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## ARTIFICIAL INTELLIGENCE AND LEARNING: INVESTIGATING THE EFFECTS ON ACADEMIC PERFORMANCE

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*Arthur Land Oliveira*

<http://lattes.cnpq.br/9498212624945061>

*Elisangela Dias Brugnera*

<http://lattes.cnpq.br/0730600349059222>

*Maria Angélica Dornelles Dias*

<http://lattes.cnpq.br/9773111188155719>

*Adriano Valter Dornelles Dias*

<http://lattes.cnpq.br/0740842824659375>

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**Abstract:** Artificial Intelligence (AI) is increasingly present in various sectors of society, including education in general and higher education. This research presents preliminary data, originating from a Scientific Initiation project financed by the Mato Grosso State Research Support Foundation (FAPEMAT), linked to the Center for Teaching, Research, Extension and Culture of ``Universidade Estadual de Mato Grosso``- Campus of Sinop. Its objective is to investigate the use of generative AI by academics during the initial training process, seeking to understand the advantages and disadvantages of this technology. The research adopts a qualitative and exploratory approach, being conducted as a case study. To collect data, an online questionnaire sent through *Google Forms* was used, and we had the voluntary participation of 43 academics as research collaborators. The results indicate a growing knowledge and use of AI platforms in the context of higher education, covering several areas of knowledge, with emphasis on Generative AI, such as Google's ChatGPT and Gemini. It is concluded that AI can be a valuable resource for higher education, with transformative potential, as long as it is used in an ethical and responsible manner, becoming a significant tool for educators and students on their learning journey.

**Keywords:** Artificial Intelligence, Academics, Higher Education.

## INTRODUCTION

In this chapter we share the partial results of a Scientific Initiation research – IC subsidized by the Mato Grosso Research Support Foundation – FAPEMAT, entitled Study of the Impact of Artificial Intelligence on Academic Performance carried out within the scope of ``Universidade Estadual de Mato Grosso`` – UNEMAT, linked to the Center for Education, Research, Education and Culture – CEPEC,

which aims to investigate the use of Artificial Intelligence (AI) in higher education, seeking to identify new teaching opportunities, in this article we will focus on the academic's perception regarding the knowledge and use of AI during the undergraduate course.

Given the rapid technological evolution and the increasing integration of Artificial Intelligence (AI) in different spheres of society, research into the impacts of generative AI in higher education acquires particular relevance. Generative AI represents a significant advancement within the field of AI, being capable of creating original and creative content autonomously. Whether generating texts, images, music or even simulating human interactions, this technology demonstrates revolutionary potential for the educational field.

The increasingly frequent presence of generative AI in different sectors highlights the need to understand its specific implications in the academic context. In higher education, where the production of knowledge and the training of critical and creative individuals are priorities, generative AI can play a significant role in transforming pedagogical practices. Understanding how this technology can be effectively integrated into the educational environment is essential to making the most of its potential to enrich and diversify students' learning experiences.

In this context, higher education has been constantly pressured in relation to the new demands of a society in constant transformation and AI emerges as a transformative agent in this process, providing new ways of teaching and learning. But to do so, it is necessary to reflect on the benefits, challenges and limitations that this technology brings to the educational process.

This research involves presenting the partial results of a scientific initiation research, whose objective is to investigate the use of generative

AI by academics in the initial training process, seeking to understand the advantages and disadvantages of using technology. We hope that this research can contribute to the discussion of the topic in the area.

## **INFORMATION AND COMMUNICATION TECHNOLOGY IN TEACHING**

With the advent of internet 4.0, technologies are increasingly present in teaching processes, the Covid-19 pandemic has caused the use of digital resources applied to education to intensify. As a result, digital platforms such as YouTube, Moodle, digital libraries, simulation websites, among other resources, became more present in educational processes and also democratized access to information, which became accessible with just a click of the mouse. Therefore, it is not possible to block the presence of digital technologies in the classroom, but rather how to make use of a range of digital resources in order to enrich the teaching and learning process.

