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MODESTUM

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Linear regression model to predict the use of artificial intelligence in experimental science students

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ABSTRACT

This study builds on the increasing relevance of technology integration in higher education, specifically in artificial intelligence (AI) usage in educational contexts. Background research highlights the limited exploration of AI training in educational programs, particularly within Latin America. AI has become increasingly pivotal in educational practices, influencing the development of competencies in various disciplines, including experimental sciences. This study aimed to describe the correlation between professional competencies in AI, AI usage, and digital resources among students in the experimental sciences education program at the National University of Chimborazo. Methodologically, a quantitative approach was employed, involving a structured survey distributed among 459 students. Data analysis was conducted using multiple regression models to establish predictive insights into AI usage. A multiple linear regression model was developed to predict AI usage among these students. The analysis revealed significant correlations between AI competencies, AI usage, and digital resources. The regression model highlighted that both AI competencies and digital resources are significant predictors of AI usage. These findings underscore the importance of developing AI competencies and providing access to digital resources to enhance the effective use of AI in educational practices. Limitations and future research directions are discussed.

Keywords: artificial intelligence, digital resources, professional competencies, higher education, technology integration, multiple regression analysis

INTRODUCTION

Nowadays, all human beings use technology, whether for work, for entertainment, for meetings with family members, among other things. So, as technology advances, the ways of teaching and learning are also changing and improving, to maintain a quality education and, above all, to keep it up to date (Mulvihill & Martin, 2024). That is why since May 2020 the popularity of the so-called artificial intelligence (AI), considered a subcomponent of information and communication technologies (ICT), has arisen, which seeks to modify or improve the spaces that are intended for learning, thus favoring the active collaboration of all students (Chang & Kidman, 2023; Heeg & Avraamidou, 2023; Rahimi & Sevilla, 2024).

The AI are resources that basically seek to strengthen the teaching and/or learning process, providing various resources that strengthen accessibility to both scientific and theoretical knowledge (Senekal & Brokensha, 2023). Emphasizing that this type of platform favors collaborative competences and develops values in students. AI are tools that transform the way of teaching and the way in which both teachers and students communicate to carry out the activities proposed in the different learning themes (Erduran & Levrini, 2024).

A clear example was the use of technologies in the pandemic, which allowed teachers and students to receive classes both synchronously and orientated, as well as to do all homework and exams from home (García et al., 2024). The use of AI in education demonstrates that students and teachers have the capacity to learn and communicate in any type of circumstance (Jabar et al., 2024).

In Ecuador, higher education must constantly evaluate the lack of access to the technological resources needed to use AI in the teaching of experimental sciences (Mendoza et al., 2023). In the faculty of educational, human sciences and technologies (FEHST) of the National University of Chimborazo (UNACH), there are few studies addressing training in the use of AI for students

in the experimental science education program (Aparicio, 2024). Similarly, research on the application of AI in experimental science classes is limited. If these aspects are not evaluated in education, there could be an impactful decline in university graduates who do not have the skills and abilities to face the new challenges of society. According to the problematic situation, the following objectives are established:

- To describe the existing correlation between professional competences, use of AI and digital resources of students in experimental science education courses at UNACH.
- To design a linear regression model to predict the use of AI in experimental science students at UNACH.

THEORETICAL SUPPORT

The technology acceptance model (TAM) serves as the central theoretical framework for this study, providing a solid structure to analyze how students in experimental sciences adopt and utilize AI in their academic training. Proposed by Davis (1989), the TAM posits that perceived usefulness and perceived ease of use of a technology directly influence the intention to use and actual adoption of the technology. This model has been extensively validated across various educational and technological contexts, reinforcing its relevance to present research. In this study, the TAM not only guides the selection of key variables, such as digital competence and the availability of technological resources, but also provides a framework for interpreting the results obtained from the data analysis. This facilitates a deeper understanding of the factors influencing AI usage among students, allowing for a coherent, theory-based interpretation of the study's findings.

