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The Integration of Artificial Intelligence in Academic Learning Practices: A Comprehensive Approach

Gabriela Alina Anghel, Cristina Mihaela Zanfir * , Florentina Lavinia Matei , Camelia Delia Voicu 
and Ramona Adina Neacșa

Department of Educational Sciences, Faculty of Orthodox Theology and Educational Sciences, Valahia University of Târgoviște, 130105 Târgoviște, Romania; alina.anghel@valahia.ro (G.A.A.); lavinia.matei@valahia.ro (F.L.M.); camelia.voicu@valahia.ro (C.D.V.); ramona.lupu@valahia.ro (R.A.N.)

* Correspondence: cristina.zanfir@valahia.ro

Abstract: The integration of artificial intelligence (AI) in education has profoundly transformed the learning landscape, offering significant opportunities for personalized, flexible, and efficient educational practices. This study explores the impact of AI on academic learning, focusing on the perceptions and behaviors of students from Valahia University of Târgoviște, Romania (N = 250). By analyzing the students' use of AI tools such as learning assistants and content generation systems, this research identifies the factors influencing the integration of AI into educational practices. Using a quantitative approach with a self-administered online questionnaire, this study tested hypotheses regarding the influences of age, field of study, and self-reported AI usage on students' perceptions of its impact on academic performance, motivation, and the development of essential skills such as critical thinking and learning autonomy. Statistical analyses were conducted using SPSS V26, and Spearman's correlation revealed significant relationships between AI competency and perceptions of academic performance ($\rho = 0.261$, $p < 0.001$), personalized learning ($\rho = 0.196$, $p = 0.002$), and motivation ($\rho = 0.234$, $p < 0.001$). The results highlight AI's potential to revolutionize educational practices by providing personalized learning experiences, stimulating motivation, and promoting lifelong learning skills. This research deepens the understanding of AI's role in higher education and its implications for future learning models, emphasizing its capacity to transform both students and educators.



Academic Editor: Randall S. Davies

Received: 6 March 2025

Revised: 18 April 2025

Accepted: 16 May 2025

Published: 18 May 2025

Citation: Anghel, G. A., Zanfir, C. M., Matei, F. L., Voicu, C. D., & Neacșa, R. A. (2025). The Integration of Artificial Intelligence in Academic Learning Practices: A Comprehensive Approach. *Education Sciences*, 15(5), 616. <https://doi.org/10.3390/educsci15050616>

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Keywords: artificial intelligence; personalized learning; student perceptions; educational practices

1. Introduction

In recent decades, artificial intelligence (AI) (Dobrev, 2005; P. Wang, 2019; Shchitova, 2020) has profoundly transformed the ways in which people interact with technology, the workplace, and, more recently, the learning process. The emergence of AI (Kokina & Davenport, 2017; Lazzeretti et al., 2023) has unlocked numerous opportunities for innovation in education, significantly impacting how students learn, assimilate information, and prepare for the future (X. Chen et al., 2022; Ouyang & Jiao, 2021; Huang et al., 2021; L. Chen et al., 2020). Research on the importance and relevance of AI in learning (Roll & Wylie, 2016; Xu & Sankar, 2024; Ruiz-Rojas et al., 2024) has highlighted several advantages of its integration, such as facilitating the design of adaptive and personalized curricula and enhancing learning flexibility.

In this context, it is recognized that certain AI-driven digital systems and technologies can contribute to analyzing students' individual performances and preferences regard-

ing specific learning strategies (Vázquez-Parra et al., 2024; Gligorea et al., 2023; Fošner, 2024) while also providing tailored learning content that meets their specific educational needs. This revolutionary aspect eliminates one of the major challenges faced by traditional education—namely, the standardization of learning strategies. By personalizing learning content, AI can enhance learning efficiency among students and improve academic performance (Artyukhov et al., 2024).

Moreover, AI-powered virtual assistants can provide continuous support and instant responses to students' inquiries (Gubareva & Lopes, 2020; Pereira et al., 2022). This feature can be particularly valuable for students who require additional assistance in understanding study materials. The integration of AI in the learning process reduces the time required for instructional activities and enables students to access essential information anytime and anywhere. This aspect offers significant flexibility, especially for those engaged in distance learning or managing demanding schedules (Tanveer et al., 2020; Salem & Shaalan, 2023).

Through data analysis, AI facilitates the delivery of detailed and personalized feedback on each student's academic performance, making it easier to identify weaknesses and focus on their improvement. Artificial intelligence fosters a learning environment that aligns with the demands of the 21st century. Students who interact with AI technology develop essential skills such as critical thinking, problem-solving, collaboration, and adaptability (Walter, 2024). The personalization of content, continuous access to support, and detailed feedback enhance students' learning experiences and provide them with greater opportunities for academic success. Furthermore, AI prepares students for the ever-evolving digital world, equipping them with the essential skills required for their future careers.

