# Artificial Intelligence Generators as Tools for Developing Academic Skills among University students

**Alma ŠKUGOR**
*Fakultet za odgojne i obrazovne znanosti, Sveučilište Josipa Jurja Strossmayera, Osijek*

**Diana MOSLAVAC BIČVIĆ**
*Fakultet za odgojne i obrazovne znanosti, Sveučilište Josipa Jurja Strossmayera, Osijek*

**Tijana BOROVAC**
*Fakultet za odgojne i obrazovne znanosti, Sveučilište Josipa Jurja Strossmayera, Osijek*

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**Abstract**

*In recent years, artificial intelligence (AI) has developed at an unprecedented pace, extending its influence to numerous aspects of daily life, including all levels of the educational system. The availability and practical applications of AI generators are transforming how students access information and engage in learning, presenting higher education institutions with a range of challenges. These challenges involve reconsidering academic skill development, rethinking the traditional roles of teaching and learning, and addressing ethical issues related to the use of emerging technologies. Integrating AI into educational systems marks a significant step in reshaping educational processes, promoting greater flexibility and accessibility.*
*A study was conducted to examine the frequency and methods of AI generator use, as well as their perceived benefits and limitations, among the students (N=499) enrolled in the Teacher Studies, Early Childhood and Preschool Education, and Educational Rehabilitation programs at the Faculty of Education in Osijek. The findings indicate that students primarily utilize AI generators for academic support, including content clarification, text composition, translation, and summarization. ChatGPT emerged as the most widely used AI generator, likely due to its accessibility, user-friendly interface, and availability in a free version. Students generally express positive attitudes toward the use of AI generators, recognizing them as valuable tools for academic development and assessing their use as largely ethical. These results point to the necessity of integrating AI generators into higher education in a structured manner, with clearly defined educational objectives, ethical guidelines, and practical examples of application.*

## ARTIFICIAL INTELLIGENCE AND DIGITAL EDUCATIONAL POLICY

In recent years, artificial intelligence (AI) has developed significantly, extending its influence across all aspects of daily life, including all levels of the educational system. The availability and practical applications of AI generators are transforming how students access information and engage in learning, presenting higher education institutions with a range of challenges. These challenges involve reconsidering academic skill development, rethinking the traditional roles of teaching and learning, and addressing ethical issues related to the use of emerging technologies. Integrating AI into educational systems represents a significant step in reshaping educational processes by promoting greater flexibility and accessibility.

Systematic efforts to enhance digital competencies are evident in various European initiatives and policy documents. The Digital Education Action Plan (2018-2020), adopted at the 2018 European Summit, outlined how educational systems can utilize innovations and digital technologies to support the development of relevant digital skills required for life and work in an era of rapid digital transformation. This plan particularly emphasized initial education and training at all levels of the educational system.

In 2019, the Organisation for Economic Co-operation and Development (OECD) adopted the Principles on Artificial Intelligence, marking the first international guidelines for the responsible governance of AI. These principles emphasize values such as inclusion, sustainable development, and human well-being, with a strong focus on human rights, democracy, and the rule of law. They also provide guidance on transparency, robustness, safety, and accountability in the development and application of AI systems. Currently, the European Union, the Council of Europe, the United States, the United Nations, and other jurisdictions use the OECD's definition of AI systems and their life cycle as a foundation for their legislative and regulatory frameworks. According to the OECD, artificial intelligence refers to computer systems that, through the analysis of input data, generate outputs such as predictions, recommendations, or decisions (AI Principles, 2019).

The White Paper on Artificial Intelligence (2020) launched a public consultation with member states, civil society, the academic community, and industry, seeking feedback on specific proposals for a European approach to AI.

These proposals include measures to encourage investment, research, innovation, skills development, and practical applications, as well as key elements for a future legal framework.

The Digital Education Action Plan 2021-2027 (2020) is a renewed EU policy initiative that sets out a common vision for high-quality, inclusive, and accessible digital education in Europe, aiming to support the adaptation of member states' educational systems to the digital age. This action plan contributed to the development of the Digital Compass 2030: Europe's Digital Decade (2021), which sets concrete targets for digital transformation.

Other relevant documents emphasize the importance of ethical considerations in the use of digital technologies and AI. For example, the UNESCO Recommendation on the Ethics of Artificial Intelligence (2021) addresses the application of AI systems in education, science, culture, communication, and information. In the educational context, this document highlights the need for ethical reflection, critical thinking, responsible design, and foundational AI literacy, with particular attention to labor markets, employability, and civic participation. Member states are encouraged to promote research initiatives on the responsible and ethical use of AI technologies in teaching, teacher education, and e-learning, with the aim of increasing opportunities while reducing challenges and risks in this field. These initiatives should be accompanied by appropriate quality assessments of educational outcomes and the impact of AI use on students and teachers. The document further emphasizes the importance of empowering students and teachers while recognizing the essential role of relationships, social aspects, and the value of traditional educational forms in teacher-student and student-student interactions. It also calls for the promotion, monitoring, and sharing of best practices at the institutional, university, and national levels (Recommendation on the Ethics of AI, 2021, Articles 101-105).

