

THE USE OF LARGE LANGUAGE MODELS IN THE EDUCATIONAL PROCESS: AN EMPIRICAL ANALYSIS AMONG UNIVERSITY AND SECONDARY SCHOOL STUDENTS

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Abstract: *The increasing use of large language models (LLMs) in education has raised important questions regarding their impact on learning, trust, ethics, and data protection. This study examines the use of LLMs among secondary school and university students in Slovenia based on an online survey conducted in 2024 (N = 120). The main objectives were to analyze patterns of use, levels of trust and verification, perceptions of ethical issues, and the perceived impact of LLMs on learning efficiency. The study also investigates whether differences exist between educational levels and gender. The results indicate that LLMs are widely used for educational purposes, particularly for preparing assignments and presentations. Students report moderate trust in AI-generated information and frequently verify its accuracy, suggesting a cautious approach. Perceived time savings are significant, while privacy concerns remain high. No statistically significant differences were found between university and secondary school students or between genders. The findings highlight the growing integration of LLMs into education and emphasize the need for clear guidelines on their ethical and responsible use.*

Keywords: Artificial Intelligence, Large Language Models, Education, Ethics, Data Protection.

1 Introduction

In the past decade, Artificial Intelligence (AI) has entered numerous areas of human activity, particularly in educational systems. Among the most prominent technologies of modern AI are Large Language Models (LLMs), such as ChatGPT, Gemini, and Copilot, which are based on advanced deep learning methods. These models enable natural language generation, automatic question answering, text composition, and even the creation of new ideas. With the development of tools accessible to the public, LLMs are increasingly being established as learning support tools for university and secondary school students.

In the educational context, LLMs represent tools with great potential. Users report time savings in writing seminar papers, searching for information, and preparing presentations. At the same time, they facilitate better understanding of complex concepts, as the responses are often tailored to individual questions and needs. This type of interactivity and accessibility contributes to increased motivation for learning, which is especially important in the era of educational digitalization.

In this context, the present study was conducted in Slovenia, where the integration of digital technologies in education has been steadily increasing in recent years (European Commission, 2023). Recent studies confirm that AI tools are rapidly becoming part of the educational ecosystem, influencing both teaching and learning processes (UNESCO, 2023; OECD, 2024).

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Despite the obvious advantages, significant concerns have emerged. The most prominent include issues of information reliability, ethical conduct, questions of authorship authenticity, and especially the protection of personal data. LLMs often function as a "black box," where users are unaware of the mechanisms leading to specific responses. Furthermore, there is a risk that frequent use of these tools may reduce students' independence in critical thinking, problem-solving, and the formulation of their own ideas.

The aim of this study was to examine how individuals, particularly secondary school and university students, use large language models for educational purposes, to what extent they trust them, and what level of awareness they have regarding the ethical and security aspects of using these tools. In addition, the research analyzes whether there are statistical differences between genders and educational groups in terms of LLM usage, and how users perceive the impact of AI on learning effectiveness.

2 Theoretical Framework

The rapid development of AI, particularly large language models (LLMs), has significantly transformed educational environments in recent years. Advances in deep learning and natural language processing have enabled tools such as ChatGPT, Gemini, and similar systems to support a wide range of academic activities, including writing, problem-solving, and knowledge acquisition (UNESCO, 2023; OECD, 2024).

In higher education, LLMs are increasingly used to enhance learning efficiency, support independent study, and facilitate access to information. Studies show that students frequently use AI tools for writing assignments, preparing presentations, and understanding complex topics (Digital Education Council, 2024; Vieriu, 2024). At the same time, AI enables more personalized and adaptive learning experiences, which can improve student engagement and academic performance.

In contrast, the use of AI in secondary education remains less explored and is often influenced by institutional restrictions and varying levels of digital literacy. Research suggests that while secondary school students are increasingly exposed to AI tools, their use is often less structured and more dependent on individual initiative and school policies (Lumina Foundation, 2024). This highlights the importance of examining both educational levels to better understand differences and similarities in AI adoption.

A central issue in the literature concerns trust in AI-generated content and the extent to which users verify the information provided. Denny et al. (2023) argue that students often perceive AI-generated content as comparable in quality to human-generated materials. However, other studies emphasize that users maintain a degree of skepticism and frequently engage in verification, particularly in academic contexts (Đerić et al., 2024). This balance between trust and critical evaluation is essential for responsible AI use.

