The Utilization of Artificial Intelligence in Hungarian Higher Education: A Meta-Summary of Recent Studies

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Abstract: The rapid spread of artificial intelligence (AI) is transforming higher education environments around the world – and Hungary is no exception. Over the past three years (2023–2025), several empirical studies have examined the attitudes of students and teachers toward AI, its uses, and the challenges of integrating the technology into Hungarian higher education institutions. The aim of this paper is to provide a comparative overview of these studies, i.e., to produce a meta-summary of the latest data and trends and to formulate recommendations for future AI strategies in Hungarian higher education. The analysis is based on four thematic categories: knowledge and use of AI tools, educational integration, ethical and pedagogical challenges, and institutional support and guidelines. Surveys show that artificial intelligence is no longer a marginal phenomenon in Hungarian higher education, but part of everyday practice. At the same time, the development of critical digital literacy, the clarification of ethical guidelines, and the establishment of institutional support systems are essential for the integration of technology into education. Based on the results, Hungarian students widely use AI tools for information retrieval and text creation, while teachers primarily use them for curriculum development and assessment purposes. In both groups, the integration of ethical and critical considerations appears to be a significant challenge. The study makes recommendations for the development of institutional policies, pedagogical practices, and ethical regulations.

Keywords: Artificial intelligence, Higher education, Attitude, Challenges

Introduction

Artificial intelligence (AI) is playing an increasingly important role in the digital ecosystem of higher education. The explosive emergence of artificial intelligence (AI) from 2022 onwards will have a significant impact on higher education practices (Figure 1). Students are increasingly turning to AI tools for learning purposes, while educators are often uncertain about the pedagogical and ethical implications of technology. The aim of this study is to map AI usage trends in Hungarian higher education based on empirical research conducted over the past three years. The aim of the research is to identify patterns of AI-based tool use, pedagogical opportunities, and ethical and didactic challenges along thematic categories.
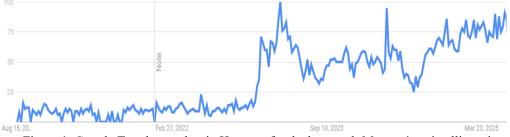

Figure 1. Google Trends searches in Hungary for the keyword: Mesterséges intelligencia

In recent years, AI has become a central topic of discourse in higher education. In Hungary, too, more and more research is examining how students and teachers integrate artificial intelligence into their everyday learning and teaching practices (Folmeg et al., 2024; Rajki et al., 2024). While students tend to adapt quickly and focus on practical applications (e.g., text composition, information retrieval), teachers are more concerned about methodological uncertainty and ethical issues (Szűts, 2024).

Several studies have already examined the integration of AI into education in the context of higher education in Hungary. Analyses by the OECD (2021, 2023) pointed out early on that digital transformation and AI integration are strategic issues for quality assurance in Hungarian higher education. According to the latest international comparative survey on the use of AI (Daskalaki et al., 2024), Hungarian teachers and students alike show considerable openness to AI tools, but institutional frameworks are lacking. At the national level, Folmeg et al. (2024) examined the components of student AI literacy and pointed out that awareness and critical thinking are limited. The international survey of KPMG (2025) has shown that Hungary is at the very last place within the 47 countries examined when it comes to AI knowledge, efficacy, and training. Several studies examine the impact of AI in specific areas of higher education: Molnár (2024) in measurement and evaluation, Tolner et al. (2023) in online examinations, and Lengyel, Felvégi, and Füzesi (2024) in agricultural higher education have presented the new opportunities and risks. In social science higher education, Marciniak and Baksa (2024) and Szűts (2024) highlighted the problems of fears, dilemmas, and regulatory gaps.

