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Generative AI as a Catalyst for Financial Learning in Vocational Training

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ABSTRACT

This study analyzes the impact of generative Artificial Intelligence (AI) on financial literacy learning among students in higher vocational education programs in Spain.

The research was conducted in two phases: in the first phase, students answered three basic questions about inflation, compound interest, and diversification without technological assistance, establishing a baseline of knowledge. In the second phase, they were allowed to use generative AI tools such as ChatGPT to investigate and solve the same questions, promoting interaction, reflection, and the search for explanations. The test was then repeated to assess the effect of AI use on academic performance.

The results showed a significant improvement in the accuracy, depth, and practical application of financial concepts, with an average performance increase of nearly 30%. Additionally, students reported greater confidence and argumentative ability. The study concludes that generative AI acts as a catalyst for learning by providing a personalized, accessible, and motivating environment. It also fosters autonomy, critical thinking, and intellectual curiosity, suggesting that its pedagogical integration can transform the teaching of complex content and contribute to a more inclusive education adapted to current challenges.

Keywords: Generative Artificial Intelligence; Financial Education; Autonomous Learning; Critical Thinking; Vocational Training.

INTRODUCTION

Purpose of study

The emergence of Artificial Intelligence (AI) in education has generated a profound change in teaching and learning processes. This transformation not only affects how knowledge is accessed, but also how it is constructed, personalized, and assessed. In this context, Artificial Intelligence (AI) is presented as a tool with high potential to improve academic performance, foster critical thinking, and promote student autonomy (González, 2023).

In the field of financial education, characterized by the abstract nature of its concepts and the need to apply mathematical and strategic reasoning, Artificial Intelligence (AI) can play a key role. Several studies have shown that students struggle to understand concepts such as compound interest, inflation, and risk diversification, which limits their ability to make informed decisions in their personal and professional lives (Barallobres, 2016; Villaseñor & Lara, 2025).

This study focuses on a group of 80 students enrolled in advanced vocational training programs in International Trade and Administration and Finance. The main purpose is to analyze the impact of Artificial Intelligence (AI) on financial literacy learning, evaluating both academic performance and the perception of AI as

an educational tool. This dual perspective allows the phenomenon to be addressed from both cognitive and affective dimensions, considering not only learning outcomes but also the student experience (Martínez, 2025).

The need for this study is justified by the increasing integration of smart technologies in the classroom and the urgent need to educate citizens capable of managing their financial resources critically and responsibly. As García (2023) points out, Artificial Intelligence (AI) can be an ally in democratizing access to knowledge, provided it is used with clear ethical and pedagogical criteria.

Study Objectives

General Objective

To analyze the impact of Artificial Intelligence (AI) on the learning of financial culture among students of higher-level vocational training cycles, considering both academic performance and the perception of the use of Artificial Intelligence (AI) as an educational tool.

Secondary Objectives

1. Evaluate students' level of financial knowledge through a test based on the three fundamental questions of the Bank of Spain: inflation, compound interest and risk diversification.
2. Compare the results of the test performed without technological assistance with those obtained after using the generative Artificial Intelligence (AI) tool.
3. Analyze student perceptions of the use of Artificial Intelligence (AI) in the learning process, considering dimensions such as usefulness, clarity, safety, error correction, motivation, experience, and training.
4. Identify correlations between the use of Artificial Intelligence (AI) and affective variables such as motivation, autonomy, and security in learning.
5. To propose pedagogical recommendations for the ethical and effective integration of Artificial Intelligence (AI) into the financial education curriculum.

These objectives align with current trends in educational research, which highlight the importance of personalized learning, adaptive feedback, and the development of digital skills (Zepeda et al., 2024).

Study Hypothesis

H_1: Artificial Intelligence (AI) improves the level of financial education of students.

This hypothesis is validated using a quasi-experimental design. A financial literacy test is administered at two points in time: before and after the use of a generative Artificial Intelligence (AI) tool. The test includes three key questions on inflation, compound interest, and risk diversification. The percentage of correct answers for each question and the number of students who answer all questions correctly are compared. The statistical analysis includes frequency measures, percentages, and comparison of means, allowing us to determine whether there is a significant improvement in academic performance.

