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HIGHER EDUCATION: DEFINING THE ROLE AND IMPACT OF ARTIFICIAL INTELLIGENCE (INCLUDING DIALOGUES WITH CHATGPT, GEMINI & BING)

Abstract. The article is devoted to considering the basics of artificial intelligence (AI) and its impact on other areas, in particular higher education. Various examples were given of how AI is directly or indirectly impacting the field of higher education, as well as how it can be implemented in the educational process. Results of an empirical study aimed at determining what different chatbots “think” about the impact of artificial intelligence on the educational process were presented. Based on their responses, the advantages and disadvantages of AI for each of the key stakeholders (students, teachers, researchers, administrators), strategies for overcoming these disadvantages, as well as ways for educators to adapt to the new educational environment, the ethical aspects of the implementation and use of artificial intelligence, etc. were identified. Conclusions about the need to pay close attention to the field of higher education as one that can influence the adequate perception and use of AI were made.

Keywords: artificial intelligence (AI), higher education, digitalization, technologies, professional development, challenging issues, innovative pedagogy.

Introduction

Modern society is characterized by the widespread introduction of digital technologies, which have a transformative effect on all spheres of human activity. This process also implies and includes the development and implementation of artificial intelligence (AI) technologies.

In recent decades, AI has become an integral part of education and has brought many innovations to this field, in particular, the widespread use of neural networks has made a real revolution. Therefore, speaking today about the advent of the era of big data management based on artificial intelligence technologies in various professional fields, it is necessary to note that even in such a fundamental area as education, the situation is changing.

Problem statement

The modern higher education system is currently undergoing significant changes dictated by new realities. The possibilities of using artificial intelligence are one of the most significant factors in teaching today, and a number of new questions connected with it arise. For example, what is a university and how are its functions defined? After all, if we assume that it is a social device for the transfer

of knowledge, then with the advent of AI it will come to an end, because, perhaps for the first time in history, it is not technical but cognitive skills of a person that are being challenged. This may create a paradoxical situation, because despite the fact that artificial intelligence replaces cognitive functions, they do not disappear and need to be used in some way.

Unlike online courses, which became especially widespread in 2020 due to restrictions related to the coronavirus, AI has already had a critical impact on universities, since the learning process on the part of students has been largely automated. For example, at the Faculty of Business Administration at the University of Economics in Prague (VŠE), after extensive discussions, it was decided to replace the bachelor's thesis with a bachelor's project, within which students will have the opportunity to demonstrate their skills and knowledge in various ways: by completing a professional internship (with a subsequent report on the international study trip), by participating in a faculty research project, or by implementing a business project. Students who choose an internship will have to complete it in one of the university's partner companies, and those who

implement a business project will have to create and launch their own business.

The dean of the faculty, Jiří Hnilica, explains that this change in strategy is due to the need to combat plagiarism and to make the bachelor's degree more practical. The use of artificial intelligence within the project is allowed, but it must be ethical and transparent [1].

Another similar example is the Faculty of Economics and Management at Masaryk University in Brno where traditional bachelor's theses will be replaced with a final project that includes an analysis of the situation, a proposal for solutions, and a justification for the conclusions and recommendations.

Thus, we see that artificial intelligence technologies are **already** making changes to the educational process, changing the system of higher education. And if decision makers do not develop the necessary solutions, we may face a situation where a technologically literate teacher will use AI to check students' work written using AI - and this will be called the "educational process".

Analysis of recent research and publications

The development of artificial intelligence, as well as its impact on higher education, is the subject of research by such domestic and foreign scientists as Russel S., Norvig P., Turing A., Charniak E., McDermott D., Haugeland J., Bellman R., Kurzweil R., Aman F, Ali R., Rauf A., Iqbal F., Hutson J., Jeevanjee T., Graaf V., Lively J., Weber J., Weir G., Arnone K., Carnes G., Vosevich K.,

Plate D., Leary M., Edele S., Tapalova O., Zhiyenbayeva N., Yukhymets S., Koliassa O., Beglova N, Beglov K, Surniak R., Melnik Y., Todorova S., Shevchenko H. et cetera.

The purpose of this article

This paper aims trying to identify how the higher education system will change influenced by AI. However, since many researchers today believe that artificial intelligence can replace many professions in different areas, including education, it seems necessary not only to study this issue, but also to find out what AI itself “thinks” about it. If we consider the possibility that instead of an educator in the usual sense of the word, an AI will “teach” in the classroom, then in some sense it is smarter than those it will replace. Therefore, it makes sense to find out what it thinks about this situation: what prospects seem most realistic, what steps can be taken, and so on.

Results

Today, the term "artificial intelligence" combines several narrower concepts, such as neural network, computer vision, machine learning, etc. This is the so-called "AI in a narrow sense", the meaning of which can be presented through a description of the methods of its operation. In general, the scientific community identifies four approaches to defining what is considered artificial intelligence, based on criteria thoughtful process/behavior and human/ideal performance (Table 1).

Table 1. Classification of AI definitions

<p align="center">Thinking Humanly</p> <p>“The exciting new effort to make computers think ... machines with minds, in the full and literal sense.” (Haugeland, 1985)</p> <p>“[The automation of] activities that we associate with human thinking, activities such as decision-making, problem solving, learning ...” (Bellman, 1978)</p>	<p align="center">Thinking Rationally</p> <p>“The study of mental faculties through the use of computational models.” (Charniak and McDermott, 1985)</p> <p>“The study of the computations that make it possible to perceive, reason, and act.” (Winston, 1992)</p>
<p align="center">Acting Humanly</p> <p>“The art of creating machines that perform functions that require intelligence when performed by people.” (Kurzweil, 1990)</p> <p>“The study of how to make computers do things at which, at the moment, people are better.” (Rich and Knight, 1991)</p>	<p align="center">Acting Rationally</p> <p>“Computational Intelligence is the study of the design of intelligent agents.” (Poole et al., 1998)</p> <p>“AI ... is concerned with intelligent behavior in artifacts.” (Nilsson, 1998)</p>

Source: [2].

As it could be seen, there's no one "standard" definition of AI. However, despite the fact that in this research artificial intelligence will be understood as the broadest possible range of technologies, it's necessary to separate some closely related concepts [3]:

– **Artificial Intelligence (AI)** is the umbrella term for machines designed to mimic human brainpower — learning, reasoning, and correcting themselves along the way. Imagine having a super-smart assistant who gets better at their job the more they work. AI encompasses a broad range of technologies and applications, from chatbots to self-driving cars.

– **Machine Learning (ML)** is all about algorithms learning from data to make predictions. If AI is the assistant, ML is the diligent intern who learns and adapts to improve performance. ML is used in various applications, from recommendation systems like Netflix® and Amazon® to fraud detection in banking.

– **Robotic Process Automation (RPA)** is the taskmaster of the tech world, automating the mundane tasks we all dread. Imagine having a robotic helper for those repetitive, soul-crushing tasks, freeing you up to focus on more strategic work. RPA is widely used in industries like finance, healthcare, and customer service to automate routine processes.

– **Generative AI** is the creative genius of the AI family, generative AI creates new content from existing data. Tools like ChatGPT and DALL-E are prime examples, producing everything from poetry to realistic images. This technology is revolutionizing content creation, from automated news articles to creating new art forms.

Speaking about the impact of AI on higher education, it is worth noting that high-quality educational programs that focus on independent student work (essays, projects, etc.) are now at risk. In this case, it is likely that we will have to abandon the entire variety of educational approaches and methods that exist today and return to traditional learning, when a student memorized material in order to retell it during an oral exam [4], which will undoubtedly set the higher education sector

back a decade. Here, however, another paradox arises: the better educational tools used, the more people who use them (or to whom they are applied) degrade. If we look at the situation from this point of view, direct instruction may not seem so ineffective, and AI, on the contrary, will pose the greatest threat to the very essence of the education system today.

