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The Use of Artificial Intelligence among Students in Higher Education

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Background/Purpose: Artificial intelligence (AI) impacts our everyday lives, from business to social areas, and, in recent years, more and more education. This paper aims to discuss using artificial intelligence tools for educational purposes from the student's perspective.
Methods: A quantitative approach was used for the research using the questioning method. Data were collected using an e-survey. The questionnaire contained closed questions referring to (i) general data, (ii) the use of specific artificial intelligence tools, and open questions (iii) about using artificial intelligence for study purposes. Parametric Independent – Samples t-Test and One-Way ANOVA tests were used for normal and near-normal distributions of the responses.
Results: The study conducted with 258 university students in Slovenia reveals a general familiarity with AI concepts yet with a limited ability to articulate this understanding. Popular AI tools like ChatGPT and Grammarly are predominantly used for information retrieval and idea generation. Notable differences in AI tool usage were observed based on gender and field of study.
Conclusion: The rapid advancement of AI is significantly transforming higher education. Integrating AI into education fosters the development of adaptive, personalized, and inclusive learning environments. Due to the study's limited sample size and geographic focus, further research with more diverse samples is needed to understand global AI tool usage in higher education fully.

Keywords: *Artificial intelligence, AI tools, Higher education, Students, Skills*

1 Introduction

Artificial intelligence (AI) is influencing all areas of our lives today. It is used across various industries and applications, transforming how tasks are performed. It helps to solve complex problems in healthcare, finance, retail, transportation, manufacturing, customer service, marketing, cybersecurity, human resources, legal, and many other areas. Artificial intelligence technology is becoming the basis for business (Barrett et al., 2019). It is developing quickly and has enormously impacted today's world. AI technologies are beneficial not only to the business sector but also to the educational domain. The education community is already trying to find ways to successfully implement AI for staff and students (Barrett et al., 2019). Many authors like Ahmand et al. (2021), Crompton and Burke (2023), Dahri et al. (2023), Chen et al. (2022), Sultana and Faruk (2024), and others have dealt with artificial intelligence in the field of education. Using AI in education goes beyond adopting technologies to facilitate easier learning. It also means reshaping, redesigning, and rethinking traditional education systems' content and methods. AI can be applied in education through three fundamental models (Luckin & Holmes, 2016): pedagogical model (knowledge and expertise of teaching), domain model (knowledge of the subject being learned - domain expertise), and learner

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model (knowledge of the learner). These models were developed to represent emotional, social, and metacognitive aspects of learning in education (Shen et al., 2021).

Many benefits of using AI in education can improve the student's learning (Singh & Mishra, 2023). For example, a significant advantage is personalized education. The current educational system relies on a one-size-fits-all model, but no two people have the same skills. AI can provide a more individualized learning experience and create lesson plans to teach each student effectively. It can also comprehend how a student is learning. AI can identify places where students are struggling and offer them alternate learning strategies. The AI algorithm analyzes students' learning behavior and adapts the course contents to support each student. Then, we have task automation, monitoring, and feedback. AI can help identify grammatical errors, sentence structure problems, and more.

AI methods have also revolutionized teachers' work by helping them track student performance using various tools, including automated grading, learning analytics, and adaptive learning platforms. Automated grading systems offer quick, reliable assessments, saving teachers time and providing timely feedback to students. Learning analytics reveal student behavior and performance patterns, enabling educators to adjust their teaching methods based on these insights. Predictive analytics analyzes historical data to foresee potential challenges, allowing educators to intervene and support students proactively (Chandrasekar, 2023; Kim, 2024; Rensfeldt & Rahm, 2023) Monitoring and feedback will help teachers understand how their students receive education so that they can help them and also see the gaps in the curriculum that need to be filled or improved (Seraydarian, 2021).

Because artificial intelligence is progressing at an accelerated pace in the education domain, we wanted to research how familiar students are with artificial intelligence. Are they familiar with the AI concept? Which AI platforms and tools do they use, and how often? How skilled are they in using them? Do they think using artificial intelligence helps them better understand the study content? Where does artificial intelligence benefit them most in their study? Do they believe that educational institutions should offer training in using artificial intelligence for studying? We also wanted to know if there are differences between students using AI tools regarding gender and the study field.

2 Theoretical Background

The ability to accumulate knowledge and then use it for solving problems is generally termed intelligence. Although contemporary definitions of intelligence vary considerably, experts generally agree that intelligence involves mental abilities such as logic, reasoning, problem-solving, and planning. Specifically, current definitions suggest that intelligence is the ability to learn from experience and recognize and solve problems. The acquisition, retention, and use of knowledge is a vital intelligence component. To use knowledge, one must first identify the issues it might address and then use what he has learned to solve problems (Jaarsveld & Lachmann, 2017).

