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GOOD PRACTICES OF USING ARTIFICIAL INTELLIGENCE IN THE DIGITALIZATION OF HIGHER EDUCATION*

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Abstract. The present research is dedicated to the good practices of using AI in the overall digitalization of higher education. The primary objective is to identify good practices used by the universities in implementing AI technologies in their everyday life for educational and administrative needs. At the same time, our additional goal is to understand the expectations of students for further implementation of AI in universities. We developed our research in 2 main stages: the first one – the collection and identification of good practices of universities with AI and digitalization, and the second one – is devoted to students' expectations. We conducted 25 interviews with representatives of 18 Bulgarian universities responsible for digitalization. The second stage was to provide a survey among students (n=254). Our findings reveal that digitalization is one of the leading priorities for universities; most universities have specific strategic documents for digitalization. Several challenges are outlined for smooth digitalization: lack of sufficient resources (including financial, administrative capacity, etc.); unwell-prepared infrastructure (including lack of shared vision for the different systems used so far within the university); the emergence of various types of resistance (both in academic and administrative staff) etc. The significant advantage for universities using AI is seen in the improved quality of the educational process (including the introduction of new educational perspectives through new technologies), improved administrative service, and enhanced public image, which reflects an increased number of potential candidates.

Keywords: Digitalization; Artificial Intelligence; Higher education institution; Digital Education

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1. Introduction

Nowadays, digitizing services offered by businesses and entities in Public Administration is essential for securing competitiveness, a high level of efficiency and a chance for the sustainability of organizations. As the crucial mediator and bridge between the education system and the labor market for young people, universities should propose high-quality educational services accompanied by relevant administrative services. Digitization has to be considered as a key to new development from all these perspectives.

Digitization and, more precisely – AI in universities, is not a simple and sporadic process. It requires the combined efforts of different experts, staff and managers. But first of all, it requires the existence of a comprehensive concept of digitization of the university; it requires the commitment of the rector's management (such as

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strategic decisions and the direction of development to be followed); on the other hand, it requires dedication on the part of IT professionals, on whom the initial main activity falls to develop and build the necessary infrastructure, together with all the required security procedures, and subsequently to maintain it at a high level. Secondly, once the required infrastructure is built, academic and administrative staff must engage with digitization. Again, this is not a smooth and seamless process because changes come with new efforts from the staff. However, the main goal - achieving high-quality educational and administrative services and meeting the requirements and expectations of students - deserves additional efforts, which will subsequently be rewarded - both by the larger intake of students and their high degree of satisfaction.

Usually, young people are willing and open to new technologies and changes. For them, the digital world is as natural as a traditional one. This observation is likely strengthened and strengthened with each passing year. The generations coming to universities are increasingly digitized and expect universities to be at an extremely high level as institutions and centers of cutting-edge technology.

The current article is in this line of consideration. We want to outline good practices implemented in universities using Artificial Intelligence and compare them with students' expectations. Namely, on this basis, we could propose new ideas for further development and implementation of AI in the everyday life of universities.

2. Literature review

The main topic of Artificial Intelligence and its application in different aspects of both professional and personal life has been the epicenter of scientific discussions for the last few years. However, the discourse is complex and covers a variety of features – from a purely technological point of view through the social impact on humans to different economic perspectives. Therefore, higher educational institutions are not an exception when we consider digitalization and, more specifically – using AI for other purposes in university (usually for improving the level of education through innovative elements, but also using AI for various administrative services developed for students).

In this line of consideration comes the research of Hornberger, Bewersdorff and Nerdel (2023), who explore university students' level of AI literacy. Their findings indicate notable differences in AI literacy levels among students, with the majority demonstrating a basic comprehension of AI concepts. Students with a technical study background or prior exposure to AI tend to possess a higher level of AI literacy. In turn, Jo has focused on studying the behaviour of students and office experts and their attitudes towards using some elements of artificial intelligence, including ChatGPT. Exploring the specifics of ChatGPT, the scholar admits that its capacity to learn and engage in conversation closely resembles human interaction, blurring the line between artificial and genuine communication (Jo, 2023). The author also claims that university students and office workers are actively utilizing the benefits of AI-driven tools. These tools assist them in various aspects, such as learning support, research assistance, time management, and automating tasks (ibid). Darvishi et al. (2024) explore AI tools' impact on how university students learn. For this purpose, the scientific team conducted comprehensive empirical research (among 1625 students from 10 countries). Their findings are exciting – they admit that students relied on AI assistance rather than learning from it. Scholars also found that when AI assistance was removed, students could depend on self-regulated strategies to some extent, but they were not as effective in filling the knowledge gap. They discovered that combining human-AI approaches, known as SAI (self-regulated strategies with AI assistance), was not more effective than AI assistance alone. They concluded that the combination of self-regulated strategies and AI was not found to enhance the learning outcomes beyond what AI assistance could achieve on its own (Darvishi et al., 2024).

Providing quality education is one of the primary objectives of any university worldwide. Therefore, technologies and techno-innovations, including using AI to improve educational processes, are also subjects of sound science interest. In this line of consideration, Tan and Cheah (2021) propose a gamified AI-enabled online learning application which helps university students improve their attitude and perception in more challenging courses such as physics. Hamid et al. (2023) explore the attitude of university students to use AI tools in the

learning process. Scholars discovered that using ChatGPT positively impacted group collaboration and student engagement. It increased their motivation and encouraged them to ask more questions. However, scholars admit that some students needed help understanding the information provided by ChatGPT, which led them to question its reliability and credibility.

Authors conclude that despite these challenges, most students recognized the potential of ChatGPT to eventually replace traditional methods of seeking information. They believed that with further improvements, ChatGPT could become a valuable tool for accessing information and acquiring knowledge (Hamid et al. (2023). Athilingam and He (2024) admit that using AI-based technology could negatively impact the ability of students to think. They claimed that despite all the controversial roles of ChatGPT and new technologies in the educational process, the better response could be to integrate ChatGPT as an assistant tool in the learning process rather than banning new technologies (ibid). Boubker (2024) has a different opinion. He conducted research, and the results indicated that the perceived usefulness of ChatGPT had positively influenced how often students used it and their overall satisfaction with it. This, in turn, led to an enhanced individual impact on their learning experience. The scholar concluded that his findings have significant implications for managers in higher education institutions (HEIs) in improving teaching practices in the digital age. HEI managers can act by incorporating ChatGPT or similar AI technologies into their teaching methodologies. This can help renovate and enhance the learning experience for students. By leveraging the benefits of ChatGPT, such as its perceived usefulness in facilitating learning and increasing satisfaction, managers can adapt their teaching practices to align with the digital age. This could lead to more effective and engaging educational experiences for students in HEIs (ibid). Dai, Liu and Lim (2023) also claim that ChatGPT and generative AI have enormous potential to empower students in their educational efforts.

On the other hand, scholars admit that this technological innovation comes with a price, which requires joint effort from all stakeholders, including HEIs management, academic staff, etc. Interesting research on the applicability of AI and different AI tools in education has also been developed by Chung et al. (2021), Kaufmann (2021), Yilmaz and Yilmaz (2023), Chen, Zhu and Castillo (2023), etc. Chiu (2024) perceives the possibility of transforming the higher education system using generative AI to prepare students for new requirements of the labor market and society, which generative AI will power.

Rodway and Schepman (2023) explore the influence of integrating AI educational technologies on the anticipated satisfaction of university students with their courses. Their findings reveal a fascinating picture of the level of student satisfaction integrating AI tools in the educational process at universities. Authors admit that while students generally expressed a moderate level of comfort with AI educational applications, their satisfaction with courses decreased when considering the hypothetical implementation of such technology. Notably, discomfort levels were highest when AI applications involved assigning final grades or providing support for well-being (ibid).