The most recent document from the European Union, the Artificial Intelligence Act (AI Act) (2024), came into effect on August 1, 2024, as a comprehensive legislative framework regulating the use of AI within the European Union. This law categorizes AI systems based on risk levels, imposing specific restrictions on high-risk applications and software to ensure safety, transparency, and the protection of fundamental rights in the development and application of AI. (Figure 1)

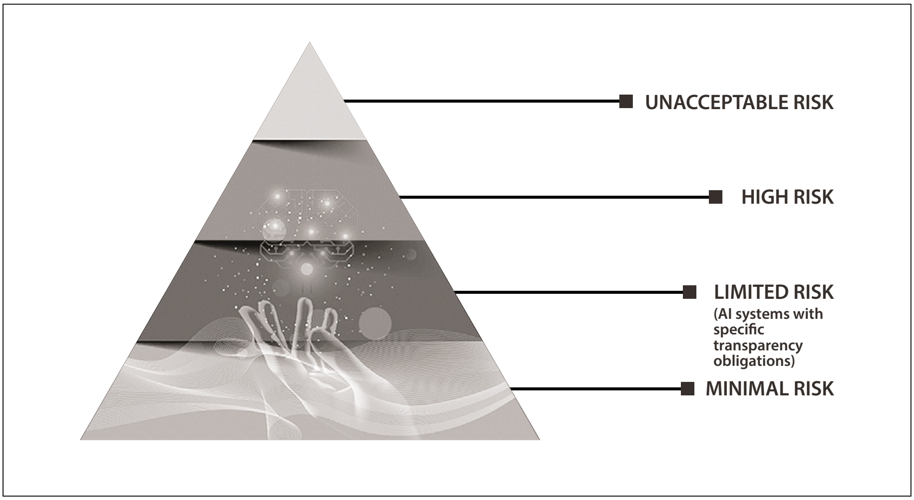


**Figure 1.** The Pyramid of AI Risks (European Commission https://digital-strategy.ec.europa.eu/en/policies/regulatory-framework-ai)

The AI Act (2024) adopts a "risk-based approach," which means that the regulation of AI systems varies depending on the assessed level of risk these systems pose to health, safety, and fundamental human rights. The AI Act (2024) defines four levels of risk:

- Unacceptable Risk: AI systems that pose a severe threat to individuals, such as those involving manipulative techniques or invasive surveillance that violate basic human rights, are prohibited.
- High Risk: These AI systems are permitted but subject to stringent risk assessments and regulatory oversight. Examples include AI applications in critical infrastructure sectors such as healthcare and transportation.
- Limited Risk: AI systems in this category must include transparency measures and provide clear explanations to end users, such as chatbots.
- Minimal Risk: The majority of AI systems fall into this category, where regulatory requirements are minimal or nonexistent, such as video games using AI components.

Together, these documents establish foundational steps for creating global and regional standards for the ethical and responsible use of AI, aiming to protect human rights, encourage innovation, and ensure safety in the digital age.

## AI GENERATORS IN EDUCATION

The definition of artificial intelligence (AI) varies significantly in the academic literature due to the complexity of the concept. In this context, AI will be defined from an educational perspective. According to Chen et al. (2020: 75267), artificial intelligence refers to "the ability of a machine to demonstrate a certain level of intelligence and perform a wide range of functions and tasks that require human capabilities, such as learning, decision-making, and adapting to the environment." The term "artificial intelligence" was first introduced by McCarthy et al. (1956), who described it as a field of science focused on creating intelligent devices, software, and systems. AI has also been characterized as a set of advanced cognitive processes, such as meaning-making, problem-solving, prediction, and the generation of outputs that can be generalized – processes typically associated exclusively with human intelligence (Arslan, 2017).

AI generators are systems that perform tasks usually requiring human intelligence, such as autopilots, robots, or household appliances. More specifically, AI generators are software applications that produce original content – including text, images, sound, music, video, or design – based on existing data through the use of AI algorithms (Mao et al., 2024). In this context, AI generators include tools like Duolingo, ChatGPT, DALL-E, Siri, Research Rabbit, Gemini, Jenni.AI, and similar applications used in educational settings. According to Garcia Lopez et al. (2024), integrating these generators into educational practice requires digitally literate educators and students capable of effectively utilizing these tools in teaching and learning.