Previous studies have shown that Artificial Intelligence (AI) can improve academic performance in various areas, including mathematics, science, and finance, by offering personalized and adaptive explanations (Jimbo et al., 2023; Mattos, 2025; Ortega et al., 2023).

H_2: The use of Artificial Intelligence (AI) in the classroom improves students' perception of safety, motivation and autonomy in the financial learning process.

This hypothesis is validated through a perception questionnaire administered to the same students who took the test. The instrument includes Likert-type items that assess the perceived usefulness of Artificial Intelligence (AI), the clarity of explanations, confidence in answering, the ability to detect errors, the motivation to reflect, the desire to use Artificial Intelligence (AI) in other subjects, and the willingness to receive training on its responsible use.

The analysis includes frequencies, percentages, and correlations between perceptual variables. This approach allows for the identification of response patterns that reflect the emotional and attitudinal impact of Artificial Intelligence (AI) on learning.

The scientific literature supports this hypothesis. Delgado et al. (2024) point out that generative Artificial Intelligence (AI) has a positive impact on student motivation and satisfaction, especially when used as a complement to traditional learning. Bustamante & Camacho (2024) highlight that Artificial Intelligence (AI) can foster self-regulation, metacognition, and decision-making about one's own learning process.

Furthermore, García & Crespo (2025) state that Artificial Intelligence (AI) improves accessibility, equity and motivation in learning, contributing to a more meaningful and personalized educational experience.

RESEARCH METHODOLOGY

Study Design

This study is part of a quantitative applied research project with a quasi-experimental design and a descriptive-comparative approach. It was conducted in a controlled classroom environment, within the context of a scheduled academic activity, with the aim of evaluating the impact of generative Artificial Intelligence (AI) on financial literacy learning and on students' perceptions of its use.

The activity took place at ESIC Business & Marketing School, specifically within the advanced vocational training programs in Administration and Finance and International Trade, with a total of 80 students. The activity was conducted in a single 60-minute session, structured in three clearly differentiated phases.

Phases of the Intervention

1. **First phase. Assessment without AI (15 minutes):** Students completed a financial literacy test consisting of three key questions, taken from the Bank of Spain's questionnaire. These questions assessed knowledge of inflation, compound interest, and risk diversification.
   This first test was carried out without any technological assistance, with the aim of establishing a baseline of the students' level of financial knowledge.
2. **Second phase. AI-assisted research (35 minutes):** After completing the first test, students were allowed to use generative Artificial Intelligence (AI) tools such as ChatGPT, Copilot, or similar programs to research, consult, and reflect on the financial concepts assessed. During this time, students could freely interact with the AI to obtain explanations, examples, confirmations of results, and conceptual clarifications.
   At the end of this period, they were asked to repeat the same test, this time with the option of applying the knowledge they had acquired through the use of generative Artificial Intelligence (AI). This second assessment allowed for a comparison of the results and an evaluation of the direct impact of Artificial Intelligence (AI) on academic performance.
3. **Third phase. Perception survey (10 minutes):** A perception questionnaire on the use of Artificial Intelligence (AI) in the learning process was administered. This instrument included Likert-type items distributed across several dimensions: perceived usefulness, clarity of explanations, confidence in answering, error correction, motivation to reflect, justification of answers, desire for use in other subjects, and training on responsible use.
   Closed-ended questions were also included about whether students changed their answers after using Artificial Intelligence (AI), whether they felt their answers had improved, and what kind of help they requested from the tool.

Data Collection Instruments

Two main instruments were used:

1. **Financial literacy test:** consisting of three multiple-choice questions, validated by the Bank of Spain, which assess basic but essential knowledge for making economic decisions.
2. **Perception questionnaire:** designed ad hoc for this study, with 13 Likert-type questions (5-point scale) and 4 closed questions.

Procedure

The activity was conducted under uniform conditions for all participants, in classrooms equipped with internet access and personal devices. Access to generative Artificial Intelligence (AI) tools was guaranteed for all students during the second phase. The total duration of the activity was 60 minutes, distributed across the three phases mentioned.