In this regard, the question of how exactly to implement artificial intelligence in the educational process comes to the fore. Several experiments conducted at the School of Advanced Studies (SAS) may help to better understand the processes taking place today and give at least a general understanding of what can be done and where to move in the current circumstances.

In the first experiment, students chose one of the questions covered in the course, answered it, and after that Google Bard offered a counterargument (very detailed, thorough), which the student had to answer, and so on several times. At the end, it was required to write a reflection on this "dialogue" with the AI.

In another experiment, students first wrote a draft, after that first showed it to professor and then to AI, and wrote an essay taking into account their comments and suggestions. Here, the following conclusions were noted:

– The teacher is dissatisfied when his assignment is carried out in strict accordance with the specified parameters.

– The tutor expects a good student to go beyond the specified parameters, and the chatbot completes the assignment literally.

– The AI will not get 10/10 points, only somewhere around 6-7/10 - the same as students who approach this assignment formally.

– The AI is apparently designed to reduce the complexity of texts by ignoring nuances.

One more experiment. Students were divided into four groups: one group knew that feedback on the task would come from a tutor, the second group was informed that feedback would be given to them by AI; the third and fourth groups also received feedback from a tutor and artificial intelligence, respectively, but they were not told who exactly was giving it. Having compared the average rating of

student reviews in each group (Table 2), the experimenters came to the conclusion that it is not so important for students who gives feedback (and even whether they know it or not), what matters is how detailed it is and how consistent it is with the grades received.

Table 2. Feedback Experiment Results

	Students know	Students don't know
AI feedback	6,2/10	7/10
Tutor feedback	7/10	8/10

Source: compiled by the author.

The next experiment seems to be especially interesting. After educator explained the principles, stages, and tools of design thinking in the first lesson of the Design Thinking course, all the students were divided into two groups. The control group (19 people) studied with the professor as usual, and the experimental group (17 people) worked with a mediator (an experienced teacher, but not familiar with the course) and a specially created AI agent as a learning resource. The tasks for both groups were the same (1. user experience research; 2. ideas and solutions for changing the experience; 3. creating prototypes, testing them, assembling a presentation), and each of them had a “digital footprint”, that is, it was possible to see how they were completed. The average score of the experimental group was 7.19, 7, and 6.58 points for each of the tasks, respectively, while the control group received an average of 7.76, 7.87, and 7.97 points. Almost everywhere the gap was less than one point, which seemed acceptable to the university management, so next year this course is planned to be conducted without a teacher, but with a mediator and AI.

The conclusions drawn from this experiment also seem very important:

- Transition from teacher-focused to student-focused. Usually, the teacher with all his expertise “fills” the audience. When he was removed, the student became in the center, since AI is not a subject by definition. This process turned out to be difficult and painful - for both teachers and students.

- Low tolerance for errors and inaccuracies that AI makes. Students are ready to forgive the teacher for mistakes, but not artificial intelligence.

Not only new, but also classical disciplines can be taught using artificial intelligence. For now, we will talk about the history course. The course lasts the entire semester, so it was divided into two blocks of 8 weeks. The first part was led by a teacher, as usual, with a large number of lectures, and its goal was to overview a large layer of history (from the Big Bang to the end of the 19th century). The second part of the course is the history of the 20th century "from a bird's eye view", a view from the perspective of an outside observer. The goals of this block were to learn about the main political, economic and cultural transformations that humanity experienced in the 20th century, as well as to get acquainted with the historical roots of modern political, economic and cultural problems.

How to get a student interested in history as a discipline, what to focus on when studying? When there was a teacher, everything was clear: he gave the material, the students learned it, and then passed the tests - and that's it. In this case, the teacher acted as a "translator of knowledge", and the student was a tabula rasa, a "blank slate". But is the goal to systematically examine history through different narratives achieved? After all, the teacher has only one, his own narrative. Nevertheless, it is not easier without a teacher, because it is not clear what narrative to lead, how to convey it to students, and who is the main “knowledge unit” within the course?

Trying to answer all these questions, a new approach was developed, namely, the so-called AI persons were designed - digital “clones” of important historical figures in the form of bots. This made it possible, on the one hand, to get many perspectives since students could work with historical information received as if from the historical figures themselves, and on the other, to move from the translational model of learning to the process of analyzing and synthesizing historical information.

In the second part of the course, a mediator appears who guides students in their

interaction with artificial intelligence, while maintaining the interaction of students in a group. His task in this process is to comprehend what students think about the subject, to help them build a narrative on their own, going through the knowledge that they receive, interacting with AI persons.

In this format, training can take various forms, for example, the mediator asks the AI a question, its answer is passed on to the students, and then the emphasis is on the student's critical response. Or the student can create an AI "persona" themselves, choosing a specific personality depending on the class topic, selecting materials (articles, books, speeches, etc.) and certain characteristics, skills of the "persona". As a result, in the second part of the course there was more group work, interaction between students - and this became an additional source of motivation, including studying the subject independently.

Motivation, in particular, in the educational environment, can be justified by the mimic desire: a person wants what another wants. Usually this is a teacher, but in his absence, this place was taken by other students who know and understand the subject better than others. And here an interesting question arises: **can the AI "persona" one day become an object of mimic desire?**

With the help of AI, it is possible not only to improve existing courses, but even to create new ones, especially if the relevant specialists simply do not exist in the world. This opportunity is perfectly illustrated by another SAS experiment, in which they decided to make a course on sound as an elective subject, but there was a problem: there was no specialist in this field. To do this, they created an AI assistant as an expert in the field of sound, after which the course design was changed: on odd weeks, classes were conducted by educators from the university, who could somehow tell something about the phenomenon of sound, and on even weeks there were topics for which there was no teacher, so AI and a mediator were introduced. The advantage of this approach is that the teacher can convey his own experience, which AI does not have, but AI gives a broader understanding of how knowledge can be used,

while the teacher often sees only his narrow direction.

As in previous cases, it is important to pay attention to the figure of the mediator. In fact, within this course, he plays three roles: the holder of meanings and connections (understands the connections between thematic blocks of the course), the holder of context (understands students' difficulties, adapts the course to a specific audience) and the facilitator (organizes different formats of work, group and individual). The mediator may not be the course coordinator, but he needs to understand what follows what, the scenarios of what is happening in the course, how to interact with students and what to do so that they can process the information until they fully understand it.

An interesting conclusion was made during this experiment: mediators/teachers said that they do everything differently, while students said that nothing has changed. Thus, it can be assumed that students resist the introduction of AI even more than teachers. However, students continue to lead instructors and administrators in their use of generative AI tools: 59% are regular (monthly or more) users compared to ~ 40% of instructors and administrators. However, both students (45%) and instructors (28%) report increased academic workloads as a result [5].

Although up until now the discussion has mainly been about the implementation of artificial intelligence to change the design of an educational course and the learning process, there are other areas of its use in higher education: proctoring, automatic assessment, smart campus design, learning analytics, personalization and adaptation of learning, and so on. This is an important point, since it is logical to assume that first of all, teaching staff, researchers, methodologists, IT specialists, managers/administrators need to be taught how to interact with AI – and only then students, since it is pointless to develop pedagogy in isolation from decision-makers and management. Nevertheless, among student affairs professionals, EAB found 64 percent of institutions rarely or never encourage their teams to use AI in their roles, 60 percent never collect information on how student success teams are using AI and 49 percent never

encourage staff to share what they're learning about AI with their peers. At the same time, 40 percent of university administrators indicating that they are currently or are planning to offer faculty and staff training on the use of generative AI tools [6].

Perhaps, we are really moving toward a society with rapidly diminished hiring of humans to perform many common white-collar tasks [7]. The cost savings to corporations (and universities) in eliminating high-paying jobs alone will lead to less expensive products, courses, certificates and degrees. This is also due to the fact that the economics of many universities are increasingly under pressure. ROI means different things to different people, but here we'll focus on the rising cost of university education relative to many future job and income opportunities. Clayton Christensen's prediction in 2011 that some universities could close in the coming years as the economics ceased to make sense was wrong on timing and scale, but AI may well prove the inflection point that makes his conclusions directionally on the mark. With costs to run universities already rising at a rapid pace, closings are already happening among the long tail of universities. Thirty American colleges folded in the first 10 months of 2023, 48 closed in 2022, per State Higher Education Executive Officers Association, and ~10% of universities are at risk financially per E&Y Research [8].