Higher education institutions bear the responsibility of setting clear educational standards and promoting continuous student development to prepare them for rapid technological change. At the same time, faculty must possess not only digital skills but also digital pedagogical competencies, enabling them to support meaningful and effective use of AI tools in educational contexts (Tondeur et al., 2023). It is necessary to integrate AI literacy into curricula, emphasizing technical, ethical, and analytical aspects. Higher education should foster intellectual development through challenging tasks that promote perseverance, analytical thinking, creativity, social and communication skills, collaborative learning, ethical discussions, and preparation for teamwork in professional settings (Walczak & Cellary, 2023).

AI generators offer numerous benefits in higher education, including innovative approaches to learning and teaching, personalized learning tailored to individual student needs and abilities, expanded educational resources, increased student engagement, and more efficient administrative processes (Wang et al., 2024; Suryanarayana et al., 2024). For instance, Chen et al. (2020: 75272) identify three primary areas of AI application in education: administration, teaching, and learning. In the administrative domain, AI can automate grading, provide timely feedback, identify learning styles and student interests, and support personalized learning plans based on data analysis. In teaching, AI can predict learning outcomes, design and analyze curricula, suggest content adjustments, instructional methods, and personalized teaching plans, facilitate out-of-class instruction, and support collaboration in higher education. In the learning domain, AI can identify student challenges, offer personalized course recommendations, forecast career development, assess learning levels, and provide customized intelligent interventions.

AI generators also support efficient grading, timely feedback, and the dissemination of educational content and materials in alignment with curricula (Chassignol et al., 2018). The integration of AI in education aims to improve learning experiences and transform educational processes, enhancing flexibility and accessibility. AI also contributes to more engaging learning environments, reducing barriers to education through online platforms (Sharma et al., 2019; Mikropoulos & Natsis, 2011). Chatbots, machine translation tools, adaptive learning systems, and intelligent tutoring systems further enhance learning experiences. Simulations, virtual reality, and intelligent tutorials promote deeper learning and the development of competencies relevant to contemporary challenges (Mikropoulos & Natsis, 2011; Sharma et al., 2019).

Research findings suggest that the use of intelligent learning systems, virtual reality, and simulation technologies has proven beneficial for practical, experiential learning, increasing student engagement, motivation, and interest (Mikropoulos & Natsis, 2011; Sung, 2017). According to Sánchez-Paniagua Lopez et al. (2024), 93.9% of students expressed a positive attitude toward using AI tools for learning, indicating a strong predisposition for the integration of AI in education. Continuous support for students in developing the skills needed to effectively use AI generators, including formulating relevant queries and critically analyzing responses, is essential. Promoting responsible and ethical use of AI generators is crucial, particularly concerning content authenticity, the risk of misuse, and the potential for creating deepfake content, misinformation, and "hallucinations."

## INTRODUCTION OF ARTIFICIAL INTELLIGENCE IN HIGHER EDUCATION

The integration of artificial intelligence (AI) into higher education presents numerous opportunities but also deepens existing educational inequalities. While AI-based technologies can enhance learning processes and provide personalized educational resources, access to these tools is not uniformly distributed. As AI platforms continue to consolidate and advance, the cost of accessing these technologies is expected to rise, potentially creating further disparities. In this context, students may increasingly prefer higher education institutions that integrate AI tools into their educational processes, offering access to advanced AI technologies, superior educational resources, and expert support. This trend may place additional financial pressure on institutions seeking to attract prospective students. Conversely, students from less developed or financially constrained institutions may have to rely on less functional, free versions of AI tools, creating a technological asymmetry that could exacerbate existing disparities in educational outcomes and professional opportunities, further deepening the structural inequalities already present in higher education. This calls for the development of inclusive policies and initiatives to ensure fair access to AI resources for all students, regardless of their socioeconomic status or the institutions they attend (Michels, 2023).

The application of AI generators is not merely a technical matter but also an ethical, social, and pedagogical concern. AI systems can inadvertently reflect biases, leading to unfair educational outcomes. These biases may arise from the training data used to develop algorithms, which may either mirror societal biases or fail to account for diverse student groups, such as those from rural areas, students with disabilities, or those from different ethnic backgrounds. This can result in lower-quality and less equitable support for these groups. Ethical issues also arise concerning the transparency of decision-making processes and the fairness of AI-based systems in education. Addressing this challenge requires a multidisciplinary approach, including careful data preparation, model transparency, active involvement of educators and students, and formal ethical guidelines to ensure fair, safe, and effective use of AI tools in higher education (Hasanein & Sobaih, 2023; Cheng & Lee, 2024; Luo, 2024).