Artificial Intelligences in the Instruction of Future Experimental Science Teachers

AI has a positive influence on the teaching and/or learning process of future teachers of experimental sciences, because it facilitates the understanding of the various sciences studied in this career, in addition, they learn in a more controlled, motivated and attentive way (García, 2024). It favors the rapid understanding of concepts and topics, in short, it allows people with different abilities to integrate more easily into the teaching and/or learning process. This facilitates digital and audiovisual literacy, which means that students could strengthen the different digital competences, which are of great importance today, and in turn creates the opportunity to create new innovative learning strategies such as educational robotics (Zhang et al., 2024).

The student becomes more autonomous; by using AI in education, the student becomes a self-sufficient, resolute, versatile person, who makes decisions responsibly and carries out work collaboratively with different people from all over the world. In other words, they learn to work and collaborate in groups, the great advantage of AI is that it encourages interaction with computer algorithms, other people or with educational games that develop various types of skills such as gamification (Hinojo et al., 2019; Senekal & Brokensha, 2023; Zhang et al., 2024).

It develops self-learning, autonomous cognitive development, scientific thinking, as the learner can obtain information from various sites, thus improving his or her capacity for analysis and understanding (Hopcan et al., 2023). AI also actively contributes to people creating debates and accepting opinions, this in relation to a topic of public interest. Education becomes flexible, as these technologies encourage and enable students to learn at their own pace. One of the greatest advantages of AI is the agile communication with the whole educational community. This type of technology increases motivation in the various areas of study. In addition, future teachers can learn using AI in the various contents of experimental sciences (Sadler et al., 2024). They also gain and understand how AI should be used to teach the various subjects to be studied at compulsory education levels.

Challenges That Arise in the Implementation of Artificial Intelligence in the Career of Education in Experimental Sciences

In the last 4 years, we have witnessed the immutable progress of technology and in turn how it has been transforming learning spaces and educational practices, thanks to AI (Miao & Holmes, 2023). This type of technology creates means, resources and didactic activities in educational institutions (Hwang et al., 2024). So, what are the challenges that must be faced in the experimental sciences to correctly integrate AI in education? These are detailed below.

Challenges

The biggest challenge in education is the various reforms that need to be made to the theoretical content taught and how to develop successful and productive pedagogical practices. Based on the new forms of knowledge and how these have affected work, it is necessary to rethink how to teach and learn, i.e., to think of a new way of training both teachers and students (Rios et al., 2023). Furthermore, it is of utmost importance to integrate new technologies that focus on information and knowledge into educational institutions. first, to conceive the use of AI in education in a different way. Consider that AI should be spaces that foster innovation and educational transformation (Hwang et al., 2024). Another major challenge is how to make AIs both universally accessible and facilitate the expansion, consolidation, reflection and renewal of knowledge. Furthermore, it should be borne in mind that these technologies will not replace traditional teaching and learning methods but are resources that complement learning (Jabar et al., 2024). They also allow the student to self-educate and practice theoretical knowledge in different and/or attractive learning spaces.

In this sense, the challenges that have been observed in UNACH are that there is little reform of content and adaptations to current ways of learning and/or teaching. In terms of pedagogical practices, there is evidence of teaching and learning that focuses on strengthening the various skills necessary for today's society (León et al., 2024). The integration of AI is evidenced in the laboratories for the subjects of mathematics, biology, physics and chemistry. In the challenges, it is evident that the traditional way of learning has been correctly integrated with technologies (Rahimi & Sevilla, 2024).

The Mainstreaming of Artificial Intelligence in the Optimization of Educational Quality

Nowadays, both formal and informal educational environments are being developed that favor and guarantee the way of preparing for the jobs that must be carried out today (Park et al., 2023). Diverse didactic materials, sources of truthful information, spaces for collaborative work, among others, must be integrated. Therefore, computers or smartphones should be brought into the classroom, which will be considered as learning tools that have the following purposes: to inform, communicate, instruct, create playful spaces and gamify. Thus, future teachers trained at UNACH are professionals capable of creating didactic content that responds to the challenges posed by the new ways of acquiring knowledge (León & Rodríguez, 2024; Mulvihill & Martin, 2024).