According to Xavier (2023, p.1) “The adoption of digital information and communication technologies (DIT) by education is no longer questioned. We now discuss how to use them to help the teacher work on the diversity of content present in the subjects of the school curriculum”

We corroborate with Xavier (2023) about the need to integrate digital technologies in education, providing more enriching learning on the part of students.

We agree with Xavier on the adoption of technologies in educational processes and with Artificial Intelligence, it would be no different. As much as we are starting the journey on the use of AI in education, we realize its insertion in society as a whole and consequently in the educational sphere.

## **ARTIFICIAL INTELLIGENCE AND ITS APPLICATIONS IN HIGHER EDUCATION**

AI has become popular in the early 2020s, but it is a concept that has been developing since the 1950s, at the Dartmouth Conference. AI in the area of technology seeks to develop computational resources that resemble human intelligence.

SOUZA (2008) conceptualizes AI as:

[...] the cybernetic method of adopting solutions by computer programs not previously foreseen by human will. Thus, through artificial intelligence it is possible for the computer system to adopt solutions based on situations or orders from previous human commands and similar new hypotheses based on acquired experience, in a process of automation of will. However, this will is not the human will, but the desideratum found by the machine, unreflective and infertile on the part, programmer or its own creator (SOUZA, 2008, p. 33-34)

It is clear that AI offers different forms and levels of interaction through algorithms, bringing benefits such as the ability to personalize teaching and identify learning patterns, but also its ethical, moral and epistemological implications deserve analysis and reflection.

Although there were advances in the area, it was only at the turn of the 21st century that generative AI began to become more prominent, driven by advances in the area of Machine Learning and Artificial Neural Networks. The popularization of algorithms such as Recurrent Neural Networks (RNNs) and Generative Adversarial Networks (GANs) in recent decades has revolutionized the ability of AI systems to create original and sophisticated content across a variety of domains, from text and images to music and videos.

The story of generative AI is a narrative of continuous development, driven by

technological and theoretical advancement over the decades, culminating in increasingly sophisticated systems capable of creating content autonomously and creatively.

The emergence of GPT (Generative Pre-trained Transformer) was developed in the artificial intelligence research laboratory in the United States of America called OPENAI, based in San Francisco. Being a generative AI with a focus on virtual dialogues, seeking human-computer interaction in a simple way through questions and answers.

In 2018, OpenAI released GPT-1, the first model in the GPT series. Although it was not as advanced as its later iterations, GPT-1 represented a significant milestone in the development of AI-based natural language systems. It has demonstrated the ability to generate coherent, contextually relevant text based on provided input, making it a valuable tool for a variety of applications including virtual assistants, automatic summarization, and content generation. The following year, in 2019, OpenAI released GPT-2, an improved version of the original model. GPT-2 was notable for its ability to generate even longer and more cohesive texts, as well as showing significant improvements in the quality and diversity of the content produced. However, due to concerns about the potential for misuse of the model to spread misinformation, OpenAI initially chose to restrict access to GPT-2.

In November 2019, OpenAI released an even larger and more powerful version of the model, known as GPT-3. With its 175 billion parameters, GPT-3 represented a significant quantitative leap compared to previous generations. Its ability to understand and produce text has reached impressive levels, enabling a wide range of applications in areas such as machine translation, code generation, writing assistance and much more.

The emergence of GPT as a leading form of generative AI has occurred over the past

decade, with each iteration representing a significant advance in the ability of AI systems to understand and produce text in an autonomous and sophisticated manner. This evolution culminated in GPT-3, one of the most advanced and influential generative AI models available today.

Landin (2023) highlights that the Chat GPT architecture is an AI model that has several layers that allow the platform to pay attention to keywords, the context and semantics that the words may have.

This AI platform is powered by information collected on the internet and, based on the crossing of information, transforms users' questions into elaborate and contextualized answers, generating an infinite number of possibilities such as: building a program's coding, creating recipes, writing an academic research, analyze data, among other possibilities. The advantage of using this resource is the ability to carry out research quickly, searching for data from a variety of sources, which makes many academics turn to this AI as a research tool. Another point that brings this *chatbot* closer to academics is the ease with which the use of language approaches the natural language used by human beings, enabling a friendlier and more accessible interface. Landim (2023) highlights that the success of this AI tool lies in the simple way of establishing a dialogue, that is, in the simple way of establishing a dialogue through questions and answers.