The integration of artificial intelligence (AI) in education can be analyzed through multiple theoretical and applied paradigms, each offering a distinct perspective on how this technology influences teaching and learning processes. These include the technological determinism paradigm (Winkel, 2024), the pedagogical individualization paradigm (Istemic, 2019), the efficiency paradigm (Wu et al., 2023), the accessibility and democratization paradigm (Costa et al., 2024), the human–technology interaction paradigm (Jwo et al., 2021), and the ethical implications and responsibility paradigm (Orr & Davis, 2020; Barros et al., 2023; López-Chila et al., 2024).

From a technological determinism perspective, AI-driven advancements are seen as an inevitable force shaping educational practices. The increasing adoption of intelligent systems in education follows a technocentric model, primarily aimed at enhancing efficiency and optimizing academic performance. Automated assessment, real-time feedback, and algorithm-driven personalized learning pathways enable educators to shift their focus toward higher-order cognitive skills, fostering deeper learning experiences while reducing administrative burdens.

A key aspect of AI's educational integration is its capacity to individualize pedagogical approaches. AI-powered systems analyze students' learning patterns, preferences, and performance data to deliver tailored educational experiences. By leveraging adaptive learning technologies, AI facilitates the customization of instructional content, ensuring that students receive materials aligned with their needs and competencies.

Several platforms and technologies focus on personalized education. For instance, Knewton can adapt the type of lessons or tests a user receives in real time. Smart Sparrow allows educators to design personalized courses while using AI to monitor students' progress and adjust instructional materials based on feedback, thus enabling adaptive learning and adjusting students' educational trajectories according to their specific needs and recorded performances. Carnegie Learning provides AI-driven educational solutions specializing in mathematics, employing an adaptive learning algorithm to tailor courses based on each student's responses and abilities and analyzing errors and progress to refine exercises and

supplementary materials for personalized and effective learning. Online learning platforms such as Coursera and edX utilize AI to deliver personalized courses by employing algorithms that recommend resources and specific modules based on users' learning behaviors and preferences. Moreover, AI can provide instant and adaptive feedback within courses, adjusting instruction based on students' progress.

The efficiency of instructional and educational processes through AI integration is reflected in the reduction in time spent on repetitive tasks, such as automated assessments and data management, allowing educators to dedicate more time to student interaction, support, and guidance. The paradigm of innovation and creativity positions artificial intelligence as a tool for providing students with interactive scenarios and learning experiences that foster creative thinking and the ability to solve complex problems. In this perspective, AI not only supports learning but also creates new opportunities for creative exploration and the development of higher-order cognitive skills. For example, ChatGPT (version GPT-4.0) and other language models developed by OpenAI can be used to generate new ideas, facilitate brainstorming, and assist with creative writing. AI, when combined with virtual reality (VR) and augmented reality (AR), can stimulate creativity by generating immersive and interactive learning environments. MEL Science employs AI, AR, and VR to encourage creative experimental learning in fields such as chemistry, physics, and biology.

The paradigm of accessibility and the democratization of education highlight the role of artificial intelligence in expanding access to education across diverse social groups. AI is seen as a means of making quality education accessible on a global scale by reducing barriers related to cost, location, and resource availability. AI-powered educational platforms offer learning opportunities to students who would otherwise face disadvantages. Within the paradigm of human–technology interaction, artificial intelligence complements rather than replaces the human component in education. The ethical-and-regulatory paradigm places AI integration in education within the broader context of concerns related to data privacy, fairness, and the risk of algorithmic bias. The ethical implications of AI in education remain a subject of intense debate within scientific communities.

2. Materials and Methods

2.1. Objective

This research aims to achieve two main objectives: identifying the main AI-powered digital tools used by students in the learning process (OS1) and measuring students' perceived impact of using intelligent digital tools on learning (OS2). The research conclusions highlight statistical indicators of academic behaviors related to learning by means of intelligent digital tools, focusing on the frequency of use, the types of tools utilized, students' attitudes toward them, and the purpose of using intelligent digital tools.

