ATTITUDES OF PRE-SERVICE BIOLOGY TEACHERS TOWARDS THE APPLICATION OF CHATGPT IN THE UNIVERSITY LEARNING PROCESS

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Abstract

The rapid advancement of artificial intelligence (AI) has brought about both positive and unforeseen negative consequences. Despite the widespread media coverage and adoption of AI, there remains a persistent lack of comprehension surrounding its intricacies. Chat GPT, a chatbot powered by AI, offers users an intuitive and personalized experience, functioning as a valuable tool that greatly enhances human capabilities and productivity. This paper presents the findings of a survey-based study that explores students' understanding of AI and their attitudes towards its integration into the learning process. The research framework was developed based on an extensive review of relevant literature, which examines the relationship between attitudes, behavior, and acceptance of AI in university education. The questionnaire, comprising nine questions (some with sub-questions), investigates various aspects of this conceptual model. The study was conducted online during the period of February to March 2023, with 120 students aged 19-23 participating through a provided link to a Bulgarian-language questionnaire. 81 acquired responses are analyzed in the paper. Descriptive statistics and analysis of respondents' opinions were employed to examine the collected data. The results reveal that participating students: (a) perceive Chat GPT as capable of addressing specific queries related to certain concepts and offering alternative learning support; (b) predominantly utilize AI writing tools, such as Chat GPT, for tasks such as homework preparation, overcoming writing difficulties, composing essays, and meeting tight assessment deadlines; (c) express an inability to evaluate the quality of information provided by Chat GPT, often interpreting the use of the writing tool as deceitful; (d) hold mixed views regarding the benefits of Chat GPT in the realm of learning and teaching. This ambivalence diminishes the positive impact attributed to the perceived usefulness of Chat GPT in the students' learning journey.

Keywords: ChatGPT, Artificial Intelligence in Education, online survey, pre-service biology teachers, AI ethics.

1 INTRODUCTION

Artificial Intelligence (AI) has revolutionized education by powering chatbots, which replicate human-like conversations and respond thoughtfully to user inquiries [1]. These AI-driven chatbots comprehend natural language, adapting responses based on context. They offer personalized learning experiences, aid in information retrieval, and handle tasks like language translation and problem-solving [2]. Integrating AI in chatbots transforms the educational landscape, engaging and supporting learners effectively. However, as AI technology advances, collaboration among educators, researchers, and policymakers is crucial to harness its potential while addressing ethical and social implications [3]. By leveraging AI-powered chatbots, education can be transformed through personalized learning, improved instructional support, and data-driven decision-making [4].

The adoption of educational chatbots is on the rise due to their ability to engage students and provide personalized learning experiences. Particularly beneficial in online classes with many students, chatbots offer instant access to course content, assignments, rehearsal questions, and study resources. They interact with students individually or facilitate collaborative learning activities. Chatbot interactions utilize various communication modes, enhancing educational task performance. Overall, chatbots provide a cost-effective and efficient way to boost student engagement and offer personalized support in education.

In recent months, many articles have been published, both general and scientific, for and against the use of this tool in the classroom. There is no educational level that is not affected by this controversial issue, from K-12 [5] to higher education [6]. And no key actor in the educational process can avoid their participation, from students to teachers, policymakers, parents, administrators, etc.

What is unquestionable is that AI is here to stay [7] and everyone has a role to play in the implementation process. But things are moving too fast for education and the motto “no one will be left behind” is difficult to achieve. According to UNESCO [8], less than 10% of schools and universities have formal policies on AI. This figure comes from a global survey of more than 450 schools and universities and shows the doubts about how to face the incorporation of AI, including the generative type used by ChatGPT, in the normal development of education.

It is therefore important to know what are the concerns that affect the implementation of this technology for all the actors involved. In [9] some of these concerns are explained. One of them is the possibility of cheating and plagiarism [10]. However, the idea of using AI as an educational tool is gaining [11]. Innovative methodologies and strategies [12] are emerging to help teachers and students, but the problem is to get them arrive to their objective public.

Today the main concern about ChatGPT application in higher education is associated with academic integrity. The concerns are mostly related to the increased risk of plagiarism and cheating if students use ChatGPT for preparation or written works. This may have deeper implications for subjects that rely more on written inputs or information. There are also concerns about detection tools plagiarism – how effective and credible they are. Meanwhile, many higher education institutions around the world have banned ChatGPT due to concerns about academic ethics, and others have updated or changed the way they grade - grading is mainly on non-written assignments and those solved in class [13].