## RESEARCH METHODOLOGY

### *Aim and Research Questions*

The primary aim of this research is to explore the use of available AI generators within the context of higher education teaching and the academic skills of students. The study seeks to determine the frequency and manner of AI generator use, as well as the perceived advantages and disadvantages as identified by students.

From this overall aim, the following research questions have been formulated:

RQ 1: How often do students use AI generators for specific academic activities?
RQ 2: Which AI generators do students most frequently use?
RQ 3: Do students use AI generators in an ethical manner?
RQ 4: Are students satisfied with the outcomes of using AI generators in the context of improving their academic skills?
RQ 5: What do students perceive as the advantages and disadvantages of using AI generators in academic tasks?

### *Participants*

The study was conducted with a convenience sample of 499 students from the Faculty of Education in Osijek, including students from the Early and Preschool Education program, Teacher Studies program, and Educational Rehabilitation program. Tables 1 and 2 present the sample structure based on the study program and year of study. Given the predominance of female students, the sample is not gender-balanced, and gender-based differences were not analyzed. Of the total number of participants, 77.8% were full-time students, while 22.2% were part-time students. The research was conducted during the winter semester of the 2024/2025 academic year.

**Table 1.** Sample Structure by Study Program

| **Study program** | **N** | **%** |
|---|---|---|
| Teacher Studies | 209 | 41.9 |
| Early and Preschool Education | 157 | 31.5 |
| Educational Rehabilitation | 133 | 26.6 |
| **Total** | 499 | 100 |

**Table 2.** Sample Structure by Year of Study

| Year of study | N | % |
|---|---|---|
| 1st year | 151 | 30.3 |
| 2nd year | 112 | 22.4 |
| 3rd year | 137 | 27.5 |
| 4th year | 38 | 7.6 |
| 5th year | 61 | 12.2 |
| **Total** | 499 | 100 |

## *Instrument*

For this research, an online questionnaire was developed using Google Forms. The questionnaire consisted of 11 items, including both open-ended and closed-ended questions. Sociodemographic data were collected through three questions, while six items were presented as Likert-type rating scales with four or five response levels. A four-point Likert scale was used to assess the frequency of AI generator use, where 1 indicated "never" and 4 indicated "always" (Tables 3 and 4). For the five-point Likert scale, participants evaluated their agreement with specific statements, where 1 indicated "strongly disagree" and 5 indicated "strongly agree" (Table 10). The Cronbach's alpha coefficient ($\alpha = 0.88$) demonstrated a high level of internal consistency, confirming the instrument' validity in measuring student perceptions regarding the frequency and manner of AI generator use.

The final two questions were open-ended, allowing participants to provide insights into the perceived advantages and disadvantages of using AI generators for academic purposes. Anonymity was guaranteed to all participants, who could withdraw from the study at any time or request additional clarification. On average, completing the questionnaire required approximately ten minutes. The collected data were processed using descriptive statistics in the Statistica 13 software, complemented by a qualitative analysis. The variables used in the study were measured on an ordinal scale, which required the application of nonparametric statistical procedures suitable for this level of measurement. The Kruskal–Wallis test was employed to examine differences among students according to their year of study and study program. In cases where statistically significant differences were observed, pairwise comparisons of mean ranks were conducted using Z-tests with Bonferroni correction to precisely identify the specific group differences.

## RESULTS AND DISCUSSION

Analysis of the data related to the first research question reveals that students primarily use AI generators for academic support and content processing activities (Table 3). Students (N = 499) assessed the frequency of use of artificial intelligence generators for each of the offered academic activities on a four-point Likert scale. The most common uses include clarifying terms and definitions, as well as searching for answers to specific questions (M = 2.28), reflecting a need for additional explanation and independent knowledge acquisition. This is followed by writing-related activities, such as drafting texts (M = 1.95), translating into foreign languages (M = 1.86), and writing summaries (M = 1.84), suggesting that students recognize the potential of AI generators as a tool for developing academic skills, particularly those related to language expression and content structuring.

Conversely, AI tools are less frequently used for more creative or communicative tasks, such as recording TikTok videos (M = 1.10), creating video materials (M = 1.21), and writing emails (M = 1.21). This usage pattern may indicate two potential trends: first, that students primarily perceive AI generators as support for "serious" academic purposes, and second, that there may be a certain level of insecurity or lack of motivation to experiment with AI tools in broader, creative, and communicative contexts. This highlights the need for clear institutional guidelines and education on responsible AI use to encourage broader and ethical application of these tools in academic settings (Khalifa et al., 2024; Freeman, 2025).