Nguyen, Le, Hoang and Nguyen (2021) developed the possibility of using ChatBot to improve the university's admission process and, primarily, to provide basic information for potential and actual candidates for students at the university. They describe the methodology used for building a chatbot for the student's admission and admit that for this purpose, ChatBot can save person-hours and, at the same time – provide adequate and relevant information to the target group at any time. An exciting application of AI chatbots for helping university students is proposed by Liu et al. (2022). The scholars explore the possibilities of providing support to university students who are in depression using for this purpose AI Chatbot.

Another opportunity where AI could also be used successfully in universities is in human resource management (HRM). Universities typically have large teams of academics and administrative staff, and in this line, AI could help drastically soon. Some ideas on the usage of AI in HRM are developed by Pan and Froese (2023), Anguelov (2023), Chowdhury et al. (2023), Radonjić, Duarte and Pereira (2022), Rodgers et al. (2023), and others. On the other hand, different applications of AI tools could also be implemented for general management improvement of the universities for instance, in their decision-making process (Baabdullah, 2024); innovations and innovation policy – Sjödin et al. (2021); mathematical algorithms in AI for enhancing

productivity (Ilieva, Anguelov, Nikolov (2019)); big data analytics (Mantri& Mishra; 2023), sustainable organization development (Sulich, Sołoducho-Pelc, Grzesiak, 2023); organizational transformation (Nosova et al., 2022; Kulkov, 2021); improvement of employee collaboration, including collaboration between AI and employees (Chowdhury et al., 2022; Sliwa, Krzos, & Piwoni-Krzeszowska, 2021) etc.

Along with various applications of AI in everyday life of the universities (both educational, scientific and administrative services), some authors also pay attention to the other side of the usage of generative artificial intelligence and its impact on the assessment of students in higher education institutions. Moorhouse, Yeo and Wan (2023) present the change in rules for evaluating universities due to the use of generative AI. Considering the current educational and employment environment, the authors concluded that it could be advantageous for universities to incorporate Generative Artificial Intelligence (GAI) into the assessment process. According to them, to implement this, instructors must acquire a new skill set termed generative artificial intelligence assessment literacy (ibid). Fesenmaier and Wöber (2023) also admit that generative AI has been met with numerous cautions, leading to universities globally either prohibiting or placing restrictions on their utilization.

Based on the literature review, the use of AI in higher education, with all the positive and negative consequences, is yet to develop and deepen. In this regard, universities should be agile and proactive in providing quality education and introducing as many new technologies as possible into their daily lives. Thus, they will simultaneously respond to the changing reality, business requirements, and a large part of the students' expectations.

3. Methodology of the research

The primary objective of the current research is to identify good practices used so far by universities in implementing AI technologies in their everyday life for educational and administrative needs. At the same time, our additional goal is to understand the expectations of students in the further implementation of AI in universities. We used the following methodology to achieve this goal, graphically presented in Figure 1.

We started with identifying the main objective of the research. The research is a part of the implementation of the overall project, financed by the Bulgarian National Research Fund and titled "Digitalization of the Learning Process in Higher Education - identification and Management Model". According to the project's action plan, we have to identify good practices of universities in implementing AI technologies and, based on this, to propose concrete ideas for further implementation of AI in the digitalization process of universities. Therefore, our major goal of concrete research is to develop a workable proposal for further integration of AI into the everyday life of universities.

The next step was to identify several specific sub-objectives, which will lead to the implementation of our primary goal. The specific objectives of the research are as follows:

- to collect information and identify good practices for using AI in universities in Bulgaria
- to understand the perception and attitude of students regarding the integration of AI into everyday life at universities
- to compare the state of play with the expectations of students and, on this basis, to propose workable ideas for further integration of AI in universities

Once we had the main objective and sub-objectives, we could select concrete tools for their achievement. For this purpose, we developed our research in 2 main stages: the first is dedicated to collecting and identifying good practices of universities with AI and digitalization, and the second is devoted to students' expectations. To carry out the first stage, we used personal interviews (semi-structured) and a review of the available information in international scientific databases. For the second stage, we developed and used a specifically designed questionnaire. The results of these two phases of the research are presented in the next part of the article.

The next step was to conduct interviews with representatives of the management of several Bulgarian universities responsible for digitalization. As a result of this step, we had 25 interviews with representatives of the 18 Bulgarian universities (located in Sofia, Burgas, Plovdiv and Blagoevgrad). The analysis of these interviews allows us to make a relatively straightforward conclusion on the state of play in the digitalization process for the universities in Bulgaria and to outline the significant problem areas so far.



Fig. 1. Methodology of the research

Based on the understanding of the situation regarding digitalization in universities, we prepared the first draft of the questionnaire so that students could understand their major attitudes and perceptions of using AI in everyday life. When we were ready, we tested this initial questionnaire draft with students willing to participate in a focus group for such a subject. The majority of the students were open and expressed their positive attitude toward the subject of the research, namely, using AI in universities. After this initial testing, we had to review three questions to achieve more correct information. The final version of the questionnaire contains 19 questions in total: 5 for the demographic profile of the respondents and the remaining 14 questions – devoted to the concrete purpose of the research.

Once we had the final version of the questionnaire, we posted it on the Internet (using Google Forms) and sent a link to all available channels (including social media, intranet channels of universities, emails, etc.) to reach as many university students as possible. Before filling in the survey card, all respondents were informed that

this research is anonymous and voluntary, being done solely and exclusively for scientific purposes to improve the quality of digitization of the Bulgarian universities. As a result, we received 254 responses.

We could analyze and synthesize the collected information when we closed the period for filling out the questionnaire, which was available for three months. We used the information to compare it with the current situation of university digitalization. Based on this, we make several recommendations and proposals for further integration of AI in the everyday life of universities.

4. Survey Analysis and Results

4.1. Analysis and results from the interviews with representatives of the Bulgarian universities

We started our research with semi-structured interviews with representatives of the management of several universities in Bulgaria. The leading idea when we conducted the interviews was to cover universities with different profiles – including economic, humanitarian and technical universities- to have as comprehensive as possible understanding of the state of play in the digitalization process of Bulgarian universities. On the other hand, we select colleagues who are willing to share such internal information for their universities.

Based on the analysis from the interviews, the following main findings could be summarized:

- the major part of the representatives of the management of the Bulgarian universities claims that digitalization is defined as one of the leading priorities for the university;
- The majority of managers admit that the university has approved specific strategic documents devoted to the digitalization of the universities
- several challenges are outlined for smooth digitalization: lack of sufficient resources (including financial, administrative capacity, etc.); unwell-prepared infrastructure (including lack of common vision for the different systems used so far within the university); emergence of various types of resistance (both in academic and administrative staff) etc.
- a significant advantage for universities using AI is seen in the improved quality of the educational process (including the introduction of new educational perspectives through new technologies), improved administrative service, and enhanced public image, which is considered to reflect an increased number of potential candidates.
- For several representatives of the universities, the lack of expert IT staff (as well as the impossibility of attracting such staff) and lack of sufficient financial resources are defined as the most significant critical points in front of the university's digitalization process.
- All of the management representatives admit that digitalization is a crucial part of securing the university's sustainability.
- Almost all of the management representatives admit that the level of digitalization will be vital in defining whether a university is successful or not in the next few years.

4.2. Analysis and results from the survey among university students

At the same time, the opinions and perceptions of the students regarding the level of digitalization of the universities and their expectations for further development are also interesting for comprehensive study when we explore the good practices of universities using AI for educational and administrative purposes. In this consideration, we provided a specific survey among university students. This survey was voluntary and anonymous and used to collect as much correct information as possible. As a result of our efforts, we collected 254 responses to our questionnaire from students representing different Bulgarian universities.

The first part of the questionnaire contains questions collecting demographic information of the respondents. The results are presented in Table. 1.