Before the activity began, the students were informed about the purpose of the study, and their informed consent was obtained. Data confidentiality and the anonymity of responses were guaranteed, in accordance with the ethical principles of educational research.

Data Analysis

The data obtained were analyzed using descriptive and comparative statistical techniques:

- **Frequencies and percentages** for each question in the test and perception questionnaire.
- **Comparison of results** between the test without Artificial Intelligence (AI) and the test with Artificial Intelligence (AI), to evaluate the impact on academic performance.

- **Analysis of correlations** between perceptual variables (motivation, safety, utility…) and final performance.
- **Identifying patterns of change** in responses after the use of Artificial Intelligence (AI).

The analysis was performed using statistical software for academic use (Excel) and the results were interpreted based on the two hypotheses put forward.

Hypothesis Validation

- **H1:** This hypothesis is validated by direct comparison between the test results without Artificial Intelligence (AI) and with Artificial Intelligence (AI). It is considered validated if a significant increase is observed in the number of correct answers and in the percentage of students who answer all questions correctly.
- **H2:** It is validated through the analysis of the perception questionnaire. It is considered validated if the majority of students position themselves at levels of "agree" or "strongly agree" in the dimensions evaluated, and if a positive correlation is observed between these perceptions and academic performance.

RESULTS

This study was conducted with a homogeneous group of 80 students enrolled in advanced vocational training programs in International Trade and Administration and Finance. This sample represents an academic profile directly linked to the economic and financial field, suggesting a certain degree of familiarity with basic financial concepts. However, the results obtained reveal significant differences in the level of understanding depending on whether or not Artificial intelligence (AI) tools were used during the activity.

Results without the Assistance of Artificial Intelligence.

Table 1. Test results without Artificial Intelligence (AI).

	Correct answers	Percentage (%)
Inflation	71	88.8%
Compound capitalization	27	33.8%
Risk diversification	58	72.5%
All correct answers	19	23.8%

In the first phase, the students answered the questionnaire without any external assistance. The results show that the concept of inflation was the best understood by the participants: 71 out of 80 students answered correctly, equivalent to an 88.8% success rate. This high percentage suggests that the notion of loss of purchasing power is widely known, probably due to its constant presence in the media and in the students' everyday experiences.

In contrast, the second question, focused on compound interest, showed a low success rate. Only 27 students answered correctly, representing 33.8%. This result highlights a widespread difficulty in understanding how compound interest works, despite it being an essential concept in personal financial planning and investment decision-making.

The third question, related to risk diversification, received 58 correct answers, representing a 72.5% success rate. Although this percentage is relatively high, it still indicates that more than a quarter of the students do not adequately recognize the importance of diversifying investments to minimize the impact of potential losses.

Finally, when analyzing how many students correctly answered all three questions, it was observed that only 19 students (23.8% of the total) demonstrated a comprehensive understanding of the three concepts assessed. This data reinforces the hypothesis that, without additional support, the level of financial literacy among students, even those with economic training, presents significant deficiencies.

Results with Artificial Intelligence Assistance.

Table 2. Results of the Artificial Intelligence (AI) test.

	Correct answers	Percentage (%)
Inflation	74	92.5%
Compound capitalization	52	65%
Risk diversification	71	88%
All correct answers	44	55%

In the second phase of the study, the activity was repeated with the same group of students, this time with the support of an Artificial Intelligence (AI) tool of their choice. The results show a substantial improvement in all indicators.

In the question about inflation, the number of correct answers increased to 74, representing 92.5%. Although the difference with the group without AI is not very large, it does indicate an improvement in the accuracy of the answers, possibly attributable to the ability of Artificial Intelligence (AI) to offer clearer and more contextualized explanations.

The most significant improvement was observed in the second question, on compound interest. In this case, 52 students answered correctly, representing 65.0%. This increase of more than 30 percentage points compared to the group without AI suggests that the use of Artificial Intelligence (AI) facilitates the understanding of mathematical concepts applied to finance, likely through interactive examples or visualizations that reinforce learning.