These data correlate with the statement made by the International Monetary Fund in early 2024 that almost 40 percent of global employment is exposed to AI. Historically, automation and information technology have tended to affect routine tasks, but one of the things that sets AI apart is its ability to impact high-skilled jobs. As a result, advanced economies face greater risks from AI — but also more opportunities to leverage its benefits — compared with emerging market and developing economies [9].

Moreover, the fact that AI can improve the productivity of individual companies and even entire economies does not mean that it will actually happen. The same situation was with the Internet, for example, when productivity growth (that is, the ratio of benefits received to the existing number of

people, factories, and land), despite all predictions, was observed for most of the 20th century, and then followed stagnating incomes, sluggish economies and a political culture that's more about fighting over what we have than distributing the riches and wonders we've gained [10]. Most likely, this is due to the fact that an extensive path of development was chosen (to do what has already been done more easily and quickly) instead of an intensive one (to make humans smarter and more capable as a collective).

At the same time, university costs are rising while the number of potential students declines, for example, the average cost of four years of American university is \$109000 (public) / \$223000 (private). Comparing it with an average annual salary of \$60K for students recently post-graduation, it seems that the average borrower takes twenty years to repay student loan debt. What's more, the US addressable market for universities actually declined in the last census: children under 18 fell 1.4% to 73MM in 2020, compared with 74MM in the 2010 census. In the latter part of the century, the US population may decline outright. It's hard to fight basic demographic math [8].

However, the consideration of the role and impact of AI in higher education seems incomplete without the participation of artificial intelligence itself. Therefore, in the context of studying the current situation, as well as the development prospects in this area, the author decided to ask several questions to various chatbots, namely ChatGPT [11], Gemini /Google Bard [12] & Microsoft Bing [13], since, according to research, these three are the most popular, including among the faculty [14]. Since the answers to the same question from different chatbots were be very similar and often contained a lot of indirect information, some of them were presented in abbreviated form. For the same reason, questions such as the advantages and disadvantages of using AI in higher education or suggestions for overcoming the weaknesses of this process were not previously discussed in detail in this study. To facilitate navigation, each of the chatbots - ChatGPT, Gemini & Microsoft Bing - will be highlighted in a specific color when answering.

Question #1: How do you think could AI replace teachers in universities?

Gemini answered that "the short answer is not entirely, at least not in the foreseeable future". Along with this, it mentioned potential roles of AI in higher education: personalized learning, administrative tasks, content delivering and tutoring [12].

ChatGPT also thinks that "fully replacing teachers involves significant challenges" and identifies next areas where AI could replace or complement teachers: automated grading and assessment, tutoring and support, course content delivery, personalized learning paths, administrative tasks. Moreover, challenges and considerations were mentioned, too [11].

In turn, Microsoft Bing agrees with its "colleagues": "While AI has the potential to transform education, it's unlikely to completely replace human teachers. The most likely scenario is a collaborative approach where AI assists teachers rather than replaces them". What about exact actions that AI could cope with, there are administrative tasks, providing supplementary tutoring and offering personalized learning experiences [13].

To summarize, none of chatbots see the possibility of total replacement teacher's role by AI. Nevertheless, it doesn't mean that managers in higher education won't try to do it.

Question #2: If AI replaces professors in universities, will it improve the quality of education? Answer in details, please.

All chatbot's answers were unambiguous and included lists of benefits and challenges. Thus, the same benefits were as follows [11-13]:

- personalized learning (creating customized learning experiences tailored to each student's strengths, weaknesses, and learning pace based on the individual performance's analysis; Microsoft Bing wrote here additional point about providing real-time feedback and assessments, while ChatGPT – about adjusting the difficulty of content in real-time);

- 24/7 availability (instant support and resources including outside regular class hours, offering immediate assistance with

questions and problems; ChatGPT also mentioned scalability – reaching a large number of students simultaneously, and Microsoft Bing – the ability to make education more accessible to students with disabilities);

- increased efficiency (automating administrative tasks and even grading that will allow professors to focus more on teaching and research; Gemini added that "this could lead to increased productivity and potentially lower costs for institutions"; very similar idea had ChatGPT – "allow educational institutions to operate more efficiently", and besides this it wrote about data-driven insights when depending on educational data AI can provide actionable insights for improving educational practices and curricula).

What about other suggestions, Gemini supposed that it could be "Access to expertise" (allowing students to learn from experts in various fields). ChatGPT wrote about "Innovative Learning Tools" – virtual reality (VR) and augmented reality (AR), and "Consistency and objectivity" that included uniform standards in grading and feedback and objective assessments based on predefined criteria.

In case of challenges, the same ones were [11-13]:

- lack of human interaction (human professors can not only provide emotional support, but also mentorship and motivation, which are crucial for student development; ChatGPT also mentioned that learning environment often requires teamwork and interpersonal skills which AI doesn't fully master, and Microsoft Bing wrote about critical thinking and creativity which professors can encourage – the same independent point was in Gemini's answer);

- ethical concerns (as AI systems are developed by humans, they can inadvertently perpetuate biases present in their training data that will to lead to unfair treatment of students in grading, feedback, and support; both Microsoft Bing & ChatGPT added here "Data privacy point");

- technical issues (risks to disrupt learning process if there are technical failures or limitations in the technology; moreover, ChatGPT & Microsoft Bing wrote about access inequality when lack of access to advanced

technology or reliable internet can exacerbate existing inequalities in education).

Besides these, ChatGPT’s answer included “Complexity of subject matter” (meaning that sometimes nuanced understanding and contextual adaptation are necessary) and “Adaptability and flexibility” (in case of rapid changes in academic fields or emerging trends).

Question #3: Okay, but what are pros & cons, advantages and disadvantages for each university group (students, teachers, researches and administrators)?

To make it easier to understand, the same advantages and disadvantages in chatbots’ responses are presented in Table 4.

Table 4. Advantages and disadvantages of using AI (similar answers)

	Pros	Cons	
Students	<ul style="list-style-type: none"> Personalized learning 24/7 access 	Over-reliance on technology	Students
Teachers	<ul style="list-style-type: none"> Data-driven insights Enhanced teaching tools Increased efficiency by reducing administrative burden 	Training requirements	Teachers
Researchers	<ul style="list-style-type: none"> Improved collaboration Accelerated research 	<ul style="list-style-type: none"> Ethical concerns Overreliance 	Researchers
Administrators	<ul style="list-style-type: none"> Increased efficiency Improved data-driven decision making 	<ul style="list-style-type: none"> Implementation costs Data security 	Administrators

Source: based on [11-13].

Some answers are equal to the previous ones, however, here they are more complete: each chatbot wrote three points per group (3 advantages for students, 3 disadvantages for students, 3 advantages for teachers et cetera). This question (and responses to it) seems to be very significant for understanding AI. Each tool, as they were trained on different databases, has its “opinion” that differs from the other. And even same, at first glance, answers can have different nuances: for example, overreliance for researchers means “dependence on the quality of the data used” for Gemini, “challenges if technical issues arise or if researchers lack access to necessary technology” for Microsoft Bing, and “dependence on AI for data analysis might overshadow human intuition and creativity” for ChatGPT.

In this case, “a dialogue” with chatbot seems like a discussion with a human being: the more thoughts we find out, the more complex and complete picture we’ll have. That’s why it’s important to know not only similar answers but different ones as well (table 5).

Source: based on [11-13].

It’s notable that advantages are all different (except teacher’s ones), even “efficiency” means “handling administrative burdens” for Gemini, and “helping with managing coursework, scheduling, and providing quick answers to academic questions” for ChatGPT. Talking about disadvantages, Microsoft Bing has more common points with Gemini (four) rather than with ChatGPT (two), while ChatGPT and Gemini have none. Thus, Microsoft Bing appears as a “mediator” between two other chatbots whose points of views are rather different.