The majority of respondents are between 17-and 22 years old (with a share of 69%), followed by students aged 23-30 (which are 26% of our respondents), and the smallest group is the students over 30 years (approximately 4%). This result is logical, considering that according to the Bulgarian educational system, the sec-

ondary level of education usually ends at 18. At the same time, the majority of our respondents (153 or 60%) are students in Bachelor programmes, followed by the students in Master programmes (34%), and respectively PhD students are the smallest group of respondents (with a share of 5%). In terms of the form of education, the majority of students participating in the survey are in regular form (73%), while 26% of students are in distance learning form of education. The relatively small representation of part-time students could be explained for several reasons: first of all, the regular students are more university-oriented and willing to participate in some voluntary activities that have no direct impact on their current university results. This directly leads to the degree of motivation and engagement between part-time students and the university. For part-time university students, work usually comes as a first priority. Then, the university and study, while for students in a regular form of education, study is the absolute priority for this specific period of their life. Secondly, logically, the main activities of university lecturers are with regular students. Therefore, the direct communication between regular students and lecturers is stronger than between lecturers and part-time students. All this means that the university has to reconsider the manner of engaging part-time students in university activities to involve them more actively in various university projects and initiatives.

Table 1. Demographic profile of the respondents

Specification	Answers in number and %		
Age	Between 17-22 years	Between 23-30 years	Over 30 years
	176 (69,3%)	67 (26,4%)	11 (4,3%)
Educational Qualification Programme	Bachelor degree	Master degree	PhD Degree
	153 (60,2%)	87 (34,3%)	14 (5,5%)
Form of education	Regular/ Full time	Distance learning/ Part-time	
	186 (73,2%)	68 (26,3%)	
Birthplace	Sofia	City, regional centre	Small town/village
	139 (54,7%)	79 (31,1%)	36 (14,2%)
Place of study	Sofia	Big cities	Faculty in small town
	143 (56,3%)	84 (33,1%)	27 (10,7%)

The birthplace of students is relatively clear for the Bulgarian situation, but here, the comparison of results between birthplace and place of study for university students is more interesting. As the birthplace is concerned, half of our responders were born in Sofia (55%), which fact is not surprising due to one very important reason: the urbanization process and regional development for the last decades in Bulgaria transformed the capital Sofia into the country's largest and most economic developed city. There is increased internal migration from small villages and towns to the capital and other big cities. This directly reflects the number of young people born in Sofia and big cities, while the population in other regions decreased. Again, the majority of students and responders in this survey are studying in Sofia (56%), which is explicable, considering that the majority of universities and the biggest universities in terms of the number of students are located in Sofia. At the same time, the research team is also located in Sofia, which also impacts the number of participants in the survey students who study in Sofia.

The second part of the survey contains specific questions devoted to university students' attitudes toward using AI technologies in everyday university life. We started with the fundamental question, "How often do you use technology (such as computers, smartphones, or tablets) for your academic activities?" as a starting point for developing the survey. The questions, along with predefined answers and the results are presented in Figure 2. Most responders claim that they use different technologies several times a day for academic purposes (83%). The other 15% admit that they use it several times a week. Only 2% of our respondents claim they use technology for academic reasons several times a month. Here, maybe the key element in this question is the inter-

pretation of the "academic activities". We purposefully left this interpretation to the students so that we could draw a main conclusion from this question about students' commitment to university activities. For some students, checking for new e-mails in the university mail account was also an academic activity. In contrast, other students interpreted this term more restrictively, such as preparing and working on specific tasks the professors assigned. Whatever the interpretation of this question was, the accumulation of responses indicates that most students use various technologies for academic purposes daily.

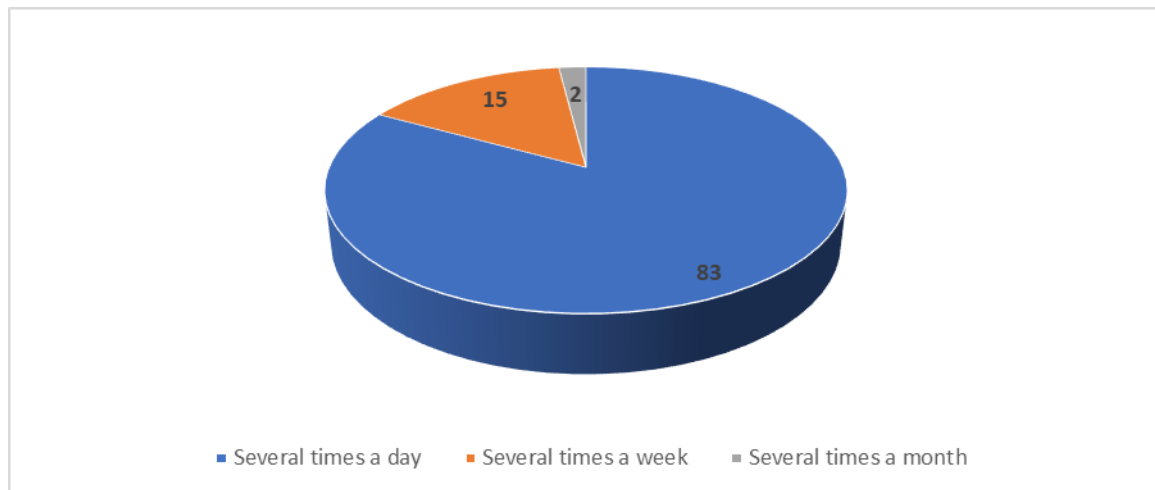


Fig. 2. Frequency of the usage of technology for academic purposes by university students (in %)

The second question was, "Are you familiar with the concept of Artificial Intelligence (AI)?". This question aimed collecting self-assessment of the students about their level of knowledge of the concept of AI. This is the fundamental question, which will give us the main idea of the starting point for the students' understanding of this concept. We ranged the closed answers according to the 5-point Likert scale. The answers are presented in Figure 3.

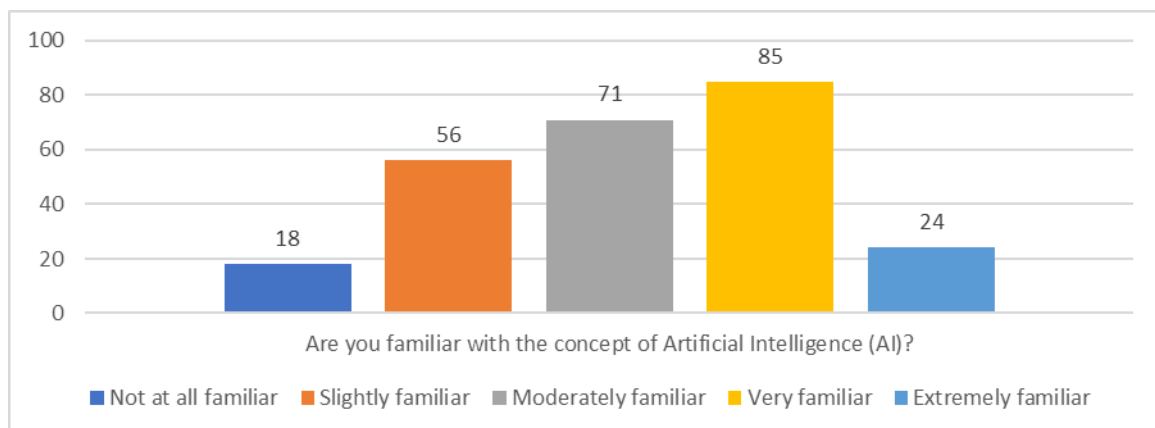


Fig. 3. Self-assessment of the students on their familiarity with the concept of AI

As shown from the figure above, the biggest group of respondents claim they are very familiar with AI (85 persons or 33%) and the other 24 persons (or 9%) believe they are highly familiar with the concept. Here, we also have to focus on 71 persons (or 28%) who consider themselves moderately familiar and the other 56 respondents (or 22%) who admit they are slightly familiar. 18 people assert that they are not familiar at all. These results are not surprising for several combined reasons. First, for young people and the new generation, new technologies and innovations are an invariable part of their daily life. Therefore, they are much more willing to take the time to explore an innovation, especially if it is considered prestigious and fashionable in their circles. From this perspective, the relatively high percentage of people who rate themselves as very familiar with the concept is a logical result rather than a surprising fact. Second, young people are much more pragmatic and practical-oriented than the older generation. Therefore, if they understand that a tool, including

an AI-based one, will benefit them, they will go to the trouble to explore it in preparing various tasks and assignments. At the same time, the question could be tricky to interpret: from one side, the purely theoretical aspect of the concept of AI (which will explain the relatively high level of people choosing moderately familiarity with the concept) and on the other side, some could interpret the question on the actual usage of such type of tools.

