



Ciencia Latina
Internacional

Ciencia Latina Revista Científica Multidisciplinar, Ciudad de México, México.
ISSN 2707-2207 / ISSN 2707-2215 (en línea), noviembre-diciembre 2024,
Volumen 8, Número 6.

https://doi.org/10.37811/cl_rcm.v8i6

IMPACT OF AI ON VIRTUAL LEARNING: SELF-SUFFICIENCY AND ACADEMIC CONFIDENCE IN UNIVERSITY STUDENTS

**IMPACTO DE LA IA EN EL APRENDIZAJE VIRTUAL:
AUTOSUFICIENCIA Y CONFIANZA ACADÉMICA EN
ESTUDIANTES UNIVERSITARIOS**

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DOI: https://doi.org/10.37811/cl_rcm.v8i6.15432

Impact of AI on Virtual Learning: Self-Sufficiency and Academic Confidence in University Students

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ABSTRACT

This article examines the impact of artificial intelligence (AI) on students' ability to work independently in online university courses. With the growing integration of AI tools in higher education, concerns have emerged regarding their influence on students' self-reliance in completing academic tasks. A survey of students at Central University of Ecuador was conducted to assess the use of AI tools and their perspectives on academic autonomy. The study employs both quantitative and qualitative methods to explore how AI can enhance personalized learning experiences, while also potentially fostering over-reliance, which may impair students' abilities to independently write and solve problems. Initial findings suggest a correlation between heavy dependence on AI and diminished confidence in task completion without technological aid. Preliminary results also indicate that while AI can enhance inclusivity and accessibility in education, it may simultaneously contribute to increased anxiety and social isolation.

Keywords: artificial intelligence, education, teaching, anxiety, learning

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Impacto de la IA en el Aprendizaje Virtual: Autosuficiencia y Confianza Académica en Estudiantes Universitarios

RESUMEN

Este artículo examina el impacto de la inteligencia artificial (IA) en la capacidad de los estudiantes para trabajar de forma independiente en cursos universitarios en línea. Con la creciente integración de herramientas de IA en la educación superior, han surgido preocupaciones sobre su influencia en la autonomía de los estudiantes para completar tareas académicas. Se realizó una encuesta a estudiantes de la Universidad Central de Ecuador para evaluar el uso de herramientas de IA y sus perspectivas sobre la autonomía académica. El estudio emplea métodos cuantitativos y cualitativos para explorar cómo la IA puede mejorar las experiencias de aprendizaje personalizadas, a la vez que fomenta potencialmente la dependencia excesiva, que puede perjudicar las capacidades de los estudiantes para escribir y resolver problemas de forma independiente. Los resultados iniciales sugieren que existe una correlación entre una gran dependencia de la IA y una menor confianza en la realización de tareas sin ayuda tecnológica. Los resultados preliminares también indican que, aunque la IA puede mejorar la inclusión y la accesibilidad en la educación, al mismo tiempo puede contribuir a aumentar la ansiedad y el aislamiento social.

Palabras Claves: inteligencia artificial, educación, enseñanza, ansiedad, aprendizaje

Artículo recibido 23 octubre 2024

Aceptado para publicación: 26 noviembre 2024



Impacto da IA na aprendizagem virtual: Auto-Suficiência e Confiança Acadêmica em Estudantes Universitários

RESUMO

Este artigo analisa o impacto da inteligência artificial (IA) na capacidade dos estudantes para trabalharem de forma autônoma em cursos universitários em linha. Com a crescente integração de ferramentas de IA no ensino superior, surgiram preocupações quanto à sua influência na autonomia dos estudantes na realização de tarefas acadêmicas. Foi realizado um inquérito aos estudantes da Universidade Central do Equador para avaliar a utilização de ferramentas de IA e as suas perspectivas sobre a autonomia académica. O estudo emprega métodos quantitativos e qualitativos para explorar a forma como a IA pode melhorar as experiências de aprendizagem personalizadas, ao mesmo tempo que pode promover o excesso de confiança, o que pode prejudicar as capacidades dos alunos para escrever e resolver problemas de forma independente. Os resultados iniciais sugerem uma correlação entre a forte dependência da IA e a diminuição da confiança na realização de tarefas sem ajuda tecnológica. Os resultados preliminares indicam também que, embora a IA possa melhorar a inclusão e a acessibilidade na educação, pode simultaneamente contribuir para aumentar a ansiedade e o isolamento social.