Sánchez-Paniagua López et al. (2024) reported similar findings, noting that students most often use AI generators as learning aids for clarifying concepts, completing academic assignments, searching for general information, and organizing personal tasks. Obenza et al. (2023) found that students utilize AI generators for writing, language enhancement, idea generation, content clarification, personalized feedback, and as virtual tutors or teaching assistants. The integration of AI chatbots in higher education has proven particularly beneficial for international students, helping them overcome language barriers, develop course materials, and navigate administrative tasks.

Qualter et al. (2024) reported that approximately half of teacher education students use AI generators, although infrequently, for lesson planning, creating teaching materials, or assessment purposes.

**Table 3.** Use of AI Generators for Academic Activity

| Academic activity | M* | Min | Max | SD** |
|---|---|---|---|---|
| Composing a text | 1,95 | 1 | 4 | 0,718 |
| Writing an email | 1,21 | 1 | 4 | 0,589 |
| Solving tasks | 1,74 | 1 | 4 | 0,689 |
| Creating a photo/an image | 1,33 | 1 | 4 | 0,648 |
| Searching for answers | 2,28 | 1 | 4 | 0,796 |
| Making a presentation | 1,53 | 1 | 4 | 0,753 |
| Making a video | 1,21 | 1 | 4 | 0,580 |
| Creating a poster or a placard | 1,33 | 1 | 4 | 0,650 |
| Writing an essay | 1,75 | 1 | 4 | 0,775 |
| Writing a seminar paper | 1,75 | 1 | 4 | 0,781 |
| Explaining concepts/definitions | 2,28 | 1 | 4 | 0,913 |
| Writing a summary | 1,84 | 1 | 4 | 0,856 |
| Translating into a foreign language | 1,86 | 1 | 4 | 0,947 |
| Literature searching | 1,74 | 1 | 4 | 0,889 |
| Recording a TikTok | 1,10 | 1 | 4 | 0,438 |
| Summarizing a text/an article | 1,72 | 1 | 4 | 0,833 |
| Suggesting activities needed for lessons | 1,79 | 1 | 4 | 0,848 |
| Talking with someone | 1,26 | 1 | 4 | 0,643 |
| Creating quizzes | 1,32 | 1 | 4 | 0,627 |
| Creating a mind map | 1,30 | 1 | 4 | 0,624 |

M* – Mean, SD** – Standard Deviation

The second research question focused on the use of specific artificial intelligence generators for completing academic tasks (Table 4). Students (N = 499) assessed the frequency of use of individual artificial intelligence generators on a Likert scale from 1 to 4. The results indicate that students overwhelmingly favor ChatGPT (M = 2.72), while all other AI generators are used rarely or almost never (M values ranging from 1.01 to 1.34). Additionally, ChatGPT demonstrates the highest variability in use (SD = 1.016), suggesting that some students use it very frequently, while others never use it at all. In contrast, the frequency of use for other generators is relatively uniform (SD < 0.7).

Some students also reported using Grammarly (M = 1.34) and Siri/Alexa/Bixby (M = 1.30), which, despite being somewhat more frequently used than other tools, still have significantly lower usage rates compared to ChatGPT. This trend is likely due to the wide availability, the free version, and the intuitive design of ChatGPT, while other AI generators may be less frequently used due to a lack of awareness regarding their potential applications.

Future studies should aim to expand this analysis by examining correlations with student demographic characteristics to determine whether there are significant differences based on the study program, year of study, or the full-time versus part-time student status.

Similar findings were reported by Walczak and Cellary (2023) in a study involving Polish students, where 79% indicated that ChatGPT was their most frequently used AI tool. Likewise, Sánchez-Paniagua López et al. (2024) found that 94.4% of Spanish students most commonly relied on ChatGPT.

**Table 4.** Use of AI Generators

| AI Generators | M* | Min | Max | SD** |
|---|---|---|---|---|
| ChatGPT | 2,72 | 1 | 4 | 1,016 |
| MS Copilot | 1,05 | 1 | 3 | 0,260 |
| Claude | 1,04 | 1 | 4 | 0,258 |
| Gemini | 1,09 | 1 | 4 | 0,396 |
| Jenni. AI | 1,01 | 1 | 3 | 0,126 |
| Knewton | 1,06 | 1 | 3 | 0,100 |
| Scite | 1,04 | 1 | 2 | 0,063 |
| SciSpace | 1,08 | 1 | 4 | 0,141 |
| Consensus | 1,04 | 1 | 2 | 0,063 |
| Hemingway | 1,06 | 1 | 2 | 0,077 |
| Quillbot | 1,03 | 1 | 3 | 0,198 |
| Research Rabbit | 1,01 | 1 | 2 | 0,118 |
| Perplexity | 1,01 | 1 | 3 | 0,134 |
| Socratic by Google | 1,07 | 1 | 4 | 0,333 |
| Siri, Alexa, Bixby | 1,30 | 1 | 4 | 0,682 |
| Quillionz | 1,01 | 1 | 2 | 0,109 |
| DALL-E2 | 1,02 | 1 | 4 | 0,189 |
| Grammarly | 1,34 | 1 | 4 | 0,637 |
| Other | 1,18 | 1 | 4 | 0,552 |

M* - Mean, SD** - Standard Deviation

The findings related to the third and fourth research questions are presented in Tables 4 - 10.