“Have you ever used any AI-based tools or applications for academic purposes?” is the next question and collects information on the experience that university students already have with these types of tools. Again, the questions' answers are predefined following the logic of a 5-point Likert scale (Figure 4).

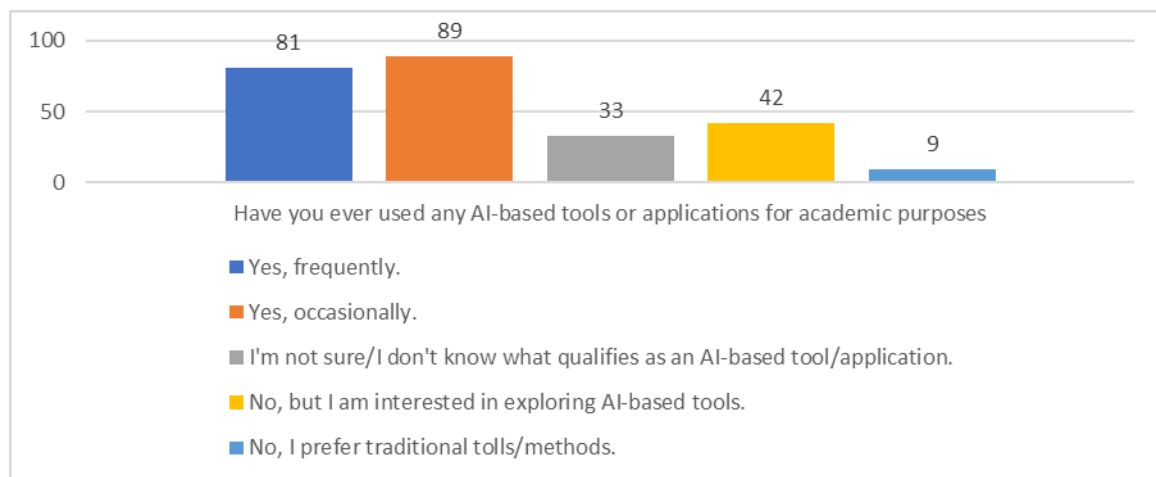


Fig. 4. Usage of AI-based tools and applications from students for academic purposes

Here, the two major groups (in total 170 or almost 70%) of respondents answered positively, with a slight change in frequency. 32% of them claimed that they used AI-based tools frequently, while 35% argued that they used AI-based tools occasionally. At the same time, 33 persons, or 13%, are unsure or need to learn the qualification of AI-based tools and applications. One of the possible explanations for this relatively high level of uncertainty could be that the practice of using AI tools for preparing different tasks has been controversially accepted by university professors so far. We do not have clarity or specific guidelines and rules at the university level allowing or prohibiting the use of AI by students in preparing tasks and assignments. At the same time, 42 persons, or almost 17%, argue that they are interested in exploring such types of tools and applications, and only 9 persons (or 3%) prefer to use traditional methods when preparing tasks.

The next question is, "What areas of university life do you think could benefit from implementing AI technology?". Here, respondents have predefined answers again, and multiple choices are possible.

As seen from Figure 5, most students (232 respondents or 91%) believe that AI will be helpful in teaching and learning activities, including personalized learning and tutoring. The fact that this option was selected from the impressive part of respondents is evidence of the priority of this specific field of implementation of AI in university. Academic life is not just a random mix of different activities, it is a whole new experience. But the heart of this experience is still the learning and teaching activities, whose importance is once again proven through the students' answers.

The second area of AI implementation in universities comes with different administrative processes (chosen by 211 persons or 83%), including admission, registration, and specific other activities. This means that, according to students, the administrative processes could be drastically improved by using AI. Some university procedures are already digitized, but AI could still enhance their effectiveness. Bulgarian universities have already practiced with digital exam protocols, students record, including exam results, etc. However, the analysis of this data, including their usability for the strategic management decisions for the further development of the university and also developing new specific policies (for instance, how to attract new potential students

in Bachelor and Master degrees; how to achieve better attendance in classes and participation and motivation of students to enter in different national and international competitions in their subject field of education etc.).

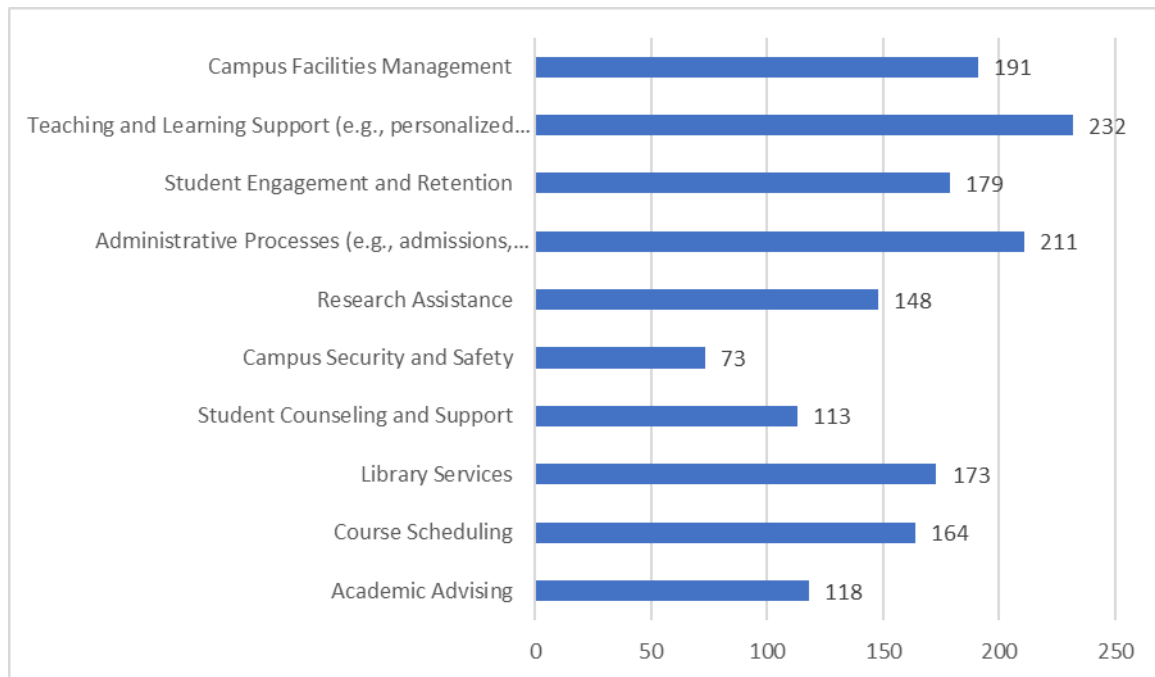


Fig. 5. Possible areas of applying the AI-technology in university

The third place is for Campus facility management, with 161 preferences and a share of 63%. The relatively high level of this implementation of AI in universities, claimed by students, could also be interpreted as their desire to improve the overall management of the campus further. AI technologies could improve operational efficiency and enhance the campus environment's overall quality for students, academic and administrative staff, and visitors. By integrating AI-driven solutions into facility management practices, universities can achieve cost savings, sustainability goals, and user satisfaction while effectively using campus resources.