In their detailed exploration of the student perspective, Jäckel and Garai-Fodor (2024) shed light on the specific attitudes of Generation Z, while Pető and Kovács (2023) interpreted the transformation of Hungarian higher education in a broader social context. Tick's (2023, 2024) domestic and international research examines the educational effects of ChatGPT and the dilemmas faced by educators, while Bokor (2023) discusses the long-term consequences of technological disruption. According to Lu and Harris (2018), there are four main areas where AI can be used particularly effectively for educational purposes:

1) Teaching with intelligent tutoring systems (ITS).
2) Personalizing the learning process
3) Assessment and examination
4) Automation of educational administration tasks.

The aim of this study is to provide a comprehensive overview and synthesis of recent empirical studies in order to explore trends, challenges, and directions for development in Hungarian higher education.

Method

Research Objective

The aim of this study is to provide a comprehensive overview of the use of artificial intelligence in Hungarian higher education, with a particular focus on the attitudes and usage habits of students and teachers, as well as the challenges of educational integration. To this end, we conducted a meta-analysis of the empirical studies published between 2023 and 2025.

Methodological Approach

The research is a qualitative study in the form of a meta-summary (narrative review) based on document analysis. Its purpose is not to produce a statistical meta-analysis, but rather to synthesize, contextualize, and thematically map the results.

Source Selection Criteria

The included studies were selected based on the following criteria:

• Time limit: empirical studies published between January 2023 and June 2025.
• Geographical focus: studies conducted in Hungary or involving Hungarian participants.
• Target group: students and teachers in higher education.
• Content focus: Educational aspects of AI use – attitudes, forms of use, challenges.

- Publication type: Professional study, article, or report based on completed research (not preliminary research or blog posts).

The initial search resulted in a total of 15,900 English language and a significantly lower amount of (811) Hungarian language results on Google scholar for this period for the keywords "artificial intelligence", "higher education", "student" and "teacher" (or their Hungarian equivalent).

Coding

The aim is to create a qualitative coding framework that can be used to perform content analysis or comparative analysis on the textual results of various empirical studies. Articles were analyzed along the following four topics:

- Knowledge and use of AI tools
- Integration into education
- Ethical and pedagogical challenges
- Institutional support and guidelines

Table 1. Coding outline based on thematic categories

Main theme	Code category	Description	Example/indicator
Knowledge and use of MI tools	tool_type	Name and type of AI tool used	ChatGPT, Grammarly, Copilot, text translator, AI note-taker
	frequency_of_use	Regularity of use	Daily, weekly, occasionally
	purpose_of_use	What the user uses it for	Writing, brainstorming, learning, research, writing papers
	depth_of_knowledge	Awareness of use, accompanied by reflection	Automated vs. interpreted use
Integration into education	learning_support	Use of AI in student learning	Note-taking, summary generation, question answering
	educational_content	Application of AI to curriculum development	Course outline creation, illustration generation
	assessment_automation	Automation of assessment	AI tool for essay assessment, test correction
	interaction_reorganization	Impact of AI on teacher-student communication	AI tutor, automated responders
Ethical and pedagogical challenges	plagiarism_concern	Fear that content created with the help of AI is plagiarism	Secret use by students, lack of "AI-generated" labeling
	critical_thinking	The impact of AI on students' independent thinking	Mechanical copying, formulaic reasoning
	transparency	The comprehensibility of AI's functioning or decision-making	Criticism of "black box" algorithms
	data_protection	Security of personal or educational data	Papers uploaded to AI tools, teaching materials uploaded with names
Institutional support and guidelines	institutional_guidance	Are there internal regulations on the use of AI?	Code of ethics for AI use, rector's recommendation
	methodological_training	Preparing teachers for the integration of AI pedagogy	Workshops, internal training, support for curriculum development
	technological_access	Is access to AI tools provided?	Institutional license, internal integration of AI platform
	student_information	Information for students on proper use	Teaching aids, case studies

Results and Discussion

Below, based on the studies examined, we present the characteristics of AI use in Hungarian higher education in a thematic breakdown, interpreting the perspectives of students and teachers separately.

