Exploring Instructor's Attitudes and Usage Patterns of Generative AI in Engineering

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Abstract. This case study reports on the results of a survey conducted among lecturers at the Faculty of Engineering of the University of Debrecen, which focused on lecturer attitudes and usage patterns related to the use of generative artificial intelligence (GenAI). The aim of the study is to collect and analyze information that will support the effective integration of GenAI into education.

Keywords: engineering education, generative AI, user attitudes and habits

1 Introduction

Recently, several studies have shown that the widespread use of generative AI is forcing a reform of pedagogical practice in higher education. GenAI can provide administrative support and create new opportunities for the development of creativity, critical thinking and autonomous learning [9]. One of the biggest challenges is the lack of AI literacy among students and faculty [3]. Research in Hungary shows that domestic educators mostly use artificial intelligence for routine tasks – such as text translation, information gathering and grammar checking – while deeper pedagogical possibilities, such as the creation of personalized learning materials, are relegated to the background [8]. In addition to the technical and educational challenges, the use of GenAI also raises significant ethical issues. It is likely that many educators are already actively using or allowing ChatGPT, while formal guidelines are incomplete or outdated [10]. For instructors, students, and AI to collaborate effectively, it is essential to develop a strong understanding of AI tools, stay informed about evolving institutional guidelines for their use, and, perhaps most importantly, embrace a spirit of experimentation. We wanted to learn about the attitudes and habits of lecturers at the Faculty of Engineering of the University of Debrecen regarding the use of AI in order to be able to incorporate the use of AI into education as effectively as possible in the future. To this end, we filled out an anonymous questionnaire online with lecturers.

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1.1 Literature review

The systematic review article by Qian, Y [9] follows the PRISMA guidelines, which focuses exclusively on direct teaching and learning applications of GenAI and does not consider research on perceptions and attitudes. Among other things, the answer is sought to the question of how GenAI tools are applied pedagogically in higher education today in teaching and learning processes. The results of the research involved in the study show that the use of GenAI can enable the automatic evaluation of written student work; it can provide cognitive support for understanding the curriculum through a quick question-and-answer system, examples, and visualizations, considering the individual needs of the student.

Creativity can be developed through multiple GenAI-generated approaches to a given problem, and critical thinking can be developed through the presentation of alternative arguments or perspectives generated by GenAI. Gervacio in [2] conducted interviews to learn about how GenAI supports self-directed learning, learning processes, and motivation among 15 science-oriented students. The study highlights that, based on the reports, GenAI offers the opportunity to create more personalized learning environments.

Learning with GenAI strengthens motivation for participation, as students interact with the learning material and thus can focus only on what they need instead of reading unnecessary materials. Although AI-based tools can support students in the learning process, their application carries risks in terms of student abuse and inappropriate use [1].

For the reasons mentioned above, among others, it is not surprising that educators are distrustful of GenAI. However, the progressive use of GenAI depends not only on educators' personal attitudes towards GenAI, but also on whether educators have the necessary pedagogical-technological competence and self-confidence [11]. In addition, for the successful integration of GenAI into education, both the instructor and the student should be aware of the impact of GenAI on learning at home and in class. Dragomir and Todorescu had 292 students in technical higher education fill out a questionnaire in this regard [5]. Their study mentions that students are fundamentally positive about using GenAI as a supplementary tool in education, but they need more information and clear guidance in the classroom and at home to use it confidently. Those completing the questionnaire expressed concerns about the decline of the teacher's role, technological dependence, and the decline in creativity. Alnsour et al. in [6] point out in their study that the lack of ethical knowledge and guidelines may increase the undesirable or addictive use of GenAI.

Shi presents a validated measurement tool to assess teachers' GenAI-related competencies, which includes five dimensions: technological proficiency, pedagogical compatibility in education, preparing students for effective application, GenAI-related professional development and communication, risks in education, and ethical awareness [7].

In their study, Kim et al. compared faculty and student attitudes towards the use of GenAI by analyzing an online questionnaire completed by 982 students and 76 faculty

members at an American university [4]. The authors make recommendations to universities: instructors should be encouraged to design assessment methods that incorporate GenAI by focusing on higher-level thinking skills rather than on memory or the template answers provided by GenAI.