The fourth place is for the student's engagement and retention, a position chosen by 179 persons and a share of 71%. AI technologies offer potent capabilities for enhancing student engagement, retention, and success in universities by providing personalized support, proactive interventions, and data-driven insights to support students' diverse learning needs and help them achieve their academic goals. By integrating AI-driven solutions into teaching, learning, and student support services, universities can create more inclusive, supportive, and effective learning environments that foster student success and retention.

Very close to the previous result is the option of the Library Services, which is recognized by 173 and has a share of 70%. At first glance, this is the most understandable option – a combination of Library services and AI, which will be helpful in many student activities, including task preparation, exam preparation, individual tasks, etc. At the same time, AI could be considered a modern tool to return young people to libraries and give libraries new opportunities for future development in the digital era. It is a very satisfying result that, according to university students, using AI in the library is considered relatively high in the ranking. Perhaps it is their very pragmatic point of view, but still, this could be the possibility of a new future strategy for library services and development.

Next comes the option for Course Scheduling, which is selected by 164 persons with a share of 64%. AI can be utilized for university course scheduling in various ways, leveraging its data analysis, optimization, and decision-making capabilities. AI algorithms can analyze vast data, including course offerings, student preferences, lecturers' availability, room capacities, and scheduling constraints. AI can generate schedules that minimize conflicts and maximize resource utilization by applying optimization techniques, such as genetic algorithms or simulated annealing. AI offers powerful capabilities for optimizing university course scheduling and

improving efficiency, responsiveness, and satisfaction for students, professors, and administrators alike. By harnessing AI technologies, universities can create more streamlined, personalized, and effective scheduling processes that enhance the academic experience.

Research Assistance was chosen by 148 persons or 58% of respondents. AI can be a valuable tool for providing research assistance to university students. AI-powered tools can help students conduct comprehensive literature reviews by analyzing vast repositories of academic papers, journals, and research articles and retrieving information from online databases, libraries, or educational resources.

118 respondents (46%) shared the selected Academic Advising option. AI has the potential to revolutionize academic advising by providing personalized support, predictive insights, and data-driven decision-making tools that empower students to achieve their educational and career goals effectively. By integrating AI technologies into academic advising practices, universities can enhance student engagement, retention, and success across diverse student populations.

Student Counselling and Support is the next option, outlined by 113 respondents and 44% share. Students may not as well recognize this implementation field as it is its potential. AI can drastically enhance the capacity of universities to provide accessible, responsive, and personalized counselling and support services to students, ultimately promoting their mental health, well-being, and academic success. However, it's crucial to complement AI-driven interventions with human support and oversight from trained counsellors, mental health professionals, and other campus resources to ensure comprehensive and holistic student support.

Campus security and safety takes the last position in this ranking, with a share of 29%. This low result could be explained by the country's relatively high level of security and safety. Still, it is a very important aspect where AI can lead to overall improvement. Although university students neglect this subject, the university management must embrace the opportunity to strengthen campus safety and security. AI can provide proactive threat detection, real-time monitoring, and intelligent response capabilities. By leveraging AI-driven solutions with traditional security measures and human oversight, universities can create safer and more secure environments for students, faculty, staff, and visitors.

The next two questions assess the possible technological solution in two fundamental aspects. The first one is devoted to administrative services and reads: "Do you believe that AI can improve the efficiency of administrative tasks within the university (e.g., admissions, enrollment, scheduling, etc.)?". Here, predefined answers were structured using the 5-point Likert scale (Figure 6).

Nothing surprising is the results achieved in this question. An impressive part of 175 persons, or 69% of respondents, agree with the statement that AI can improve administrative procedures. Only 19 people think AI cannot help universities in these specific activities, and the other 14 people cannot decide. Our responders highly appreciate the apparent potential of AI for improving administrative tasks and services.

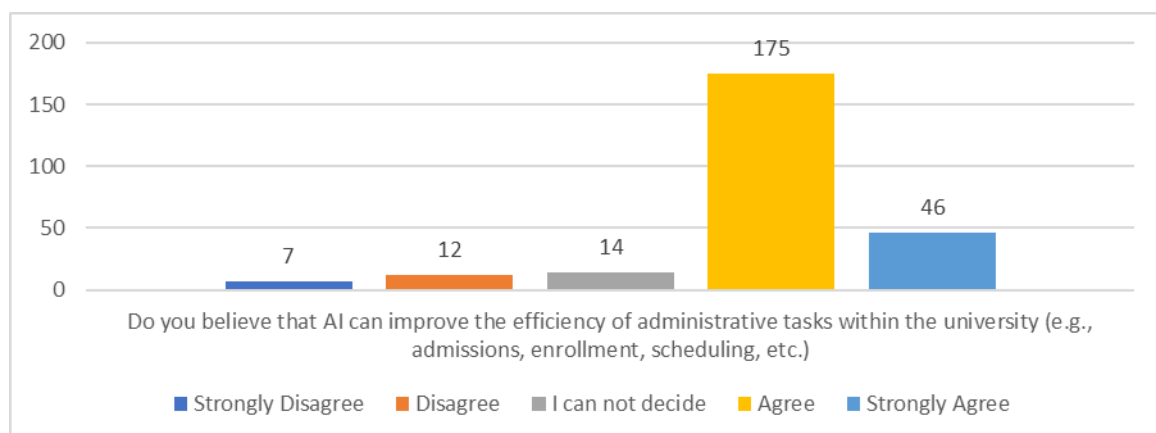


Fig. 6. Intentions on the improvement of administrative services of universities by using AI

The next question collects the students' opinions on using AI in assessment. The following question is: How comfortable would you be with using AI for grading assignments or exams? Results are presented in Figure 7.

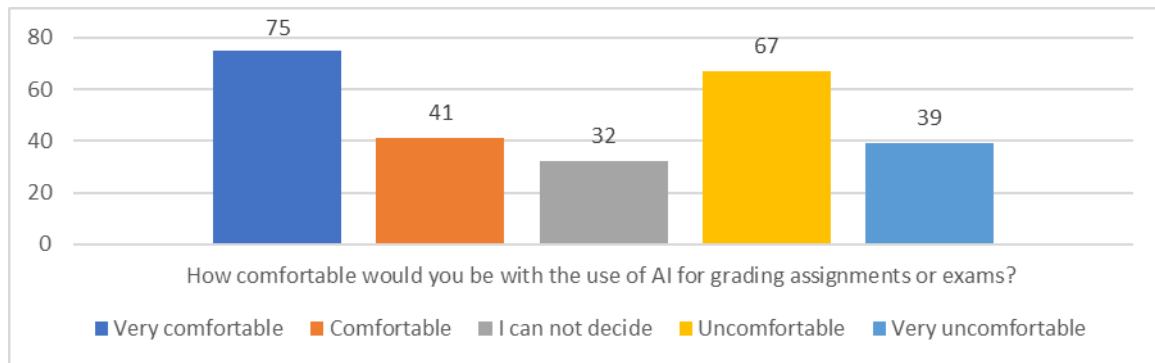


Fig. 7. Students' attitude on their assessment using AI technologies

As shown in the figure above, the answers have no clear preference. Notably, the greatest accumulation of responses is on the highly positive attitude chosen by 75 persons (almost 30%). This means that 30% of our respondents claim they are comfortable using AI for grading assignments or exams. If we add the number of people who answered positively to this question, we get 116 approvals (or a share of 46%). At the same time, the total number of people who stated that they would not feel comfortable using AI in their assessment is 106 (or 42%). Therefore, the answer to this question divides our respondents almost equally. At the same time, it should be noted that most positive opinions on this question are concentrated to the extreme degree – "very comfortable"- while the disapproval opinions are focused to the "uncomfortable" degree. The number of people choosing the option "I cannot decide" remains relatively high, considering the actuality of the topic and, in general, the attitude of young people towards the use of new technologies (32 or 12%).