Which can be represented by the considerable increase in access to this AI platform, data presented by Exame magazine in 2023, the ChatGPT page had 863 million hits globally, a growth of 42119.2% compared to the same period in 2022.

This growth leads us to reflect on how this use could impact the training process in higher education courses, as it changes the way we relate to the process of knowledge construction.

## RESEARCH METHODOLOGICAL PATH

This research proposal is part of the assumptions of the qualitative research method. According to GIL (2017), in qualitative research the results are presented through verbal descriptions. Given the objectives of the research, it is considered exploratory. This type of research aims to provide greater familiarity with the problem, with a view to making it more explicit or building hypotheses.

It can be said that this research has as its main objective the improvement of ideas or the discovery of intuitions. Its planning is, therefore, quite flexible, so that it allows the consideration of the most varied aspects related to the fact studied. (GIL, 2002, p. 41).

The research focuses on investigating the use of generative AI by academics in the initial training process, seeking to understand the advantages and disadvantages of using technology.

The research had as collaborators professors and academics from ``Universidade Estadual de Mato Grosso`` – Campus. To generate the data, the online questionnaire via *Google Forms* was adopted as an instrument, with objective and subjective questions, aiming to understand the use of AI in the initial training process of academics.

According to Gil (2008, p. 121), questionnaire refers to “research technique composed of a set of questions that are submitted to people with the purpose of obtaining information about knowledge, beliefs, feelings, values, interests, expectations, aspirations, fears, present or past behavior, etc”.

The formulation of the analysis *corpus* comprised the set of data collected through the online questionnaire. These data were organized and analyzed based on the theoretical framework that supported the research.

## ANÁLISE DOS DADOS DATA ANALYSIS

Initially we had great resistance regarding the participation of academics in answering the questions sent via Google Forms, making it necessary to resend the form to obtain a greater reach. In total, we had the collaboration of 66 academics from various areas of knowledge who voluntarily responded to the questionnaire. We believe that because this is a new topic, and because we are observing sensitive issues, we ended up not having the desired participation and that for this reason it is necessary to expand discussions within the university about the use of AI in higher education.

We observed that the vast majority of research participants use generative AI, this fact is due to its speed and agility in providing answers. We noticed that academics in general carry out searches that involve AI, as with just the generation of a question and in less than a minute, information related to the topic being researched will be presented.

Based on this data, we can give indications that by frequently using AI resources, academics generate dependence on this technology, as it is a faster way to obtain answers, which ends up distancing the academic from building a scientific research practice, failing to develop skills such as interpretation, organization and synthesis of information, the development of logical reasoning based on theoretical studies, which ends up causing harm to the training of this academic. Since AI performs all the research, delivering the work with the requested information.

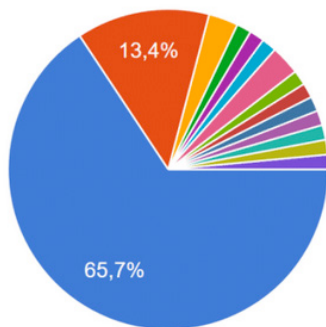
With this, we observed that the development of writing, interpretation and critical analysis skills can be compromised, which impacts the way academics carry out scientific research and interact in a critical and reflective way about them.

We asked whether academics were aware of any AI platform and whether they knew



which one they used?

This graph reveals that the majority of survey participants are using artificial intelligence in some aspect of their activities. The 65.7% who stated that they use artificial intelligence indicate a significant adoption of this technology. This suggests that artificial intelligence is already integrated into different sectors and contexts of respondents' daily and professional lives. On the other hand, the 13.4% who said they did not use artificial intelligence show that there is still a significant portion that has not adopted this technology. This can be attributed to a number of reasons such as lack of access, lack of knowledge on how to implement, or simply a lack of perceived need. This discrepancy between the two groups suggests a digital divide in terms of technology adoption, which could have implications in terms of competitiveness, efficiency and even inequality in certain sectors.