Using a quantitative approach, this study examines the perceptions of students from Valahia University of Targoviste regarding the integration of AI into higher education. The collected data provide a detailed understanding of students' attitudes and perceptions about the impact of AI technologies on educational processes, such as academic performance, personalized learning, and the development of essential skills, including motivation, critical thinking, and learning autonomy (Figure 1). In this context, this study tests the following hypotheses:

H1: *There is a significant positive association between age and frequency of AI tool usage (Q5, Q6) among students.*

H2: *There is a significant positive association between the field of study and the frequency of AI tool usage (Q5, Q6) among students.*

H3: *There is a significant positive association between self-reported AI usage (Q3) and students' perceptions of its impact on academic performance; personalized learning; and the development of motivation, critical thinking, and learning autonomy (Q10–Q16).*

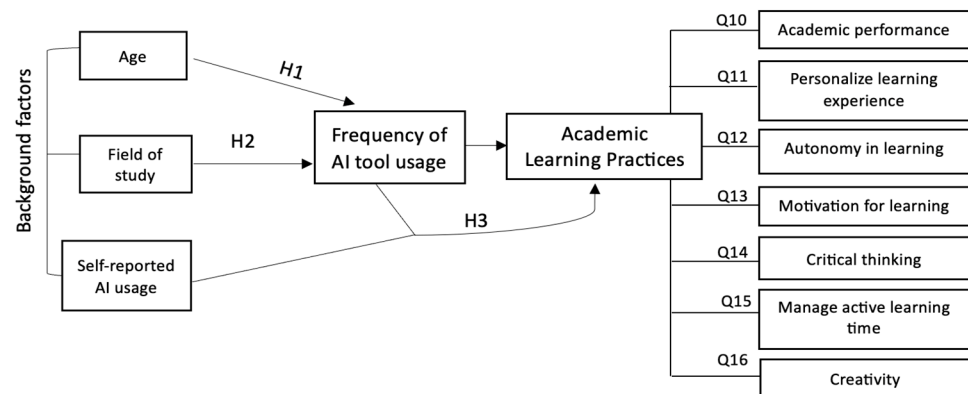


Figure 1. Lock frame research (source: authors).

2.2. Participants

The sample consisted of 250 students from Valahia University of Targoviste, Romania, selected using convenience sampling. Of the total participants, 63.2% were female and 36.8% were male. Regarding the age distribution, the participants varied widely, with a significant proportion of students aged between 21 and 23 years. Additionally, the academic statuses of the participants covered a broad spectrum, with the majority in their first or second years of study. A comprehensive breakdown of the participants' demographic and academic characteristics is presented in Table 1.

Table 1. Summary of demographic information ($N = 250$).

Characteristic	Frequency	Percent
Gender		
Female	158	63.2%
Male	92	36.8%
Total	250	100%
Academic year		
First year (1)	95	38%
Second year (2)	55	22%
Third year (3)	57	22.8%
Master	42	17.2%
Total	250	100%
Age		
18–21 ani	38	15.2%
21–23 ani	88	35.2%
23–26 ani	45	18%
26–28 ani	29	11.6%
>28 ani	50	20%
Total	250	100%

2.3. Instrument

The data were collected using a self-administered questionnaire distributed online to participants in September 2024 via the Google Forms platform. To ensure the content validity of the questionnaire and its alignment with this study's objectives, the initial version of the instrument was reviewed and refined by a team of academic staff, including three

university professors with expertise in educational sciences and digital technologies. The questionnaire items were developed and adapted based on the relevant literature (Chan & Hu, 2023; Y. Chen et al., 2023), which explored the integration of artificial intelligence in educational contexts. This process helped ensure that the items were clearly formulated, theoretically grounded, and suitable for the target population. The questionnaire was structured into three main sections. The first section aimed to gather demographic information from the participants, including variables such as gender, age, level of education, and field of study, to outline their profiles. The second section focused on assessing the students' attitudes toward artificial intelligence (AI) as well as the types of AI tools used in the educational context. The third section includes statements regarding students' perceptions of the potential effects of AI tools on academic learning practices. The participants evaluated seven statements using a 5-point Likert scale, with response options ranging from "strongly agree" to "strongly disagree", with a neutral option in the middle. The choice of the 5-point Likert scale was made to ensure efficient data collection while maintaining clarity and integrity in the participants' responses.

2.4. Procedure

The participants were selected from the students of the Valahia University of Targoviște using convenience sampling. An online questionnaire was distributed to the participants from both undergraduate and master's programs via email and university communication platforms.

The questionnaire was designed to assess the students' perceptions of the integration of artificial intelligence (AI) in educational practices, with a particular focus on its impacts on academic performance; personalized learning; and the development of motivation, critical thinking, and autonomy in learning. Before completing the questionnaire, the participants were provided with detailed information regarding the objectives of this study and were asked to give informed consent. The data collection took place over a period of six weeks, during which reminders were sent to maximize the response rates. Following the ethical guidelines for research involving human subjects, all procedures adhered to the relevant regulations regarding data protection and confidentiality. Statistical analyses, including sequential mediation modeling, were performed using SPSS V26 software to examine the relationships between the different variables.