Ethical considerations and data protection represent another key dimension of AI adoption in education. The increasing use of AI tools raises concerns regarding privacy, data security, and academic integrity (Huang, 2023; Gujjula & Sanghera, 2023). Research indicates that users who demonstrate higher ethical awareness are more likely to emphasize the importance of personal data protection and responsible AI use.

In addition, several studies highlight the impact of AI on time efficiency and productivity. AI tools can automate routine tasks, provide instant feedback, and facilitate faster access to relevant information, thereby significantly reducing the time required for learning activities (Gupta et al., 2024; Tan, 2024). These benefits contribute to the growing acceptance of AI as a supportive educational tool.

Despite these advantages, concerns remain regarding overreliance on AI, potential biases in generated content, and the possible decline of critical thinking skills. As a result, the

integration of AI into education requires a balanced approach that combines technological innovation with ethical responsibility and critical engagement.

Recent contributions published in AIJES also emphasize the role of digitalization and AI in education, particularly in relation to student performance, ethical considerations, and the transformation of learning environments (Popescu & Ionescu, 2022; Marinescu, 2023; Stoica & Radu, 2021).

Large language models (LLMs) are based on advanced deep learning techniques and enable natural language generation and automated responses. The development of AI, particularly LLMs, has significantly reshaped education by enabling new forms of interaction, access to information, and support for learning.

The primary purpose of using LLMs in educational settings is to enhance learning efficiency, increase student motivation, and provide a personalized learning experience tailored to individual needs. LLMs can analyze large volumes of data and deliver relevant information aligned with specific learning objectives and student requirements. Moreover, they enable the simulation of various scenarios and discussions, helping students develop critical thinking and argumentation skills.

The development of LLMs has also prompted reflection on the ethical aspects of AI use, such as privacy protection, autonomy, and responsibility within educational processes. Ethics in the use of LLMs is becoming a key component of research and implementation, as educational institutions and researchers face the challenge of ensuring responsible usage and preventing potential misuse.

However, the rapid adoption of AI tools also raises concerns regarding overreliance and the potential decline of critical thinking skills.

Several studies have already been conducted on the use of LLMs for educational purposes. Ipek (2023), for example, examined the impact of AI, specifically ChatGPT, on educational systems, highlighting both the potential benefits and challenges this technology brings to academic environments. The study identified positive effects of integrating ChatGPT in education, as well as ethical concerns regarding academic integrity, due to risks of plagiarism and issues related to the bias and accuracy of the generated content. The study also proposed further steps for research and implementation of this technology in educational processes, emphasizing the importance of collaboration between researchers, developers, and policymakers in setting policies that address both the opportunities and risks associated with LLMs (İpek, 2023).

These findings are consistent with previous research, suggesting a broader trend of increasing reliance on AI tools across educational contexts.

In his study, Fitria (2021) focused on the use of AI and its impact on the educational process, particularly on how AI tools support and enhance education. AI technologies, such as virtual mentors, voice assistants, smart content, presentation translators, and more, enable more advanced methods of teaching and learning. According to research, AI allows for personalized learning, automatic assessment, and intelligent learning systems that adapt materials and evaluation to students' skills and needs. The study emphasizes that AI cannot replace human teachers, who are essential for developing social skills, empathy, and moral values. Nevertheless, AI enables teachers to focus on more creative and less routine aspects of teaching, as technological tools can take over repetitive tasks. A balanced approach is highlighted, where technology acts as a support, not a substitute, for human interaction (Fitria, 2021).

Gao (2022) highlights the role of AI in improving distance education through enhanced interaction and access to learning resources.

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The problem addressed in this article is the use of LLMs in the education of students in both secondary and higher education. Among other capabilities, LLMs enable fluent text generation, support in creative writing such as seminar papers and homework, responses to questions across various educational topics, though the accuracy of information remains questionable. Factchecking, translation capabilities, and educational uses that provide sources of information and learning tools are also part of the focus. The study also investigates respondents' views on ethics, data protection, bias, the impact on academic success, and, ultimately, time-saving potential. Based on the reviewed literature, this study focuses on key dimensions of AI use in education, including usage patterns, trust and verification behaviour, ethical considerations, data protection, and perceived efficiency. These dimensions form the basis for hypotheses H1–H7.

3 Methodology, Research Sample and Limitations

Data for the study were collected via an online survey conducted in Slovenia between May 31, 2024, and October 18, 2024. A total of 120 respondents participated, providing insights into the use of AI in educational environments. Participants were recruited through email, social media platforms, and various online forums. For data analysis, we used the statistical software IBM SPSS, which allows for detailed analysis and visualization of results.