People are termed as born intelligent. However, machines are created to resolve what is outlined in their programming. Once a machine can show intelligence like any other human being, it is called artificial intelligence (Arora, 2021). Artificial intelligence is the simulation of human intelligence processes by machines, especially computer systems (Laskowski & Tucci, 2023). We can say that artificial intelligence refers to the development of computer systems that can perform tasks that typically require human intelligence. These tasks include learning, reasoning, problem-solving, perception, language understanding, and speech recognition. AI aims to create machines or software that mimic human cognitive functions and sometimes surpass human capabilities.

AI can be categorized into narrow or weak AI and general or strong AI (AGI). Narrow AI is designed and trained for a particular task. It excels in performing specific functions but lacks the broad cognitive abilities of a human. Weak AI is often focused on performing a single task extremely well. While these machines may seem intelligent, they operate under far more constraints and limitations than basic human intelligence (Schroer, 2023). Examples include virtual personal assistants, image and speech recognition systems, and recommendation algorithms. Artificial general intelligence, often portrayed in science fiction, refers to machines that can understand, learn, and apply knowledge across a wide range of tasks at a human level. Like human general intelligence, AGI would have many advantages compared to narrow (limited, weak, specialized) AI. An AGI system would be much more flexible and adaptive. AGI systems also require fewer human interventions to accommodate the various loose ends among partial elements, facets, and perspectives in complex situations (Korteling et al., 2021).

Both narrow AI and AGI concepts have been explored and applied in education, but most practical implementations fall under the narrow AI category. For example, Personalized Learning Platforms (PLP) are AI systems that analyze students' learning patterns and provide customized study materials, exercises, and pacing recommendations. Many authors like Hashim et al. (2023), Farooq et al. (2024), Naseer et al. (2023), and others are exploring personalized learning platforms. All the students have different aptitudes, learning skills, and orientations. With AI's assistance, only content required and suited to the student is delivered (Arora, 2021). Then, we have Intelligent Tutoring Systems (ITS), which use AI to adapt the learning experience based on students' individual needs. They can

provide feedback, answer questions, and guide students through learning. ITS replicates teachers' roles and increasingly automates pedagogical functions (e.g., problem generation, problem selection, and feedback generation) to help create new methods and redefine educational goals (Shen et al., 2021). Lin (2023), Ramadhan (2024), Rybina (2023), and many others are writing about intelligent tutoring systems. Language Processing Applications: Natural Language Processing (NLP) (Campino, 2024; Kaouni, 2024; Wu, 2024) is used in educational tools for tasks like automated grading of essays, language learning apps, and chatbots that assist students with queries. In the education sector, chatbots are also used in different processes like admission, career counseling, etc. (Malik & Solanki, 2021). In Learning Analytics, AI is applied to analyze data generated by students' interactions with digital learning platforms. This information helps educators understand student progress and identify areas needing additional attention.

Many systems, platforms, or tools are available to students, helping them in their educational process. Thinkers on mathematics were designed to help students with any help in math. They relate maths with real-life situations and are also appropriate for kids of a young age. For example, Math Thinker was designed for free for K-12 students to have fun and help in math, but it is also suitable for older students. It was initiated because of the problems during the Covid-19 school shutdowns (https://maththinker.org/about.html). Thinkster Math provides the student with specific issues fitting their scope of capacities and abilities. It upgrades explanations by providing video help (https://hellothinkster.com/). Authors like Casal-Otero et al. (2023), Lane (2023), Wang and Lester (2023), and many others are researching the use of AI in K-12 education.

Some platforms support students' work on a specific text. They help to learn and master content by breaking text down into manageable pieces of information. For example, Cram101's AI technology can turn any textbook into an intelligent study guide complete with chapter summaries, unlimited true-false and multiple-choice practice tests, and flashcards drilled down to a specific book, ISBN, author, and chapter (https://contenttechnologiesinc.com/). JustTheFacts101 highlights and generates text and chapter-specific summaries on the spot. Platforms that check the grammatical correctness of the text, as well as the appropriate formation of whole sentences, are widely used today. For instance, Grammarly instantly generates clear and compelling writing while maintaining the student's unique voice (https://www.grammarly.com/). Platforms like ProWritingAid, Hemingway App, WhiteSmoke, and WordTune, all similar to Grammarly, help students improve spelling, grammar, style, and impact.