2 METHODOLOGY

The article delves into a comprehensive exploration of students' perceptions and attitudes toward artificial intelligence (AI) and its integration within the realm of the educational process. Through a meticulously designed survey, the research endeavors to shed light on the intricacies of students' understanding of AI and how they perceive its potential within the learning environment.

To construct the conceptual framework of this study, extensive literature review was conducted, focusing on the correlation between attitudes, behaviors, and the adoption of AI in higher education. The resultant conceptual model provided a solid foundation for the survey, enabling a systematic investigation into various aspects related to students' attitudes and behavioral inclinations concerning AI.

The survey questionnaire, meticulously crafted in line with the conceptual model, encompasses a total of 9 questions, some of which further branch out into sub-questions. These questions are strategically designed to address specific elements of the conceptual model, thus facilitating a comprehensive and detailed understanding of the subject matter.

The data collection for this study took place in the online domain during the months of February and March in the year 2023. A web-based survey link provided in Bulgarian was distributed to a target group of 120 students preparing to become biology teachers at Sofia University "St. Kliment Ohridski". The students aged between 19 and 23 years. The inclusion of an online platform for data collection ensured a broader reach and ease of participation, allowing for a diverse and representative sample of respondents.

Following the data collection phase, a rigorous analysis was undertaken, employing descriptive statistics and a detailed examination of the frequencies of respondents' opinions. This analytical approach allows for a robust understanding of the various dimensions of students' perspectives on AI and its potential role in the educational landscape. The meticulous examination of the gathered data enables meaningful insights and paves the way for informed discussions and conclusions regarding the integration of AI in educational practices.

3 RESULTS

The survey was completed by 81 students. Most of them - 77 (95,1%) study at the bachelor's degree, and only 4,9% study at the master's degree (Figure 1).

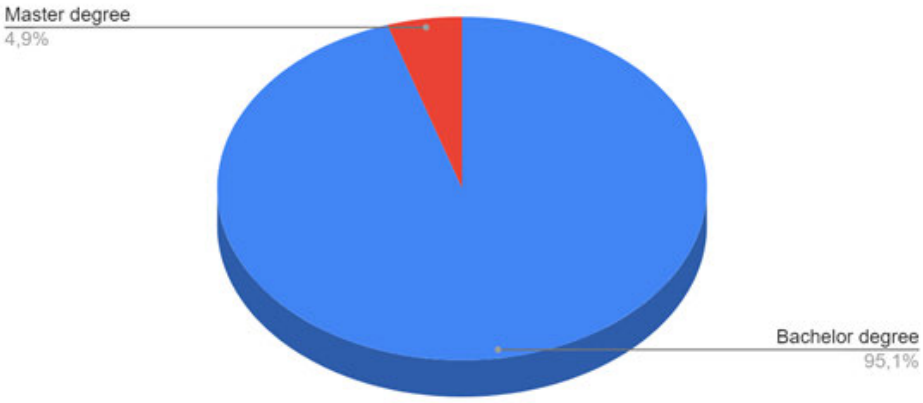

Figure 1. Profile of the respondents depending on the degree

The relative share of respondents studying in the first, third and fourth year is approximately the same (34,6%, 3,.9% and 33,3%, respectively). Students who are in their second year of study are only 1.2% of the respondents (Figure 2).

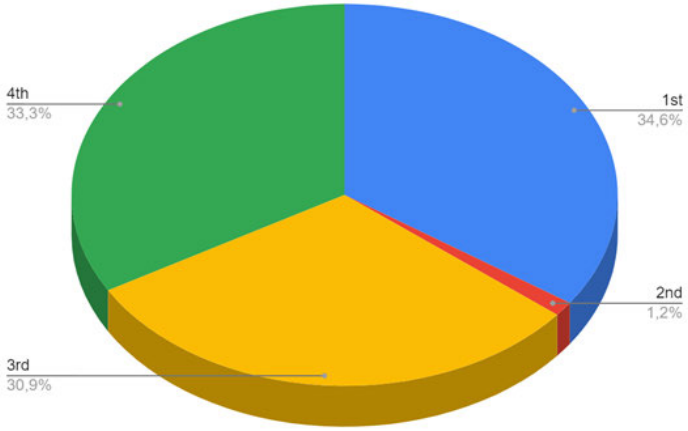

Fig. 2. Profile of the respondents depending on the year of study

Most of the respondents were female (70,4%), with a smaller relative share of males (28,4%) (Figure 3).