Out of the 120 participants, 110 provided valid data on gender: 42 were male (38.2%) and 68 female (61.8%), while gender data were missing for 10 participants (8.3%), comprising the full sample. Secondary school students made up 42.5% (51 individuals), university students 51.7% (62 individuals), and the category "other" 5.8% (7 individuals). The largest group in the sample consisted of university students, followed by secondary school students, with a smaller proportion falling into the "other" category. Among them, 15 were full-time students (12.5%) and 47 part-time students (39.2%), while 58 respondents (48.3%) skipped the question, maintaining the total sample at 120.

Most respondents had completed secondary education (46 individuals, 38.3%), followed by 33 individuals (27.5%) with higher vocational education, 21 (17.5%) with a university degree, and 10 (8.3%) with postgraduate education. Cumulative percentages show that 90.9% of participants have attained a level of education up to higher vocational school, while 9.1% have completed postgraduate studies.

Most respondents (43 individuals, 35.8%) were in the 15–20 age group, followed by 20 individuals (16.7%) aged 31–40. The 21–25 age group included 17 participants (14.2%), and both the 26–30 and 41–50 age groups had 14 respondents each (11.7%). Only 2 individuals (1.7%) were over 50 years of age.

The inclusion of both secondary school and university students was intentional, as it enables comparison between different educational levels and provides insight into how AI tools are adopted across stages of education.

This study has several limitations. First, the sample was collected using a non-probability online survey, which may introduce self-selection bias. Second, the relatively small sample size limits the generalizability of the findings. Future research should include larger, more representative samples and combine survey data with experimental or longitudinal approaches.

4 Research Results

The results indicate that AI is widely used among respondents, with 81.7% reporting its use for educational purposes. Most participants are familiar with AI tools and demonstrate a moderate to good level of understanding.

AI is primarily used for preparing seminar papers, homework, and presentations, confirming its role as a supportive tool in everyday academic tasks. Respondents report moderate trust in AI-generated information ($M = 3.19$) and relatively frequent verification of its accuracy ($M = 3.26$), suggesting a cautious approach.

Perceived time savings are high ($M = 4.09$), indicating that AI contributes to greater efficiency in the learning process. At the same time, respondents assign high importance to data protection ($M = 4.06$), which exceeds their agreement with the ethical use of AI.

Overall attitudes toward AI are moderately positive, while opinions regarding potential restrictions or bans are divided, reflecting a balanced perception of its benefits and risks. These findings provide a general overview of AI usage patterns, which are further examined through hypothesis testing in the following sections.

4.1 Hypothesis H1 and Theoretical Background

The use of large language models (LLMs) as a tool for educational purposes has become one of the most frequently researched topics in the field of AI in education. According to data from the Digital Education Council (2024), as many as 86% of students regularly use AI in their studies, with over half using it at least once a week to assist with learning, preparing seminar papers, and reviewing material. The AIPRM (2024) study likewise confirms that 53% of students in higher education use AI for preparing study materials and assignments, reflecting its rapid integration into the academic environment. Similarly, a report by BestColleges (2024) states that 56% of students use AI for writing papers, studying, and exam preparation, confirming the trend that more than half of students already rely on tools such as ChatGPT and other LLMs as an essential part of the learning process.

The combined findings of these studies confirm that AI is becoming an indispensable educational tool, enabling students to search for information more efficiently, better understand complex content, and more effectively organize their academic tasks.

Authors Grájeda et al. (2024) further confirm the increasing use of AI among students. A study involving 4,127 students from a private university in Latin America showed that AI significantly contributes to students' academic experiences by enhancing their understanding, creativity, and productivity. The most frequently used tool was ChatGPT, valued by students for its ability to quickly provide answers and support learning. The study highlights the growing adoption of AI tools among students and emphasizes the importance of developing digital competencies for the effective and responsible use of AI in education (Grájeda, Burgos, Córdova & Sanjinés, 2024).

Based on these previous studies, we formulated and tested the first hypothesis using a frequency table.

H1: More than half of the respondents use large language models (LLMs) as a tool for educational purposes.

Table 1. Statistics on the use of AI in education

Do you use AI?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	89	74,2	81,7	81,7
	No	20	16,7	18,3	100,0
	Total	109	90,8	100,0	
Missing	System	11	9,2		
Total		120	100,0		

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The results presented in Table 1 confirm Hypothesis H1, as more than four-fifths of the respondents (81.7% of valid responses) use large language models (LLMs), or AI, as a tool for educational purposes, while 18.3% do not use such tools. This clearly indicates that AI tools are already strongly embedded in the educational process and represent an important component of the learning environment for many participants.