Very often used today are chatbots. A chatbot is a software application or web interface designed to mimic human conversation through text or voice interactions. It simulates a human conversation with an end user. Though not all chatbots are equipped with artificial intelligence, modern chatbots increasingly use conversational AI techniques like natural language processing (NLP) to understand the user's questions and automate responses (IBM, 2023). ChatGPT is a very well-known chatbot today, developed by OpenAI. Many authors like Garrel and Mayer (2023), Bhullar et al. (2024), Korseberg and Elken (2024), Jensen et al. (2024), Rawas (2024) and others are researching the use of ChatGPT in education. Based on a large language model, it enables users to refine and steer a conversation towards a desired length, format, style, level of detail, and language. Similar to it is Bing, a web search engine owned and operated by Microsoft. Bard is a conversational generative artificial intelligence chatbot developed by Google, based initially on the LaMDA (Language Model for Dialogue Applications), PaLM, (Pathways Language Model), and Gemini families of large language models. Many others exist, such as Jasper Chat, Claude 2, Llama 2, HuggingChat, etc. Also well-known is PerplexityAI, a user interface strategy similar to ChatGPT, but it is less a chatbot and more of a search bot. It closely resembles the Google search engine in its layout and includes a prominent central search bar where users can input their questions to the AI.

Brainly is the knowledge-sharing community where hundreds of millions of students and experts put their heads together to crack their most challenging tasks (https://brainly.com/). Mika is a personalized virtual tutor that easily adapts to student's needs and provides real-time feedback to help them learn more effectively. SmartEd allows students to easily customize learning materials such as textbooks to the student's learning style and needs. It also has gamification features that make learning more engaging and fun (Seraydarian, 2021).

3 Method

3.1 Sample

The study sample consisted of 258 students from randomly selected faculties of universities in Slovenia. Fourteen did not answer the general questions about gender and study level. Of the 244, 46.3 % were male and 53.7 % were female; 65.6 % were undergraduate and 34.4 % postgraduate students. Sixteen did not answer the general questions about the study field. Of the 242 students, 55.4% were social science students, 12.4 % were natural science students, and 32.2 % were technical sciences students (for more details, see Table 1).

Table 1: Frequency distributions of the study variables (n=258)

		Frequency	Percent	Valid percent
Gender	Male	113	43.8	46.3
	Female	131	50.8	53.7
	Missing	14	5.4	
Study level	Bachelor	160	62	65.6
	Masters	84	32.6	34.4
	Missing	14	5.4	
Study field	Social sciences	134	51.9	55.4
	Natural sciences	30	11.6	12.4
	Technical sciences	78	30.2	32.2
	Missing	16	6.2	

3.2 Questionnaire and Procedure

The questionnaire contained closed questions referring to (i) general data (gender, level of study, and field of study), (ii) the use of specific artificial intelligence tools, and open questions (iii) about using artificial intelligence for study purposes.

The frequency of using specific AI tools was measured on a 5-point Likert-type scale. Students were asked to choose from "1=Never", "2=Rarely", "3=Medium often", "4=Often", and "5=Very often". The answers regarding the helpfulness of using the AI tools in different areas of their studies were measured on a 5-point Likert-type scale. Students were asked to choose from "1=Not helpful", "2=A little helpful", "3=Partially helpful", "4=Helpful", and "5=Very helpful".

The skills in using AI tools were measured on a 5-point Likert-type scale from "1= Not very skilled", "2=A little skilled", "3=Partially skilled", "4=Skilled", and "5=Very skilled". Students were asked to rate their level of satisfaction with the use of AI tools on a 5-point Likert-type scale from "1= Dissatisfied", "2=Not too pleased", "3=Satisfied", "4=Very satisfied", and "5= Excited".

The online questionnaire was presented to students by professors during lectures and tutorials. Participation in this research was voluntary and anonymous.

All statistical tests were performed with SPSS 27. Parametric Independent – Samples t-Test and One-Way ANOVA tests were used for normal and near-normal distributions of the responses.

4 Results

The first set of questions concerns general knowledge about artificial intelligence. We asked students if they had heard of the term artificial intelligence, were familiar with the basic concepts of AI, and had ever encountered tools using AI. 255 (99.2 %) students had already heard of the term AI, and 2 (0.8 %) had not. 229 (88.8 %) answered that they know the basic concepts of AI, and 29 (11.2 %) that they do not. 229 (88.8 %) had encountered using tools or apps that involve artificial intelligence, thirteen (5 %) did not, and 16 (6.2 %) did not know if they had (Table 2).