The next question explores university students' attitudes toward the ethical aspects of using AI in universities. The question is the following: "In your opinion, what are the potential ethical concerns associated with using AI in universities?" Students had the possibility of multiple choice of predefined answers. Results are presented in Figure 8.

According to the answers accumulation, there are four leading ethical aspects of using AI in university for university students. First place, with the highest result, is the threat of "depersonalizing the learning experience, diminishing the role of human interaction" (217 votes or 85%). This answer is followed by the "lack of possibility to disagree with the exam result" (215 votes or 84%). Therefore, due to the insignificant difference in the results (2 votes), these are the two top concerns of students. In third place comes the lack of possibility of the right to choose whether or not to use AI for education (with 208 votes), followed by the threat of broken relationships between professors and university students (195 votes).

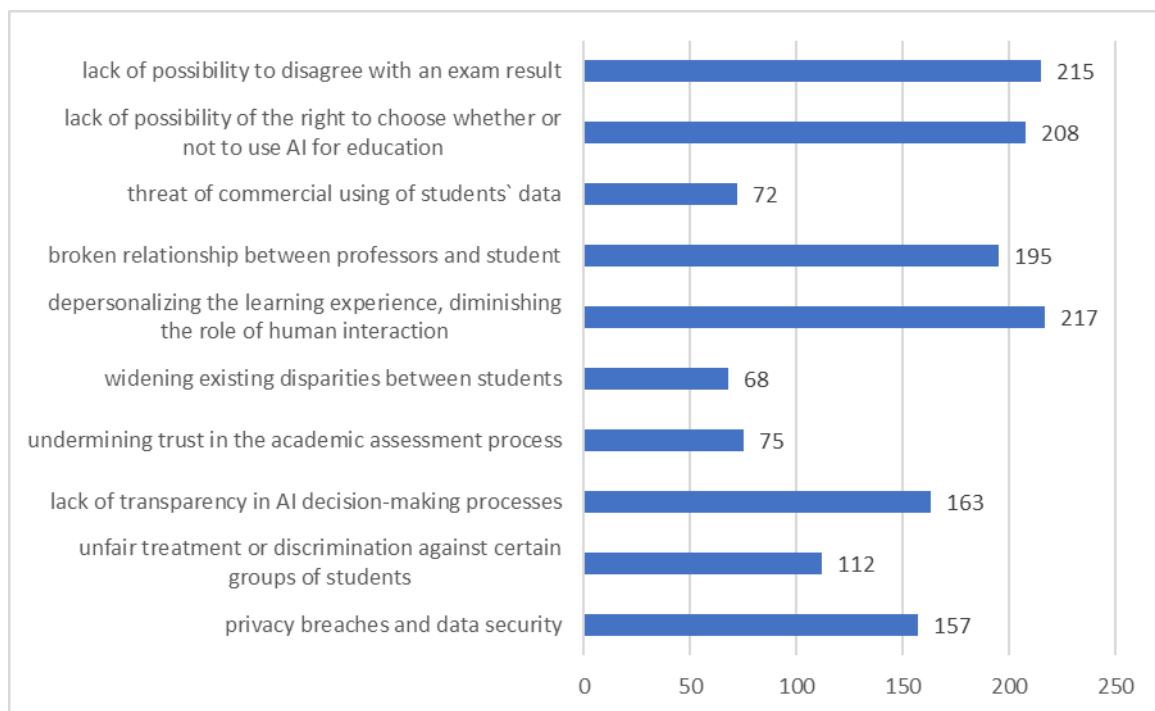


Fig. 8. Ethical aspects of using AI in universities

In the last three positions, with the fewest votes, are the answers "undermining the trust in the academic assessment process" – 75 votes, "threat of commercial using of student's data" - 72 votes and "widening disparities between students" – 68%. Most of our respondents do not recognize these three options as severe ethical threats.

The next question is, "Would you prefer AI-based tutoring or personalized learning systems over traditional teaching methods?". Again, answers are structured according to a 5-point Likert scale.

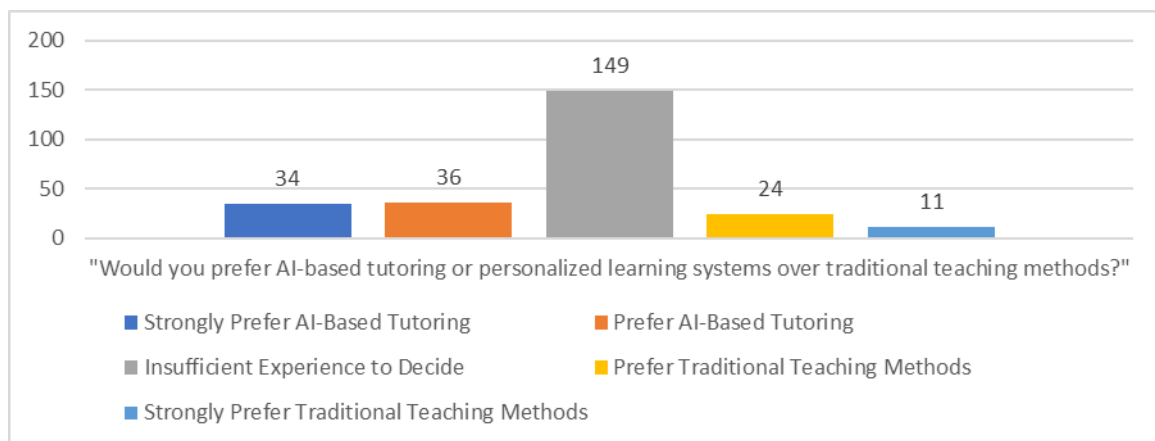


Fig. 9. Preferences of types of tutoring

The results show that most of our respondents define themselves as people with insufficient experience to judge their preferences between traditional tutoring or AI-based (149 or 59%). At the same time, the two groups supporting AI-based tutoring collected 70 votes in total (or 27%), while proponents of traditional tutoring remain barely 14% (Figure 9).

The question is: "Would you be interested in participating in workshops or training sessions on AI technology offered by the university?" Again, the answers to this question were predefined according to the 5-point Likert scale.

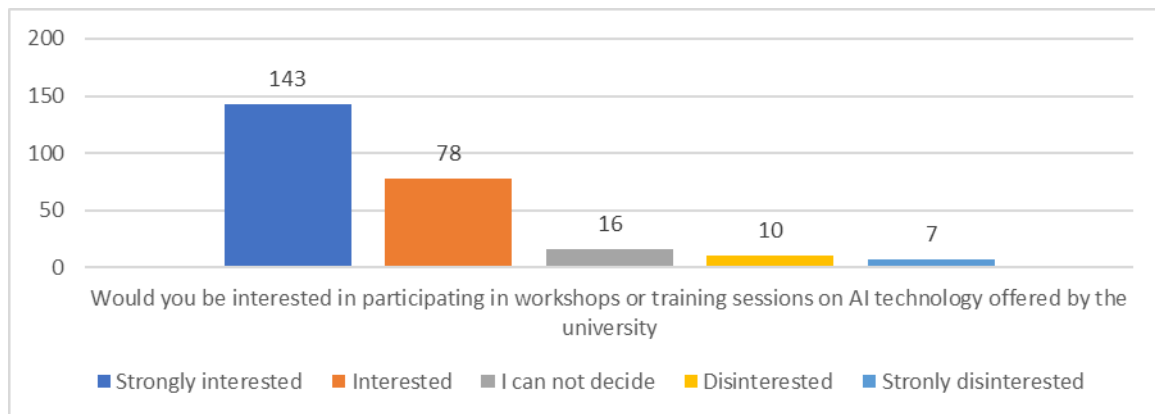


Fig. 10. Potential participation in training on AI technology

The results in Figure 10 are clear and definite – 221 persons, or 87% of our responders, claim their positive decision to participate in a workshop or training session devoted to AI technology organized by the university. This makes such training a horizontal issue, with massive interest among students despite their university major. Only 7 people expressed their strong disinterest, which could be defined as an insignificant share, and the other 16 could not decide. It should be borne in mind that this hesitation may be due to the subject of study itself - AI-based technologies, but it may also be related to other, radically different reasons - such as a busy schedule, personal commitments, etc. However, most respondents are very positive and open to such opportunities.