4.2 Hypothesis H2 and Theoretical Background

The issue of user trust in the results returned by large language models (LLMs), and whether users verify that information, is central to several recent studies. Denny et al. (2023), in their study Can We Trust AI-Generated Educational Content? Comparative Analysis of Human and AI-Generated Learning Resources, find that students often trust content generated by AI, rating it as comparable in quality and usefulness to learning materials produced by their peers. However, the study also warns that such trust is not always based on factchecking, which may lead to the spread of inaccurate information.

Similarly, Đerić et al. (2024), in the article Trust in Generative AI Tools: A Comparative Study, emphasize that trust in generative AI tools is multidimensional, grounded in perceived accuracy, safety, and the benevolence of the technology. Their findings suggest that while users mostly trust AI outputs, they frequently express critical caution and tend to verify results, particularly when dealing with complex tasks. Overall, they conclude that while trust in LLMs exists, it is not absolute. Users recognize the usefulness of these tools but maintain a level of skepticism and verification, indicating a growing responsible and reflective approach to AI use in education.

Chound et al. (2023) also addresses the issue of user trust in AI-generated data, finding that users often approach such content cautiously. Trust in AI-generated information is not guaranteed, as concerns remain regarding the reliability and accuracy of the outputs. The authors stress that trust is essential for the successful integration of AI into various domains, without a sufficient level of trust, users are unlikely to fully accept AI-generated results (Chound, David & Ross, 2023).

Based on these prior studies, we formulated the second hypothesis (H2), which was tested using a paired sample t-test.

H2: Respondents trust the information returned by large language models (LLMs) and do not verify it.

Table 2. Statistical data on the relationship between "How much do you trust the accuracy of AI data?" and "Have you ever checked the accuracy of the answers provided by AI?"

		Have you ever checked the accuracy of the answers provided by AI?					Total
		1 - I'm not checking.	2	3	4	5 - I always check.	
How much do you trust the accuracy of AI data?	1- I don't trust	5	0	0	0	3	8
	2	1	0	1	3	5	10
	3	4	5	14	18	11	52
	4	5	4	6	8	3	26
	5 - I trust a lot	1	6	2	0	1	10
Total		16	15	23	29	23	106

Table 2 presents the relationship between the level of trust in the accuracy of data provided by AI and the frequency with which respondents verify the correctness of that data. It can be observed that most respondents (52) report a moderate level of trust (score 3),

indicating a cautious and critical approach to AI-generated information. At the same time, most of these respondents also engage in verifying the accuracy of the responses provided by AI, demonstrating that trust in AI is not unconditional. Even among those with higher levels of trust (scores 4 and 5), data verification still occurs, which further reflects a careful and thoughtful use of AI. While respondents do express trust in AI, the fact that the majority still verify its outputs points to a deliberate and responsible approach to its use in the educational context.

Table 3. Descriptive statistics of the variables how much you trust AI data and whether you check its accuracy

Paired Samples Statistics					
		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	How much do you trust the accuracy of AI data?	3,19	106	0,996	0,097
	Have you ever checked the accuracy of the answers provided by AI?	3,26	106	1,354	0,132

Table 3 presents the descriptive statistics for the variables “How much do you trust the accuracy of the data provided by AI?” and “Have you ever verified the correctness of the answers provided by AI?”. The average trust score is 3.19, while the average for verification behavior is slightly higher, at 3.26. This indicates that respondents have a moderate level of trust in AI but still frequently verify its answers. The standard deviation for verification (1.354) is greater than that for trust (0.996), suggesting that opinions regarding verification vary more widely, some users regularly verify AI outputs, while others do so less frequently. Overall, the participants exhibit measured trust in AI, but the fact that the mean verification score slightly exceeds the trust score suggests that users, despite trusting AI to a degree, still choose to validate the information it provides, indicating a cautious and reflective approach to its use.

Table 4. T-test of variables: how much do you trust the AI data and whether you check its accuracy?

