of the references and he does the synthesis. I have the freedom to change the text and adjust the way the AI thinks. But if you don't tweak and revise, it can get really bad. You can even cite a reference that didn't say that. I know because I've found this kind of mistake. (Joker2).	Individual reflection practices for adjustments and problem solving; modes of reasoning characteristic of scientific research linked to the use of AI.	Presence of freedom to act. "[...] I am free to change the text and adjust it."	Textual production of scientific articles.
I applied AI to put my research project in the ABNT standards and I will use it in my thesis, because the result was very good. My course allows me to decide how I do the formatting, I can even outsource it to a professional. So I let the app do everything on automatic and then reviewed it. [...]. It advanced the time, because it saved me from excessive mechanical work that I had. It was more about intellectual work. I had time to improve my interpretations of the data. (Bardot1).	Practices of individual reflection for interpretation, adequacy and resolution of problems related to the research project; modes of reasoning characteristic of scientific research linked to the use of AI.	Presence of freedom to act "My course allows me to decide how I do the formatting, I can even outsource it."	ABNT formatting.

Source: the data.

From the analysis of the data presented in Chart 5, we identified the practices of using AI in the scientific productions of the interviewees, linked to the epistemic activities they carried out for the development of their own knowledge, and to the relationships they established with autonomy under the presence of freedom and interest to think and act.

The epistemic activities included individual reflections of the interviewees, for the interpretation, adequacy and resolution of problems related to scientific productions (Joker1-2, Bardot1); and the creation of strategies, based on the development of modes of reasoning characteristic of scientific research linked to the use of AI (Joker1-2, Bardot1).

Regarding the researchers' relationships with autonomy, the use of AI and the presence of interest, we identified the report of the researcher Joker. In the words of the researcher "[...] I have an interest in using it the way I'm thinking is right. [...] as long as it does not hinder autonomy [...] to think and produce with novelty" (Joker1).

The deponent's reflections reveal his concerns about his intellectual independence through the use of AI in his scientific productions. And, they establish relationships that

were also presented by those researched in the study by Lopes, Forgas and Cerdà-Navarr (2024). They are: the interpretation of the use of AI under the criterion of admissibility conditioned to scientific rigor and attention to moral principles.

On the occasion, the deponent also expressed his considerations about the positive aspects of the use of AI for textual productions, for example, in the preparation of syntheses, similar to what was reported in the studies by Cevher and Yildirim (2023), on the aid of AI for written production.

Regarding the researchers' relations with autonomy under the presence of freedom, we observed that the interviewees also discussed positive and negative aspects about the use of AI in their work (Bardot1; Joker2).

In these reports, the deponents defined AI as a tool that helps in the construction of academic works, and that can present a result "[...] very good" (Bardot1), when used under the following strategies they developed:

- Use AI for the "excessive mechanical" work that ABNT formatting requires, and thus increase the time available for the "intellectual work" that the researcher performs in his interpretations of the research data (Bardot1);
- use AI for textual production, under the manipulation of elements of memory and intelligence of the application, in order to refine the actions of the tool, correct errors, and bring the "way of thinking" and writing of AI closer to that of the researcher-user (Joker2).

Regarding the aforementioned strategy that involves the manipulation of AI, the reports presented by the deponent Joker, enabled us to highlight how AI can participate in the construction of knowledge in scientific production processes, based on adjustments and information that the researcher-user provides when they have the autonomy to do so, and is concerned with the maintenance of scientific rigor.

For example, we highlight an excerpt from the deponent's report "It [the AI application] learns your style, your vocabulary and you correct it. Provide the quotations to him, part of his interpretation of the references and he does the synthesis. But if you don't tweak and revise, it can get really bad. You can even quote a reference that didn't say that" (Joker1).

Reflections such as Joker's, which cite details on how to manipulate AI's "way of thinking" for scientific production, and to correct application flaws, under strategies developed by the researcher himself, were not presented by the references we used in this study.

And they demonstrate that, contrary to the frustration experienced by the academics who made use of AI in Cevher's study, Yildirim (2023), the researchers we interviewed showed satisfaction, interest, and were able to use AI, and configure it, to meet the needs of their productions (Joker2, Bardot1).

On the other hand, in the study by Cevher and Yildirim (2023), the AI configurations for textual production activities were previously carried out by teachers and inaccessible to academics. There was a lack of autonomy to configure the AI, so the application did not meet the specific needs of the academic-users.

Consequently, the satisfaction, interest of our interviewees and their ability to create strategies regarding the use of AI, expressed from the excerpts organized in Chart 5, are related to the presence of the autonomy of researchers in their practices.

These fragments allow us to highlight that the use of AI in scientific production demands criteria, adjustments, and fundamental elements, such as the presence of autonomy, specific technological knowledge, commitment to scientific rigor, and the exercise of values; and the choice of AI applications that enable the configuration of "thought" processes to meet the needs of researchers during their scientific productions (Joker1-2, Bardot1).

Other considerations about this study are presented below.

CONCLUSION

In this investigative proposal we aimed to characterize the relationships that educational researchers established with their own autonomy in situations in which they made use of Artificial Intelligence as a tool to assist them in their scientific productions. We consider that, based on the results presented in the previous section, this objective was achieved.