3. Results

3.1. Students' Attitudes and Types of AI Tools Used

From the descriptive statistics point of view, as shown in Figure 2, the majority of the participants (45.3%) reported using learning assistants, such as ChatGPT, followed by study material recommendation systems (23.7%) and content generation tools (16%). The use of augmented and virtual reality technologies was significantly lower, with only 5% of participants reporting usage, and speech recognition systems were used by 2% of the respondents.

Regarding the students' attitudes toward AI, as measured on a Likert scale ranging from 1 (very negative) to 5 (very positive), the majority of the participants (63.5%) exhibited positive attitudes toward the use of AI tools in education, indicating a substantial openness to these technologies. Only 16.6% expressed disagreement, while 19.8% remained neutral.

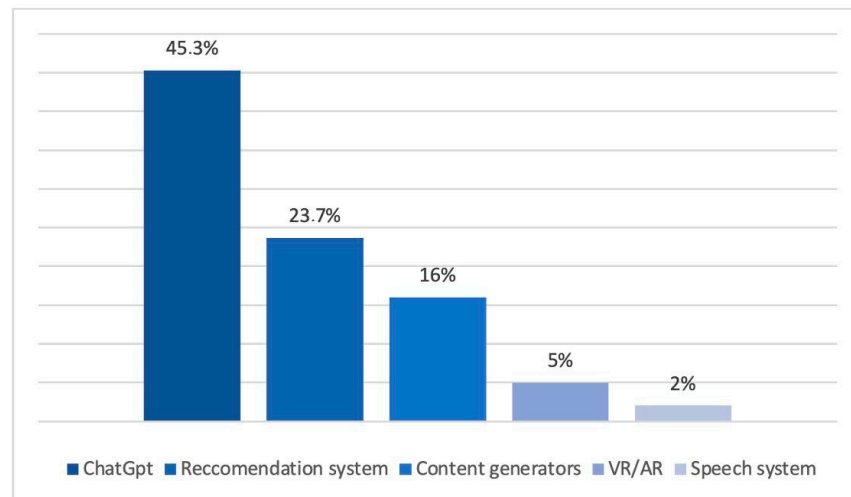


Figure 2. AI tool usage distribution among participants.

3.2. Frequency of AI Usage Based on Age and Field of Study

The results of the Chi-square test ($\chi^2 = 113.527$, $p < 0.001$) highlight a significant relationship between age and frequency of AI tool usage. Specifically, the students in the 21–23 age group reported a significantly higher frequency of daily AI usage compared with their older peers (Table 2). To interpret this trend, we drew on the conceptual framework proposed by Prensky (2001), who introduced the terms of digital natives and digital immigrants to describe generational differences in interaction with technology. While these terms have been critiqued for potentially oversimplifying complex socio-technical dynamics, they remain useful when applied critically and contextually. Several researchers (Tapscott, 2009; Carr, 2010; Rosen, 2010; Prensky, 2010; Odegaard et al., 2021; Lin et al., 2017) have refined these concepts in educational contexts, emphasizing that digital nativity encompasses not merely exposure to technology but the extent to which digital tools are integrated into daily life, learning behaviors, and cognitive routines.

Table 2. Crosstab—frequency of AI tool usage by age group.

Age Group	Never	Rare	Often	Once a Week	Daily	Total
18–21	2	5	17	7	7	38
21–23	0	0	22	31	35	88
23–26	3	8	25	9	0	45
26–28	7	12	10	0	0	29
>28	8	10	11	3	18	50
Total	20	35	85	50	60	250

Thus, for younger students—those born into a world where digital interaction is ubiquitous—the boundaries between the physical and digital realms are often blurred. In contrast, older students may be considered digital immigrants not because of a lack of technological competence but because their formative educational experiences took place in pre-digital or early-digital environments, which may shape how they engage with emerging technologies such as AI.

Regarding the influence of field of study on the frequency of AI tool usage, the Chi-square analysis ($\chi^2 = 7.309$, $p = 0.120$) did not reveal a significant association between these two variables. Although the differences were not statistically significant, an interesting trend was observed among the students in the humanities field, who reported a higher frequency of AI usage (Table 3). In contrast, the students in the exact sciences field showed

a much lower usage, with only two students reporting daily AI usage compared with an expected value of 7.1.

Table 3. Crosstab—field of study and frequency of AI tool usage.