Regarding risk diversification, the number of correct answers rose to 71, reaching 88.8%. This result not only significantly surpasses the performance of the group without AI but also indicates that the students were able to grasp the logic behind financial risk management, which is fundamental in investment and wealth planning contexts.

The most revealing finding is the number of students who correctly answered all three questions. In the group using Artificial Intelligence (AI), 44 students (55.0% of the total) achieved this goal, more than double the number in the group without technological assistance. This result provides strong evidence supporting the hypothesis: the use of Artificial Intelligence (AI) significantly improves students' financial literacy.

Perception of the Use of Artificial Intelligence (AI)

In addition to the knowledge test, a second questionnaire was administered to assess students' perceptions of the use of Artificial Intelligence (AI) during the activity. This instrument allowed for the collection of qualitative information about the students' experience, their level of satisfaction, the perceived usefulness of the tool, and their willingness to use it in other educational contexts.

The results show a predominantly positive assessment. Regarding the statement "AI helped me better understand the questions" (Table 3), 65 % of students agreed or strongly agreed, while only 13% disagreed. This suggests that Artificial Intelligence (AI) not only improves performance but also facilitates the understanding of the questions, which is key to problem-solving.

Table 3. Artificial Intelligence (AI) helped me to better understand the questions.

	I completely disagree	Disagree	Neutral	OK	Totally agree
Answers	7	3	18	25	27
%	9%	4%	23%	31%	34%

Regarding the statement "AI provided me with clear and useful explanations" (Table 4), 82 % of students responded favourably, with 46% indicating they strongly agreed. This result reinforces the idea that Artificial Intelligence (AI) can act as an effective pedagogical mediator, capable of translating complex concepts into accessible explanations.

Table 4. Artificial Intelligence (AI) offered me clear and useful explanations.

	I completely disagree	Disagree	Neutral	OK	Totally agree
Answers	3	0	11	29	37
%	4%	0%	14%	36%	46%

The perception of safety was also assessed. When asked, "Thanks to AI, I felt safer answering" (Table 5), 59 % of students agreed or strongly agreed, while 14% disagreed. This indicator is relevant, as safety in the response process can directly influence the quality of learning and the willingness to participate actively.

Table 5. Thanks to Artificial Intelligence (AI), I felt more confident when answering.

	I completely disagree	Disagree	Neutral	OK	Totally agree
Answers	7	4	22	21	26

%	9%	5%	28%	26%	33%

Another important aspect was AI's ability to detect errors. 62% of students stated that "AI helped me identify errors in my initial answers" (Table 6), suggesting that the tool not only acts as support but also as a feedback mechanism, allowing students to review and correct their reasoning.

Table 6. Artificial Intelligence (AI) helped me identify errors in my initial answers.

	I completely disagree	**Disagree**	**Neutral**	**OK**	**Totally agree**
Answers	14	5	12	18	31
%	18%	6%	15%	23%	39%

Regarding motivation, 55% of students indicated that "AI motivated me to reflect more on my answers" (Table 7), which points to a positive effect on the development of critical thinking. Although 20% were neutral and 20% disagreed, the majority acknowledged a favourable impact on their attitude toward learning.

Table 7. Artificial Intelligence (AI) motivated me to reflect on my answers.

	I completely disagree	**Disagree**	**Neutral**	**OK**	**Totally agree**
Answers	8	8	20	15	29
%	10%	10%	25%	19%	36%

Regarding changes in responses (Table 8), 58 % of students admitted to modifying some of their answers after consulting with the AI, and 66% felt their answers improved thanks to this interaction (Table 9). Furthermore, 74 % stated that Artificial Intelligence (AI) helped them better justify their answers, indicating an improvement in argumentation and reasoning skills (Table 10).

Table 8. Did you change any of your answers after using Artificial Intelligence (AI)?

	Yeah	**No**	**I'm not sure**
Answers	46	30	4
%	58%	38%	5%

Table 9. Do you think your answers improved thanks to Artificial Intelligence (AI)?

	Yeah	**No**	**I'm not sure**
Answers	53	24	3
%	66%	30%	4%

Table 10. Did Artificial Intelligence (AI) help you better justify your answers?