We also wanted to know if there are differences between students using AI tools regarding gender and the study field. First, we tested if there are any differences between males and females regarding knowing the concepts of artificial intelligence. No statistically significant differences were found ($t = -1.459$ and $p = 0.146$). There were also no statistically significant differences between students of different study fields regarding knowing the concepts of artificial intelligence ($F = 2.429$ and $p = 0.090$).

The second set of questions concerns the use of artificial intelligence tools. First, we asked students if they use apps or tools, including artificial intelligence, for study (learning) purposes. Within this question, we also asked them to skip the next set of questions if the answer was no. Two hundred fifty students answered this question, where 187 (75 %) use AI tools for study purposes, and 63 (25 %) do not. Of 185 students who answered the next question, 43 (23 %) use AI tools rarely, 81 (44 %) use AI several times a month, 44 (24 %) several times a week, and 17 (9 %) use AI tools almost every day (Figure 1). Two students didn't answer. We tested if there were any differences between males and females regarding the frequency of using AI tools. No statistically significant differences were found ($t = 1.796$ and $p = 0.074$). There were also no statistically significant differences between students of different study fields regarding the frequency of using AI tools ($F = 2.520$ and $p = 0.083$).

Table 2: Descriptive statistics for the first set of questions

	Yes			No		Do not know	
Question	N	Freq.	Percent	Freq.	Percent	Freq.	Percent
Have you heard of the term artificial intelligence?	257	255	99.2	2	0.8	/	/
Are you familiar with the basic concepts of artificial intelligence?	258	229	88.8	29	11.2	/	/
Have you ever encountered using apps or tools that involve AI?	258	229	88.8	13	5.0	16	6.2

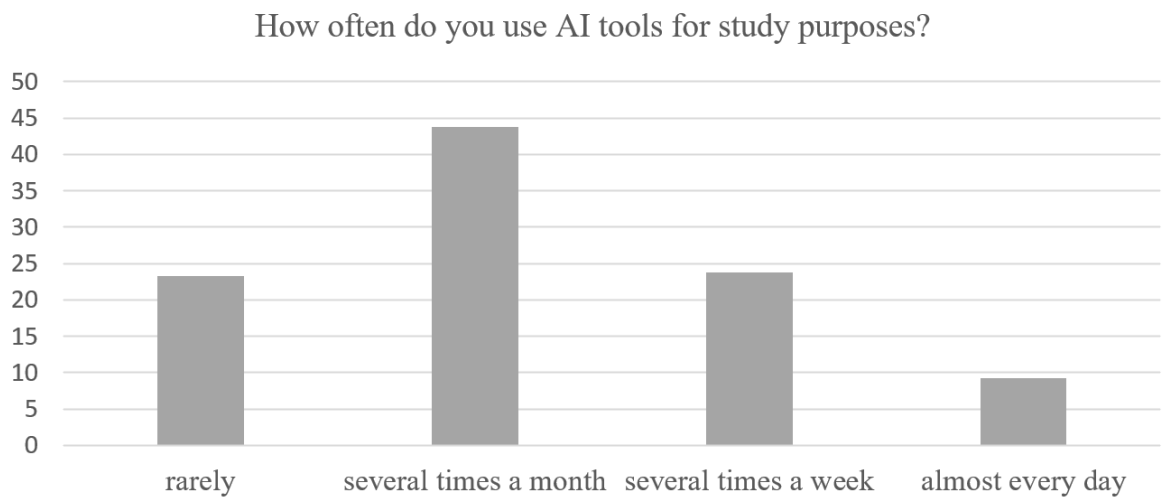

Figure 1: The use of AI tools for study purposes in percentage

Next, we asked them which AI tools they use and how often. The results can be seen in Table 3. Of all the tools, students use ChatGPT and Grammarly the most. Some students also use other AI tools, but rarely. These tools are MS Bing, Perplexity AI, Google Bard, Jasper Chat, ChatSonic, Claude 2, Llama 2, HuggingChat, ProWtitingAid, Hemingway App, WordTune, and Midjourney.

Since ChatGPT and Grammarly were the tools used most often among students, we tested if there were any significant differences between males and females and students of different study fields. No statistically significant differences were found between genders (ChatGPT: T = -0.350 and p = 0.727; Grammarly: t = 0.460 and p = 0.646) and between students of various study fields (ChatGPT: F = 0.180 and p = 0.836; Grammarly: F = 1.134 and p = 0.324).