Knowledge and use of MI Tools

Student Usage and Attitudes

The national survey conducted by Rajki et al. (2025) based on a sample of 1,027 students shows that nearly 90% of students use some form of AI-based tool, primarily for text creation, translation, and information retrieval. At the same time, the level of conscious and critical use varies greatly, and pedagogical use is still in its infancy. The most common tool is ChatGPT (83%), followed by Grammarly and various AI-based note-taking tools. The purpose of use was typically information retrieval, text composition, and exam preparation. Approximately 64% of respondents use AI tools on a weekly basis (Rajki et al., 2025).

The focus group study by Folmeg et al., 2024 confirms these patterns, but also points out that students often use AI "based on intuition" rather than reflectively or consciously. Use is mainly limited to generating and searching for academic texts. The results show that students typically use the tools in an experimental manner, while rarely reflecting on their ethical or methodological implications.

Jäckel and Garai-Fodor (2024) specifically demonstrated that the demand for fast and efficient information retrieval among Generation Z led to intensive experimentation with AI tools. According to a pilot study by Tick et al. (2023), students rated ChatGPT positively, but its long-term learning effects are uncertain. It must be noted that although students turn more and more towards digital learning, mainly using smart tools but, at the same time, they require an occasional, personal, face-to-face contact.

Educational Perspectives

On the teaching side, tool use is much more heterogeneous: many are familiar with it, but conscious, systematic integration is only observed in a small circle (Daskalaki et al., 2024). This Navigating the Future of Education survey provides an opportunity for international comparison, asking 1,754 educators in five countries, including Hungary, about the integration of artificial intelligence. 63% of Hungarian teachers have tried some kind of AI tool for educational purposes, but only 21% use it regularly. Among Hungarian respondents (17%), the most common areas of use were curriculum development and student performance assessment, but there were significant concerns about algorithmic bias, transparency, and a decline in students' critical thinking skills. From the perspective of educators, Tick (2024) and Marciniak and Baksa (2024) argue that teachers are often ambivalent: although they recognize the innovative potential of AI, they fear misuse by students. Placing this in a broader context, Bokor (2023) draws attention to technology-invariant challenges.

Integration into Education

Based on feedback from both students and teachers, it is clear that AI is rarely used to reorganize interactive processes (e.g., tutoring, feedback) – this is not yet typical in Hungarian higher education culture. Students mainly use AI to support learning, especially when quick information or simple explanations are needed. At the same time, several students reported that the generated content is formulaic and therefore unreliable without critical evaluation. The use of AI is typically informal, often without the knowledge of teachers (Rajki et al., 2025). Tick stresses (2019) that more attention must be paid to security awareness trainings and courses for the students of the Z generation within Hungarian higher education. Although teachers are open to AI tools, many are unable to integrate them into their courses. The Navigating survey shows that while the assessment of lesson preparation is mostly positive, the application of AI to automate assessment is still in its infancy, mainly due to mistrust and data protection issues (Daskalaki et al., 2024).

The practical aspects of integration are presented in several field-specific studies. Molnár (2024) emphasizes the automation potential of AI in assessment processes, while Tolner et al. (2023) identify immediate benefits but also serious ethical risks in online testing. Lengyel et al. (2024) see the support of research processes and the alleviation of the shortage of teaching staff in agricultural higher education as feasible.

The OECD (2023) highlights that integration among Hungarian higher education institutions is uneven, and in many places there is a lack of organizational-level strategy. This is consistent with the international survey by Daskalaki et al. (2024), which found that the majority of Hungarian educators use AI in an experimental manner but do not receive institutional support for it. Experimentation has begun, but a comprehensive methodological framework is lacking.

Ethical and Pedagogical Challenges

Almost all of the studies examined highlight the existence of ethical dilemmas. The phenomenon of "secret AI use" is common among students: although they use the tools, they do not always admit to it. The line between plagiarism and non-plagiarism becomes blurred, especially when the text is only partially generated. Students often view generative AI as a "co-author," which generates strong ethical debates.