Field of Study	Never	Rare	Often	Once a Week	Daily	Total
Humanities	16	31	76	36	64	223
Exact Sciences	4	4	10	7	2	27
Total	20	35	86	43	66	250

3.3. The Impact of AI on Academic Learning Practices

Seven Likert-scale items were used to measure the students' perceptions regarding the impact of AI on academic learning practices. The respondents indicated their levels of agreement or disagreement with each statement using a 5-point scale. To assess the reliability of our instrument, we calculated the Spearman–Brown stepped-up reliability coefficient, also known as the standardized Cronbach alpha (α), which yielded a value of 1.00, indicating a high level of internal consistency for our scale. While this value is unusually high and may suggest item redundancy, it reflects the deliberate construction of the items around a tightly related set of constructs. Given the theoretical coherence and the exploratory nature of this study, we opted to retain all the items to preserve the conceptual richness of the students' perceptions. Nevertheless, future studies might explore the factor structure of this scale to further refine its dimensionality.

The mean (M) and standard deviation (SD) for each of the seven items are presented in Table 4. The final item was negatively oriented; therefore, reverse coding was applied.

Table 4. Descriptive statistics for student perceptions of AI's impact on learning.

Question	Statement (Do You Think AI Can...)	Mean (M)	Standard Deviation (SD)
Q10	Contribute to the improvement of academic performance	3.73	1.08
Q11	Personalize your learning experience	3.73	1.08
Q12	Positively influence autonomy in learning	3.45	1.05
Q13	Positively influence your motivation for learning	3.39	1.16
Q14	Positively influence the development of critical thinking	3.99	0.92
Q15	Help you manage your active learning time	4.01	0.98
Q16	Negatively influence creativity	3.33	1.18

The results reveal varied perceptions among the students regarding the use of AI tools in education, offering a complex picture of their perceived impact. For instance, 42% of the students believed that AI has a negative impact on creativity, while 38% remained neutral and 20% did not perceive any such negative effect, indicating significant divergence on this matter. In contrast, the perceptions were more favorable when it came to AI's support of active learning, with 79% of the respondents clearly agreeing that AI helps facilitate this process. Only 12% were neutral, and 9% disagreed, highlighting a strong consensus regarding AI's positive influence in this area. Regarding critical thinking development,

76% of students saw AI as playing a positive role, while only 6% disagreed, and the rest remained neutral. This suggests that generally, AI is viewed as an effective tool for enhancing critical thinking skills.

When it came to the impact of AI on learning motivation, the responses were more mixed. In total, 43.9% of the students believed AI boosted their motivation, 37.7% were neutral, and 18.4% did not see a significant effect, suggesting that while AI is generally seen as motivating, not all students are convinced of its impact in this regard. Similarly, regarding the development of learning autonomy, 48.2% of the students believed AI contributes positively, 35.1% remained neutral, and 16.4% disagreed, indicating a general tendency toward favoring AI for supporting independent learning, though with some reservations.

On personalized learning, 60% of the students appreciated AI's ability to tailor the educational process to individual needs, while 29.5% remained neutral and 9.1% disagreed, reflecting strong trust in this aspect of AI. Finally, 61.4% of the students reported that AI has improved their academic performance, while 28.1% remained neutral and 7.6% did not perceive any positive impact, suggesting general appreciation for AI's effect on academic outcomes, though a small proportion of the students did not perceive such an impact.

3.4. Correlation Between Self-Reported Competence and the Impact of AI on Academic Learning Practices

Spearman's rank-order correlation was conducted to assess the relationship between the students' perceptions of the implications of AI in educational practices and their self-assessed competence in technology use (Table 5). The analysis revealed that greater competence in AI use is associated with a positive perception of academic performance and personalized learning. Specifically, self-assessed competence in using AI was significantly correlated with perceptions of improved academic performance ($\rho = 0.261, p < 0.001$) and personalized learning ($\rho = 0.196, p = 0.002$). Additionally, AI was perceived as a factor that stimulates motivation in learning ($\rho = 0.234, p < 0.001$) and the development of critical thinking ($\rho = 0.273$). The students with higher competence in using AI reported increased motivation to explore their academic capabilities and diversify their learning methods. This supported skills of analysis and problem-solving, contributing to the development of critical thinking. However, the influence of AI on learning autonomy and time management varied, suggesting that these aspects may be shaped by additional contextual or pedagogical variables. For instance, while a weak negative correlation was found between AI competence and learning autonomy ($\rho = -0.091$), this result is not statistically significant given the current sample size ($N = 250$) and should be interpreted with caution. This finding may indicate that autonomy in learning depends on more complex or indirect mechanisms beyond technical proficiency. Although AI can contribute to the personalization of learning, students seem to perceive it primarily as a supportive tool rather than a transformative or central element in the learning process. Furthermore, high competence in AI use was associated with a negative perception of creativity ($\rho = -0.440, p < 0.001$), suggesting that students with greater AI skills may feel that the intensive use of such tools limits creative expression by automating processes traditionally driven by original thinking and innovation.