The next question addressed using payable or free AI tools. One hundred eighty-six students answered the question, 161 (86.6 %) use only free AI tools, 24 (12.9 %) use both free and payable AI tools, and one student uses only payable AI tools. We found statistically significant differences between genders regarding using both payable and free AI tools (t = 3.183 and p = 0.002). Males (M = 0.2093 and SD = 0.4092) are more likely to use payable and free AI tools than females (M = 0.015 and SD = 0.2223). We also found statistically significant differences between genders regarding using only free AI tools (t = -2.919+ and p = 0.004). Females (M = 0.9381 and SD = 0.2421) are likelier to use only free AI tools than males (M = 0.7907 and SD = 0.4092). We found statistically significant differences between technical and social students using payable and free AI tools. The Games-Howell test showed that students from the technical field are more likely to use payable and free AI tools than students from the social field (Sig = 0.016). Students from the social field are more likely to use only free AI tools than technical students (Sig = 0.031). No statistically significant differences were found between students from the social and natural fields and students from the technical and natural fields regarding using payable or free AI tools.

Table 3: Descriptive statistics for the use of AI tools (Mean and Std. Deviation)

	Never	Rarely	Medium often	Often	Very often	N	Mean	Std. deviation
ChatGPT	6 (3%)	34 (18%)	51 (28%)	54 (29%)	40 (22%)	185	3.5	1.1
MS Bing	149 (84%)	11 (6%)	10 (6%)	3 (2%)	4 (2%)	177	1.3	0.8
Perplexity AI	155 (88%)	13 (7%)	6 (3%)	2 (1%)	1 (1%)	177	1.2	0.6
Google Bard	148 (84%)	21 (12%)	5 (3%)	2 (1%)	0 (0%)	176	1.2	0.5
Jasper Chat	166 (94%)	7 (4%)	2 (1%)	0 (0%)	1 (1%)	176	1.1	0.4
ChatSonic	166 (95%)	5 (3%)	3 (2%)	0 (0%)	1 (1%)	175	1.1	0.4
Claude 2	164 (95%)	5 (3%)	2 (1%)	1 (1%)	1 (1%)	173	1.1	0.5
Llama 2	171 (98%)	3 (2%)	1 (1%)	0 (0%)	0 (0%)	175	1	0.2
HuggingChat	170 (98%)	3 (2%)	0 (0%)	0 (0%)	0 (0%)	173	1	0.1
Grammarly	86 (49%)	34 (19%)	23 (13%)	26 (15%)	6 (3%)	175	2	1.2
ProWritingAid	165 (96%)	4 (2%)	2 (1%)	0 (0%)	0 (0%)	171	1	0.3
Hemingway App	168 (98%)	3 (2%)	1 (1%)	0 (0%)	0 (0%)	172	1	0.2
WhiteSmoke	169 (98%)	2 (1%)	1 (1%)	0 (0%)	0 (0%)	172	1	0.2
WordTune	161 (95%)	6 (4%)	2 (1%)	0 (0%)	0 (0%)	169	1.1	0.3
Midjourney	157 (92%)	7 (4%)	3 (2%)	2 (1%)	2 (1%)	171	1.2	0.6

1=Never, 2=Rarely, 3=Medium often, 4=Often, and 5=Very often

Table 4: Descriptive statistics for skills in using AI tools

How skilled are you in using AI tools?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not very skilled	25	9,7	13,4	13,4
	A little skilled	50	19,4	26,9	40,3
	Partially skilled	71	27,5	38,2	78,5
	Skilled	34	13,2	18,3	96,8
	Very skilled	6	2,3	3,2	100,0
	Total	186	72,1	100,0	
Missing	Prekinjeno	8	3,1		
	Leap (if)	64	24,8		
	Total	72	27,9		
Total		258	100,0		

We also asked students how skilled they are using AI tools. We can see that most students (56.5 %) are partially skilled or skilled in using AI tools. More details can be seen in Table 4. The mean value for the above question is 2.71, with a standard deviation of 1.020. We found statistically significant differences regarding skills of using AI tools between genders ($t = 3.881$ and $p < 0.001$) and also between students of various study fields ($F = 6.605$ and $p = 0.002$). Males ($M = 3.01$ and $SD = 1.035$) are more skilled in using AI tools than females ($M = 2.44$ and $SD = 0.946$). Most skilled in using AI tools are students from the technical field ($M = 3.02$ and $SD = 0.976$), then students from the natural field ($M = 2.88$ and $SD = 0.993$), and the least skilled are students from the social field ($M = 2.44$ and $SD = 1.018$).