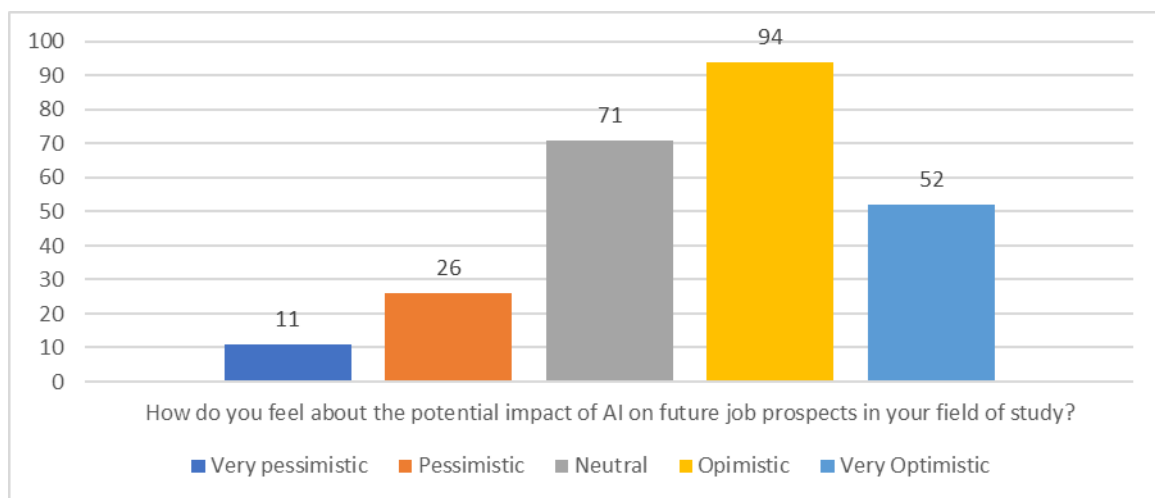


Fig. 11. Potential impact of AI on future job prospects in the field of study of responders

In general, students assess the impact of AI technology on their future job prospects very positively (Figure 11). Only 37 persons (or 14,5%) believe that AI will negatively impact their job opportunities in the field of study. At the same time, 94 persons are optimistic, and the other 52 are very optimistic about their future professional realization despite the presence of AI. This significant 57% of all respondents in the two degrees of optimism could be interpreted differently. First of all, it could be considered as pure acceptance of changes due to technological development. Young people are usually more willing to accept any changes, and the new generation that is born and raised with the latest technologies and innovations is usually positively oriented to the impact of AI on their professional and social lives. Second, it is also possible that students (especially in the first few years of their university education) do not have a clear idea of the specifics of professional life and, therefore, perceive the impact of AI only positively.

Next following is "How confident are you in your ability to use AI tools and technologies for academic or research purposes?" The two options of confidence collect the majority of votes, with a predominance of "con-

fident" (chosen by 78 persons) over "very confident" (selected by 63 respondents). 47 people claim they are unconfident in using AI tools and technologies, and 32 need to be more confident. At the same time, 34 people remain neutral on this question. However, 141 or 55,5% of students participating in the survey claim different levels of confidence in using AI for academic purposes (Figure 12).

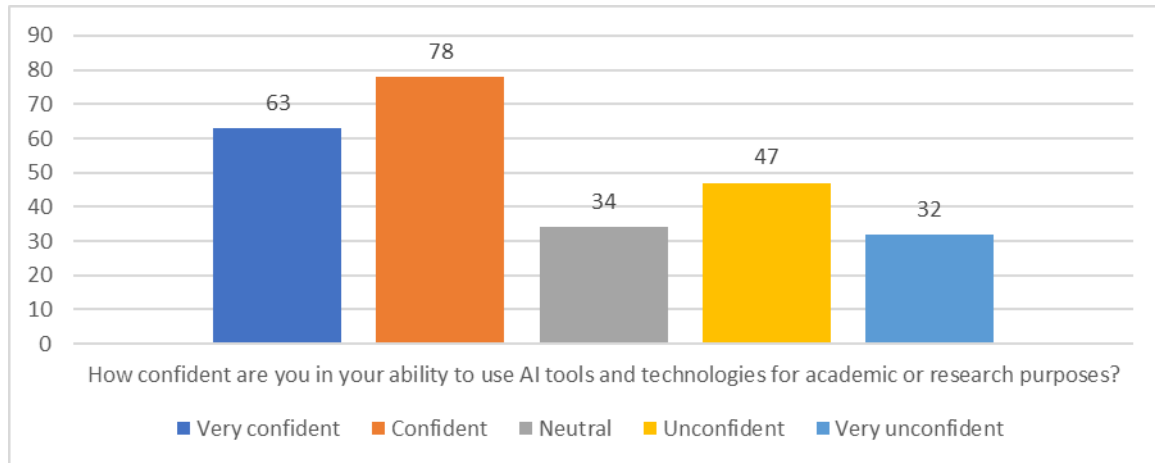


Fig. 12. Self-assessment of confidence of students to use AI tools for academic purposes

The following question focuses on the university's future strategy and the role of AI in this development. The question is, "Do you believe universities should invest more resources in AI research and development?" Here, the picture is obvious – the majority of respondents answered "yes" (198 or 78%), and only 15 persons chose "no" (6%). At the same time, we have 41 persons who cannot decide (16%). According to students, the future development of universities is closely connected with AI and AI-based technologies, and universities have to invest purposefully in this direction (Figure 13).

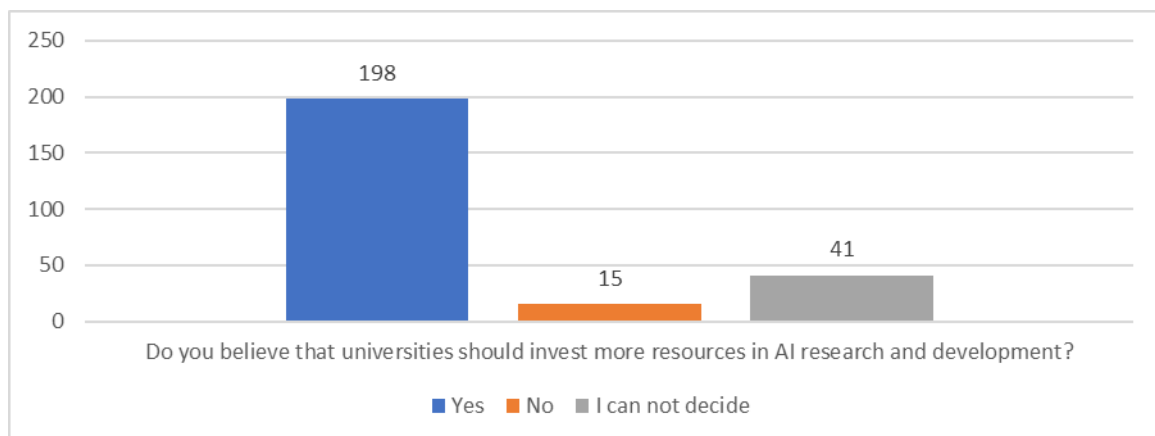


Fig. 13. Future investments of universities in AI development

The results of the question "How important do you think it is for universities to prioritize teaching AI-related skills and knowledge to students across different disciplines?" are presented in Figure 14. Once again, the majority of responders define such a topic as important or very important – 164 (or 65%). The surprising thing in the answer is that nearly 20% of the respondents chose the two options because of the unimportance of this learning topic. Perhaps one of the possible explanations for this relatively high percentage is that such students consider themselves sufficiently competent and sufficiently familiar with AI technologies. For them, such kind of training will be a waste of time.