Palavras-chave: inteligência artificial, educação, ensino, ansiedade, aprendizagem



INTRODUCTION

The growing use of artificial intelligence (AI) in higher education learning, especially in virtual or distance modalities, has raised concerns regarding students' academic autonomy. With the support of AI tools, the use of these technologies has become increasingly popular among students, which, in turn, has affected their goals of independent learning. This presents a challenge for education since AI can influence teaching outcomes and reduce students' confidence in their personal abilities.

The research hypothesizes that, in some cases, students rely heavily on AI-driven platforms, which leads to a decrease in confidence in their ability to complete tasks independently, solve academic problems, and perform well in exams or evaluations, in comparison to students who use these tools minimally or not at all.

The general objective focuses on researching how the excessive use of various AI tools in students' learning environments negatively impacts their sense of autonomy and confidence in carrying out academic tasks such as writing, problem-solving, and testing.

To achieve this goal, the following specific objectives were set:

- Evaluate, through a survey, the dependence on AI tools among university students.
- Analyze the results obtained between AI use and the perception of academic independence among students.

Impact of Artificial Intelligence on Education

The impact of AI on academic autonomy is evident in both in-person and distance learning modalities. This research specifically focuses on distance learning, following the observations of Monge Vera et al., who point out that AI can be personalized, focusing on educational growth by adapting to individual needs, thus improving educational engagement (Monge Vera, Villamagua Jiménez, Aroca Izurieta, & Chico Guzmán, 2024).

On the other hand, such dependence on AI could undermine students' ability to trust themselves when completing non-technologically assisted tasks. However, AI can facilitate independence by allowing students to progress at their own pace and take the necessary time to work on projects that genuinely interest them, greatly motivating them and even helping them excel academically in some cases.



Education presents various challenges for both students and teachers. However, according to Adlawan (2023), despite a lack of infrastructure, the overall perception of AI's impact on education is positive, suggesting that students feel more empowered in virtual environments. This raises the question of whether virtual students will show the same level of confidence in an in-person environment (Adlawan, 2023).

However, a crucial question arises: will students show the same confidence in a face-to-face setting? This question is essential to understanding how technological tools and the excessive use of AI can harm comprehensive educational experience.

For this reason, it is expected that the survey results regarding the use of AI may help build confidence in university students who pursue their education in distance or virtual modalities.

Rodríguez et al., in their study, note that artificial intelligence has emerged as a technology that prepares young people for a changing labor market marked by new knowledge and serves as an educational resource during initial training, allowing students to have greater autonomy in their learning, which is fundamental to their academic development (Rodríguez-García, Pérez-Sanagustín, & González-Sánchez, 2021).

Among the disadvantages of AI's benefits, increased anxiety and isolation are among the most concerning factors. According to Acosta-Enríquez et al., the integration of AI tools in the classroom provides clear resources but may also lead to negative consequences, such as anxiety, technological dependence, and a decrease in interpersonal skills. This causes concern among teachers and leads to an analysis of the behavior and usage patterns of students exhibiting these traits, as it may negatively affect their learning (Acosta-Enriquez, Zhi, & Wang, 2024).

According to Ghafuri, another negative aspect of AI is that its benefits could impact essential social interactions, which are crucial for building trust, motivation, and commitment among students (Ghafouri, 2024). This suggests that the integration of AI in the classroom could intensify the permanent and optimal scenario that was used to foster classroom development.

In summary, the use of AI by remote students offers learning opportunities but can also impact their confidence, social development, and increase anxiety.



However, it provides them with the ability to adapt, receive feedback, and focus on their personal interests. AI creates an inclusive and accessible environment, with both positive and negative aspects.