Students (N = 499) expressed their level of agreement with the offered statements on a five-point Likert scale. In terms of ethical use (Table 10), students generally perceive themselves as using AI generators ethically (M = 3.78). However, the standard deviation (SD = 1.05) indicates a relatively wide range of opinions, suggesting that while a significant portion of students feels confident in their ethical behavior, there remains a considerable number who are less certain about the ethical implications of their actions. This highlights the need for clear guidelines and educational initiatives to promote academic integrity in the use of AI generators within academic contexts.

The Kruskal–Wallis test did not indicate statistically significant differences in perceptions of the ethical use of AI tools according to the year of study, while differences across study programs were statistically significant () (Table 5). Post hoc comparisons with Bonferroni correction revealed a significant difference between the students of the Teacher Studies program and students enrolled in the university undergraduate program in Educational Rehabilitation (). A comparison of mean ranks shows that educational rehabilitation students exhibit a higher level of perceived ethicality regarding the use of artificial intelligence, which may be attributable to their professional orientation toward working with vulnerable groups (Table 6).

These results emphasize the need for systematic integration of digital ethics and responsible technology use into educational programs, especially in the context of pedagogical and educational professions, where reflection on the ethical implications of artificial intelligence applications is a crucial component of professional competence.

**Table 5.** Kruskal–Wallis Test for Ethical Use of AI Tools

| **Variable** | **Group** | **H** | **df** | **p** | **Statistical significance** ($\alpha$ = 0.05) |
|---|---|---|---|---|---|
| Ethical use of AI tools | Year of study | 6.59 | 4 | .159 | No |
| Ethical use of AI tools | Study program | 19.22 | 5 | .002 | Yes |

**Table 6.** Average Ranks of Ethical Use of AI Tools by Study Programs

| Study program | Average Rank (R) |
|---|---|
| Teacher Studies | 231.67 |
| Early and Preschool Education | 241,67 |
| Educational Rehabilitation | 284.37 |

Students also express a high level of satisfaction with the outputs provided by AI generators (M = 3.64), noting that these tools effectively address their academic needs (Table 10). Furthermore, they believe that AI generators have the potential to enhance their academic skills (M = 3.34). The standard deviations for these items (SD = 0.77 and 0.95, respectively) indicate a more consistent response pattern compared to the ethics-related question, suggesting a more unified perception of the practical benefits of AI tools.

To examine differences across study years and programs, the Kruskal–Wallis test was applied, followed by post hoc comparisons with Bonferroni correction to explore specific group differences. The results indicated statistically significant variations in student satisfaction with the use of artificial intelligence tools across years of study ($H(4, N = 499) = 12.26$, $p = .016$). However, no significant differences were observed based on the study program ($H(5, N = 499) = 2.39$, $p = .794$) (Table 7). Subsequent post hoc comparisons with Bonferroni correction did not reveal statistically significant differences between specific pairs of years (all $p > .05$) (Table 8). Analysis of average ranks demonstrated a marked upward trend in satisfaction from the first year through the fourth year, followed by a slight decline in the fifth year. This pattern suggests that satisfaction with AI tools increases with academic experience, potentially reflecting enhanced technological competence and improved understanding of tool functionalities. The observed decrease during the fifth year may be attributable to a more critical perspective and a realistic appraisal of the limitations inherent to artificial intelligence.

**Table 7.** Kruskal–Wallis Test for Satisfaction with the Results of Using AI Tools

| Variable | Group | H | df | p | Statistical significance (α = 0.05) |
|---|---|---|---|---|---|
| Satisfaction with the outputs provided by AI generators | Year of study | 12.26 | 4 | .016 | Yes |
| Satisfaction with the outputs provided by AI generators | Study program | 2.39 | 5 | .794 | No |

**Table 8.** Average Ranks of Satisfaction with the Use of AI Tools by Years of Study

| Year of study | Average rank (R) |
|---|---|
| 1st year | 222.96 |
| 2nd year | 260.83 |
| 3rd year | 258.91 |
| 4th year | 294.42 |
| 5th year | 249.39 |

Results of the Kruskal–Wallis test did not show statistically significant differences in the perception of the possibility of improving academic results using AI tools, neither by year of study ($H(4, N = 499) = 8.04$, $p = .090$), nor by study program ($H(5, N = 499) = 3.32$, $p = .651$) (Table 9). These findings suggest a relatively uniform perception among students, regardless of their academic status or major. The homogeneity in assessments can be interpreted as an indication that students overall recognize the potential of artificial intelligence to enhance their academic success, irrespective of the year of study or study program.