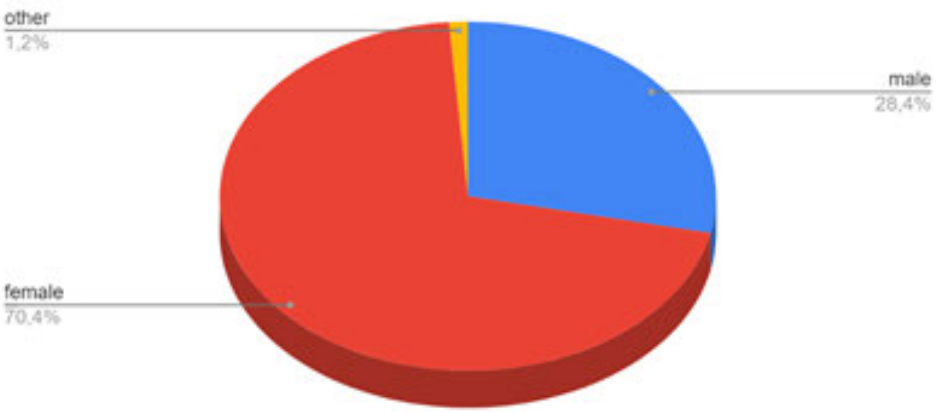

Fig. 3. Profile of the respondents depending on the sex

For the study, it is of interest for what purposes students use ChatGPT. The largest number of respondents who use it for preparing their homework is 53 students (with a relative share of 27,5%). The relative share of students who use ChatGPT for writing an essay and writing a term paper/term project is the same – 23,8% (46 students). Respondents use this Chatbot in case of questions arising in connection with training in a specific scientific discipline (27 students with a relative share of 14%), and also when solving a test or home test (19 students with a relative share of 9,8%). One of the actors uses ChatGPT for other purposes (Figure 4). (Students may choose more than one answer for this question.)

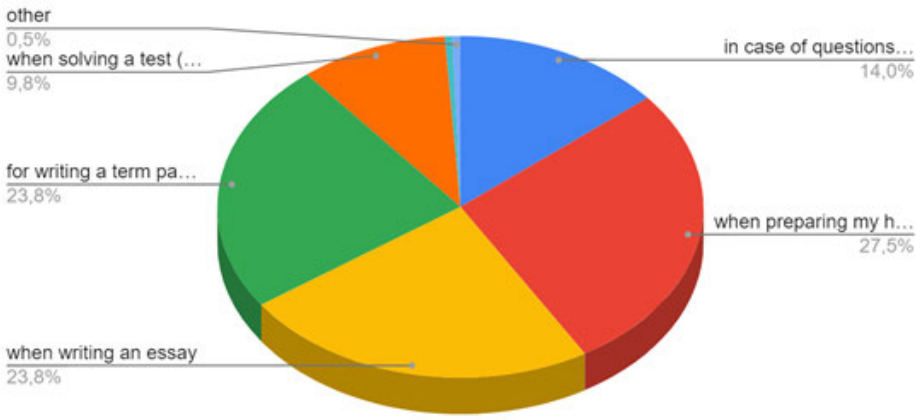

Fig. 4. Purposes for which students use ChatGPT

Another aspect of interest is related to the reasons why students use ChatGPT for learning purposes. Most respondents use this Chatbot for difficulties with writing skills – 53 students with a relative share of 31,2%. The number of those who answered that they use it for difficulties in understanding tasks and for the need to meet short deadlines for the submission of written works is approximately the same (respectively 45 and 41 students with a relative share of 26,5% and 24%). The relative share of students whose motives are related to lack of sources on the researched problem (assigned task, thematic area) is slightly lower - 28 students with a relative share of 16,5%. In the answers "Other", 3 students with a relative share of 1,8% wrote "I don't use the software.", "Makes work a lot easier.", "It reviews a large volume of information that I don't have the physical time to read."