From a pedagogical perspective, these findings suggest that individual perceptions of AI's impact on educational practices can significantly influence how it is integrated into the learning process. When implementing AI technology in educational settings, teachers and policymakers must recognize the complexity of AI integration and consider that students' attitudes toward AI usage in education can shape how they leverage these tools. Therefore, it is essential to develop a theoretical and practical framework that enhances the educational value of AI technologies and guides students toward responsible and effective use.

Table 5. Spearman correlations between AI competence and students' perceptions.

Variable	Self-Assessed Competence in Technology Use
Academic performance	0.261 *** <0.001
Personalization of learning	0.196 ** <0.002
Motivation for learning	0.234 *** <0.001
Critical Thinking	0.273 *** <0.001
Managing time in active learning	0.254 *** <0.001
Autonomy in learning	−0.091
Negatively influencing creativity	−0.440 ***

** indicates correlation is significant at the 0.01 level (2-tailed). *** indicates correlation is significant at the 0.001 level (2-tailed).

3.5. Study Limits

Although this study provides valuable insights, several limitations should be acknowledged. First, the study population was confined to university students from Valahia University of Targoviste, which may restrict the generalizability of the findings to broader contexts. Another limitation arises from the sampling method. Convenience sampling resulted in a majority of responses from one field of study, with fewer responses from other disciplines, which poses a challenge for drawing statistically significant conclusions. This limitation should be critically examined, especially regarding its potential impact on the field-of-study variable. While the observed trend of higher AI usage among humanities students, although not statistically significant, is noteworthy, it warrants further exploration in future research to investigate how different academic disciplines approach and perceive digital tools. To improve the external validity of the results, future studies should include larger and more diverse samples from various regions and educational systems, thus enabling a more comprehensive understanding of students' perceptions of AI integration in education. Additionally, future research could involve gathering insights from other key stakeholders in higher education, such as faculty members and university administrators, to gain a more holistic understanding of the impact of AI on the educational environment.

4. Discussion

(H1) The advancement of artificial intelligence technology generates its integration with rapid steps in education. Technologies such as virtual reality, machine learning, neuroscience and other intelligent technologies are being constantly and rapidly integrated into education (Yufei et al., 2020). The main contribution of this study focuses on investigating students' perceptions of AI tools in education. Studies in the field have indicated that advances in AI have led to the integration of such tools in pedagogical activity (Almaiah et al., 2022; Munir et al., 2022). Studies that have investigated the influence and perception of students regarding the role, integration, and use of specific artificial intelligence tools (Vázquez-Parra et al., 2024; Syed et al., 2023; Ahmad et al., 2021, 2022) illustrate the existence of a significant impact and a positive relationship of students' attitudes toward the adoption of AI tools in learning. The first hypothesis of the present study, which assumes that the ages of students significantly affect the frequency of use of AI tools, indicates that

there is a significant relationship between the ages of students and the frequency of the use of AI. Age is a factor that negatively influences the use of AI in learning among students because they may encounter difficulties in quickly adapting to digital environments. When talking about the use of AI in learning among students, it is essential to consider solutions that take into account their age and the level of digital skills they possess.

(H2) Interaction with AI tools in learning is a cumbersome process for older students, unlike young ones who were formed in a highly digitalized environment. Given that the educational environment will experience a much higher level of use of AI tools in the future, a solution for the faster adaptation of older students may be the implementation of training courses for them. As the use of AI tools increases in the educational environment, more students who are less able to adapt with age will develop comprehensive understandings of what education means with the help of multiple intelligences. In this way, students are helped to better use AI technology in the learning process, to understand the benefits that AI can bring to the development of their learning skills, and, at the same time, to benefit from improvement in the quality of learning methods and personalized teaching. Artificial intelligence makes learning more accessible and can support lifelong learning through gamification and project-based learning (Huang et al., 2021).

Regarding the second hypothesis of this study, the analysis of the results shows that field of study does not significantly influence the frequency of use of AI tools among students. Among the respondents of this study, those from the humanities field registered a higher frequency of using AI tools in learning. The present study did not target students from technical fields, but if we were to refer to technical fields such as engineering or exact sciences, we could assume that, due to their specificity, there is a very high frequency of using AI tools in learning among students. AI tools are also used in the medical field for the early detection of diabetic retinopathy in order to intervene with timely treatment (Deshmukh & Roy, 2021; Vieriu & Petrea, 2025).

(H3) As expected, the data analysis revealed positive correlations between the perceived level of competence in using AI and the level of the academic performance of the students, which contributes to strengthening the idea of a positive impact of using AI on learning outcomes in the educational environment (but not only there), highlighted in recent years by numerous studies (George & Wooden, 2023; Mallillin, 2024; Sun & Zhou, 2024). Therefore, the students stated that the effective use of AI in learning led to learning success and materialized in better grades and increased passability, an aspect also emphasized in a study published by Zhang and Tur (2024).