	Yeah	**No**	**I'm not sure**
Answers	59	17	4
%	74%	21%	5%

Regarding the type of help requested (Table 11), 55% asked for explanations of concepts, 23 % sought confirmation of results, and 15% requested examples. These data reflect a diversity in students' needs and show how Artificial Intelligence (AI) can adapt to different learning styles.

Table 11. What type of help did you ask Artificial Intelligence (AI) for?

	Explanation of concepts	Examples	Confirmation of results	Other
Answer	44	12	18	6
%	55%	15%	23%	8%

The overall experience was rated positively (Table 12): 75% of students described their experience as good or very good, and only 4% expressed a negative opinion. Furthermore, 83% expressed interest in using Artificial Intelligence (AI) in other subjects (Table 13), and 89% considered Artificial Intelligence (AI) to be a useful study tool (Table 14).

Table 12. How would you describe your experience using Artificial Intelligence (AI) in this activity?

	I completely disagree	Disagree	Neutral	OK	Totally agree
Answers	3	0	17	33	27
%	4%	0%	21%	41%	34%

Table 13. I would like to use Artificial Intelligence (AI) in other subjects.

	I completely disagree	Disagree	Neutral	OK	Totally agree
Answers	1	2	11	20	46
%	1%	3%	14%	25%	58%

Table 14. I believe that Artificial Intelligence (AI) can be a useful tool for studying.

	I completely disagree	Disagree	Neutral	OK	Totally agree
Answers	3	1	5	22	49
%	4%	1%	6%	28%	61%

Finally, regarding the statement "I would like to receive training on how to use AI responsibly" (Table 15), 81 % of students agreed or strongly agreed. This finding is particularly relevant, as it indicates an emerging awareness of the need to develop ethical and critical digital skills in the use of emerging technologies.

Table 15. I would like to receive information on how to use Artificial Intelligence (AI) responsibly.

	I completely disagree	Disagree	Neutral	OK	Totally agree
Answers	3	4	9	10	54
%	4%	5%	11%	13%	68%

SUMMARY OF RESULTS

The combination of quantitative data from the knowledge test and qualitative data from the perception test allows us to construct a clear picture of the impact of Artificial Intelligence (AI) on financial learning. On the one hand, a significant improvement in academic performance is observed, especially in complex concepts such as compound interest. On the other hand, a positive experience is noted among students, who value Artificial Intelligence (AI) as a useful, clear, and motivating tool capable of improving their confidence and argumentation skills.

These results not only validate the study's initial hypotheses but also open new lines of research on the role of Artificial Intelligence (AI) in education. The improved performance, combined with a positive perception, suggests that AI can become a strategic ally in financial literacy, especially in contexts where traditional teaching methods fail to meet all students' needs.

DISCUSSION AND CONCLUSIONS

Discussion

The results obtained in this study confirm the hypothesis that the use of Artificial Intelligence (AI) tools significantly improves students' financial literacy. This improvement is evident both in academic performance and in the positive perception of AI as a learning support tool.

The improved understanding of complex financial concepts, such as compound interest, suggests that Artificial Intelligence (AI) acts not only as an information resource but also as a cognitive facilitator, enabling students to construct knowledge in a deeper and more personalized way. This assertion is supported by studies such as that of García et al. (2023), whose meta-analysis concludes that Artificial Intelligence (AI) has a positive impact on academic performance, especially in STEM fields, by fostering motivation and a positive attitude toward learning.

Furthermore, the increase in the number of students who answered all the questions on the financial test correctly after using artificial intelligence (AI) (from 23.8% to 55%) reinforces the idea that these technologies allow for a comprehensive assimilation of the content. This phenomenon has also been observed by Bolaño & Duarte (2024), who highlight that Artificial Intelligence (AI) transforms the way we teach and learn by enabling personalized learning and immediate feedback.

Students' perceptions of Artificial Intelligence (AI) use also offer revealing data. More than 80% of students felt that AI provided them with clear and useful explanations, and 74% stated that it helped them better justify their answers. These results align with the findings of Alfaro & Díaz (2024), who identify a gap between the perception and actual use of AI and recommend strengthening ethical and pedagogical training for its responsible use.