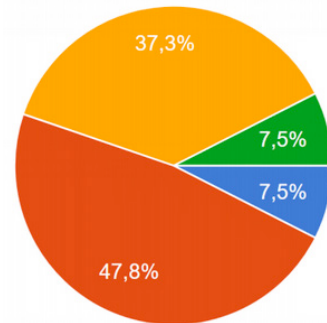


- (a) Yes
- (b) Not
- Chat GPT
- Bing, Chat GPT, Bard, Cici, GPS
- Gemini, gpt chat, luzia virtual assistant
- CHAT GPT
- ChatGPT
- Chat GPT, virtual assistant

Graphic 1: Knowledge about Generative AI

Source: Research Data

The question that continued the questionnaire refers to how familiar are you with this type of tool? We observed that a considerable portion of survey participants are familiar with the use of artificial intelligence (AI) tools, with 47.8% claiming to have some level of familiarity. This suggests that a significant proportion of people surveyed already have some prior knowledge or experience using AI-based technologies. This familiarity can be attributed to a number of reasons, such as exposure to products and services that incorporate AI, formal or self-taught training in AI technologies, or simply a personal interest in the field. But on the other hand, the 37.3% who said they were unfamiliar with using AI tools indicate that there is still a considerable part of the sample who do not feel comfortable or confident with this technology. This could be due to a number of reasons, including lack of exposure, limited access to educational resources about AI, or simply a reluctance to adopt new technologies.



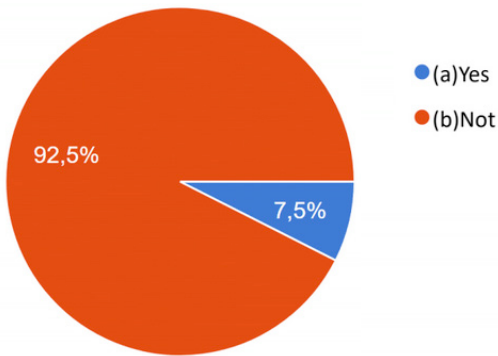
- (a) Very familiar
- (b) Acquainted
- (c) Little familiar
- (d) Unfamiliar

Graph 2: Familiarity with using AI.

Source: Research Data

When we asked whether academics had received any course or training on how to use AI in higher education, we observed that, according to the graph provided, 92.5% of

participants did not receive any course on the subject. Only 7.5% said they had received some type of course or training in this area. This disparity reveals a significant gap in formal AI education in higher education and has several important implications. This disparity could have several implications. Firstly, it suggests that there is a gap in formal education about AI in higher education, which may leave students ill-prepared to face a world where AI plays an increasingly important role in many professional areas. This may also contribute to a lack of equal opportunity, as those who do not have access to AI courses may be at a disadvantage in terms of preparing for future careers.

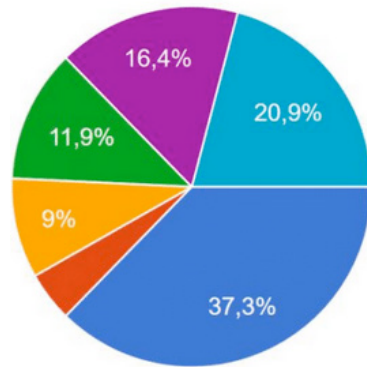


Graph 3: Did you receive a course on AI for higher education  
Source: Research Data

The fourth question we asked academics which AI they used in the academic field? We observed based on the data that 37.3% of students said they use chatbots or virtual assistants, which suggests that this form of AI is gaining acceptance and use in the academic environment. These systems can be used for a variety of purposes, such as answering frequently asked questions, providing support for administrative tasks, or even assisting in learning and research.

Furthermore, it is interesting to note that 20.9% of students responded that they did not use any of the alternatives presented.