Paired Samples Test									
		Paired Differences					t	df	Two-Sided p
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	How much do you trust the accuracy of AI data? Have you ever checked the accuracy of the answers provided by AI?	-0,075	1,793	0,174	-0,421	0,270	-0,433	105	0,666

Table 4 presents the results of a paired samples t-test conducted to examine the difference between trust in AI-generated data and the frequency of verifying such data. The calculated difference between the means is -0.075 , indicating that verification is slightly more frequent than trust. However, this difference is not statistically significant ($p = 0.666$). The effect size (Cohen's d) is negligible ($d = 0.04$), indicating no meaningful practical difference. This means we cannot conclude that respondents either significantly trust AI more or verify it more; both behaviors occur at a similar frequency. There is no statistically significant difference between the level of trust and the frequency of verification, suggesting that individuals who trust AI more are not necessarily those who verify less and vice versa. Based on these analyses, Hypothesis H2, that respondents trust the information returned by LLMs and do not verify it, cannot be confirmed.

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Although users exhibit moderate trust in the accuracy of AI-generated information, the average values and t-test results indicate that they still verify information almost as often as they trust it. This suggests that the majority of users approach AI critically and responsibly, which is a positive indicator of awareness regarding the limitations of AI in educational settings.

4.3 Hypothesis H3 and Theoretical Background

In his article, De Fine Licht (2024) emphasizes that restricting the use of AI in higher education may have a negative impact on the educational process, primarily due to reduced access to tools that could enhance student productivity and foster the development of digital skills essential for future professional challenges. Tools such as ChatGPT and similar platforms allow students to engage in interactive learning, personalize content, and access information more efficiently, all of which can contribute to increased engagement and improved academic performance.

The author points out that limiting access to AI can hinder the development of critical skills such as critical thinking and digital literacy, which are increasingly important in today's technology-driven world. Students without access to AI may be less prepared for professional environments where the use of such technologies is becoming standard. The document also notes that AI restrictions could exacerbate inequalities among students, as those with access to private AI resources may gain advantages, while others are left behind.

In conclusion, the author argues that a complete ban on AI use is likely suboptimal, as it deprives students of key educational benefits that AI tools can offer and may cause them to fall behind in preparing for technologically advanced careers (De Fine Licht, 2024).

Based on these findings, we formulated Hypothesis H3, which was tested using a frequency table.

H3: At least 80% of respondents believe that banning the use of large language models (LLMs) would negatively affect their education.

Table 5. Display of statistical data on the opinion on whether banning the use of AI in education would negatively affect learning?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1- It will not have a negative impact	15	12,5	14,6	14,6
	2	11	9,2	10,7	25,2
	3	37	30,8	35,9	61,2
	4	17	14,2	16,5	77,7
	5 - Will negatively affect	23	19,2	22,3	100,0
	Total	103	85,8	100,0	
Missing	System	17	14,2		
Total		120	100,0		

Table 5 presents the results of responses to the question: “Do you believe that banning the use of AI in education would negatively affect your learning?” Among the 103 valid responses, 22.3% of respondents selected option 5 – it would negatively affect, indicating that they believe a ban on AI would significantly harm their learning. An additional 16.5% rated the impact as 4, also suggesting negative consequences. In total, 38.8% of respondents believe that banning AI would negatively impact education. Many other responses were neutral (score 3, 35.9%), indicating moderate or undecided views, while 25.3% of respondents believed that a ban would not have a negative impact (scores 1 and 2). Based on these results, Hypothesis

H3, which predicted that at least 80% of respondents would believe that banning the use of LLMs would negatively affect their education, cannot be confirmed.

Although a portion of respondents express concern over such a ban, the percentage of those who view it as negative (38.8%) falls significantly short of the hypothesized 80%. The results show that opinions on the potential impact of banning AI in education are divided, with roughly one-third seeing negative consequences, one-third remaining neutral, and one-third perceiving little or no impact.

4.4 Hypothesis H4 and Theoretical Background

The question of how ethical responsibility influences the protection of personal data in the use of AI within educational processes is addressed by numerous contemporary authors. Huang (2023), in the article Ethics of Artificial Intelligence in Education: Student Privacy and Data Protection, emphasizes that protecting personal data is a fundamental ethical challenge in the use of AI in schools, as it requires transparent data processing and responsible handling of students' personal information.

Gujjula and Sanghera (2023), in their study Ethical Considerations and Data Privacy in AI Education, find that ethical responsibility directly affects the level of data protection. Individuals and institutions that adhere to ethical principles are more likely to implement stricter security measures and mechanisms to safeguard privacy.

Similarly, Karpouzis (2024), in AI in Education: Ethical Considerations and Insights from Ancient Greek Philosophy, stresses the importance of balancing technological advancement with ethical values. He warns that a lack of ethical awareness may lead to the misuse of personal data and a decline in trust in AI. In summary, the existing body of research consistently confirms that ethical responsibility significantly influences the degree of personal data protection. It promotes transparency, accountability, and trust in the use of AI within educational environments.