Considering international literature, we created a questionnaire that examines educators' attitudes towards Gen AI along the following dimensions: teacher uncertainty, pedagogical innovation, risk in education, institutional assessment, belief in the positive long-term impact.

1.2 About the instructor's questionnaire

Since AI-based Learning Companion Systems (LCS) are expected to play a significant role in the learning processes of future engineers, the preparedness of instructors must be taken into account when defining the educational strategy. For this purpose, we have prepared the questionnaire for the instructors.

Questions 1-3 focused on the respondent's age, the type of subjects they teach (foundational subjects: mathematics, physics, computer science; engineering subjects; other); and the frequency of use of GenAI tools.

In question 4, we asked which of the artificial intelligence-based tools we listed the instructor was familiar with. We included the tools described below in the questionnaire.

- General-purpose GenAI systems based on reflective dialogue, such as ChatGPT, Microsoft Copilot, Google Gemini, Claude, DeepSeek, can help the learning process with explanations and summaries, presumably supporting self-efficacy.
- A system mainly focused on information search, i.e. source-based learning, is Perplexity AI.
- Creative content generation systems that can be used as educational tools but are not considered LCS include Midjourney, DALL-E and Jasper AI. The former two can be used to create images, the latter to create text.
- With GitHub Copilot, engineering students studying programming languages such as Python, C, Java can understand the solution to programming tasks faster. The conversational-style interface can be used to learn how to debug program code, and Copilot can help make existing code more readable.
- DeepSeek is a set of code models that support learning to program, especially in code interpretation and analysis of more complex software projects. Compared to GitHub Copilot, DeepSeek can be more efficient in handling project-level relationships across multiple files, especially for analysis and explanation tasks.

Question 14 specifically asks how often educators encounter misleading AI-generated content in technical subjects.

We further conducted the analysis based on five aspects related to teachers' attitudes. For each, a 6-point Likert scale was applied: 1 = Strongly disagree, 2 = Disagree, 3 = Slightly disagree, 4 = Slightly agree, 5 =Agree, 6= Strongly agree.

In questions 5-9, we wanted to find out about the respondent's level of anxiety regarding their future as a teacher; in short, about teacher uncertainty. The following had to be rated based on the Likert scale above.

- **TU1**=The emergence of GenAI makes me feel uncertain about the future of my role as an educator.
- **TU2**=When reviewing students' work, it is more difficult for me to determine how much of it is an independent product.
- **TU3**=I find it difficult to determine which subtasks AI use should be permitted for during classes.
- **TU4**=I am uncertain about the extent to which students rely on GenAI when completing independent tasks.
- **TU5**=I am not sure how to respond to the intensive use of GenAI.

Questions 10-13 were related to the intensity of the teachers' willingness to experiment, i.e., they examined their openness to pedagogical innovation. The following had to be evaluated based on the aforementioned 6-point Likert scale.

- **PI1**=Gen AI has enabled new types of learning experiences in my courses.
- **PI2**=If I had more opportunities, I would experiment even more with GenAI-based methods.
- **PI3**=The future of lessons will be shaped by the "teacher + GenAI" collaboration.
- **PI4**=I consider GenAI a natural part of modern learning design.

Questions 15-19 aimed to assess the perceived and experienced risks of using GenAI in education, the statements were as follows:

- **R2=**I often encounter GenAI-generated content in submitted assignments.
- **R3=**I have observed that, thanks to the use of GenAI, students invest less effort in deeply understanding or learning the material
- **R4=**I see that the spread of GenAI use reduces students' independence in completing tasks.
- **R5=**Due to the use of GenAI, evaluating certain student performances has become more difficult
- **R6=**Due to the spread of GenAI, students' motivation to learn shows a declining trend.

Please note that we initially included question 14 (R1) in the above group of questions, but ultimately decided to treat it separately.