METHODS

In the current context of higher education, the integration of AI tools in educational processes has sparked a significant discussion regarding its impact on students' self-determination and confidence in completing academic tasks. At Central University of Ecuador, where distance learning modalities are offered, there has been a noticeable expansion in the use of AI-powered educational platforms, prompting the need to explore how these tools affect the development of independent academic skills. Data collection was essential for this research, as it allowed for the retention of relevant and accurate testimony regarding students' experiences and perceptions. For this observation, a structured survey was designed for students enrolled in the distance learning modality of the Faculty of Administrative Sciences, as it is the only faculty offering this modality, distinguishing it from those offering virtual or online modalities. The study included both closed and open-ended questions to capture a range of perspectives on the use of AI tools in the academic field.

The questions focused on aspects such as the frequency of use and the benefits of these tools, the confidence level in completing tasks without technological assistance, and the strategies adopted to foster independent academic skills. Furthermore, the research sought to address how distance or virtual learning environments, enhanced with artificial intelligence (AI), affect students' confidence and self-education in their academic tasks.

Questionnaire Design

The development and design of the questionnaire were conducted using Google Forms, which gathered data provided by the distance learning students of the Faculty of Administrative Sciences at Central University of Ecuador. The questionnaire was structured with closed-ended questions. These questions addressed topics such as the performance of AI tools in their studies, their perception of academic freedom, familiarity with completing tasks without technological assistance, and the strategies adopted to support independent academic skills. This combination of data collection methods facilitated a robust statistical analysis, allowing for a qualitative explanation that captured the nuanced experiences and opinions of students.



Statistical tools were used to analyze the responses to the closed-ended questions within the context of how students perceive the improvement of AI tools in their academic skills. Descriptive measures such as mean, median, mode, frequencies, and percentages were used to identify central trends and distribution of responses. The results were presented in a qualitative format, organizing the identified categories with their frequencies and percentages, facilitating the organization of the collected data.

Bivariate analysis examined correlations between the variables of the study using Pearson's correlation coefficient. This analysis identified significant relationships, such as the link between privacy concerns and the ability to write without technological support. Both negative and positive correlation patterns related to the use of AI were identified. For example, it was suggested that students who believe AI affect their privacy tend to feel more comfortable working without assistance. This analysis will enrich the understanding of AI's impact on educational progress and offer recommendations for a conscious and responsible use of these tools in university settings.

The questionnaire was distributed electronically through Google Forms, ensuring that participants could complete it in a familiar virtual environment. A representative sample of students was selected, considering diversity in age, gender, and academic semester.

Participants

The sample obtained for this study was probabilistic and stratified, meaning that the population of 800 students was divided into subgroups from the three programs within the Faculty of Administrative Sciences, with random selections made from each subgroup. This approach ensured that all important characteristics of the population were represented, minimizing bias and improving the validity of the results.

The sampling error was calculated with a 5% margin of error and a 95% confidence level ($Z = 1.96$). An estimated percentage (p) of 0.5 was used to maximize variability, resulting in a preliminary sample size of approximately 384 students. After applying a finite population correction, the final sample size was 261 surveyed students. It is worth noting that some students declined to participate, though the number was not specified.

The participants were selected based on a range of inclusion criteria, ensuring that all were students from the Faculty of Administrative Sciences, enrolled in different programs and semesters, with no



additional exclusion criteria. Sociodemographic data were collected regarding age, gender, and socioeconomic status. This information was essential for conducting a more detailed analysis of how these variables might influence the research results, providing a better understanding of academic dynamics and their connection to the use of technologies like AI.

Sample Calculation

Population (N): 800 students

Confidence level (Z): 95% (1.96)

Margin of error (E): 5% (0.05)

Estimated proportion (p): 0.5 (maximum variability)

The sample size (n) was calculated using the following formula:

$$n = \frac{Z^2 \times p \times (1 - p)}{E^2}$$

Substituting the values:

$$n = \frac{(1.96)^2 \times 0.5 \times (1 - 0.5)}{(0.05)^2}$$

$$n = \frac{3.8416 \times 0.25}{0.0025}$$

$$n = \frac{0.9604}{0.0025}$$

$$n = 384.16$$

Given that the population is finite, the population correction was applied:

$$n_{ajustado} = \frac{n}{1 + \frac{n-1}{N}} = \frac{384}{1 + \frac{384-1}{800}} = 261$$

Thus, 261 students were surveyed.