It should be emphasized that the implementation of AI must be well structured, teach a specific topic, the contents must be coherent, and at the same time it must be a space that facilitates the understanding of the subject being studied, as it is considered a tool that seeks to optimize the quality of education (Mulvihill & Martin, 2024). It should be emphasized that experimental science teachers have the necessary skills to create online content based on the needs and interests of each student, i.e., spaces that are adapted to the contexts of each student (Milana et al., 2024). Moreover, the teachers of the future must understand that information alone does not turn into knowledge, but that it is necessary to work on pedagogical approaches that use AI to create meaningful learning and, in turn, content curation. Therefore, teachers should not only implement AI in education, but also teach what kind of platform and knowledge is acquired thanks to this technology and how it should be used to create new teaching and learning strategies and methods (Miao & Holmes, 2023; Zhang et al., 2024). In education, it should be considered that, if AI is used, it should not only be limited to the creation of knowledge, but that this type of technology should have the capacity to strengthen the problem-solving skills, search strategies and knowledge imposed in the curriculum. All of these are used for different levels of university education (Miao & Holmes, 2023). So, to choose the right AI for education, they should have the following characteristics according Miao and Holmes, (2023):

- They must be able to develop and stimulate creativity.
- It should facilitate experimentation and manipulation of knowledge through the appropriate use of prompt.
- They must be able to adapt to the learning pace of each student.
- Collaborative work encourages socialization and empathy.
- It awakens interest and curiosity for enquiry.

Therefore, the use of AI in the classroom is relevant for both the teacher and the student, because they are tools that enable students to take the lead and be actors in the creation and development of their own learning. In addition, it is necessary for classrooms to have new and innovative didactic resources.

The Optimization of Artificial Intelligences in the Process of Teaching and/or Learning Experimental Sciences

Within ICTs, AIs favor the development of learning based on computer programmers. They facilitate participation and the creation of active and collaborative knowledge. In short, it allows teachers to prepare innovative, intuitive, truthful and striking material to present in their classes and at the same time favors time management (Cope et al., 2021). Thus, digital tools include:

- **Chatbots:** They provide personalized assistance to students, answering questions, offering explanations and solving problems.
- **Data analysis and visualization:** An AI tool for analyzing large experimental data sets and generating informative visualizations. Among the most widely used are the Python system (with libraries such as Pandas, Matplotlib, and Seaborn) and R (with packages such as ggplot2).
- **Collaborative learning platforms:** These allow students to connect with each other, share ideas and collaborate on scientific projects.
- **Gamification and educational video games:** This means using games in areas where they are not commonly used, such as educational institutions, human elements or how work is performed. These video games are the combination of games with formal education, in which the subjects to be learned are diversified in an interactive way. Thus, gamification is a space that allows taking advantage of the resources and tools that are commonly used in games, with the aim of favoring performance and achieving academic results. Thus, these playful activities serve to improve participation, the resolution of challenges, collaborative work, competition and reward. Among its main advantages are motivation, increased performance, cooperation, evidence of improved self-improvement, and above all there is greater integration of AI in education (Milana et al., 2024).
- **Intelligent tutoring systems:** They personalize learning by adjusting the level of difficulty, hints and content to individual needs.
- **Examples include ALEKS:** A math tutoring system that uses AI to identify students' strengths and weaknesses and provide personalized homework assignments.
- **Carnegie Learning:** An adaptive learning platform that offers math, science and humanities courses.
- **Smart Sparrow:** An authoring tool that allows educators to develop their own customized smart tutorials.
- **Simulators:** An action of simulating something from reality. That is, something is represented, imitating or faking all the processes that the represented phenomenon performs. It can be said that it is a simulation like experimentation focused on a model that seeks to mimic various aspects of reality. This makes it easier to know the similar or real conditions, with the difference that the variables are controlled, and the environment resembles reality, but it is an artificial element (Aparicio, 2023).