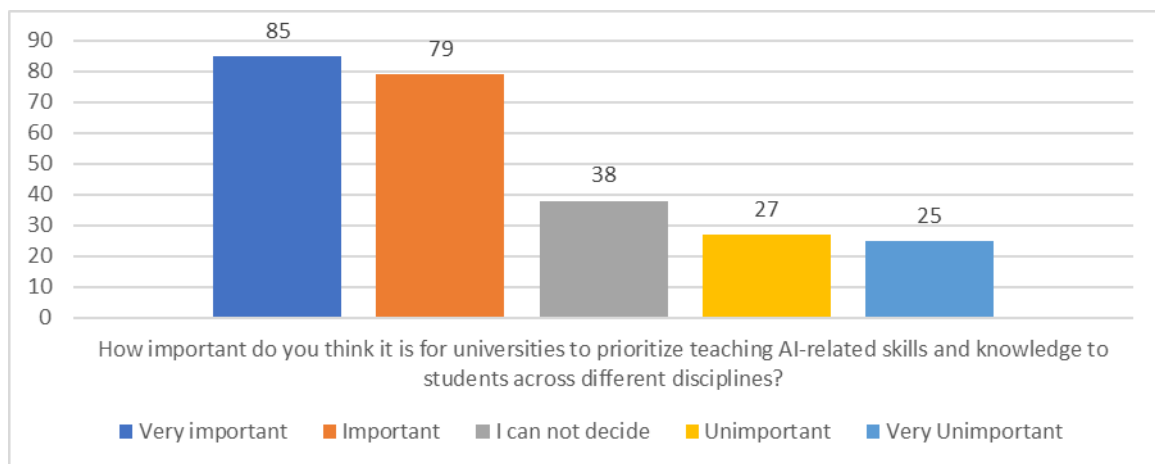


Fig. 14. Importance of teaching AI-related skills and knowledge in universities

The survey's last question is the following: "How do you think AI can contribute to improving the overall educational experience for university students?" The first three leaders of answers, receiving the most votes, are connected with personal customization, learning experience, and the possibility of digital evaluation. The first answer, according to the number of preferences, is "tailored learning platforms" (207), followed closely by the customized learning experience (201, only 6 votes difference), and third place is for the computerized/digital evaluation (198). The last option is the possibility of facilitation of group projects, which needs to be more broadly recognized as the possibility of improving the educational experience.

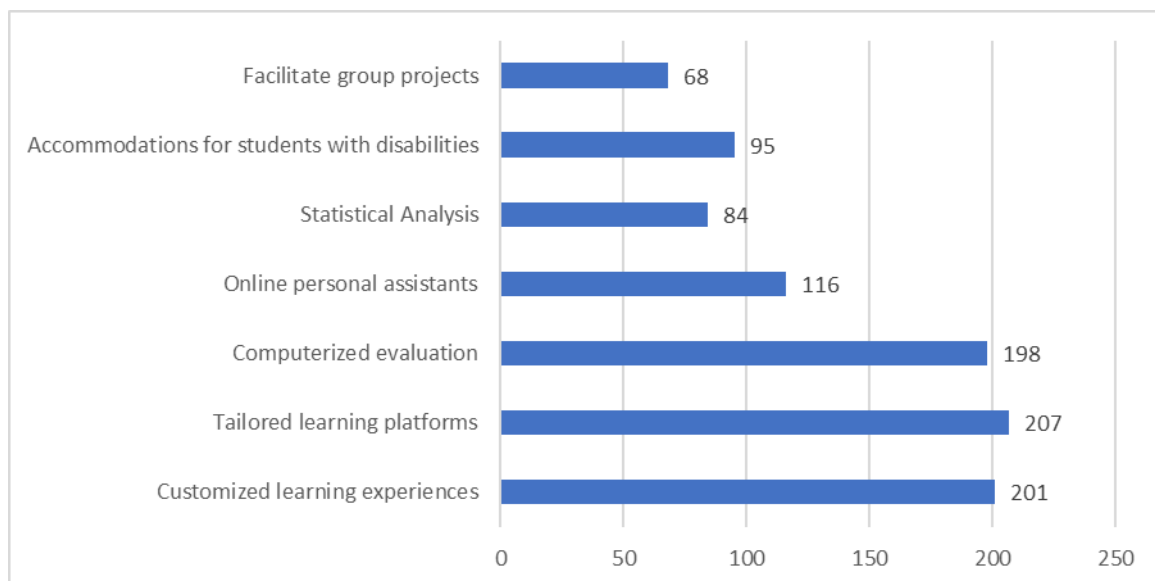


Fig. 15. Possibility of improving the overall educational experience of university students

In summary, the general viewpoints held by university students regarding AI remain optimistic (Figure 15). Still, their opinions vary and are shaped by many factors, including their level of interaction with AI technologies. According to the survey, most students eagerly embrace AI, recognizing its capacity to enrich educational endeavours and streamline various aspects of university life. Conversely, some minor cohorts harbour reservations, expressing apprehensions about potential job displacement, ethical quandaries, and privacy infringements associated with AI technologies.

5. Conclusion and recommendations

In conclusion, integrating Artificial Intelligence technologies within universities signifies a pivotal juncture poised to revolutionize the landscape of higher education. This transformative potential extends across teaching, learning, and research, offering many opportunities to reshape traditional practices and enhance the educational experience for all stakeholders.

By leveraging the capabilities of AI-driven solutions, universities stand to unlock a wealth of benefits. Notably, implementing AI promises to foster personalized learning experiences tailored to individual students' unique needs and preferences. Educational content can be dynamically curated and delivered through adaptive learning platforms and intelligent tutoring systems, catering to diverse learning styles and fostering deeper engagement and comprehension.

AI presents unprecedented opportunities to streamline administrative processes and optimize resource allocation within university ecosystems. From admissions and enrollment management to course scheduling and student support services, AI-powered systems can automate routine tasks, alleviate administrative burdens, and enhance operational efficiency, enabling institutions to redirect resources towards more strategic initiatives and student-centric endeavours.

Furthermore, the integration of AI technologies holds profound implications for advancing the frontiers of academic research and innovation. By harnessing the capabilities of AI in data analysis, predictive modelling, and computational study, scholars can unlock new insights, accelerate discoveries, and address complex societal challenges.

However, the successful adoption of AI in universities necessitates a nuanced approach that prioritizes ethical considerations, privacy protections, and equity principles. As AI algorithms increasingly shape decision-making processes within educational contexts, there is a pressing need to ensure transparency, accountability, and fairness in algorithmic outcomes. This requires robust governance frameworks, ethical guidelines, and mechanisms for addressing biases and mitigating unintended consequences.

Safeguarding the privacy and security of student data is paramount in an era marked by heightened concerns over data breaches and unauthorized access. Universities must implement robust data protection measures and adhere to regulatory standards to uphold the trust and confidence of students and other stakeholders.

As AI technologies evolve, universities must commit to ongoing evaluation and improvement to ensure that AI-driven initiatives align with institutional objectives and educational values. This necessitates a culture of continuous learning and adaptation, wherein feedback mechanisms and performance metrics are leveraged to refine AI algorithms and enhance their efficacy and reliability over time.

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