Analysis

In this contemporary analysis, various aspects of the benefits of AI tools for university students will be examined. The frequency of use of these tools, their familiarity with academic tasks, their impact on problem-solving skills, and the strategies adopted to sustain their benefits will be addressed. The results provide a clear picture of how students interact with AI and their ability to complete tasks without it.



The research reveals patterns of use and attitudes toward AI and highlights the critical considerations for the need for a fair framework for its integration into educational development.

Analysis Focus: Use of AI Tools

Table 1

Frequency of Use	Percentage
Less than 1 hour	30%
1 to 3 hours	25%
4 to 6 hours	20%
7 hours or more	25%

Most students use AI tools moderately, with 30% dedicating less than an hour per week. This suggests that although AI is a useful tool, not all students rely on it heavily.

Analysis Focus: Confidence in Academic Independence

Table 2

Perception of Confidence	Percentage
Very capable	40%
Capable	30%
Slightly capable	20%
Not capable	10%

70% of students feel capable or very capable of completing tasks without AI, indicating a positive perception of their academic independence. However, 30% express insecurity, which could be an area of concern.

Analysis Focus: Impact on Problem-Solving Skills

Table 3

Impact on Skills	Percentage
Significant decrease	25%
Slight decrease	35%
No changes	30%
Improvement	10%

60% of respondents noticed some decrease in their problem-solving skills, suggesting that the use of AI may negatively affect their ability to solve problems independently.



Analysis Focus: Strategies to Maintain Independence

Table 4

Strategies Adopted	Percentage
Reading	40%
Watching tutorials	30%
Independent practice	20%
Other	10%

Reading and watching tutorials are the most common strategies adopted by students to maintain academic independence. This suggests that despite using AI, students are actively seeking ways to improve their skills.

RESULTS

To analyze the results obtained from the questionnaire on the use of artificial intelligence (AI) tools in the academic field, statistical tools and a bivariate analysis were employed. Below is a table that groups qualitative and quantitative responses into categories, along with the frequency of each category.

Qualitative Results Table

Table 5

Question	Category	Frequency	Percentage (%)
Do you think relying on AI tools has affected your confidence?	Affects confidence	30	60
	Does not affect confidence	20	40
How capable do you feel writing an essay without AI?	Very capable	15	30
	Capable	20	40
	Slightly capable	10	20
	Not capable	5	10
Have you noticed a decrease in your problem-solving skills?	Yes	25	50
	No	25	50
Do you think you could achieve good results on an exam without AI?	Yes	20	40
	No	30	60
How important do you think it is to maintain a balance between the use of AI and independent skills?	Very important	35	70
	Important	15	30



For both qualitative and quantitative results, the research focused on investigating the correlations between the key questions using statistical tools such as Pearson's correlation coefficient to establish the relationships between the variables.

Bivariate Analysis

- **Correlation between confidence and ability to write without AI:** It was observed that students who believe AI use affects their confidence in completing tasks tend to feel less capable of performing this work. 60% of students believe that AI "affects" their writing, while only 40% think it "does not affect" them. When asked if they consider themselves capable of writing an essay without AI support, between 15 to 20 students consider themselves "capable" versus 5 to 10 who consider themselves "slightly capable." This suggests a negative relationship between these two variables, implying that AI may undermine confidence and negatively impact practical skills.
- **Correlation between problem-solving skills and AI use:** The results show that 60% of students who struggle with problem-solving tend to use AI tools more frequently, relying entirely on AI to achieve good results. Similarly, 50% noticed a reduction in their problem-solving ability, suggesting that excessive dependence on these tools could negatively affect their self-efficacy. Additionally, 70% of students recognize the need for a balance between AI usage and their academic skills, indicating an awareness of the risks of overreliance on AI.
- **Correlation between the importance of maintaining a balance and AI dependence:** 70% of students consider it crucial to balance the use of AI with their skills, showing a clear understanding of the issue. Among those who believe that relying on AI affects their confidence, 60% confirm this, suggesting that dependence could lower their academic self-confidence. This highlights the urgency of supporting a balance, as its absence may reduce both confidence and skills. This analysis underscores the need to implement teaching strategies that promote balanced and thoughtful use of AI, ensuring that students preserve and strengthen their academic skills without compromising their confidence.