Question #4: How to overcome weak places that you mentioned in previous answers?

All chatbots gave rather detailed answers – one strategy per one challenge as minimum. To make it easier to understand their interconnection, all of them are given in Table 6.

Table 5. Advantages and disadvantages of using AI (different answers)

	Pros	Cons	
Students	<ul style="list-style-type: none"> • Efficiency (ChatGPT & Gemini) • Accessibility for students with disabilities (Microsoft Bing) 	<ul style="list-style-type: none"> • Lack of human interaction (Microsoft Bing & Gemini) • Potential for job displacement (Gemini) • Privacy concerns (Microsoft Bing & ChatGPT) • Accessibility issues (ChatGPT) 	Students
Teachers	—	<ul style="list-style-type: none"> • Job security (Microsoft Bing & Gemini) • Loss of personal touch (Microsoft Bing & ChatGPT) • Dependency on technology (Gemini) • Bias and fairness (ChatGPT) 	Teachers
Researchers	<ul style="list-style-type: none"> • New research avenues (Gemini) • Advanced analytics (ChatGPT) • Automation of routine tasks (Microsoft Bing) 	<ul style="list-style-type: none"> • Job role & skill changes (Microsoft Bing & Gemini) • Data privacy (ChatGPT) 	Researchers
Administrators	<ul style="list-style-type: none"> • Improved student support (Gemini) • Cost savings (Microsoft Bing) • Enhanced communication (ChatGPT) 	<ul style="list-style-type: none"> • Resistance to change (Microsoft Bing & Gemini) • Complexity (ChatGPT) 	Administrators

Table 6. Strategies to overcome weaknesses in higher education’s AI integration

	Issues	Strategies
Students	<ol style="list-style-type: none"> 1. Over-reliance on technology. 2. Lack of human interaction. 3. Potential for job displacement. 4. Privacy concerns. 5. Accessibility issues. 	<ol style="list-style-type: none"> 1. Critical Thinking Development using AI tools as supplements rather than replacements (Gemini & ChatGPT); Digital Literacy Programs, Backup Plans (Microsoft Bing); Create new tasks (ChatGPT). 2. Opportunities for students to interact with human instructors (Gemini); Hybrid Learning Models Combining AI tools with human instruction (Microsoft Bing). 3. Digital Literacy (Gemini). 4. Data Protection Policies, Transparency – clearly explain how student data will be used and obtain consent before collecting data (Microsoft Bing & ChatGPT); Use AI tools that comply with regulations like GDPR or FERPA (ChatGPT). 5. Offer training and support to help students who may have limited experience with AI technologies, Ensure that all students have the necessary resources (ChatGPT).
Teachers	<ol style="list-style-type: none"> 1. Training requirements. 2. Job security. 3. Loss of personal touch. 4. Dependency on technology. 5. Bias and fairness. 	<ol style="list-style-type: none"> 1. Develop user-friendly AI tools and platforms to support teachers in their roles (Gemini); Provide continuous professional development and technical support, and foster a culture of collaboration where teachers can share best practices and learn from each other (Microsoft Bing & ChatGPT). 2. Provide comprehensive training programs to help teachers effectively integrate AI into their teaching (Microsoft Bing & Gemini); Emphasize the unique value that human teachers bring, such as emotional support and mentorship, which AI cannot replicate (Microsoft Bing). 3. Maintain human interaction using AI to complement, not replace professors, and creating a supportive classroom environment (ChatGPT); Use AI to handle administrative tasks while teachers focus on personal connection, and incorporate tools that facilitate interactive and engaging learning experiences (Microsoft Bing). 4. Clear explanation how AI will be used and how it will impact faculty roles and responsibilities (Gemini). 5. Regularly review and test AI systems for biases, and combine AI evaluations with human ones (ChatGPT).

Researchers	<ol style="list-style-type: none"> 1. Ethical concerns. 2. Overreliance. 3. Job role & skill changes. 4. Data privacy. 	<ol style="list-style-type: none"> 1. Develop and adhere to ethical guidelines (Microsoft Bing, ChatGPT & Gemini); Regular audit using diverse datasets (Microsoft Bing) and establishing review boards (ChatGPT). 2. Establish rigorous standards for data collection, curation, and use (Gemini); Skill development and redundancy plans – backup systems and manual processes to ensure research continuity (Microsoft Bing); Combine AI-driven analysis with human expertise and intuition, and encourage interdisciplinary collaboration (ChatGPT). 3. Human-AI Collaboration (Gemini); Collaboration between AI experts and researchers from other fields and training programs (Microsoft Bing). 4. Enhance data security, for example, using encryption and access controls (ChatGPT).
Administrators	<ol style="list-style-type: none"> 1. Implementation costs. 2. Data security. 3. Resistance to change. 4. Complexity. 	<ol style="list-style-type: none"> 1. Allocate sufficient resources (Gemini); Phased implementation and search grants and funding opportunities (Microsoft Bing & ChatGPT). 2. Implement strong cybersecurity measures (Microsoft Bing & Gemini); Regular audits (Microsoft Bing & ChatGPT); Train staff on data protection best practices and ensure compliance with relevant data protection laws (ChatGPT). 3. Change management (Microsoft Bing & Gemini); Engage faculty and staff in the decision-making process (Microsoft Bing). 4. Choose user-friendly interfaces and tools and offer strong support and training resources (ChatGPT).

Source: based on [11-13].

Overall, many AI’s answers on this question are rather general or look like “do right, don't do wrong”, as Gemini’s suggestion just to “allocate sufficient resources”. In this case, Microsoft Bing & ChatGPT gave more specific advice to find out some funds or grants. But, in my opinion, the problem wasn’t solved enough, that’s why the next question appeared.

Question #5: And how could you exactly help to realize strategies to overcome challenges connected with the AI implementation in universities?

Microsoft Bing paraphrased its previous answers, sometimes making them more (or even less) detailed, but didn’t show how exactly it can help in realizing this or that steps. Here are several points:

- Invest in modern infrastructure, including high-performance computing resources and cloud-based solutions (but where will we get money from?).
- Establish clear metrics for success and regularly evaluate the impact of AI on educational outcomes (good idea, however, what exactly should these indicators be?).
- Explain the benefits of AI clearly and involve all stakeholders in the implementation process (what’s the role of chatbot itself here is not clear, as well as in other cases).

This time Gemini gave rather good advices. Unlike previous one, this chatbot focused on its possibilities and made suggestions like:

- “Best practice identification: by accessing a vast amount of information, I can identify successful AI implementation strategies in other institutions” (compare it with the Microsoft Bing’s “Collaborate with experienced AI providers to ensure smooth integration”).
 - “Knowledge Sharing: I can disseminate information about AI technologies, tools, and research findings to the university community” (this is besides several points about creating educational materials and curriculum development).
 - “Data Analysis and Interpretation: I can process and analyze large datasets related to education, student performance, and AI trends to identify potential challenges and opportunities.”
- In addition, at the end of the answer Gemini asked if I want to focus on some specific point and even gave a few more additional ones (in general, this option was included in all its answers):
- developing a robust AI ethics framework for your university;
 - creating a personalized learning platform using AI;
 - assessing the potential impact of AI on faculty roles and responsibilities.

Finally, ChatGPT gave the most extended answer (its answers are the biggest among these chatbots, however, sometimes it resembles a student who doesn't know the exact answer to a question, and therefore tries to tell everything he knows). Coming back to the fourth question, all proposals corresponded to the previously identified problems. Of course, AI can't solve the problem of financing itself, so the suggestions were within its capabilities:

- assist in conducting a cost-benefit analysis for different AI tools;
- share information about grants, funding opportunities, and partnerships that can help offset the costs of AI implementation.