The next question addressed satisfaction with using AI tools for study purposes. Of 186 students, 20 (10.8 %) are excited about using AI tools, 33 (17.7 %) are very satisfied, 120 (64.5 %) are satisfied, 12 (6.5 %) are not too pleased, and one is dissatisfied. We can see that the majority of students are satisfied or even more. The mean value regarding satisfaction with using AI is 3.32, with a standard deviation of 0.772. We found no statistically significant differences regarding satisfaction with using AI tools for study purposes between genders ($t = 1.562$ and $p = 1.120$) and between students of various study fields ($F = 0.203$ and $p = 0.817$).

Next, we wanted to know where the AI benefits them most in their study. The results can be seen in Table 5. We can see that the areas where AI tools help students the most are searching for information ($M = 3.8$ and $SD = 1.1$) and generating ideas ($M = 3.6$ and $SD = 1.1$).

Statistically significant differences between genders were revealed only for generating ideas ($t = -2.325$ and $p = 0.021$). There were no statistically significant differences between students of various study fields regarding the areas where using AI tools benefits them. However, we found statistically significant differences between undergraduate and postgraduate students regarding faster learning ($t = 2.218$ and $p = 0.014$) and task solving ($t = 1.998$ and $p = 0.047$). Undergraduate students find AI tools more helpful for faster learning ($M = 3.4$ and $SD = 1.076$) than postgraduate students ($M = 2.95$ and $SD = 1.371$). Undergraduate students also find AI tools more helpful for task solving ($M = 3.01$ and $SD = 1.185$) than postgraduate students ($M = 2.63$ and $SD = 1.139$).

We also asked them if they think using artificial intelligence helps them better understand the study content. Of 183 students, 158 (86.3 %) think AI helps them better understand the study content, and 25 (13.7 %) do not.

The third and last set of questions concerns the issue of involving artificial intelligence tools in the educational process. The questions and answers can be seen in Table 6.

5 Discussion

Most students reported familiarity with AI concepts, which aligns with AI's growing awareness and integration into various aspects of society. However, their ability to articulate this understanding in their own words was limited. The best explanation, in the words of a student, was "a software tool that "takes" data from a wide database, according to our "requirements."". Students' statements about missing "a single AI that can use text and images and can take a picture of text and have it automatically written" or "AI tools for simplifying very general and broad topics, so there's no need to search for information and read entire books or articles" indicate that some are unfamiliar with AI tools and their capabilities.

Table 5: Descriptive statistics of areas where using AI tools benefits students

	Not helpful	A little helpful	Partially helpful	Helpful	Very helpful	N	Mean	Std. deviation
Faster Learning	18 (10%)	31 (17%)	55 (30%)	48 (26%)	31 (17%)	183	3.2	1.2
Generating ideas	6 (3%)	20 (11%)	51 (28%)	62 (34%)	42 (23%)	181	3.6	1.1
Writing seminar papers	17 (9%)	45 (25%)	63 (35%)	31 (17%)	25 (14%)	181	3	1.2
Searching for information	8 (4%)	9 (5%)	48 (26%)	65 (35%)	54 (29%)	184	3.8	1.1
Explanation of material	16 (9%)	33 (18%)	53 (29%)	46 (25%)	35 (19%)	183	3.3	1.2
Tasks solving	25 (14%)	43 (24%)	62 (34%)	28 (15%)	23 (13%)	181	2.9	1.2
Problem-solving	15 (8%)	39 (21%)	65 (36%)	38 (21%)	25 (14%)	182	3.1	1.1

Table 6: Descriptive statistics for the third set of questions

Yes				No		Do not know	
Question	N	Freq.	Percent	Freq.	Percent	Freq.	Percent
Do you think using artificial intelligence positively affects the quality of your study?	185	156	84.3	29	15.7	/	/
Do you think that artificial intelligence will be even more involved in educational processes in the future?	184	169	91.8	3	1.6	12	6.5
Do you think students should learn more about how artificial intelligence works during their studies?	184	155	84.2	11	6.0	18	9.8
Do you think that educational institutions should offer training in the field of using artificial intelligence for studying?	183	146	79.8	16	8.7	21	11.5

ChatGPT and Grammarly emerged as the most frequently used AI tools, which resonates with broader trends. Natural language processing tools and writing assistance applications are widely adopted due to their versatility and direct relevance to academic tasks. A few students listed to the majority lesser-known AI tools like Kapwing, a known online video editing platform. It has gained popularity, especially among users who seek easy-to-use tools for creating and editing multimedia content. Next was DALL-E, an AI model OpenAI developed that generates images from textual descriptions. It gained significant attention due to its ability to create unique and imaginative images based on user prompts. However, it may not be as widely used by the general public as some more consumer-oriented applications. Students also mentioned they use the Orange Data Mining AI tool, an open-source data visualization and analysis tool. It is known in the data science and machine learning communities for its user-friendly interface and versatility. It's famous for educational purposes and exploratory data analysis. Some students also use rewriting AI tools or services with text-rewriting capabilities for academic purposes. They did not reveal which ones.