Furthermore, 66% of students felt their answers improved thanks to Artificial Intelligence (AI), suggesting that this technology not only acts as technical support but also enhances critical thinking and argumentation skills. Oliva et al. (2025) argue that Artificial Intelligence (AI) can be an ally of critical thinking if used ethically and for clear pedagogical purposes.

Regarding the overall experience, 75% of students positively valued the use of Artificial Intelligence (AI) in this activity, and 83% expressed interest in using it in other subjects. This finding is consistent with the results of studies such as that of Chao & Rivera (2024), who found that 33% of university students were already using Artificial Intelligence (AI) tools, and that there is a significant difference between the perception of faculty and students regarding its impact on learning.

Motivation was also positively influenced: 55% of students indicated that Artificial Intelligence (AI) motivated them to reflect more on their answers. This type of emotional and cognitive impact has been documented by Jardón et al. (2024), who point out that Artificial intelligence (AI) can improve the teaching and learning experience if used as a complement to, and not a substitute for, disciplinary knowledge.

On the other hand, 74% of students stated that Artificial Intelligence (AI) helped them better justify their answers, indicating an improvement in argumentation and logical reasoning skills. This aspect has been addressed by Mosqueda (2024), who emphasizes that Artificial Intelligence (AI) can improve the quality of learning if implemented with ethical principles and appropriate teacher support.

The type of help requested by students is also relevant: 55% asked for explanations of concepts, 23% for confirmation of results, and 15% for examples. This suggests that Artificial Intelligence (AI) is used as a resource for consultation and verification, which aligns with the findings of Andrade (2023), who notes that AI allows for adjusting the content and difficulty of tasks based on student progress.

The willingness of students to receive training on the responsible use of Artificial Intelligence (AI) (81%) indicates an emerging awareness of digital ethics, an aspect that has been widely discussed by Tramallino & Zeni (2024) who warn that the use of AI in education must be accompanied by digital literacy and ethics programs.

Taken together, these results suggest that Artificial Intelligence (AI) not only improves academic performance but also transforms the educational experience, fostering a more reflective, critical, and autonomous attitude in students. This transformation has been documented by Mena et al. (2024), who, in their bibliometric review, highlight the exponential growth of publications on AI in education and its impact on teaching and learning processes.

Conclusions

Based on the results obtained and a comparative analysis with the scientific literature, it is concluded that Artificial Intelligence (AI) significantly improves academic performance in financial education, especially in complex concepts such as compound interest. This translates into a higher success rate and a deeper understanding of the content.

Student perception of AI use is largely positive, as students highlight its usefulness in better understanding questions, justifying their answers, correcting errors, and increasing confidence when responding. This demonstrates that Artificial Intelligence (AI) acts not only as a technical resource but also as a cognitive facilitator that enhances critical thinking and argumentation.

This technology transforms the educational experience by generating greater motivation, confidence, and willingness to learn, and is valued by students as a useful tool they wish to incorporate into other subjects. Furthermore, there is a growing awareness of the need for ethical training in the use of AI, which opens the door to designing digital literacy programs that promote the responsible, reflective, and critical use of these technologies.

Artificial Intelligence (AI) is positioned as a resource for consultation, verification, and personalization, capable of adapting to students' individual needs and facilitating access to knowledge. This demands that its implementation in education be accompanied by clear pedagogical strategies, specialized teacher training, and institutional policies that guarantee its ethical, inclusive, and effective use. Far from replacing teachers, AI complements them, allowing them to focus on tasks of greater pedagogical value, such as personalized support and the development of transversal skills. The observed improvement in academic performance is consistent with international studies, suggesting that the positive impact of AI can be replicated in different educational contexts and at various levels.

Ultimately, this study provides empirical and theoretical evidence on the transformative role of AI in financial education and highlights the need for further research into its application in other areas of knowledge, as it not only improves outcomes but also profoundly modifies how students learn, think, and engage with knowledge.

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