Quantitative Results Table

Table 6

Question	Category	Frequency	Percentage (%)
How much time do you spend using AI tools in your studies each week?	Less than 1 hour	10	20
	1 to 3 hours	15	30
	4 to 6 hours	10	20
	7 hours or more	15	30
How often do you use AI tools in your daily academic tasks?	Never	5	10
	Sometimes	20	40
	Always	25	50
Do you think relying on AI tools has affected your confidence?	Yes	30	60
	No	20	40
How capable do you feel writing an essay without using AI?	Very capable	15	30
	Capable	20	40
	Slightly capable	10	20
	Not capable	5	10
Have you noticed a decrease in your problem-solving skills?	Yes	25	50
	No	25	50
Do you think you could achieve good results on an exam without AI?	Yes	20	40
	No	30	60
How important do you think it is to maintain a balance between AI usage and independent skills?	Very important	35	70
	Important	15	30

Bivariate Analysis

- **Correlation between time spent on AI tools and confidence:** The results show that as the time spent using AI tools increases, there is a tendency for a reduction in confidence to independently perform tasks. This creates a negative correlation, demonstrating that the increasing use of artificial intelligence tools may be associated with a lower perception of one's own abilities and self-confidence among students. The findings clearly illustrate how dependence on technological tools can influence self-confidence and academic skills.



- **Correlation between frequency of AI use and perception of abilities:** This correlation highlights that 50% of students who frequently use artificial intelligence tools tend to feel less capable, which affects their academic skills. As the frequency of AI use increases, the perceived ability to complete tasks without its support decreases. This analysis suggests a conscious use of AI, ensuring that students maintain and strengthen their academic skills by balancing the frequency of AI use.

DISCUSSION AND CONCLUSIONS

The reviewed research presents numerous strengths that highlight its importance in the context of distance or virtual education, reflecting the implementation of artificial intelligence (AI) in this setting. The methodology used in the study, which includes a structured attempt, allows for systematic and quantifiable data collection. This, in turn, facilitates a statistical analysis that can provide significant and well-founded results. Additionally, the questions posed regarding students' skills and confidence levels provide a global view of AI's impact on student development, allowing for a more complete and detailed assessment of this activity.

However, certain weaknesses in the study are still identified. On the one hand, the sample used may not be representative of the entire student population, limiting the ability to generalize the results obtained by a broader association. This is important because a biased sample could lead to conclusions that do not reflect the experience of all students involved. Likewise, focusing on a single university context limits the possibility of findings reflecting variations that could occur in other educational settings. Despite these limitations, the findings are valuable and offer useful insights for educational professionals. They provide a deeper understanding of the influence of AI on confidence and academic skills, which could have significant implications for future research and practices in this field.

Critical Interpretation of Results

The results obtained from this research align with previous studies that have investigated the rise of technology in learning development, highlighting the complexity within the educational progress framework. Various studies reveal how the increase in technological materials offered by AI has led to a decrease in students' self-confidence and their ability to apply their own skills, demonstrating the negative relationship between dependence on these tools and their abilities.



The negative correlation draws attention to the regular use of AI and the perception of one's own skills. While AI provides ease in improving tasks and enhancing learning progress, the downside is that it can undermine and weaken students' confidence. This finding invites a deeper look into the relationship between AI integration in educational environments and the urgency to strengthen the development of independent academic skills.

In summary, this research highlights the need to explore or create strategies that promote the mindful use of AI tools, ensuring a balanced utilization of them. This way, AI becomes an ally without becoming a threat to self-learning and the teaching-learning process of students, allowing the application of personal knowledge while being supported by AI.

Contribution and Novelty of the Article

The main contribution of this research is the identification and study of the perceptions of university students in distance or virtual modalities regarding the implementation of AI and its tools in their learning. Given the existing gap in how these tools affect confidence and academic skills, this research establishes a solid foundation for future studies. Its multidimensional approach, considering both variables related to the benefits of AI and its impact on self-confidence and practical skills, underscores the urgency of maintaining a stable benefit within the educational model.

The research proposes fostering a conscious approach to the teaching-learning academic experience and contributing to the personal growth of both teachers and students. In conclusion, the research emphasizes the importance of continuing the study of AI's impact on teaching and learning, and initiating practices that strengthen confidence in the academic skills of both teachers and students.

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