**Table 9.** Kruskal–Wallis Test for Perception of Academic Improvement with AI

| Variable | Group | H | df | p | Statistical significance (α = 0.05) |
|---|---|---|---|---|---|
| Improvement of academic performance with AI | Year of study | 8.04 | 4 | .090 | No |
| Improvement of academic performance with AI" | Study program | 3.32 | 5 | .651 | No |

Overall, students' attitudes toward the ethical use of AI generators, their satisfaction with the outcomes, and the perceived potential for improving academic skills are generally positive (Table 10). However, the observed variability suggests a need for further education, clearer guidelines, and practical examples to strengthen these perspectives.

**Table 10.** Ethical AI Use, Satisfaction, and Academic Skill Improvement

| Statements | M* | Min | Max | SD** |
|---|---|---|---|---|
| I use artificial intelligence tools in an ethical way. | 3,78 | 1 | 5 | 1,051 |
| I am satisfied with the results obtained by using artificial intelligence. | 3,64 | 1 | 5 | 0,767 |
| By using artificial intelligence tools, I can improve my academic performance. | 3,34 | 1 | 5 | 0,952 |

M* - Mean, SD**-Standard Deviation

Qualter et al. (2024), in their study with teacher education students, similarly found a high level of awareness regarding the ethical issues associated with AI technologies, emphasizing the importance of understanding the limitations and biases inherent in AI algorithms. The majority of these students believe that, with appropriate guidelines in place, AI generators can be used responsibly in educational settings.

Silva et al. (2024) argue that merely introducing "raw" technologies, such as ChatGPT, into educational practice is insufficient. Instead, it is essential to develop clear guidelines and protocols defining when and how these tools should be used, including policies on academic integrity, citation protocols for AI-generated content, and instructor roles in overseeing their use, to prevent over-reliance on automated responses.

Analysis of open-ended questions regarding the advantages and disadvantages of using artificial intelligence (AI) generators in academic tasks addressed the fifth research question. Students identified practical and functional benefits of AI generators in academic contexts, most commonly related to efficiency and learning support, including:

- quick access to information and solutions, facilitating and accelerating academic work,
- time savings and ease of use,

- translation capabilities and easier access to foreign literature,
- explanations and content summarization, which can aid in comprehension,
- idea generation and support in task structuring.

However, students also noted numerous ethical, pedagogical, and qualitative challenges associated with AI generator use, including:

- inaccuracy of information and fabricated sources, potentially undermining academic credibility,
- risk of misuse, such as passive copying without critical reflection,
- reduced creativity and autonomy, potentially hindering the long-term development of academic skills,
- dependence on free versions, perceived as less reliable,
- emergence of academic laziness and decreased personal engagement.

These findings align with those from recent studies. For example, Silva et al. (2024) identified efficiency, diverse ways of facilitating academic tasks, and broad social impact as major advantages of ChatGPT. Meanwhile, Sánchez-Paniagua López et al. (2024) reported that students primarily viewed unreliable outputs (73.1%) and potential over-reliance on technology (50%) as significant disadvantages.

## RESEARCH LIMITATIONS

When interpreting the results of this study, certain limitations should be considered. The findings are based on students' self-assessments of AI generator use, rather than objective measurements of their actual skills and competencies. This may not accurately reflect their proficiency or effectiveness in using these tools, highlighting the need for future studies that combine subjective and objective indicators. Additionally, while the study sample is numerically substantial, providing valuable insights into student practices and attitudes within a specific context, these findings may not fully capture the experiences of students from other disciplines and institutions.

## CONCLUSION

AI systems play a significant role in contemporary society by creating a new context in which children and young people grow up, develop their understanding of the world and themselves, critically engage with media and information, and learn to make informed decisions. Given the unpredictability of future skill demands, the core mission of higher education must be to foster the capacity for lifelong learning.