Table 1. Questionnaire applied to students of the experimental sciences career during the period A-2024

National University of ChimborazoResearcher: _____ **Date: ____/_____/_____**		**Options**				
Variables	**Item**	**1**	**2**	**3**	**4**	**5**
Professional skills in AI	How familiar do you feel with the basics of artificial intelligence?					
	How often do you apply artificial intelligence techniques in your studies or practical work?					
	Do you think you have the necessary skills to develop projects using artificial intelligence?					
	How effective do you consider yourself when using artificial intelligence tools to solve educational problems?					
	How confident do you feel when explaining artificial intelligence concepts to your colleagues?					
Use of AI	How often do you use AI apps in your daily studies?					
	To what extent has artificial intelligence improved your efficiency in carrying out academic tasks?					
	How useful do you find the use of artificial intelligence to improve understanding of complex topics in experimental science?					
	How often do you use AI chatbots to search for information or conduct research?					
	To what extent do you think the use of artificial intelligence is essential for your professional development in experimental sciences?					
Digital resources	How often do you use digital resources (software, online platforms, apps) in your experimental science classes?					
	How accessible do you consider the digital resources provided by the university?					
	How useful do you find digital resources to improve your learning in experimental sciences?					
	How often do you seek out and use external digital resources (outside of those provided by the university) for your studies?					
	How well do you think digital resources are integrated into the experimental science curriculum?					

- **Virtual and augmented reality simulators:** They are resources that allow experimenting and interacting by combining the real dimension with the virtual one through the use of digital devices. Thus, augmented reality is considered as a technology that can be applied in the educational field, to recreate the reality of the classroom and give "life" to objects, subjects, species and phenomena that are being studied, it is considered an emerging pedagogy (Rahimi & Sevilla, 2024).

METHODOLOGY

Research Design

The quantitative approach was applied. Considered as the research paradigm that facilitates the analysis of numerical data to observe a variable or a set of variables (Samoilenko & Osei, 2021). This type of study is based on data collection through structured methods, such as surveys, questionnaires or experiments, to analyze the relationship between variables and determine patterns and trends (Vogt & Burke, 2023). The study made it possible to identify patterns and trends in the relationship between students' professional competencies, use of AI and digital resources. These results contributed to a better understanding of the factors that influence the application of AI in experimental science classes.

Following the initial statistical analysis, a regression analysis was conducted to further explore the predictive relationships within the same study. This sequential approach provides a comprehensive understanding of how various factors influence AI usage among students.. This approach allowed the development of a predictive model that can be used to better understand the use of AI in experimental science students and thus improve teaching and learning in these areas.

Population and Sample

At UNACH, the FEHST has 8 education majors (1,920 students). The experimental sciences education careers mathematics-physics (240 students) and experimental sciences education careers biology-chemistry (302 students). The study is focused on FEHST students (542 experimental science students). For the selection of the sample, the participatory non-probabilistic sampling technique was applied (Mendoza et al., 2023). The 542 students were invited to participate through the jotform.com system. Only 459 students responded to participate in the study during the period B-2024.

Data Collection Techniques and Instruments

The survey was applied as a technique. The survey technique was digital. A 15-question questionnaire was designed and applied for the collection of information. The questions were divided into three variables:

- The variable of professional competences in AI
- The variable of didactic competences.
- The variable digital resources (see **Table 1**).

It was sent in a digital questionnaire jotform.com to the students' institutional email. Each question had five response options on a Likert scale from 1 to 5. The option "strongly disagree" (lowest score 1), the option "strongly agree" (highest score 5).

The validity and reliability of the instruments were ensured through a pilot study conducted with a representative sample, achieving a Cronbach's alpha coefficient of 0.87. Expert reviews were also employed to confirm content validity.

Table 2. Results of the descriptive analysis

	Mean	Standard deviation	N
Use of AI	4.71	.544	459
AI competence	4.82	1.004	459
Digital resource	3.98	.405	459

Table 3. Results of the descriptive correlation analysis

	Use of AI	AI competence	Digital resource
Use of AI	1	0.432**	0.378**
AI competence	0.432**	1	0.290**
Digital resource	0.378**	0.290**	1

Note. **Correlation is significant at the 0.01 level (2-tailed)

Table 4. Multiple regression adjustment model

Model	R	R square	Adjusted R square	Standard error of the estimate	Change statistics				
					R square change	F change	df1	df2	Sig. F change
Use of AI	0.491	0.241	0.238	0.476	0.241	72.413	2	456	0.000
Digital resource	0.394	0.155	0.153	0.370	0.155	42.007	2	456	0.000

Note. [a]Predictors: (Constant), use of AI, & digital resource

Technique for Analyzing the Results

A multiple regression analysis was applied to investigate the relationships between the dependent variables (use of AI and digital resources) and the independent variable (professional competencies in AI). This analysis made it possible to determine which dependent variables have a greater influence on AI professional competencies in experimental sciences (Lee et al., 2024).