According to the data obtained, the most frequently used form of AI is ChatGPT (45.3%), followed by book and study material recommendation systems (23.7%); therefore, tools that provide students with easy and fast sources of information and the knowledge necessary to complete academic tasks in a personalized manner. Otherwise, the support of the accelerated identification of resources for the accomplishment of learning tasks constitutes the main asset in the use of AI (Zingoni et al., 2021; Mallillin, 2024; Elaiess, 2023). Other recent research (Pacheco-Mendoza et al., 2023) also affirms the idea of academic performance supported by the fast and easy access to educational resources offered by AI.

Not only this characteristic of AI but also other characteristics specific to AI-mediated learning, captured in the present research, support academic performance: personalization of learning, development of critical thinking, support for active learning, and increased motivation for learning. For these variables, positive correlations were identified with self-perceived competence in using AI. Therefore, students who perceive themselves as efficient in using AI claim to benefit from active and personalized learning, namely from learning based on the ability of AI to facilitate their access to materials and activities in accordance with the specific preferences and needs of the learners (Pacheco-Mendoza et al., 2023,

p. 10). Activism in learning, as opposed to passivity, i.e., the role of a simple receptacle of received information, involves curiosity, intention, and direction (orientation) in knowing and accomplishing learning tasks, all of which are elements of an intrinsic motivation and of the attitude of a learning agent (learning agency) as opposed to the attitude of a learning object. The attitude of agency represents “the capability of individuals to engage in self-defined, deliberate and meaningful actions in situations limited by contextual and structural relations and factors” (Hooshyar et al., 2023, p. 2), or, more simply put, “the capability to exercise choice in reference to preferences” (Winne, 2006, p. 8). Applied to the student role, student agency is “a student’s experience of having access to or being empowered to act through personal, relational, and participatory resources, which allow him/her to engage in intentional and meaningful action and learning in study contexts” (Hooshyar et al., 2023, p. 3; Hinojo-Lucena et al., 2019).

The agentic attitude is embodied in the ability of students to regulate, control, and monitor their learning (Code, 2020) through the abilities to regulate their cognitive, affective–motivational, and behavioral processes while interacting with environmental factors. AI offers students the opportunity to choose, to control what AI tools they use and how, to critically analyze, and to decide how to use AI-generated resources. Therefore, it facilitates and supports their agentic attitudes, allowing for intentional, meaningful engagement in learning with the involvement of metacognitive and behavioral regulation mechanisms (Stenalt & Hachmann, 2024; Pisica et al., 2023). The agentic attitude is confirmed by positive correlations between the positive perception of competence in using AI and motivation in learning: namely, the desire to know more, to perform better, and, therefore, to develop professional skills. Also, the study by Pacheco-Mendoza et al. (2023) highlighted the fact that the use of AI-type educational technologies can contribute to greater student involvement and motivation, which leads to better academic performance. Other studies highlight that the use of generative AI, particularly ChatGPT, significantly enhances student motivation (Yilmaz & Karaoglan Yilmaz, 2023, p. 9). Furthermore, Mallillin (2024) suggests that AI positively impacts students’ motivation to learn by meeting their need for quick knowledge acquisition, reducing physical effort, and providing satisfaction through easy access to necessary resources, ultimately promoting efficient learning. Other studies regarding student motivation in the context of using AI in learning have highlighted the role of the satisfaction component (therefore an affective motivation) in the interaction with AI in the context of academic activities (T. Wang et al., 2023; L. Wang & Li, 2024). The same study emphasizes that the positive emotions associated with the use of AI constitute the most critical factor influencing the intention to continue using AI in academic activity. Other studies on the relationship between AI, student agency, and learning motivation have highlighted that AI applications do not involve motivational regulation but only cognitive and behavioral (Stenalt & Hachmann, 2024). In fact, the use of a specialized GenAI application by students allows for the nuanced manifestation of student agency in modeling the learning experience, specifically in the manifestation of cognitive, affective–motivational, and behavioral control and self-regulation, depending on four types of learning experiences identified among students: resistive learning, responsive learning, resourceful learning, and reflective learning (Yang et al., 2023, p. 11). Of these, only the reflective-learning type fully involves the agent attitude and, therefore, emotional regulation in that the use of Gen-AI induces an exploration process that provokes thought, going beyond the immediate needs of students and inherently involving the regulation of momentary dissatisfaction/satisfaction. Also, the facilitation of student agency is supported by the strong correlation between the positive perception of competence in the use of AI and the perception of the development of critical thinking. Therefore, in the context of the effective use of AI tools, students have demonstrated their analytical and reflective skills on AI-mediated learning resources. The

engagement and cognitive adjustment of students, specific to agent attitudes, manifested in the context of the use of AI have also been highlighted by other research (Lo et al., 2024; Darvishi et al., 2024; Ahadzadeh et al., 2024; Demartini et al., 2024). At the same time, the data revealed that students perceive AI as a useful tool in time management, respectively, in organizing and monitoring the time allocated to learning, thus facilitating behavioral adjustment, not only cognitive.