The problems of plagiarism, authorship, and evaluation appear as central dilemmas (Szűts, 2024; Folmeg et al., 2024). Among educators, the greatest uncertainty can be observed in determining ethical and supportive forms of application. The Navigating survey (Daskalaki et al., 2024) also highlights that 62% of Hungarian educators believe that the lack of ethical regulations hinders implementation. The dilemmas faced by students are detailed by Rajki et al. (2024); many students are uncertain whether the use of AI tools is compatible with academic integrity. Marciniak and Baksa (2024) point out that in social science education, teachers fear that text-generating AI weakens critical thinking. Szűts (2024) also highlights broader ethical and social concerns, such as the issues of autonomy and responsibility. Teachers are very concerned that students' independent thinking is being pushed into the background. According to the studies, teachers receive little support on how to teach students to use AI critically. According to Tick (2024), educators are particularly concerned about plagiarism and assessment bias. Pető and Kovács (2023) identified the risk of increased social inequality, as the use of AI tools is highly dependent on students' digital competence.

Institutional Support and Guidelines

Based on OECD reports from 2020 and 2023, the digital transformation of Hungarian higher education institutions is progressing slowly but surely. Specific strategies for artificial intelligence are still rare, but demands from students and teachers are putting increasing pressure on the administrative sphere. All studies indicate that institutional regulation and support are lacking. According to Rajki et al (2025), 78% of students did not receive any information from their university on how to use AI responsibly. The Navigating survey (2024) reveals that 87% of teachers believe that institutional guidelines and internal AI ethics are needed.

Research consistently points to a lack of institutional regulation (Rajki et al., 2025; OECD 2021, 2023). Only a few Hungarian universities have explicit AI regulations, while most institutions leave it up to teachers to establish the framework. Institutional support for the digital transformation of Hungarian higher education is fragmented, and regulations on AI are only partially in place (OECD 2021, 2023).

Methodological training is also lacking: there is no systematic development or training program tailored to Hungarian higher education for the integration of AI pedagogy, either for students or teachers. European comparative research (Daskalaki et al., 2024) confirms this picture: 60% of Hungarian teachers have tried AI, but there is little official training or guidance available.

The example of Lengyel et al. (2024) from agricultural higher education shows that innovation at the institutional level is successful when AI is treated not only as a teaching aid but also as a research aid. Bokor (2023) also highlights the lack of institutional-level strategy, which may reinforce the fragmentation of applications in the long term.

Recommendations

1. Development of institutional guidelines

Higher education institutions should establish transparent, accessible protocols for the use of AI. These should cover issues such as plagiarism thresholds, source usage, independent work, and AI support.

2. Methodological and ethical training

Courses and training sessions should be launched both for students and teachers on the conscious and critical use of AI tools. Digital competencies should be integrated into basic training.

3. Development-focused assessment practices

An assessment reform—such as project-based, reflective, or process-focused assessments—can help control and support the use of AI-based content.

4. Supportive infrastructure

The development of internal AI platforms, such as education-specific chatbots or university AI assistants, is recommended. In addition, the integration of administrative AI tools (e.g., automatic feedback, timetable management) can reduce the workload of teachers.

Conclusion

Surveys show that artificial intelligence is no longer a marginal phenomenon in Hungarian higher education, but part of everyday practice. AI is spreading rapidly in Hungarian higher education, but its integration is unregulated and raises significant ethical questions. The development of critical digital literacy, the clarification of ethical guidelines, and the establishment of institutional support systems are essential for the integration of technology into education. The lack of institutional support appears to be a key obstacle. This meta-summary offers a starting point from which future training policy and research directions can be mapped out. The main findings of the study are as follows:

- Student use of AI is widespread but informal and unreflective.
- Teacher integration of AI is sporadic and cautious, often ad hoc.
- The lack of critical thinking and ethical frameworks carries risks.
- There is a strong demand for structured institutional responses and training.

The study's recommendations could contribute to strengthening future regulatory and methodological frameworks.

Scientific Ethics Declaration

Conflict of Interest

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