Of course, the skill of communicating with AI is not as easy as it seems since for different chatbots different questions are required, because, for example, the request that is formulated for Microsoft Bing may not ((and most likely will not) be understood by ChatGPT. And this research didn't aim to get answers meeting all requirements but just to understand if it is possible at all.

Question #6: In some spheres MOOCs have already substituted traditional university learning. AI is much more powerful tool, won't it destroy the higher system education at all?

This question turned out to be quite difficult for AI (perhaps also due to its wording). Microsoft Bing listed ways how artificial intelligence can transform and enhance the higher education system, in fact repeating advantages from the previous answers: personalized learning, accelerated research, enhanced teaching tools et cetera.

ChatGPT this time also failed suggesting that we are talking about the implementation of MOOC & AI into higher education. That's why its "detailed look" focused on advantages, very similar to those we've mentioned above. It proposed "augmentation rather than replacement", at the same time saving core university values and functions: mentorship, networking, and collaboration with other students and/or professors; campus experience, including extracurricular activities, social interactions; credentialing and curriculum design that ensure credibility of

programs aligning with academic and industry standards. Universities, in this case, should focus on soft skills development and continue to address ethical, social, and cultural dimensions of knowledge, fostering critical thinking and responsible citizenship. In addition, universities will continue to play a critical role in research and innovation, as well as in lifelong learning – and, of course, providing equitable access, inclusive design (of AI tools), quality control, integration of AI for improvement of learning, teaching and administrative processes.

The best work made Gemini. Firstly, it compared MOOC & AI's influence (emphasizing that artificial intelligence can potentially address some of MOOCs' shortcomings, but also raise concerns about job displacement for educators and the quality of education). Second step was to highlight advantages of traditional universities which they still have:

1. Community and networking.
2. Hands-on learning.
3. Research and innovation.

And thirdly, Gemini suggested a hybrid educational model that will include best practices of all groups, that will lead to shorter, more focused programs' appearance (as MOOC); using AI to tailor education to individual student needs; combining online and in-person learning; and providing continuous education and upskilling opportunities.

Question #7: Your points are good, however, many of them are rather expensive, and universities want to decrease their costs, not to increase them. Moreover, small regional universities don't have enough financing at all.

Last sentence of this question led to misinterpretation, and all chatbots have concentrated on the small regional universities. Still, this probably didn't have much of an impact on their answers which were very close to each other: leverage free and open-source tools, community support (both external, such as cooperation with other institutions for common using AI tools or consortia memberships, and internal, that includes engaging tech-savvy students, mentoring

programs (ChatGPT), alumni support (Microsoft Bing) et cetera), low-cost professional development (using “competitive” MOOCs we’ve just mentioned, organizing internal workshops or participate in free webinars and workshops) and so on.

It seems to be important to dwell separately on the ChatGPT’s proposal to increase university’s efficiency through automating administrative processes that can “reduce workload and operational costs”. On the one hand, this naturally implies the dismissal of a certain number of people performing administrative functions. And here it is important to understand that such situations, when someone, be it an educator or another university employee, has to be fired and his functions will be transferred to AI, will inevitably arise. However, despite the well-founded fears that AI will replace human employees, the disappearance of universities with all their faculty and administrative staff seems unlikely. Rather, we are talking about a change in the organizational and economic model, the implementation of which, at least at the first stage, should probably be carried out not by one university, but by a group, a consortium.

But, on the other hand, another problem that is little paid attention to, and sometimes simply not noticed, is the excessive number of administrative staff at universities. For example, at Stanford, at the end of 2022, there were 16,937 students - and 15,750 administrators. And if you also take into account the 2,288 faculty members, it turns out that the number of university employees exceeded the number of students [15]. Considering 24/7 availability of AI assistants and their ability to deal with tasks like scheduling, student questions & queries, grading et cetera, this scenario seems to be an opportunity to simplify the overly bloated university organizational structure.

This brings us to the next important question.

Question #8: Managers in different spheres, including higher education, will be happy to use AI instead of people. How could we save and protect the "teacher" profession?

Answering this question, AI didn’t take into account features of human psychology and behavior. All their proposals were based on rational decision making and desire to save human workers. However, today’s situation is characterized by the opposite trend: if earlier business owners wanted to automate their enterprises gradually, leaving about 95% of employees, then starting from the beginning of the 2020s the question has started to pose differently: how to get by with one percent of the people we have? [16] Having emerged in the commercial sector, sooner or later this trend will reach higher education (after all, universities today, despite the fact that they perform socially significant functions, are often business entities and operate within the framework of a market economy), which is for the most part a less profitable business, often requiring financial support from outside.

That’s why chatbots’ answers look out of touch with reality. For example, all AI tools wrote about "policy and advocacy" campaigns as a useful tool to protect teachers, but how many leaders will do it in fact, especially if using artificial intelligence will increase efficiency and decrease costs? The same question arises in case of Microsoft Bing & ChatGPT’s point about emphasizing the unique value of human professors. Will the university administration really identify this value, or it will be guided only by economic justifications and arguments, forgetting about teachers’ unique experience, emotional intelligence, which also contributes to conflict management [17] – one of the skills that AI can’t yet replace and which is so important for the university work, ability to give career advice, etc?

A similar situation occurs with another point common for all, professional development, especially AI & tech-savvy training. Why will it be done if this not decreases but increases costs? Moreover, how can we motivate educators really improve their skills, as well as develop innovative teaching models like blended learning environments? (This was also the reason for the following question).

Gemini raised an important question about redefining the teacher's role. As we have seen in experiments above, this is a very likely

situation. Since professors stop to be the only source of knowledge in the class, they have switched to another functions, such as developing students' critical thinking, problem-solving, and creativity, becoming mentors, coaches and/or mediators, guiding students through their academic and personal journeys.

Also, Microsoft Bing & ChatGPT mentioned highlighting success stories which shows how teachers have effectively used AI to enhance their teaching (another common point was again about embracing AI as a tool, not a replacement). Experiments in SAS show that it's a really good idea, but there are other examples, including in related sectors. Thus, Thinkster Math, a global leader in AI & Data Science driven math tutoring, in 2021 patented a system that makes learning hyper-personalized: it tracks every step a student takes to solve a problem and generates detailed progress reports that show understanding of every skill assessed. At the same time, math tutors also see huge benefits in being part of the Thinkster platform. They receive daily insights and reports on every student in the system, which allows them to provide high-quality services. In addition, tutors can act as Thinkster pseudo franchisees and earn \$3,000 to \$6,000 per month without any financial investment by becoming a certified Thinkster math tutor [18].

This shows us the possible way higher education could change. It can be assumed that not the artificial intelligence itself will be in demand, but so-called "digital centaur" - a human who has been enhanced and augmented with digital tools and is able to perform at a higher level than their peers because of the enhancement [Introducing the Role of the Digital Centaur. Emids.

URL:<https://www.emids.com/insights/introducing-the-role-of-the-digital-centaur/>]. This seems to be the most logical, since there are a number of skills that are still the prerogative of humans and which AI is not able to fully master today, as chatbots mentioned earlier in their previous answers.

One more interesting tool is to build a community (attracting students and other stakeholders) that will somehow protect educators. Nevertheless, it seems to be a

complex work that includes also professional recognition, career development, legislative support, additional financing and so on.

Question #9: Many professors are old people, it will be hard for them to adapt in an AI world. However, they have a huge theoretical and practical background. How can they still be effective and efficient?

Chatbots' answers were rather different and interconnected at the same time. For better understanding, all suggestions were separated according to two factors: whether AI is used or not, and who implements the strategy – educator or someone else (Fig. 1).

Let's take a closer look at each strategy:

– Mentorship. This AI-free strategy requires efforts both from educators and administrators, because the first ones have to change their studying and communication approaches and role in general, and second ones have to redesign the whole studying process in this case. If Gemini suggested just "guiding students through complex issues and providing career advice", ChatGPT gave more ways of realizing this strategy, also adding here internship opportunities and research collaborations which could propose professors. Microsoft Bing added an interesting idea about mentoring younger faculty members to share with them knowledge and experience while staying engaged in the academic community.