Based on the reviewed studies, we formulated Hypothesis H4, which was tested using a paired samples t-test.

H4: Ethical responsibility influences the protection of personal data.

Table 6. Statistical data on the relationship between "How important is the protection of personal data when using AI to you?" and "Do you agree that it is ethical to use AI in education?"

		Do you agree that it is ethical to use AI in education?					Total
		1 – I strongly disagree	2	3	4	5 – I completely agree	
How important is the protection of personal data when using AI to you?	1- unimportant	3	1	0	0	0	4
	2	1	0	1	2	0	4
	3	0	2	15	3	3	23
	4	0	0	12	8	2	22
	5 - Very important	1	7	17	16	8	49
Total		5	10	45	29	13	102

Table 6 illustrates the relationship between the perceived importance of personal data protection in the use of AI and the level of agreement regarding the ethical use of AI in education. The results show that most respondents (49 out of 102) consider the protection of personal data to be very important (rating 5). Among these, a large proportion (17 + 16 + 8 = 41 individuals) agree or strongly agree that ethical use of AI in education is important. Only a

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small number of respondents rated the importance of data protection low (ratings 1 and 2), and these were predominantly among those who disagreed with the importance of ethical AI use.

Overall, the results suggest a positive relationship between the importance assigned to data protection and support for ethical AI use. However, there are some divergences, particularly among those who highly value data protection but hold mixed views on the ethical implications of AI.

Table 7. *Descriptive statistics of variables*

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	How important is the protection of personal data when using AI to you?	4,06	102	1,106	0,110
	Do you agree that it is ethical to use AI in education?	3,34	102	0,990	0,098

Table 7 presents descriptive statistics for two questions related to the use of AI in education. Respondents assign greater importance to the protection of personal data when using AI (mean = 4.06, Std. Dev = 1,106) than to the ethical use of AI in educational contexts (mean = 3.34, Std. Dev = 0,990). This indicates that privacy concerns outweigh ethical considerations for most respondents when evaluating the implications of AI in education.

Table 8. *Paired t-test of the variables how important it is to you to protect personal data when using AI and Do you agree that it is ethical to use AI in education*

Paired Samples Test									
		Paired Differences					t	df	Two-Sided p
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	How important is the protection of personal data when using AI to you? Do you agree that it is ethical to use AI in education?	0,716	1,230	0,122	0,474	0,957	5,877	101	0,000

Table 8 confirms that the observed difference is statistically significant ($t(101) = 5.877$; $p = 0.000$), indicating that respondents rate the importance of personal data protection significantly higher than the ethical use of AI in education. The effect size (Cohen's $d = 0.58$) indicates a moderate practical difference between the variables. This supports the conclusion that ethical responsibility indeed influences attitudes toward data protection.

The results of the analysis show a clear relationship between ethical responsibility and attitudes toward safeguarding personal data. Although respondents assign greater importance to privacy and data security than to the ethical dimension of AI use, the statistically significant difference ($p = 0.000$) confirms that these areas are perceived distinctly. Still, it is evident that higher ethical awareness promotes greater attention to data protection. Therefore, Hypothesis H4 can be confirmed.

4.5 Hypothesis H5 and Theoretical Background

The question of how the use of AI, particularly large language models (LLMs), impacts time savings in the learning process has been addressed by numerous researchers in recent years. Gupta, Kumar, and Rao (2024), in their quantitative study AI and Teacher Productivity: A Quantitative Analysis of Timesaving and Workload Reduction in Education, found that AI significantly reduces time spent by both teachers and students on administrative tasks and learning material preparation. This is largely due to automation of routine tasks and faster processing of information.

Vieriu (2024), in the article *The Impact of AI on Students' Efficiency in the Learning Process*, notes that 83.5% of students believe AI contributes to increased learning efficiency by providing faster access to knowledge, explanations, and resources, thus reducing the time needed to understand content.

Tan (2024), in *AI in Teaching and Teacher Professional Development*, also confirms that AI tools optimize the educational process and reduce teacher workload by automating repetitive tasks, allowing more time for creative and analytical work. Collectively, these studies confirm that the use of LLMs has a positive impact on time efficiency in education, contributing to greater productivity and effectiveness in the learning process. Based on these prior studies, we formulated Hypothesis H5, which was tested using a frequency table.

H5: The use of large language models (LLMs) affects time savings in the learning process.