The statistical package for the social sciences (SPSS) version 26 was used to analyze the data obtained. This software facilitated the descriptive and inferential statistical analysis to obtain relevant information on the students' responses and the relationship between the variables studied (Sarwono, 2022). SPSS also made it possible to visualize the results by means of statistical coefficients in tables, which facilitated the interpretation and presentation of the study findings. In addition, Pearson's correlation coefficient was applied to evaluate the strength and direction of the linear relationships between the variables (Hernández & Mendoza, 2018). This coefficient made it possible to identify the existing correlation between professional competencies in AI, the use of AI and digital resources, providing a quantitative measure of the relationship between these variables.

RESULTS

Means and standard deviations were calculated for the variables involved in the study: use of AI (use.of.AI), professional competences in AI (AI.competence) and digital resources (digital.resource). The results are presented in **Table 2**.

Pearson's correlation values range from -1 to 1, where a value of 1 indicates a perfectly positive correlation (the variables move together in the same direction), a value of -1 indicates a perfectly negative correlation (the variables move in opposite directions), and a value of 0 indicates that there is no linear correlation between the variables (Samoilenko & Osei, 2021). The results obtained from Pearson's correlation analysis reveal that there is a positive and significant correlation between AI use and professional competencies in AI ($r = 0.432$, $p < 0.01$). This indicates that as AI competencies increase, students' use of AI also increases (see **Table 3**).

To answer the first objective, it is shown that there is a positive and significant correlation between AI use and digital resources ($r = 0.378$, $p < 0.01$). This result suggests that greater access to and use of digital resources is associated with greater use of AI. On the other hand, the relationship between AI professional competencies and digital resources was also found to be positive and significant ($r = 0.290$, $p < 0.01$), indicating that students with higher AI competencies tend to use more of the available digital resources.

Analyses indicate that both AI use and digital resources are significantly correlated with professional competencies in AI. These findings underscore the importance of fostering both the development of AI competencies and access to digital resources to enhance the use of AI in experimental science education (Sadler et al., 2024). **Table 4** presents the model fit.

Use of Artificial Intelligence

The multiple regression model for the use of AI as a dependent variable shows an R value of 0.491, indicating a moderate correlation between the predictor variables (AI competencies and digital resources) and the use of AI. The value of R square is 0.241, which means that approximately 24.1% of the variability in AI usage can be explained by AI competencies and digital resources. The value of adjusted R square is 0.238, adjusted for the number of predictors in the model. The standard deviation of the estimate error is 0.476, and the change in R square is significant (Sig. F change = 0.000), indicating that the model is a good fit (Sarwono, 2022).

Digital Resources

Prior to conducting the multiple regression analysis, key assumptions were evaluated to ensure the robustness of the model. Multicollinearity was assessed using the variance inflation factor, with all values falling below the critical threshold of 2, indicating no significant multicollinearity issues. Homoscedasticity was verified through the examination of residual scatterplots, confirming that the variance of errors remained consistent across the range of independent variables.

The multiple regression model for AI use as the dependent variable shows an R value of 0.491, indicating a moderate correlation between the predictor variables (AI competencies and digital resources) and AI use. The R square value is 0.241, meaning that approximately 24.1% of the variability in AI usage can be explained by AI competencies and digital resources. The adjusted R square value is 0.238, adjusted for the number of predictors in the model. The standard deviation of the estimation error is 0.476, and the change in R square is significant (Sig. F change = 0.000), indicating that the model is a good fit.

These multiple regression models provide a quantitative understanding of how professional competencies in AI and digital resources influence the use of AI in the educational setting of experimental sciences. To answer the second objective, on a multiple linear regression model to predict the use of AI in experimental science students at the UNACH, the independent variables AI professional competencies (AI.competence) and digital resources (digital.resource) can be used.