Therefore, we characterize the autonomy of the educational researcher as a condition and ability, carried out under the presence and absence of freedom and interest to use Artificial Intelligence in practices applied to research activities, linked to training and work, and to the exercise of ethics, political skills, and knowledge development.

The research activities that involved the use of AI were: data collection and treatment (1), text production (2), publication of papers (3), negotiations with advisors (4), presentation of papers at scientific events (5), dialogues with superiors and supporters (6), execution of dialogue strategies (7), choice of research methods and tools (8), and individual reflections (9).

In the context of these activities, the practices of using AI carried out by the researchers were: general research (1), literature review (2); translation of texts (3); plagiarism and self-plagiarism scanner (4); image production (5); video production (6); preparation of a script for the presentation of scientific papers (7); development of instruments for data collection (8); textual production (9), data transcription (10); and ABNT formatting (11).

Therefore, AI in this study was defined as applications based on artificial intelligence, capable of providing support for the activities of researchers, based on commands and personalized information, linked to scientific rigor and ethical and institutional principles.

In general, scientific rigor was a fundamental requirement established by researchers to use AI in their productions, and was understood, as presented by Severino (2015), as maintenance of objectivity, epistemological rigor, logical coherence, and methodological consistency, and the authenticity and veracity of the data and knowledge produced.

The guarantee of such rigor was related by the researchers to the criterion of "conditional admissibility" applied in the following actions: communication about the use of AI in scientific production to superiors, research groups, and readers; hybrid production (AI and researcher); attention to the ethical standards that govern scientific research, and that guide on plagiarism, authenticity of data, and descriptive and essay quality of productions; and manipulation/configuration of the AI's "way of thinking" in a personalized way to meet the needs and quality of the research.

Concomitantly, the maintenance of scientific rigor also involved the exercise of values shared by researchers, such as responsibility for the quality of productions; the truth about the methods adopted, the intentions of use, and the information found with AI; respect for superiors and readers, and for ethical and institutional norms; and dialogue for the construction of social relations and problem solving related to the use of AI in scientific practice.

Key positives of using AI linked to researchers' practices included saving time for the researcher; guarantee of originality and authenticity (through plagiarism verification and hybrid production); quality of personalized information; and accessibility (to theoretical frameworks, English language, and tools for video production, data collection and transcription).

The negative aspects involved the limitations of AI to write a scientific text in its entirety; the imprecision in the information on theoretical references and the need to review this information; and the fear of using AI and generating productions with low scientific quality.

In this study, the absence of autonomy was linked to four topics that can help in the planning of objectives for the training of autonomous educational researchers. They are:

- The offer of activities and spaces for researchers to exercise their own autonomy;
- the development of researchers' political skills for dialogue with superiors on new research methods, and for the development of efficient strategies related to the needs that emerge from scientific practice;
- training on values related to the commitment of researchers to the institutional, ethical and legal norms that govern training and scientific work, and to maintaining the rigor of their productions in situations of autonomy;
- the elaboration of norms that regulate the practices of use of contemporary tools by educational researchers, such as AI.

Regarding the elaboration of standards, in this study the analyses revealed how some research groups, graduate programs, researchers and professors are organizing themselves to use AI in educational scientific production, linked to ethics and scientific rigor. In particular, the research groups were described by the respondents as the first places where the norms for the use of AI were established.

The dynamics of this standardization involved discussions, permissions, and limits for the use of AI. The discussions took place based on interlocution strategies of the proponents, to present projects and work plans capable of convincing their peers about the relevance of such use.

In addition, we identified relationships with research practices under the use of AI and the exercise of teaching. Such relationships involved compliance with the standards of the educational institutions in which the researchers worked. For example, the requirement of communication and prior authorization for the use of AI, at different stages of the production processes of projects and articles.

In view of all the above, we consider that the results presented in this study made it possible to corroborate the theoretical assumptions that we chose regarding autonomy and the use of AI in scientific practice (ANDRE, 2006; GATTI, 2010; FARTES, 2014; SEVERINO, 2015; BERKENBROCK-ROSITO, 2019; SAVI NETO; FARE; SILVA, 2020; MAYAN; MEDEIROS, 2021; CAREGNATO; MIORANDO; LEITE, 2022; AXE; ARRUDA; PASSOS, 2024; CEVHER; YILDIRIM, 2023; LOPES; FORGAS; CERDA-NAVARR, 2024). They also enabled us to advance on the descriptions of the relationships, the difficulties and the contributions present in the practices of AI use carried out by educational researchers, in the context of *Stricto sensu training*, and professional practice.

However, we also observed that other relationships need to be identified in future studies, so that we can broaden our understanding of the subject. For example: studies on the values expressed by researchers in their practices of using AI; characterizations about the absence of freedom and interest of the researcher to use AI in their productions; other strategies of researchers to negotiate autonomy to use AI; other relationships about the eleven types of AI use practices that we have identified; new practices regarding the use of AI and the inherent elements of relations with autonomy (ethics, politics and knowledge); description of the application settings and the researcher's specific knowledge applied to the use of AI to maintain the scientific rigor of their productions.

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