– Recognition. Both Microsoft Bing & Gemini wrote that recognizing and celebrating contributions and achievements of older professors can help them to feel their value.

– Collaboration. Two ways of this strategy were suggested: Gemini proposed to pair with younger faculty to create a dynamic teaching team, while Microsoft Bing concentrated on collaborating with tech-savvy colleagues, becoming more comfortable with AI tools and contributing expertise at the same time. ChatGPT's answer included both points, adding the idea to collaborate with IT professionals and educational technologists to effectively integrate AI tools into the curriculum, ensuring that the technology is used to support and enhance teaching rather than overwhelm it.

– Support staff. Very human-oriented version with assigning staff to assist older professors with technology integration, however, it is unlikely that universities will choose this strategy as it will increase their costs.

– Feedback and support. This point is close to mentorship suggesting to offer in-depth feedback and support on student projects, papers, and research.

– Step-by-step implementation. ChatGPT & Gemini offered to introduce AI tools incrementally to allow for adaptation.

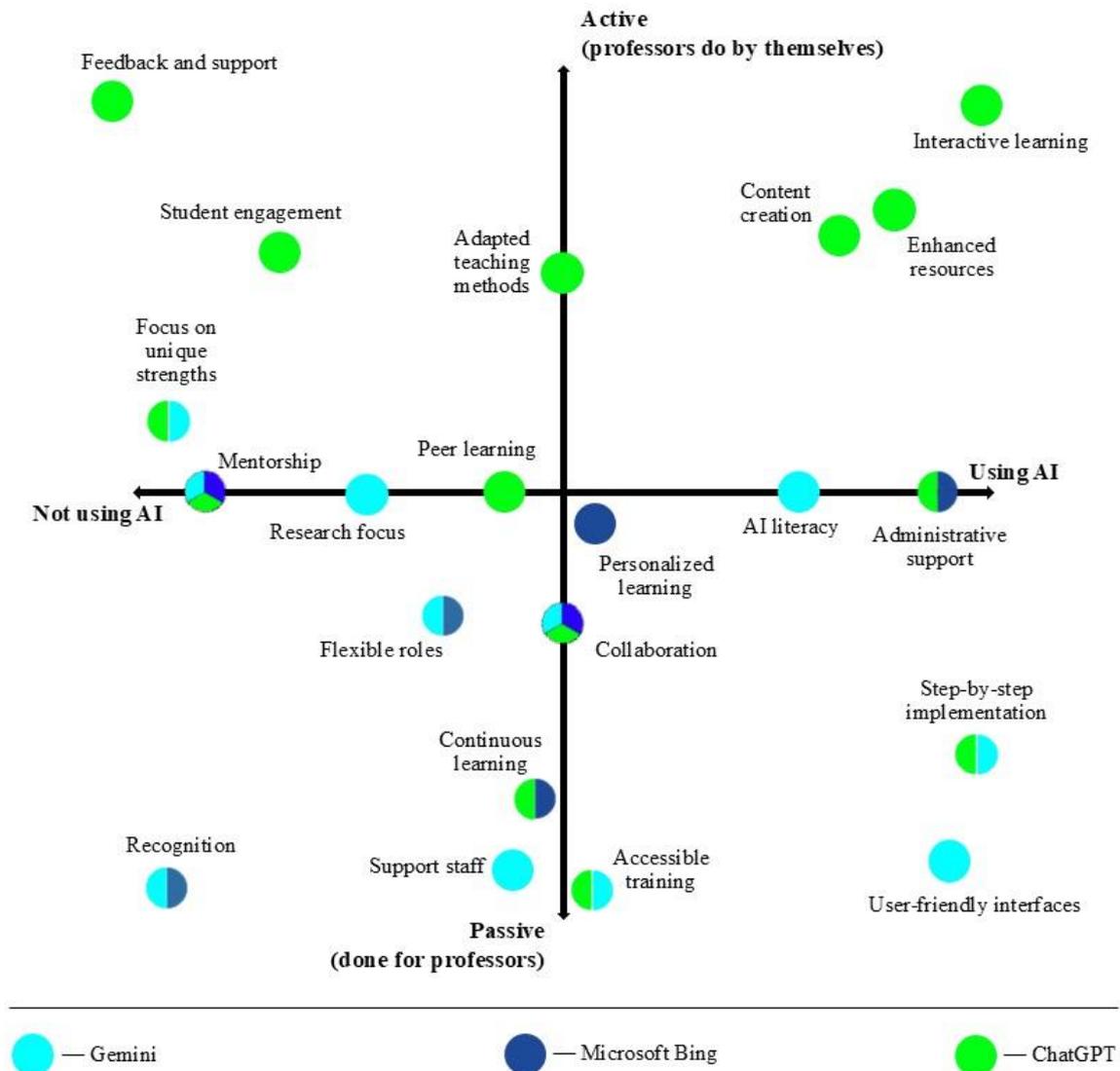


Fig. 1. Strategies to overcome older educators' weaknesses

– Accessible training. This point can be attributed to teachers' learning in general, nevertheless, ChatGPT focused on a practical side of using AI in this case, while Gemini emphasized appropriate formats (for example, in-person workshops) and customization of different parameters like display settings, font sizes and so on (for on-line training).

– Continuous learning. In comparison with the previous strategy, chatbots mentioned more about new advancements and best practices in

educational technology rather than technological advancements.

– AI literacy. As a separate item there was specific training on AI tools and their applications in education. Moreover, despite the fact that Gemini highlighted this point as a passive one (implying that this would be realized by university), educators can do it by their own initiative.

– Research focus. As well as mentoring, this could be a good solution, but there are

some questions: scientific work could be not a desired one for educators, whereas administration will require high results as it will be paid. As a result, this may lead to scientists using the same AI for their research, and only in an ethical way.

- User-friendly interfaces. This point seems to be complementary to other activities.

- Flexible roles. Whether it's about adjusting teaching loads to accommodate the learning curve (Gemini) or offering flexible roles that allow to continue contributing in like curriculum development, guest lectures, or advisory roles (Microsoft Bing), this step looks more like addition to another scenarios, just like the previous one.

- Focus on unique strengths. This strategy by Gemini could be realized in several ways: individually, focusing on theoretical knowledge, critical thinking, problem-solving and creativity, or in collaboration with a colleague (possibly a younger one) who can handle technology integration and student engagement. In addition, ChatGPT proposed using practical experience to design hands-on learning opportunities and creating case studies and stories that enrich the learning experience and provide valuable context.

- Administrative support. AI can be used to handle administrative tasks by administrators (Microsoft Bing) and/or professors themselves (ChatGPT) – anyway, the result will be freeing up teachers to focus on teaching, mentoring and research.

- Personalized learning. This approach seems to be a combination of “AI literacy” and “Continuous learning”. Even though Microsoft Bing meant that this should be realized by university with focus on practical applications of AI, the opposite situation (realizing by an individual and focusing not only on AI) is possible.

- Enhanced resources. Provide data-driven insights and analytics, AI can help tailor their instruction based on student performance without requiring them to manage the technical aspects.

- Content creation. Professors can create learning material with the help of AI, just curating and validating it.

- Interactive learning. Tools like simulations or virtual labs, which are based on

artificial intelligence, could be used to enhance student engagement and understanding.

- Peer learning. In some way an opposite point to the “Personalized learning”, it suggests to encourage knowledge sharing between faculty members, especially participating in and/or organizing workshops and seminars.

- Adapted teaching methods. Applying both traditional learning methods and AI tools, blended learning environments can appear, including strengths of both approaches. Active learning strategies that engage students in discussions, projects, and problem-solving activities can be implemented, whereas AI handles more routine tasks.

- Student engagement. An educator may build a strong community in the classroom through meaningful interactions and personal connections.