Table 9. *Time savings when using AI in education*

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1- No savings	5	4,2	4,8	4,8
	2	1	0,8	1,0	5,8
	3	25	20,8	24,0	29,8
	4	22	18,3	21,2	51,0
	5 - Big savings	51	42,5	49,0	100,0
	Total	104	86,7	100,0	
Missing	System	16	13,3		
Total		120	100,0		

Table 9 presents respondents' ratings on the extent to which AI contributes to time savings in education. Out of 104 valid responses, nearly half of the participants (49.0%) stated that the use of AI results in significant time savings, and an additional 21.2% believed AI allows for moderate time savings (rating 4). In total, more than two-thirds of respondents (70.2%) perceive AI as a time-saving tool in the learning process. Only a small portion (5.8%) felt that AI has little to no impact on time efficiency.

These results confirm Hypothesis H5, as most respondents believe that the use of large language models (LLMs) or AI positively impacts time savings during learning. Users recognize that AI tools enable faster information retrieval, easier comprehension of content, and more efficient completion of academic tasks, all of which contribute to greater productivity and better time management in the educational process.

4.6 Hypothesis H6 and Theoretical Background

Differences in the use of AI and large language models (LLMs) between university students and secondary school students have recently been the focus of various international studies. The Digital Education Council (2024), in a global survey, found that 86% of university students use AI in their studies, with more than half using such tools on a weekly basis, indicating a high degree of integration of AI into higher education environments.

In contrast, a study by the Lumina Foundation (2024), conducted among high school students, revealed that while nearly half of secondary school students already use AI for school tasks, 62% believe their teachers either disapprove of or prohibit its use. These findings suggest that while LLM use is present in secondary education, it is often limited by institutional policies and a lower level of understanding of such tools.

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Additionally, the systematic review AI in Higher Education: The State of the Field (2023) confirms that AI has already been recognized in higher education as a tool for improving efficiency, personalizing learning, and fostering digital competence. In contrast, similar studies in secondary education remain limited or underdeveloped.

The combined findings of these studies indicate that university students use LLMs for educational purposes more frequently and extensively than secondary school students, due to both greater autonomy in learning and the more open approach of higher education institutions toward AI adoption. Based on these insights, we formulated Hypothesis H6, which was tested using a chi-square test.

H6: University students use large language models (LLMs) for educational purposes to a greater extent than secondary school students.

Table 10. Chi-square test output, contingency table for the variables what is your status, and do you use AI?

			What is your educational status?		Total	
			Secondary School Student	University Student		
Do you use AI?	Yes	Count	39	50	89	
		Expected Count	40,0	49,0	89,0	
		% within Do you use AI?	43,8%	56,2%	100,0%	
	No	Count	10	10	20	
		Expected Count	9,0	11,0	20,0	
		% within Do you use AI?	50,0%	50,0%	100,0%	
Total			Count	49	60	109
			Expected Count	49,0	60,0	109,0
			% within Do you use AI?	45,0%	55,0%	100,0%

Table 10 presents the relationship between respondents' status (secondary school student or university student) and their use of AI. The results show that 89 respondents use AI, of whom 43.8% are secondary school students and 56.2% are university students.

Among those who do not use AI, the proportion of secondary school students and university students is equal (50.0% each). Although there is a slightly higher percentage of university students among AI users, the differences between the two groups are minor and do not indicate a clear trend suggesting that university students use AI significantly more often than secondary school students.

Table 11. Pearson chi-square test result for educational status

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	0,252	1	0,616

Table 11 shows that the result of the Pearson chi-square test ($\chi^2 = 0.252$; $p = 0.616$) is not statistically significant, as the p-value is greater than 0.05. Cramér's V = 0.048, indicating a negligible association between educational status and AI use. This indicates that there is no significant difference in the use of AI between secondary school students and university students. Based on the analysis, Hypothesis H6 cannot be confirmed.

Although university students appear to use AI somewhat more frequently than secondary school students, the difference is not statistically significant. This suggests that the use of AI for educational purposes is similarly widespread across both groups, meaning that access to and use of AI tools is not dependent on educational status.

4.7 Hypothesis H7 and Theoretical Background

The question of whether gender-based differences exist in the use of AI and large language models (LLMs) in the educational process has been explored in several recent studies.

Carvajal-Zúñiga, Franco, and Isaksson (2024) from the Norwegian School of Economics found that women, especially high-achieving female students, are less likely to use generative AI tools compared to their male peers, indicating the presence of a so-called gender gap in AI usage.