This may indicate a lack of exposure to these technologies or a preference for traditional methods of interaction and learning.

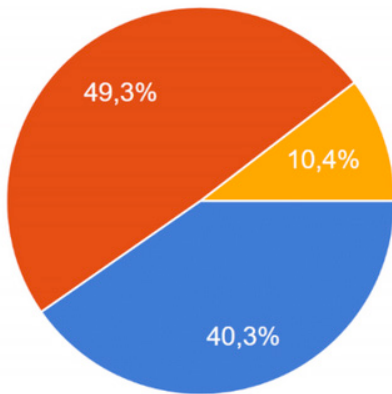


- (a) Chatbots or virtual assistants
- (b) AI-Powered Online Tutoring Platform
- (c) Machine translation tools for academic texts
- (d) AI-powered grammar and spelling proofing tools
- (e) All of the above
- (f) None of the options above

Graph 4: Which AI is used in academia.  
Source: Research Data

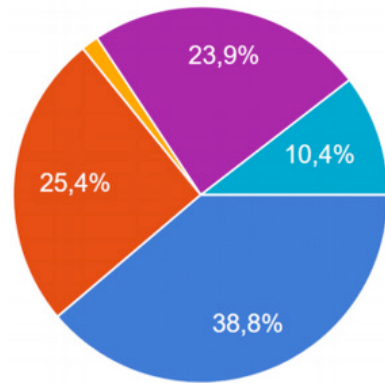
When students were asked how often they used AI, the results indicated that most students use AI infrequently. Specifically, 49.3% of students responded that they use AI rarely, while 40.3% said they use it frequently.

These results reveal that, although there is a considerable proportion of students who use AI frequently, an even larger proportion use AI more sporadically or occasionally. This can be attributed to several reasons, such as the availability of specific AI tools in their courses or research, familiarity with these technologies, or simply the lack of integration of AI into traditional academic activities.



Graph 5: How often is AI used.

Source: Research Data



Graph 6: For what purposes did you use AI.

Source: Research Data

The graph explains the use of artificial intelligence (AI) by students for different purposes. We observed that the majority of students use AI as a support tool to answer questions about academic content. Specifically, 38.8% of students responded that they use AI for this purpose. This suggests that AI is being employed as an additional source of information and clarification to assist students in their learning process. Additionally, 25.4% of students reported using AI to get help with academic exercises and assignments.

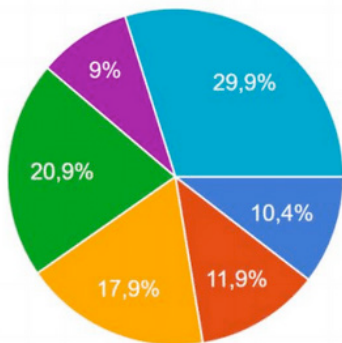
This indicates that AI is being used not only to clarify concepts but also to provide practical assistance in solving problems and completing specific course-related tasks.

On the other hand, only 1.5% of students responded that they use AI to practice for tests and exams. This low percentage may suggest that students are not yet confident in AI's ability to adequately prepare them for formal assessments, or perhaps currently available AI tools do not fully meet exam practice needs.

Investigating the challenges or difficulties encountered by students when using artificial intelligence (AI) in their studies, we observed that several concerns were raised by respondents, 10.4% of students reported having difficulty understanding the explanations provided by AI. This suggests that, despite AI's potential to provide information and clarification, some platforms or systems may not be communicating effectively with users, resulting in an inadequate understanding of the content presented. 11.9% of students cited lack of access to AI tools as a challenge. This indicates that a significant portion of students may not have adequate access to AI resources, whether due to financial constraints, lack of technological infrastructure in educational institutions or other barriers. 17.9% of students expressed concerns about data privacy and security when using AI in their studies. This concern is understandable considering that the use of AI often involves the sharing of sensitive personal and academic data, which can raise questions about the protection and ethical use of this information.