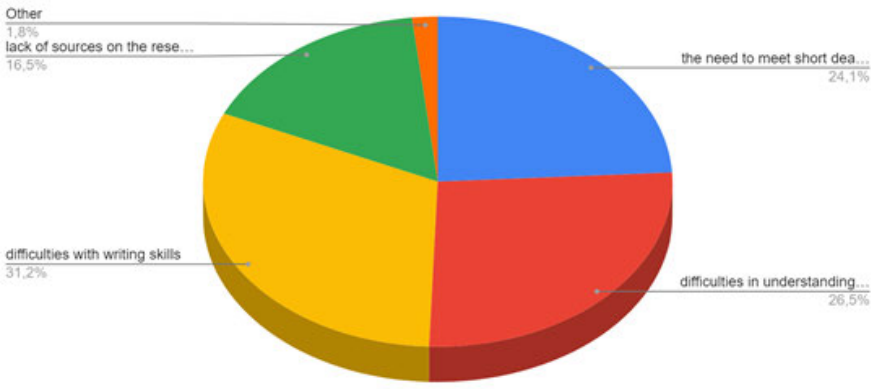

Fig. 5. Purposes for which students use ChatGPT

Table 1 presents the results of a survey question related to students' opinion about what it is appropriate to use ChatGPT for. The question covers the following criteria: selection of textual resources, creativity, writing, active learning, differentiated / personalized learning.

The table clearly shows the student opinion on what it is appropriate to use. Most students think that ChatGPT is suitable for helping to generate initial ideas to develop further, helping develop own creative ideas, providing a variety of resources on a given topic and helps students to ask their questions without worry. Based on the findings, it is evident that students hold a favorable view towards the "creativity" aspect of ChatGPT. However, a lesser number of participants recognize its usefulness in text resource selection, writing, active learning, and differentiated or personalized learning.

Table 1. Results of students' opinion of what it is appropriate to use ChatGPT for

Possible answers (any applicable can be chosen)	***SA***	***A***	***N***	***DA***	***SDA***
Providing a variety of resources on a given topic	28	24	16	5	8
Helping to generate initial ideas to develop further	35	29	12	4	1
Helping you develop your creative ideas	29	29	15	5	3
Full realization of your idea	17	28	21	12	3
Obtaining a completely finished product - an idea and its complete implementation	18	31	16	8	8
Support in the development of digital competences	22	41	14	2	2
Improve writing style	18	28	27	7	3
Improving the way of expression	17	32	18	8	6
Spelling improvement	17	19	25	8	12
Supports active learning (including questioning)	24	33	18	3	3
Helps students to ask their questions without worry	29	33	15	1	3
Provides answers at different levels, depending on the individual questions of the students	23	29	19	3	7
Supports a deeper understanding of the material	17	33	16	6	9
Assists in the analysis and understanding of literary sources	24	26	16	5	10

In the table, SA stands for Strongly agree, A for agree, N is “Cannot decide”, as D is for Disagree and SDA for Strongly disagree. The figures in the columns represent the number of the students who responded.

The research aimed to assess how students perceived the information provided by ChatGPT, resulting in the following findings. A significant portion of the respondents (39 students, constituting 48,1%) were unsure about the quality of the information. Subsequently, there were students (27 students, making up 33,3%) who believed that the information obtained from ChatGPT was quite good. In contrast, a smaller portion of the participants (10 students, accounting for 12,3%) thought that the information from ChatGPT was subpar. A slight percentage of students (4 students, representing 4,9%) rated the information as exceptionally high quality. Notably, only one respondent rated the information as extremely poor in quality (Figure 6).