In questions 20-24, we are interested in how the instructor feels that his or her institution is handling GenAI consistently and transparently. Examining this is important because we can see the degree of tension that the current regulation regarding AI is causing among the instructors at the institution.

- **IA1=**My institution communicates about GenAI more cautiously than we actually use it.

- **IA2=**Discussions about GenAI mostly take place in informal settings, rather than on open forums.
- **IA3=**The university's regulations are not keeping pace with actual practices.
- **IA4=**The current regulations limit the innovative use of GenAI
- **IA5=**The institution's leadership encourages the deliberate experimentation with GenAI.

Questions 25-27 can inform us how optimistic educators are about the future educational role of GenAI.

- **BP1=** GenAI enables new educational models that do not yet exist today.
- **BP2=** I believe that the teacher's role will become more creative with the spread of GenAI.
- **BP3=**Overall, the development of GenAI will improve the quality of education.

Questions 28-30 were open-ended questions:

- Have you ever tried an educational format where GenAI played an active role? What was your experience?
- What purposes do you use GenAI for most often?
- In your opinion, how can GenAI be used to develop creativity and critical thinking?

2 Analysis of the questionnaire

The questionnaire was completed by 38 lecturers employed by the Faculty in January 2026. Most respondents were middle-aged, as 18% of respondents were younger than 36 years old, 69% were older than 36 years old but younger than 56 years old, and only 13% were 56 years old or older.

Table 1. AI tools used by the 38 educator respondents.

AI tools	percentage
ChatGPT	97%
Google Gemini	61%
Microsoft Copilot	24%
DeepSeek	16%
Perplexity AI	18%
Claude	13%
DALL-E	5%
GitHub Copilot	3%
Notebook LM	3%
Scholar Labs	3%
Jasper AI	0%
Midjourney	5%

Of those surveyed, 13 teach basic subjects (mathematics, physics, computer science), 24 teach engineering subjects, and 1 teaches other subjects.

21% of responding educators use GenAI in their work rarely, 16% a few times a month, 16% once a week, 21% several times a week, and 24% daily. The remaining 2% self-reported that they have not yet used GenAI for the aforementioned purpose.

Table 1 shows the percentage of respondents who have used the listed GenAI tools. Of course, ChatGPT leads, as in other countries, and almost everyone has used it.

The first group of questions related to instructor uncertainty about GenAI (TU1–TU5) focused on uncertainty regarding instructors' roles, teaching methods, assessment, and interaction.

Based on the boxplot diagram, assessment appears to pose the greatest difficulty for instructors. For items TU4 and TU5—that is, the extent to which students rely on GenAI when completing independent tasks and teachers' reactions to intensive GenAI use—teacher uncertainty varies considerably, as indicated by the large interquartile range (Figure 1a).

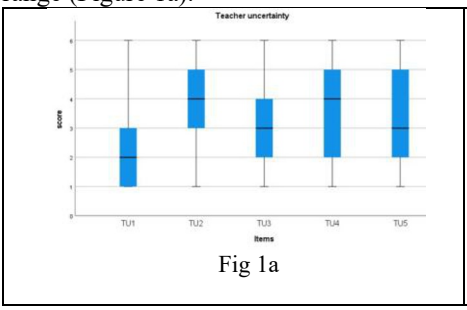


Fig 1a

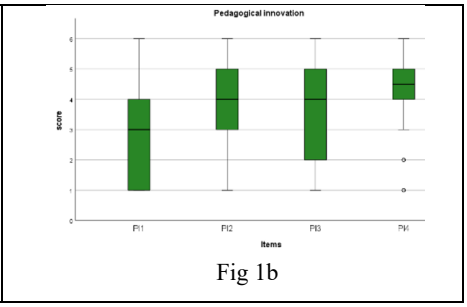


Fig 1b

Fig. 1. Teacher Uncertainty & Pedagogical

Based on responses to item PI1, it appears that most instructors do not yet use GenAI in classroom teaching. In fact, apart from two respondents, all participants believe that GenAI should be part of modern instructional design (Figure 1b).