Thus, most advices could be combined in several general interconnected strategies:

1. Lifelong learning. Regardless of how AI develops in the future and whether teachers use it (and allow students to use it), they will need to be continuously trained, primarily in soft skills such as emotional intelligence, including empathy, the ability to interact with other people, etc.

Although AI, unlike humans, is not fully capable of, for example, showing empathy or motivating someone, it can recognize human emotions relatively well (again, like a “digital centaur”). Moreover, recent studies have shown that speaking about online self-presenting, artificial intelligence can build trusting relationships and inspire confidence - and people cannot determine who wrote the text, a person or algorithms [19]. Therefore, despite the advantage in this area, we are talking about the need to develop EI, otherwise it may soon turn out that in this component artificial intelligence is ahead of the average person, too. That's why educators should not only have the necessary competencies, but also continuously learn something new and have the desire to learn in order to remain a sought-after specialist [20].

However, not only soft skills matter. If educator expects that artificial intelligence will be used in some way within the educational process, hard skills such as technological

literacy in general and AI literacy in particular will be required.

2. New roles. As we have seen in various examples, the functions performed by educator are already gradually changing, and now those to which most teachers previously (almost) did not pay attention are coming to the fore. This naturally professional development, improving existing skills and learning new ones.

3. Redesigning classes. The use of AI can help create fundamentally new ways of teaching, but even if the professor does not do this for one reason or another, he will still have to change the approach to teaching. This involves not only the new roles discussed in the previous point, but also how the subject will be taught, what assignments will be given, what grades will be given for, how the assessment process will take place, etc. And here the university administration also plays an important role.

It's no less interesting to see how the responses of various chatbots were distributed. If we look closer on Figure 1, the next picture will arise: ChatGPT mostly suggested strategies that can be used by educators themselves while Microsoft Bing & Gemini vice versa. This maybe one of the factors why this time there's a small number of similar suggestions – only "Mentorship" & "Collaboration" were in all three answers. However, there were also answers that coincided between the two chatbots: two for ChatGPT & Microsoft Bing, the same for Microsoft Bing & Gemini and three for ChatGPT & Gemini.

Question #10: Many activities that AI can do better than students (searching information, finding out appropriate and reliable sources, build logical structure in the text etc.) can improve their cognitive skills. Won't students (and the humanity in perspective) become more silly in this case?

All chatbots agreed that this risk exists and suggested different ways how to manage it. Summarizing all their points, to avoid the situation of cognitive skills degradation it is necessary to encourage active learning creating new tasks & exercises which will require critical thinking and problem-solving skills, and engage students in discussions, debates,

teamwork and hands-on projects (research ones and requiring creativity and innovation will be the most appropriate). These activities may include the use of AI, however, it's important to maintain a balance of AI-assisted learning and traditional methods emphasizing the importance of evaluating the reliability and credibility of AI-generated sources and information and forming your own conclusions, analyze and interpret information rather than just consuming it et cetera. Artificial intelligence may complement but not replace students' work, from this point of view skills development as a part of lifelong learning becomes crucially important. And, of course, ethical considerations matter.

In addition, Microsoft Bing wrote about the necessity of regular reflection and feedback sessions, and ChatGPT emphasized importance of human elements of education (such as social learning and mentorship and support) and both ethical and philosophical researches & discussions.

Question #11: Help me, please, to create an Ethical Code of using AI in university.

It was a specific request, aimed not at finding information, but at creating some "final product". And, frankly speaking, two out of three chatbots, Microsoft Bing & Gemini, failed: their answers had just general recommendations what should be included in Ethical Code but not this paper itself. Gemini gave short code structure, and Microsoft Bing – small example statement. Only ChatGPT wrote a document that can be used as a template (table 7).

Source: based on [11-13].

Question #12: You're rational, but most people usually not. How can we prevent using AI in a harmful and/or silly way, especially in higher education?

By and large, the answers to this question included the same things as earlier mentioned: provide stakeholder training (especially critical thinking and AI literacy), develop ethical standards (including responsible development/innovation & limitations on AI use) and usage guidelines, conduct regular

audits and reviews, ensure human oversight et cetera.

Table 7. Ethical Code for AI Use in University

<p>1. Purpose and Scope</p>	<p>1.1 The <u>purpose</u> of this Ethical Code is to establish principles and guidelines for the responsible use of Artificial Intelligence (AI) within the university environment. This code aims to ensure that AI is used in ways that are ethical, equitable, and aligned with the university’s mission and values. 1.2 This code applies to all members of the university community, including faculty, staff, students, and researchers, as well as any external partners or vendors involved in the development or implementation of AI systems within the university.</p>
<p>2. Principles of Ethical AI Use</p>	<p>2.1 Respect for Human Dignity 2.1.1 Human-Centric Approach. AI systems should be designed and implemented to respect the dignity and rights of all individuals, ensuring that technology serves to enhance human well-being. 2.1.2 Informed Consent. Ensure that individuals are fully informed about how AI systems will be used and obtain their consent before collecting or using their data.</p> <p>2.2 Transparency and Accountability 2.2.1 Clear Communication. Clearly communicate the purpose, functionality, and limitations of AI systems to all stakeholders, including students, faculty, and staff. 2.2.2 Responsibility. Assign clear accountability for AI systems, including oversight of their development, deployment, and ongoing use.</p> <p>2.3 Fairness and Equity 2.3.1 Non-Discrimination. AI systems should be designed and implemented to avoid discrimination and bias, ensuring equitable treatment and opportunities for all individuals. 2.3.2 Accessibility. Ensure that AI tools and resources are accessible to all members of the university community, regardless of their background or abilities.</p> <p>2.4 Privacy and Data Protection 2.4.1 Data Privacy. Implement robust measures to protect the privacy and security of personal data collected and used by AI systems, adhering to relevant data protection regulations and best practices. 2.4.2 Minimal Data Use. Collect and use only the data that is necessary for the intended purpose, and ensure data is anonymized where possible.</p> <p>2.5 Integrity and Academic Excellence 2.5.1 Academic Integrity. Ensure that AI systems used in academic settings uphold the principles of academic integrity, including the prevention of plagiarism, cheating, and fraudulent behavior. 2.5.2 Supporting Learning. Use AI to support and enhance, rather than replace, traditional teaching methods, fostering an environment of active learning and critical thinking.</p>
<p>3. Guidelines for Implementation</p>	<p>3.1 Development and Deployment 3.1.1 Ethical Review. Conduct an ethical review of AI systems and technologies before deployment to assess potential impacts and ensure compliance with ethical principles. 3.1.2 Inclusive Design. Involve diverse stakeholders, including students, faculty, and experts, in the design and testing of AI systems to ensure they meet the needs of all users.</p> <p>3.2 Training and Education 3.2.1 AI Literacy. Provide training and resources to university members on the ethical use of AI, including understanding the capabilities and limitations of AI technologies. 3.2.2 Ongoing Education. Offer continuous education opportunities to keep stakeholders informed about emerging AI technologies and ethical considerations.</p> <p>3.3 Monitoring and Evaluation 3.3.1 Regular Audits. Implement regular audits and evaluations of AI systems to ensure they are functioning as intended and adhere to ethical guidelines. 3.3.2 Feedback Mechanism. Establish a feedback mechanism for users to report concerns or issues related to AI systems, and address these concerns promptly and transparently.</p> <p>3.4 Research and Innovation 3.4.1 Ethical Research. Ensure that AI research conducted at the university adheres to ethical standards, including the responsible use of data and consideration of potential societal impacts.</p>

	3.4.2 Collaboration. Collaborate with external partners and organizations to stay informed about best practices and advancements in AI ethics.
4. Enforcement and Compliance	<p>4.1 Compliance Measures</p> <p>4.1.1 Policy Enforcement. Enforce compliance with this Ethical Code through established policies and procedures, including disciplinary actions for violations.</p> <p>4.1.2 Review Process. Implement a review process for evaluating compliance with ethical guidelines and addressing any issues or breaches.</p> <p>4.2 Reporting and Accountability</p> <p>4.2.1 Reporting Mechanism. Provide a clear and confidential mechanism for reporting ethical concerns or violations related to AI use.</p> <p>4.2.2 Responsibility. Assign specific individuals or committees to oversee the implementation and adherence to the Ethical Code and address any issues that arise.</p>
5. Review and Revision	<p>5.1 Continuous Improvement</p> <p>5.1.1 Regular Review. Regularly review and update the Ethical Code to reflect changes in technology, regulations, and ethical standards.</p> <p>5.1.2 Stakeholder Input. Seek input from stakeholders, including students, faculty, and external experts, to ensure the code remains relevant and effective.</p> <p>5.2 Transparency</p> <p>5.2.1 Public Access. Make the Ethical Code publicly accessible to ensure transparency and accountability in the use of AI within the university.</p>

Question #13: In your opinion, how will the higher education sector look like in 5 years?