The study identified differences in using payable AI tools and skills based on gender. Males are likelier to use payable and free AI tools than females. While this aligns with the general acknowledgment of gender gaps in technology adoption, the extent of these differences may vary across different studies and cultural contexts. Students from the technical field are more likely to use payable and free AI tools than students from the social field. Technical science students showing a higher propensity to use also payable AI tools and demonstrating greater proficiency align with the expectation that specific disciplines might engage more deeply with AI technologies.

Students' moderate level of skills in using AI tools is consistent with the learning curve associated with adopting new technologies (Zehng et al., 2021; Sumakul et al., 2022; Coffey, 2023; Salido, 2023). Further studies might delve into the specific skills students find challenging or proficient in using AI tools.

The predominant use of AI tools among students was for information retrieval and idea generation. The perceived benefits of AI tools in faster learning, idea generation, and information retrieval are also discussed by authors like Delcker et al. (2024), Bello (2024) and others. Students also use AI tools for writing seminar papers, task-solving, problem-solving, material simplification, and a more straightforward understanding of matter and tasks. One student wrote he uses AI tools for reading and generating poetry.

Most students express satisfaction and excitement with AI tool usage, which aligns with the generally positive attitude towards technology adoption in education. However, specific factors contributing to satisfaction may vary and could be explored further.

The anticipation of increased AI involvement in educational processes aligns with the overall trajectory of AI adoption in education globally. Education with the help of artificial intelligence is most developed in several countries, each focusing on different aspects of AI integration in education. Notable countries leading in AI education are the United States, China, Singapore, South Korea, Finland, Spain, Japan, Sweden, and Luxembourg (Baker, 2017; Lake, 2023; Basheer, 2024; Hanks, 2024). In terms of specific fields, AI is being used broadly across various educational domains, including (STEM) science, technology, engineering, mathematics, robotics, language learning, special education, and administrative efficiency

(World Economic Forum, 2024; Baker, 2017; Lake, 2023; Hanks, 2024).

Studies often reflect an awareness of the evolving role of AI in shaping educational practices. Most students supporting the incorporation of AI training into educational curricula are consistent with recognizing AI as a crucial skill set for future professionals. This aligns with the broader discourse on preparing students for the AI-driven workforce.

Students stated that since there are many valuable artificial intelligence tools, they should learn to use as many AI tools as possible at the faculty. They want to involve artificial intelligence more in their studies and use it to assist them in various projects they must complete at faculties. They want to learn how to use artificial intelligence most skillfully. They think it would improve the quality of learning and reduce the time needed for specific tasks related to the study purposes. One student stated, "Instead of suppressing the use of AI, we should use it to our advantage, such as obtaining key data." Another statement was, "It would be excellent if we could use artificial intelligence without getting into trouble."

Some students miss easier fact-checking, like citing sources in responses, which would enable the checking. They miss better guidance on sources when searching for relevant professional literature. Although that, this is already possible with specific AI tools such as Perplexity. They would like to know "how to best obtain as accurate information as possible from artificial intelligence since it often happens that it does not provide accurate information or does not 'understand' what they need and gives completely wrong answers." Students also miss better AI tools for solving mathematical problems, better assistance in programming, and better and more accurate information. They state "most AI tools cannot solve and explain more challenging tasks. For example, ChatGPT often solves computational tasks incorrectly."

Many students see AI as a valuable asset for performing different tasks and know that AI doesn't replace humans. Many authors like Harding (2023), Hong (2024), Brusilovsky (2024), Eisbach et al. (2024), Spillias et al. (2024), and others also support these findings. On the other hand, some authors discuss the possibility and implications of artificial intelligence replacing humans. Roos (2023) highlights various professions where AI could replace humans, including graphic designers, data analysts, programmers, and warehouse workers. Talmage-Rostron (2024) discusses how AI impacts receptionists, accountants, and salespeople jobs. AI systems are already performing tasks that range from managing reception duties to automating bookkeeping and sales processes, which raises concerns about the future need for human workers in these roles. ScienceDaily (2023) reports on the University of Waterloo's findings that AI could replace humans in social science research. AI's ability to process and analyze large datasets efficiently suggests it could handle tasks traditionally performed by human researchers.