20.9% of students highlighted the difficulty in integrating AI with other study tools as a challenge. This suggests that interoperability between different AI platforms and other study resources could be a significant obstacle for students, preventing a more integrated and efficient learning experience.



- (a) Difficulty responding to AI explanations
- (b) Lack of access to AI tools
- (c) Concerns about privacy and data security
- (d) Difficulty in integrating AI with other study tools
- (e) All of the above
- (f) None of the options above

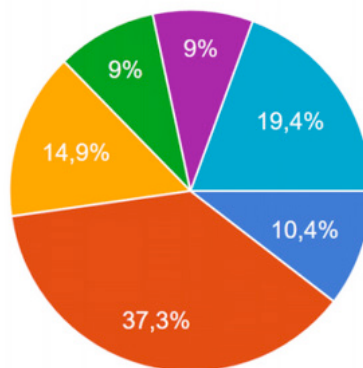
Graph 7: Challenges when using AI in studies.

Source: Research Data

Analyzing students' main concerns regarding the use of artificial intelligence (AI) in undergraduate studies, it is possible to identify several points of attention raised by respondents, 10.4% of students expressed concern about the impact that the use of AI may have on the role of teachers. This suggests a concern about how AI can influence traditional teaching dynamics, raising questions about the role of the teacher as a facilitator of learning and mentor of students in an increasingly technological environment. 37.3% of students highlighted ethics and privacy issues as one of their main concerns regarding the use of AI in undergraduate studies. This concern is understandable considering that the use of AI often involves the processing and sharing of large amounts of

personal and academic data, raising questions about the protection, transparency and ethical use of this information. 14.9% of students cited the possibility of bias in AI tools as a significant concern.

This indicates a concern about the fairness and impartiality of decisions made by AI systems, especially when these systems are used for evaluation or decision-making in academic contexts. 9% of students expressed concern about lack of access to technology as an obstacle to effective use of AI at undergraduate level. This highlights the importance of accessibility and digital inclusion when implementing AI-based solutions in the educational environment, ensuring that all students have equal opportunities to access technological resources.



- (a) Impact on the role of teachers
- (b) Ethics and privacy issues
- (c) Possibility of bias in AI tools
- (d) Lack of access to technology
- (e) All of the above options
- (f) None of the options above

Graph 8: Concerns regarding the use of AI in undergraduate studies.

Source: Research Data

Ultimately, student concerns regarding the use of artificial intelligence in undergraduate education reflect a variety of important challenges and considerations that must be addressed to ensure ethical, transparent, and equitable implementation of this

technology in the academic environment. It is essential that educational institutions, technology developers, and policymakers take a collaborative and holistic approach to addressing these concerns by promoting ethics and privacy education, ensuring the transparency and impartiality of AI tools, and working to ensure that all students have equal access to the technologies necessary for an enriching and inclusive learning experience. In doing so, we can make the most of the potential of artificial intelligence to improve undergraduate teaching and learning, preparing students for the challenges and opportunities of an increasingly digitized and technologically advanced world.

## FINAL CONSIDERATIONS

Based on the data obtained in the research, we noticed the increasing presence of Generative AI in the academic field, whether due to factors such as time optimization, ease of interaction with technology, meeting deadlines and practicality. Observing the positive points, we must also look at the negative aspects such as the dependence caused by this technology and the lag in the development of important skills such as:

writing, critical and reflective analysis, data interpretation and knowledge synthesis, are some examples that we can cite among countless others.

We conclude that generative AI is increasingly present in undergraduate courses, due to its growth and insertion in all social spheres. What we believe to be relevant in this process is the holding of debates and discussions on the topic, seeking to guide academics on the use of this resource, the moral and ethical aspects that involve its use in order to help academics develop the conscious use of Generative AI, observing the negative aspects that involve its use, benefiting from the positive aspects. We believe that this research only presents a snapshot of reality as it involved the participation of a small number of collaborators. For future research, it is necessary to use more instruments for data collection, as well as promoting an engagement and participation campaign for academics in order to research how academics, as active subjects in the process of building their initial training, perceive the impact of using generative AI in carrying out research and academic work.

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