All the variability of factors that chatbots wrote in their answers can be classified as in PEST analysis into political, economic, socio-cultural and technological ones. However, given the factors that have been identified, it seems necessary to add two more groups for ethical and industrial factors. Thus, our PEST analysis transformed into STEEPI analysis (table 8).

Table 8. STEEPI analysis of higher education sector

<p align="center">Technological factors</p> <ul style="list-style-type: none"> • Emerging technologies beyond AI (Gemini) • Increased use of VR/AR (ChatGPT & Gemini) • Increased use of AI and automation (ChatGPT, Microsoft Bing & Gemini) • Access to virtual labs and simulations (ChatGPT) • Predictive Analytics (ChatGPT) 	<p align="center">Economic factors</p> <ul style="list-style-type: none"> • Economic conditions in the country (Gemini) • Increased focus on operational efficiency and productivity to reduce costs (Gemini & ChatGPT) • Exploring new alternative revenue sources (Gemini & ChatGPT)
<p align="center">Socio-cultural factors</p> <ul style="list-style-type: none"> • Data-Driven Decision Making (Microsoft Bing) • Emphasis on soft skills (Microsoft Bing & ChatGPT) • Sustainability and social responsibility (Microsoft Bing) • Skill-based assessment & competency-based education (ChatGPT) • Continuously updating and adapting programs to meet evolving needs (ChatGPT) • Enhanced privacy and data security protections (ChatGPT) • Lifelong learning (ChatGPT, Microsoft Bing & Gemini) 	<p align="center">Industrial factors</p> <ul style="list-style-type: none"> • A stronger emphasis on student mental health and well-being (Gemini & ChatGPT) • Cross-Institutional Collaboration (ChatGPT) • More global partnerships between universities/students/educators (Microsoft Bing & ChatGPT) • Hybrid online/in-person learning, teaching, research et cetera (ChatGPT, Microsoft Bing & Gemini) • Integrating real-world projects into educational programs (ChatGPT) • Collaborations between academia and industry (Gemini & ChatGPT) • Flexible learning pathways: more modular and stackable programs (ChatGPT & Gemini) • The rise of alternative education providers (ChatGPT) • The growth of decentralized and blockchain-based educational credentials (ChatGPT) • Shift faculty roles towards facilitators and mentors (ChatGPT) • Increased international student enrollment and online programs (Gemini) • Adaptive learning systems (ChatGPT)

Ethical factors	Political factors
<ul style="list-style-type: none"> • Focus on initiatives to improve access and success for underrepresented groups (ChatGPT & Gemini) • Ethical guidelines for AI (ChatGPT) 	<ul style="list-style-type: none"> • Government policies related to higher education (Gemini)

Source: based on [11-13].

This time, unlike the previous questions, we can observe that the most quality of common points (10) have Gemini and ChatGPT, including cases when all three chatbots agree with each other (thrice – predicting increasing of hybrid online/in-person educational activities, influence of lifelong learning trend and increased use of AI and automation). For comparison, Microsoft Bing had no similar points with Gemini and only two – with ChatGPT (in both cases, with the exception of the three above, the same for all).

It is also interesting how the factors were distributed among groups. Despite the fact that there was no mentioning AI in the question, a lot of answers connected with it. Moreover, political (1/1), economic (3/3) and technological (3/5) factors were mostly suggested by Gemini, whereas Microsoft Bing “concentrated” on socio-cultural group. Since ChatGPT, as usual, had the most points, it made significant contributions to almost all groups, except political one.

Prospect of further research

AI technologies are changing at an incredible rate these days, changing at the same time many other areas. Even during this research, Microsoft Bing ceased to exist, and Copilot appeared in its place - and its answers on the same questions differ from the Bing's ones. That's why it seems crucially important to constantly conduct new researches that will help assess the potential impact of AI on higher education and make the right decisions improving educational process.

Conclusions

It is quite possible that in the coming decades we will see many professions change dramatically, for example, a manager will not have the right to fire an employee without consulting with artificial intelligence - and vice versa, will not be able to keep him if the AI is against it. Similar changes can happen to the teaching profession. That's why it seemed

important not only to conduct a study on what changes can occur (or are already occurring) in higher education, but also to do it together with AI, to see how it sees and evaluates the situation that is developing today in this area, and what solutions to the difficulties that arise along the way it can offer.

The responses from Gemini, Microsoft Bing & ChatGPT showed that even one artificial intelligence does not see the situation comprehensively, which means that it cannot be completely relied upon. It is important to note that the issue of AI & teacher “relationships” was generally assessed equally by chatbots, leaning more towards their interaction than towards replacement – unlike many managers who want to replace as many of their subordinates with robots as possible. Based on this, we can conclude that **the danger is coming from the individual using the technology, and not the AI itself.**

Nevertheless, we must be prepared for the fact that some positions may actually disappear, and the functions of those who remain will change significantly. In this case, lifelong learning comes to the forefront for both teachers and students. What seems especially important here is not only getting new and improving existing skills, especially soft skills, but also the desire and ability to learn in general. To do this, first of all, it is necessary to stimulate curiosity and the ability to ask questions.

Many problems are not created by AI, but only revealed, as, for example, in the case of students' inability to ask questions and their reluctance to do so in general. Therefore, the task of higher education in the era of AI should be to increase the complexity and versatility of developed competencies. The passive assimilation of information and the development of algorithmic intellectual skills should be replaced by the competencies of formulating questions and independent critical thinking. The response to the development of technology should not be the subordination of the student to AI, but his or her movement to the position of a subject of knowledge and

activity, capable of creatively using and developing AI as a working tool.

Thus, it is the education sector, with its still irreplaceable function of upbringing, that must not only show and explain how to use AI, but also how to do it correctly. But for this, teachers should thoroughly understand themselves what and how to do. For example, universities today need to think about who and how will teach specialists in professions (both existing and those that are yet to be created) related to the active development of AI, because the danger to higher education comes not only from the introduction of artificial intelligence in this area, but also from how this technology will be used by competitors, in particular, online platforms for learning foreign languages (Duolingo) or taking courses on almost any topic (Coursera), because related fields are developing in this direction faster and more successfully, and in order to graduate, say, masters in the specialty of "AI Auditor" or "Dream Designer", the university must prepare highly professional personnel. And the question of where to get them, and most importantly, how to attract them to teaching at the university, remains open. Obviously, such a decision should be developed not by one educational institution, but at least by some consortium, if not by government agencies representing the entire higher education system as a whole.

The most important task for humanity today is to understand how to minimize the losses that will definitely arise along with all the incredible benefits that we can get from the development and implementation of artificial intelligence. After all, the more advanced technology, the more attractive idea that it can teach us something. But history has shown the opposite: the more perfect the technology, the more it replaces real, including intellectual, activity, and the less we actually learn. When a student reads a summary of a great piece of literature written by a chatbot, no one believes that this is the same as actually reading and comprehending the entire book. Or that by assigning artificial intelligence to write an essay for him, the student cleverly boosted his/her productivity rather than lost the opportunity to learn something new [10].

Humanity has already failed the "Internet test." Now it's important not to fail the "AI test," because that might lead not to another "retake," but to "expulsion."

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