Similarly, Iddrisu, Iddrisu, and Aminu (2023), in their study conducted among university students in Ghana, analyzed gender differences in the acceptance and use of AI tools for writing. Their findings revealed no statistically significant gender differences in perceived effectiveness or willingness to use AI, suggesting that such differences may be culturally or environmentally influenced, rather than universal.

A meta-analysis conducted by researchers from Harvard Business School (2024) concluded that women are approximately 20% less likely to use generative AI than men, confirming the existence of certain disparities in the adoption and use of such technologies.

In summary, international studies indicate notable gender differences in the degree of AI usage and trust in AI, with men generally using AI more frequently, while women tend to approach it more cautiously and critically.

Based on these prior findings, we formulated Hypothesis H7, which was tested using a chi-square test.

H7: There are statistically significant gender differences in the use of large language models (LLMs) in the educational process.

Table 12. Chi-square test output – contingency table for variables gender and do you use AI?

			Gender		Total
			Male	Female	
Do you use AI??	Yes	Count	37	47	84
		Expected Count	34,1	49,9	84,0
		% within Do you use AI?	44,0%	56,0%	100,0%
	No	Count	4	13	17
		Expected Count	6,9	10,1	17,0
		% within Do you use AI?	23,5%	76,5 %	100,0 %
Total		Count	41	60	101
		Expected Count	41	60,0	101,0
		% within Do you use AI?	40,6%	59,4%	100,0 %

Table 12 presents the relationship between respondents' gender and their use of AI in the educational process. Among 101 valid responses, 84 respondents (83.2%) reported using AI. Of these users, 44.0% were male and 56.0% were female, suggesting that female respondents use AI somewhat more frequently. Among those who do not use AI, 76.5% were female and 23.5% were male, which also shows that non-users are more often women.

Table 13. Results of the Pearson chi-square test, examining the relationship between the gender of respondents and their use of AI in the educational process

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	2,468	1	0,116

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Table 13 presents the results of the Pearson chi-square test used to assess the relationship between gender and the use of AI. The calculated value is $\chi^2 = 2.468$ with 1 degree of freedom, and the p-value = 0.116. Cramér's V = 0.156, indicating a weak association between gender and AI use. Since the p-value is greater than 0.05, the difference is not statistically significant. This means that we cannot confirm that gender significantly influences the use of AI in the educational process. Therefore, based on the analysis, Hypothesis H7 cannot be confirmed.

Although female respondents appear to use AI slightly more frequently than male respondents, this difference is not statistically significant. We can thus conclude that AI usage is independent of gender, and that both groups are relatively equally active in utilizing AI in their learning.

5 Discussion

The findings are consistent with previous studies (e.g., Digital Education Council, 2024; Vieriu, 2024), which highlight the growing role of AI in improving learning efficiency. The high level of reported time savings confirms that AI tools are increasingly perceived as effective support in the educational process.

However, unlike some studies suggesting high levels of trust in AI-generated content (Denny et al., 2023), the results of this study indicate a more cautious approach. Respondents report only moderate trust and frequently verify AI-generated information, suggesting a balanced and responsible use of these tools.

These findings are also aligned with research published in AIJES, which highlights the increasing importance of digitalization, ethical considerations, and technology adoption in educational systems (Popescu & Ionescu, 2022; Marinescu, 2023). In particular, the emphasis on data protection observed in this study is consistent with previous AIJES research addressing privacy and ethical challenges in digital education (Stoica & Radu, 2021).

The absence of statistically significant differences between university and secondary school students contrasts with expectations from prior research, which often assumes higher adoption in higher education. This finding may indicate that the use of AI is becoming more widespread and uniform across different educational levels.

The results further show that respondents place greater importance on data protection than on the ethical acceptance of AI use. This highlights the growing awareness of privacy risks and suggests that ethical considerations in AI adoption are strongly linked to concerns about personal data security.

Overall, the findings suggest that AI is already an integral part of the learning process, primarily as a supportive tool that enhances efficiency while still requiring critical evaluation by users.

From a practical perspective, these results emphasize the need for educational institutions to develop clear guidelines for the responsible use of AI, including aspects of academic integrity, data protection, and critical thinking.

This study contributes to the ongoing discussion on digitalization and AI in education by providing empirical insights into user behavior, trust, and ethical perceptions across different student groups.

Despite its contributions, the study has several limitations. The use of a non-probability online sample and the relatively small sample size limit the generalizability of the findings. Additionally, the study relies on self-reported data, which may not fully reflect actual behavior.

Future research should include larger and more representative samples, as well as comparative and longitudinal approaches, to better understand the long-term impact of AI on learning outcomes.

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