The general multiple linear regression equation is represented, as follows:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \varepsilon, \quad (1)$$

where use of AI is the dependent variable, X_1 is the first independent variable (AI competencies), X_2 is the second independent variable (digital resources), β_0 is the ordinate to the origin (intercept), β_1 and β_2 are the regression coefficients of X_1 and X_2, respectively, and ε is the term error.

Using the coefficients obtained from the multiple regression analysis in SPSS, the following coefficients were obtained:

- Intercept (β_0): 1.5
- Coefficient for AI Competencies (β_1): 0.3
- Coefficient for Digital Resources (β_2): 0.4

The predictive multiple linear regression equation would be:

$$Use\ of\ AI = 1.5 + 0.3\ (use\ of\ AI) + 0.4\ (digital\ resources). \quad (2)$$

Interpretation of the Equation

- Intercept (β_0) = 1.5, when AI competencies and digital resources are zero, the predicted AI use would be 1.5.
- Coefficient for AI competencies (β_1) = 0.3, for each unit increase in AI competencies, an increase of 0.3 in AI use is expected, keeping digital resources constant.
- Coefficient for digital resources (β_2) = 0.4, for each unit increase in digital resources, an increase of 0.4 in AI use is expected, keeping AI competencies constant.

Application of the Model

If a student scores 4 in AI competencies and 3.5 in digital resources, the predicted AI use would be:

AI usage = 1.5 + 0.3 (4) + 0.4 (3.5) = 1.5 + 1.2 + 1.4 = 4.1.

This model makes it possible to predict the level of AI use based on AI competencies and students' access to digital resources.

DISCUSSION

The present research has provided significant insight into the correlation between professional competencies in AI, the use of AI and digital resources in students of the experimental science education career at the UNACH. First, the results indicate that professional competencies in AI are highly correlated with the use of AI (R = 0.652). This finding is consistent with previous studies that suggest that greater competency in emerging technologies, such as AI, leads to greater use and adoption of these technologies in educational contexts. This result reinforces the importance of developing AI competencies to facilitate their effective integration into pedagogical practices (Aparicio, 2024).

On the other hand, the correlation between AI competencies and digital resources (R = 0.564) suggests that students with higher AI competencies also tend to use a wider variety of digital resources. This finding is in line with research that has indicated that digital competencies are a key factor in taking advantage of available technological resources (Lee et al., 2024). However, the moderate correlation indicates that other factors may also influence the use of digital resources, which could be an interesting area for future research.

Multiple regression analysis revealed that AI competencies are a significant predictor of both AI use and digital resource use. The regression model equation suggests that both factors contribute to AI use, but AI competencies have a greater impact. This is consistent with studies that highlight the influence of specific skills on the adoption of advanced technologies It is important to note that while AI skills are a significant predictor, digital resources also play an important role in education (Park et al., 2023).

This could indicate that access to a variety of digital resources could complement and enhance AI competencies, facilitating a broader and more effective use of AI in educational contexts (Miao & Holmes, 2023; Zhang et al., 2024). Compared to previous studies, this work also brings new perspectives (Jabar et al., 2024). For example, previous research has tended to focus on a single aspect, either competencies or resources, whereas this study provides a more holistic view by considering both factors together (Sadler et al., 2024). In addition, the inclusion of the sample of experimental science students from UNACH adds a specific context that contributes to the existing literature on the adoption of technologies in higher education in Latin America (García, 2024).

The implications of the digital divide must also be considered when interpreting the study's findings. The limited access to technology and resources in some educational contexts can restrict the practical adoption of AI tools, potentially skewing the outcomes in favor of well-equipped institutions. Addressing this challenge requires strategic efforts to ensure equitable access to digital infrastructure, thereby enabling a more inclusive approach to AI integration in education.

CONCLUSIONS

This study has provided comprehensive insights into the factors influencing the adoption and use of AI among students in experimental science education programs. Anchored in the TAM, the research demonstrated that perceived usefulness, perceived ease of use, and digital competencies are significant determinants shaping students' attitudes and behaviors toward the integration of AI into their academic practices (Hafiza Razami & Ibrahim, 2022). These findings validate the study's objective of examining the predictive relationships between these variables and their impact on AI usage, confirming that the theoretical framework aligns well with the observed outcomes.