The findings from this study align closely with existing research on student use of AI generators in academic contexts. Similar to Sánchez-Paniagua Lopez et al. (2024) and Obenza et al. (2023), students primarily utilize AI tools like ChatGPT for academic support activities such as clarifying terms and drafting texts, reflecting their role in facilitating independent learning and skill development. The observed lower use of AI for creative tasks also mirrors previous studies, which indicate students predominantly view AI as an aid for structured academic work rather than broader creative applications (Freeman, 2025).

The preference for ChatGPT and heterogeneous usage levels among students correspond with findings by Walczak and Cellary (2023), who similarly reported ChatGPT as the dominant AI tool but with varying acceptance across user groups. Regarding ethical use, the positive perceptions and significant differences among study programs, with Educational Rehabilitation students reporting higher levels of ethical use, align with the findings of Qualter et al. (2024), who emphasize the role of professional orientation in shaping ethical awareness.

Student satisfaction with AI outputs increasing across academic years, followed by a decline in the final year, parallels patterns reported by Walczak and Cellary (2023) and Sánchez-Paniagua López et al. (2024), likely reflecting growing competence and critical appraisal. The broad recognition of AI's potential to enhance academic skills across fields supports conclusions by Silva et al. (2024) and Khalifa et al. (2024) on AI's positive role when integrated responsibly.

However, consistent with Silva et al. (2024) and Sánchez-Paniagua López et al. (2024), this study highlights persistent concerns about AI's ethical, pedagogical, and qualitative challenges, reinforcing the imperative for clear guidelines and educational initiatives to promote responsible use. The high adoption rate among UK university students (Freeman, 2025) underscores the growing importance of these issues globally. The similarities with recent international studies confirm the universality of these usage patterns and perceptions, regardless of cultural and educational context.

Overall, these findings indicate a need for systematic integration of AI generators into higher education through clearly defined pedagogical goals, ethical frameworks, and practical application examples. Future research should explore differences in AI generator use based on demographic characteristics (e.g., program, year of study, full-time or part-time status) and develop educational approaches that support responsible, critical, and creative use of AI technologies in educational settings.

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# Generatori umjetne inteligencije kao alati za razvijanje akademskih vještina studenata

**Alma ŠKUGOR**
*Fakultet za odgojne i obrazovne znanosti, Sveučilište Josipa Jurja Strossmayera, Osijek*

**Diana MOSLAVAC BIČVIĆ**
*Fakultet za odgojne i obrazovne znanosti, Sveučilište Josipa Jurja Strossmayera, Osijek*

**Tijana BOROVAC**
*Fakultet za odgojne i obrazovne znanosti, Sveučilište Josipa Jurja Strossmayera, Osijek*

**Ključne riječi:**
*generator umjetne inteligencije, studenti, akademske vještine, etičnost, prednosti generatora umjetne inteligencije, nedostatci generatora umjetne inteligencije*

**Sažetak**

*Posljednjih se godina umjetna inteligencija (UI) ubrzano razvija te se širi na sve aspekte našeg života čime je sve prisutnija i na svim razinama obrazovnog sustava. Dostupnost i primjenjivost generatora umjetne inteligencije mijenja načine dolaženja do informacija i učenje studenata, što pred visoko obrazovanje stavlja niz izazova koji se odnose na nove mogućnosti razvijanja akademskih vještina, ali i preispitivanje tradicionalne uloge poučavanja u visokom obrazovanju te pitanja etičnosti pri uporabi novih tehnologija. Integracija umjetne inteligencije u sustav obrazovanja predstavlja značajan korak u preoblikovanju obrazovnih procesa prema većoj fleksibilnosti i pristupačnosti.*
*Provedeno je istraživanje među studentima (N=499) svih godina učiteljskog studija, studija ranog i predškolskog odgoja i obrazovanja i studija edukacijske rehabilitacije Fakulteta za odgojne i obrazovne znanosti u Osijeku s ciljem utvrđivanja učestalosti i načina primjene generatora umjetne inteligencije te percepcije njihovih prednosti i nedostataka. Rezultati upućuju na to da se studenti generatorima umjetne inteligencije koriste u svrhu akademske podrške, posebice u pojašnjavanju nastavnih sadržaja, pisanju tekstova, prevođenju i sažimanju. ChatGPT ističe se kao najčešće korišteni generator umjetne inteligencije što se može povezati s njegovom dostupnošću, intuitivnim sučeljem i besplatnom verzijom. Studenti općenito izražavaju pozitivan stav prema primjeni generatora umjetne inteligencije, ocjenjujući ih korisnima u vlastitome akademskom razvoju, te se uglavnom procjenjuju etičnima u njihovu korištenju. Dobiveni rezultati upozoravaju na potrebu sustavne integracije generatora umjetne inteligencije u visoko obrazovanje uz jasno definirane pedagoške ciljeve, etičke okvire i praktične primjere primjene.*