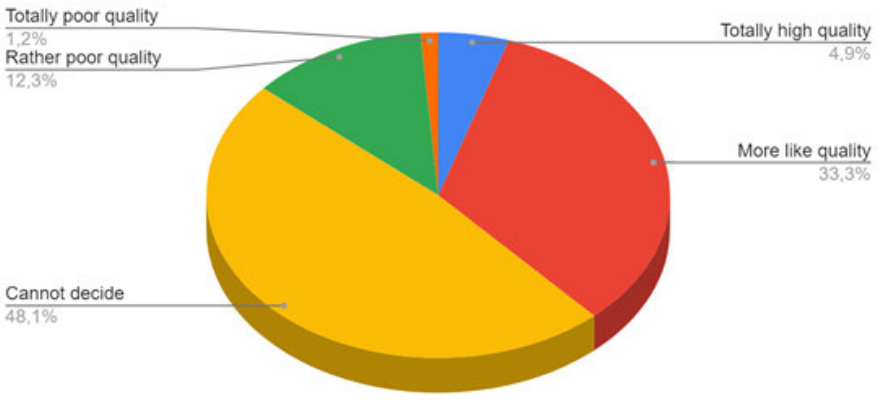

Fig. 6. Rate the quality of information you receive from ChatGPT

Regarding the inquiry on whether participants would suggest employing ChatGPT for aiding learning, an equivalent number of respondents replied with either "rather yes" or expressed uncertainty (25 students, making up 30,9%). A slightly smaller proportion (22 respondents, constituting 27,2%) indicated a definite recommendation for utilizing the Chatbot. Conversely, a minor subset of respondents (7 students) leaned towards "rather no," and a mere 2 students (with a relative share of 2,5%) firmly opposed recommending ChatGPT for educational support (Figure 7).

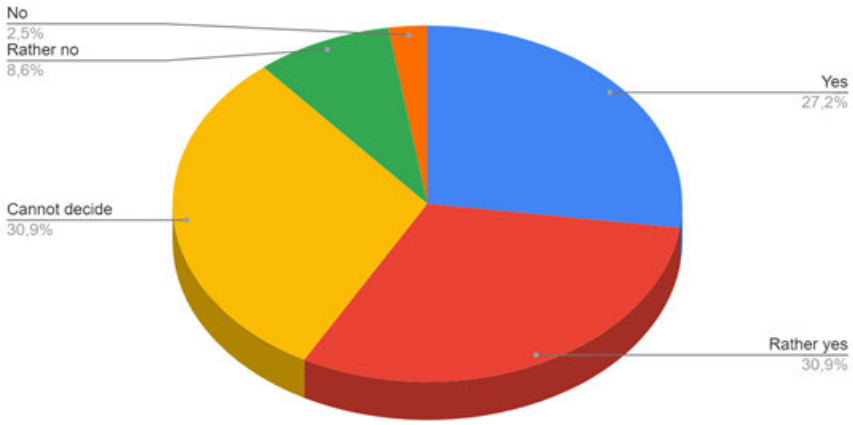

Fig. 7. Question about respondents' willingness to recommend other learners to use ChatGPT to support their learning

The results of the question related to approval regarding the use of ChatGPT during classroom training (lectures, exercises, seminars) are interesting. More than half of the respondents (49 students with a relative share of 60,5%) do not approve of using the Chatbot, 17 students with a relative share of 21% approve of its use in class, and 15 students (with a relative share of 18,5%) cannot decide (Figure 8).

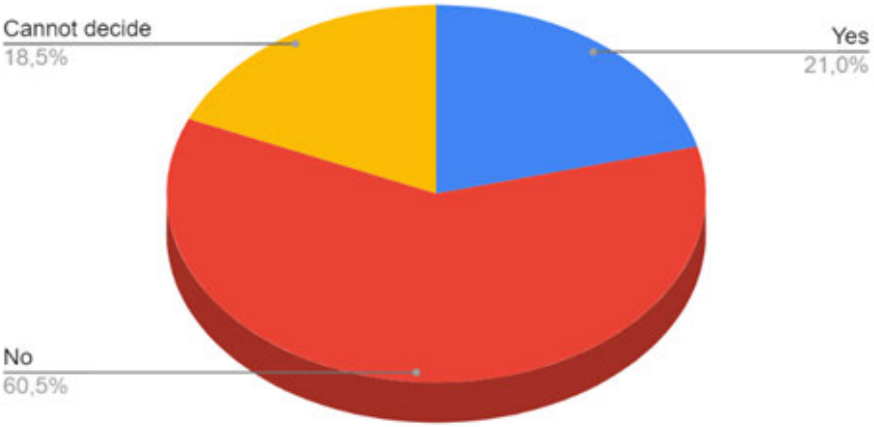

Fig. 8. Approval regarding the use of ChatGPT during classroom training (lectures, exercises, seminars)

The next question from the survey related to the need to teach students how to use ChatGPT in a formal learning process. Most of the respondents (67 students with a relative share of 82,7%) answered that they did not need training (Figure 9). Only 14 of the students (with a relative share of 17,3%) believe that they need training. Here are some quotes from their answers: "I don't know how to formulate my searches in the most precise way, and I'm more likely to come up with something.", "How to set my assignment more precisely.".