The awareness by a significant percentage of respondents (mostly from humanities fields of study, for which documentation, interpretative, and creative skills are essential) of some limits of the use of AI, respectively of a negative impact on creativity, is also an indicator of specific self-regulation of the student's agent attitude. The opinion regarding the impact of AI on student creativity is a nuanced one, varying between a negative impact, an insignificant impact or no impact, and a positive impact. A study by Habib et al. (2024) brings some clarifications on this impact, emphasizing the fact that among AI tools, ChatGPT contributes to improving divergent thinking, increasing the diversity of ideas and detailed information, which supports students in the process of developing ideas/contents. The same authors also highlighted the fact that this support can also have a negative effect because the answers provided by AI are of a generic type, relatively stereotyped, which can induce a decrease in creativity through the phenomenon of fixing thinking and not stimulation or expansion (Habib et al., 2024; Sova et al., 2024). Additionally, S. Wang et al. (2023) highlighted the role of creativity in mediating, both directly and indirectly, the effect of AI on learning performance. The opinions of this group of students reflect a broader debate in the academic literature regarding the role of AI in fostering creativity—some studies advocate for the positive impact of generative AI on creativity, while others emphasize its potential negative effects. This fact might be determined by the complexity of creativity, both as a process and a product, and at both the personal and professional levels. Taking into consideration this complexity, Marrone et al. (2022) believe that AI can stimulate creativity based on the 4C theory of creativity. Nevertheless, educators should strive to establish a collaborative relationship between human creativity and artificial intelligence, ensuring that one enhances the other (Habib et al., 2024).

5. Conclusions

Despite the limitations of the sample of the respondents, this study provides valuable insights, showing that as students' competence in using AI in education increases, their perceptions of the technology's impact in various educational areas become more positive. Higher proficiency in AI tools is linked to better perception of academic performance. Additionally, the ages of students significantly influence the frequency with which they use AI tools; there is a notable relationship between age and the frequency of AI use in their learning.

Students who have positive self-assessments of their competence in using AI often believe that AI has a beneficial impact on their academic performance, personalized learning, and the development of motivation and critical thinking skills. This suggests that a favorable evaluation of one's ability to use AI can be a strong indicator of how positively the technology influences students' learning outcomes and processes.

Furthermore, it implies that such competence may predict improvements in critical thinking, motivation, and personalized learning through the regular and effective use of AI tools, especially among university students aged 21 to 23 studying the humanities.

From the perspective of human–technology interaction, recognizing the positive impact of AI on academic learning reflects students' intentions to use these tools, which can enhance their engagement and agency in the learning process.

A complementary direction of development of research and educational policies related to the use of AI in higher education aims at the need to integrate explicit training in the use of artificial intelligence-based technologies within educational programs. This approach would have the potential to strengthen students' positive self-assessment of digital competence, thus functioning as a catalytic factor in capitalizing on the benefits brought by AI on the learning process. By developing functional and critical skills in the use of these tools, especially among students in the humanities, significant progress can be made in terms of motivation, autonomy in learning, and the ability to personalize the educational path. In addition, such training contributes to the development of informed and reflective critical thinking, essential for adapting to the demands of contemporary digital society.

Author Contributions: Conceptualization, G.A.A. and C.M.Z.; methodology, G.A.A. and C.M.Z.; software, C.M.Z.; validation, G.A.A. and F.L.M.; formal analysis, C.M.Z.; investigation, all authors; resources, all authors; data curation all authors; writing—original draft preparation, G.A.A. and C.M.Z.; writing—review and editing, C.D.V. and R.A.N.; visualization, C.M.Z. and F.L.M.; supervision G.A.A.; project administration, all authors. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: Since the study did not involve medical, psychological, or sensitive personal data, formal approval from an Ethics Committee was not required under our institution's regulations. However, we strictly adhered to ethical research guidelines, including the Declaration of Helsinki, ensuring transparency, voluntary participation, and confidentiality.

Informed Consent Statement: Informed consent was obtained from all subjects involved in this study.

Data Availability Statement: This study did not report any data.

Acknowledgments: We would like to thank all students of the Valahia University of Targoviste for answering the survey and the teacher who helped with formatting and creating the target group.

Conflicts of Interest: The authors declare no conflicts of interest.

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