The results underscore that enhancing digital infrastructure and fostering an educational environment supportive of AI adoption are critical for effective integration (Senekal & Brokensha, 2023). This approach ensures that students not only develop essential technical skills but also gain the confidence to leverage AI tools effectively, facilitating improved academic performance and innovation in learning methods (Miao & Holmes, 2023). By addressing these elements, the study verifies that investing in the development of digital competencies and resource accessibility can significantly influence the willingness of students to engage with advanced educational technologies (Aparicio, 2024).

Moreover, the implications extend beyond the immediate context of this research. Educational policy and curriculum design should prioritize closing the digital divide, as equitable access to AI resources remains a cornerstone for broader implementation and sustained usage (Erduran & Levrini, 2024). This consideration is vital to creating inclusive educational practices that empower all students, regardless of socioeconomic background, to benefit from technological advancements. The results of this study advocate for a strategic shift in educational planning that encompasses both skill-building initiatives and infrastructural investments, aligning with the long-term objective of fostering a digitally competent student body (Mendoza et al., 2023).

Future research should explore longitudinal studies and diverse educational contexts to examine the sustained impact of these factors over time. Additionally, interventions that target improvements in teacher training, curriculum adaptation, and cross-institutional collaborations could further amplify the effectiveness of AI adoption (Rios et al., 2023). By supporting these strategies, educational institutions can build a robust framework that prepares students for the demands of an increasingly AI-integrated professional and academic landscape.

In conclusion, the study confirms that the objectives set at the outset have been achieved through an in-depth examination and discussion of the findings. The alignment of these results with the TAM theoretical framework highlights the essential role of targeted educational strategies in enhancing AI adoption and ensuring that students are equipped for the evolving technological demands of the future.

Limitations

This study has some limitations that should be considered. We focused on a single institution, which could limit the generalizability of the results to other educational contexts (Linares et al., 2023). Future research should include samples from different institutions and geographical contexts to obtain a broader and more representative view. In addition, it is suggested to explore other factors that could influence the use of AI and digital resources, such as technological infrastructure, institutional support and student attitudes towards technology. In conclusion, the results of this study underscore the importance of developing AI competencies and providing access to digital resources to promote the effective use of AI in higher education. These findings have practical implications for both educators and educational policy makers, who should consider these variables when designing and implementing strategies to integrate AI into educational curricular (Senekal & Brokensha, 2023). Also, this study opens new lines of research that could deepen the understanding of the factors that facilitate or hinder the adoption of emerging technologies in education. A significant limitation to consider is the impact of the digital divide on the integration and utilization of AI technologies. Limited access to digital resources and technological infrastructure in certain educational institutions can hinder students' ability to engage effectively with AI tools. This disparity can affect the frequency and depth of AI usage, suggesting the need for comprehensive policies aimed at bridging this gap. Future research could investigate targeted interventions that seek to reduce the digital divide and subsequently enhance the adoption and effectiveness of AI in educational settings.

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Ethical statement: The authors stated that all relevant ethical guidelines and principles were carefully considered in the preparation of this scientific paper. The conduct of the research, as well as the collection, analysis and interpretation of data, were conducted in strict adherence to ethical standards to ensure that potential impacts on humans and the environment were minimized. The study does not require an ethics committee. Because no names, surnames or personal data were used that affect the ethics or morals of the informants. Everything was written in 3rd person. However, before data collection, the Research Directorate of the National University of Chimborazo carried out an audit, which reviews in advance the design, instruments and process of the study. The authors further stated that this review includes compliance with ethical standards in the research process (including the anonymity of the subjects, the voluntariness of participation and confidentiality in the handling of data) and only after successful evaluation was the study implemented. A comprehensive ethical assessment was conducted prior to the study; This weighed all the potential risks and benefits of the research. Any interaction with human participants was voluntary, and informed consent was obtained. The privacy and confidentiality of participants was always respected and appropriate measures were taken to maintain anonymity. All study participants gave informed consent.

Declaration of interest: No conflict of interest is declared by the authors.

Data sharing statement: Data supporting the findings and conclusions are available upon request from the corresponding author.

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