They know that AI contributes only a part in making it easier and faster for humans to perform tasks. One student stated, "I firmly believe that we must make an effort for everything ourselves, and artificial intelligence can only serve as assistance, as Google did initially, significantly easing everything for us." One other said, "It would be right for people to be acquainted with artificial intelligence and use it for assistance, not exploitation." Students are aware that some students are exploiting AI tools with minimal effort to perform different tasks regarding study.

Based on the results and students' statements, we suggest that educational institutions should offer training in using AI for studying purposes.

6 Conclusion

Artificial intelligence is progressing at an accelerated pace, which already impacts the profound nature of higher education (Popenici & Kerr, 2017). The application of artificial intelligence to education has been the subject of academic research for many years. Jia et al. (2024) try to fill a gap in the current review of research on AI in science education (AISE) in the early stage of education by systematically reviewing existing research in this area. Different researches are centred on various educational levels, fields, and contexts. For example, Xu and Ouyang (2022) are discussing STEM education (science, technology, engineering, mathematics), Liang et al. (2021) language education, Drigas and Ioannidou (2013) special education, etc. The field investigates learning wherever it occurs, in traditional classrooms or workplaces, to support formal education and lifelong learning. It brings together AI, which is itself interdisciplinary, and the learning sciences (education, psychology, neuroscience, linguistics, sociology, and anthropology) to promote the development of adaptive learning environments and other AI tools that are flexible, inclusive, personalized, engaging, and effective.

The article discusses using AI tools for educational purposes from the perspective of students in higher education. Two hundred fifty-eight students from different faculties of universities in Slovenia participated in the study. The findings indicate that while most students reported familiarity with AI concepts, their ability to articulate this understanding in their own words was limited. ChatGPT and Grammarly emerged as the most frequently used AI tools. The predominant use of AI tools among students was for information retrieval and idea generation. The study also unveiled some statistically important differences in using AI tools based on gender and field of study. The study's limitation is the sample size of 258 students from university faculties in Slovenia. The study's findings may also not be generalized to a larger population because they are

focused on students from a specific geographic location and may not capture the full diversity of AI tool usage and familiarity among students in higher education globally. Further research with a more extensive and diverse sample and objective measures of AI tool usage and skills could provide a more comprehensive understanding of the use of AI tools among students in higher education.

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Uporaba umetne inteligence med študenti v visokem šolstvu

Ozadje/Namen: Umetna inteligenca (UI) ima vpliv na naše vsakdanje življenje, od poslovnih do družbenih področij, in v zadnjih letih vse bolj tudi na izobraževanje. Namen prispevka je dobiti vpogled v uporabo orodij umetne inteligence za izobraževalne namene iz perspektive študentov.
Metode: Za raziskavo je bil uporabljen kvantitativni pristop z metodo anketiranja. Podatki so bili zbrani z e-anketo. Vprašalnik je vseboval zaprta vprašanja, ki so se nanašala na (i) splošne podatke, (ii) uporabo specifičnih orodij umetne inteligence, in odprta vprašanja (iii) o uporabi umetne inteligence za študijske namene. Za normalne in skoraj normalne porazdelitve odgovorov so bili uporabljeni parametrični t-test za neodvisne vzorce in enosmerna analiza variance (ANOVA).
Rezultati: Študija, izvedena med 258 študenti v Sloveniji, razkriva splošno seznanjenost s koncepti UI, vendar z omejeno sposobnostjo artikulacije tega razumevanja. Priljubljena orodja UI, kot sta ChatGPT in Grammarly, se pretežno uporabljajo za iskanje informacij in generiranje idej. Pokazale so se določene razlike v uporabi orodij UI glede na spol in področje študija.
Zaključek: Hiter napredek UI pomembno spreminja visokošolsko izobraževanje. Integracija UI v izobraževanje spodbuja razvoj prilagodljivih, personaliziranih in inkluzivnih učnih okolij. Zaradi omejene velikosti vzorca in geografske osredotočenosti študije so potrebne nadaljnje raziskave z bolj raznolikimi vzorci, da bi v celoti razumeli uporabo orodij UI v visokem šolstvu na globalni ravni.

Ključne besede: *Umetna inteligenca, Orodja UI, Visoko šolstvo, Študenti, Veščine*