Among the R2–R6 items examining the risks of GenAI adoption, respondents showed the greatest uncertainty regarding items R4 and R6. In the case of R5, most respondents assessed the risk similarly, although a few outliers are present (Figure 2a).

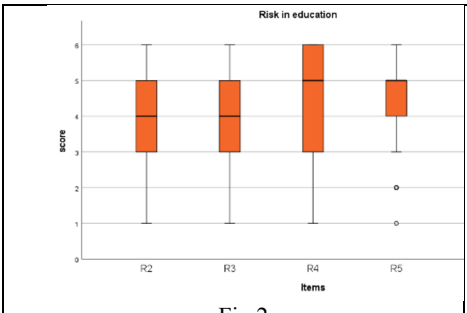


Fig 2a

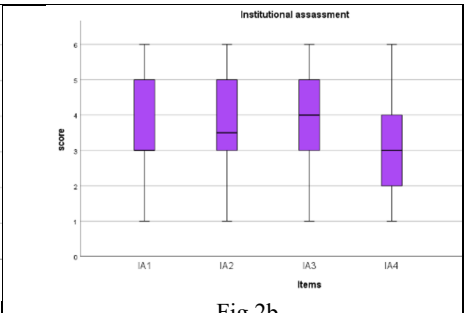


Fig 2b

Fig. 2. Risk in Education & Institutional Assessment

Regarding the institutional evaluation item IA1 (Figure 2b), only a few respondents believe that the phenomenon described in the statement is absent. Based on the responses, a discrepancy between communication and actual practice is observable, although it is not extremely pronounced. In the case of items IA2–IA4, opinions are more divided. For item IA5, respondents are somewhat neutral overall, but they generally tend to believe that institutional leadership does not encourage conscious experimentation with GenAI.

Overall, respondents are optimistic about all three questions concerning the long-term positive impact of GenAI (Figure 3).

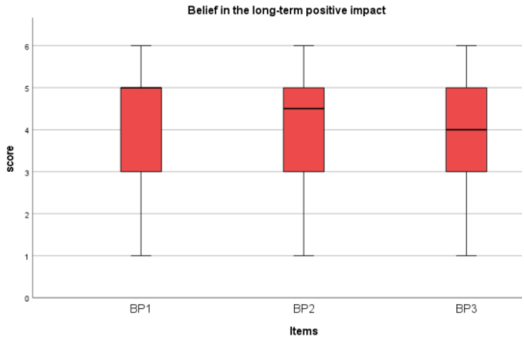


Fig. 3. Belief in the long-term positive impact

For the TU, PI, R, IA, and BP question groups, we calculated the average score given by each respondent and then computed the arithmetic mean of the resulting 38 values. The averages are presented in Table 2.

Table 2. Overview of instructors' attitudes

Group of questions	Average
TU	3.70
PI	3.70
R	4.17
IA	3.48
BP	4.13

The averages indicate that respondents slightly agree that teacher uncertainty is present. Participants tend to perceive the spread of GenAI in education as rather risky. In terms of institutional evaluation, a divided opinion is observed. There is a slightly positive attitude toward pedagogical innovation, but no strong commitment. Relatively strong agreement suggests that respondents tend to believe in the long-term positive impact.

It should be noted that despite the relatively strong belief in the positive impact, most respondents rated the item "I rarely encounter incorrect or misleading GenAI responses in technical topics." as 2 on a 6-point Likert scale.

We quote two of the responses given to the first open-ended question below.

„The students really enjoyed it because, before using the AI, I showed them how to set it up, how to check its reasoning, and how to reference it ethically."

„I used it a few times, but the students said that, according to other instructors, using GenAI should be avoided."

It can be said that, with one or two exceptions, instructors are not yet using AI in the classroom. Here, the explanation is also likely similar to what Alnsour et al. in [6] mentioned in their study, namely that only a smaller proportion of participants were familiar with the current ethical guidelines or policies regarding the use of artificial intelligence in educational institutions.

Among the responses to the second open-ended question, the following were typically mentioned: literature research and review, text generation, data management and analysis, coding, engineering calculations, supporting teaching activities, idea generation, translation, research assistance and information gathering. This is consistent with the finding that deeper pedagogical applications mentioned in [8] have not yet been implemented.

In response to the question of how GenAI can be used to develop creativity and critical thinking, the following themes appeared in the answers:

The user's foundational knowledge (If a student lacks the ability to solve a task without AI, they may accept AI-generated answers uncritically.)

Importance of different prompting strategies (Comparing different responses initiates a thinking process.)

GenAI as a provocative thinking partner (It stimulates thinking through questions, feedback, and encouraging reflection.)

Unfortunately, most of the respondents answered that they do not know how AI could be used to develop creativity and critical thinking, which is a rather significant problem.

3 Concluding remarks

There is a need to develop discipline-specific guidelines for the meaningful integration of generative AI into education, which requires the development of instructors' AI competencies.

Without clear regulations, instructors are likely to be reluctant to use AI in teaching. Open faculty-level professional forums are needed to share experiences and discuss concerns. Assessment methods should shift away from mere memorization toward higher-order thinking skills. Only in this way can AI become a genuine tool for supporting learning rather than a risk.

References

1. Cotton, D. R. E., Cotton, P. A., & Shipway, J. R. (2023). Chatting and cheating: Ensuring academic integrity in the era of ChatGPT. Innovations in Education and Teaching International, 1–12. https://doi.org/10.1080/14703297.2023.2190148

2. Gervacio, A. P. (2024). Exploring how generative AI contributes to the motivated engagement and learning production of science oriented students. Environment and Social Psychology, 9(11), Article 3194. https://doi.org/10.59429/esp.v9i11.3194
3. Mah, D. K., & Groß, N. (2024). Artificial intelligence in higher education: exploring faculty use, self-efficacy, distinct profiles, and professional development needs. International Journal of Educational Technology in Higher Education, 21, 58. https://doi.org/10.1186/s41239-024-00490-1
4. Kim, J., Klopfer, M., Grohs, J. R., et al. (2025). Examining Faculty and Student Perceptions of Generative AI in University Courses. Innovations in Higher Education, 50, 1281–1313. https://doi.org/10.1007/s10755-024-09774-w
5. Dragomir, G.-M., & Todorescu, L.-L. (2025). Students' perceptions of the impact of generative artificial intelligence (GenAI) on learning in the classroom or at home. Revista Românească pentru Educaţie Multidimensională, 17(3), 451–471. https://doi.org/10.18662/rrem/17.3/1030
6. Alnsour, M. M., Qouzah, L., Aljamani, S., et al. (2025). AI in education: enhancing learning potential and addressing ethical considerations among academic staff—a cross-sectional study at the University of Jordan. International Journal of Educational Integrity, 21, 16. https://doi.org/10.1007/s40979-025-00189-4
7. Shi, L. (2025). Assessing teachers' generative artificial intelligence competencies: instrument development and validation. Education and Information Technologies, 30, 23365–23384. https://doi.org/10.1007/s10639-025-13684-5
8. Nagy, T. J., Rajki, Z., & Dringó-Horváth, I. (2025). Mesterséges intelligencia a felsőoktatásban: oktatói hozzáférés, attitűd és felhasználási gyakorlat. Iskolakultúra, 35(7), 3–20. https://doi.org/10.14232/iskkult.2025.7.3
9. Qian, Y. (2025). Pedagogical Applications of Generative AI in Higher Education: A Systematic Review of the Field. TechTrends, 69, 1105–1120. https://doi.org/10.1007/s11528-025-01100-1
10. Krause, S., Panchal, B. H., & Ubhe, N. (2025). Evolution of Learning: Assessing the Transformative Impact of Generative AI on Higher Education. Frontiers in Digital Education, 2, 21. https://doi.org/10.1007/s44366-025-0058-7
11. Rispler, C. H., Mashiach-Eizenberg, M., & Yakov, G. (2025). Understanding academic staff attitudes toward GenAI in teaching. Journal of Ethics in Higher Education, 6(1), 209–235. https://doi.org/10.26034/fr.jehe.2025.8397

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