Building a plan or drawing up tables and solving complex problems that make it difficult for the student. for questions.", "For setting search requests.", "To what extent it is allowed to be used in the preparation of assignments related to the learning process."

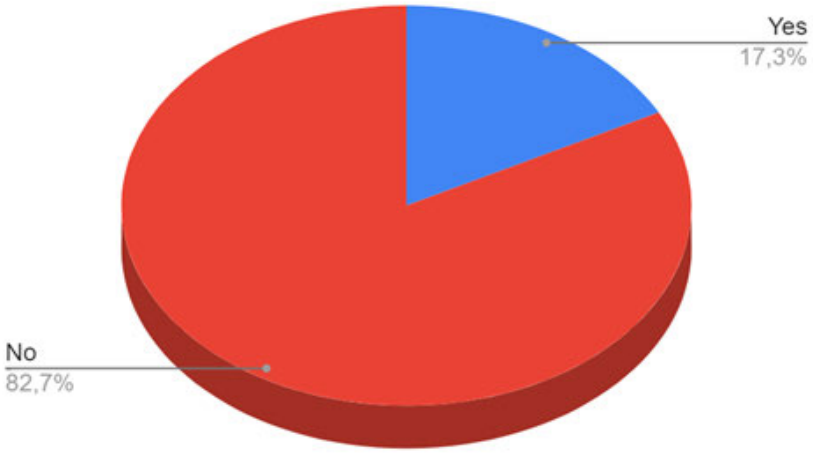

Fig. 9. A need to teach students how to use ChatGPT in a formal learning process

The responses gathered from the question “Do you consider it cheating/plagiarism/unfair practice to use the ChatGPT tool when writing coursework, essays, homework, etc.?” (Figure 10) clearly reveals the uncertainty that this tool generates in university teachers; 27 students with a relative share of 33,33% of students consider that they don’t have enough arguments to decide. This fact also demonstrates a lack of adequate knowledge on this topic, although it is a very current topic that will have to be addressed immediately.

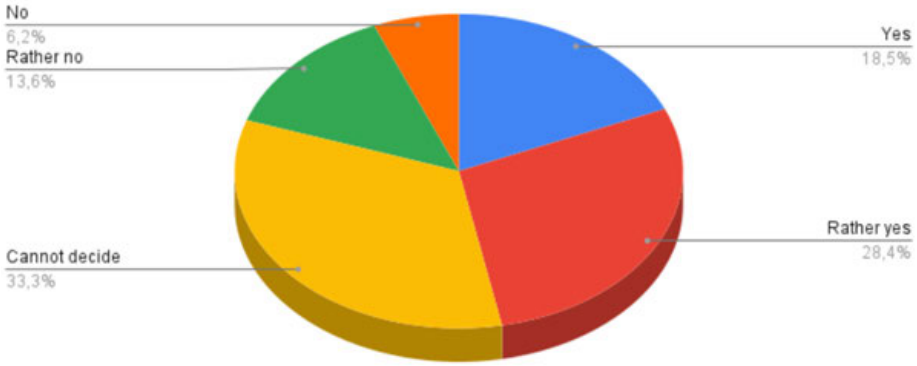

Fig. 10. Question whether students appreciate cheating/plagiarism/unfair practice is the use of ChatGPT tool when writing coursework, essays, homework, etc.

Many issues have recently been raised about ChatGPT in particular, and about AI in general, not only scientific, or technological, but also [14], such as bias, reliability, robustness, autonomy or accountability. In any case, the distrust among students on ChatGPT is obvious, with a substantial 59,26% of respondents expressing worries about its usage by the students because they consider this practice as a cheating/plagiarism/unfair practice.

This scepticism can be considered as a normal behaviour because the combination of new technologies and education is always challenging.

3.1 Discussion of the results

ChatGPT (late 2022) raised concerns about the implications of artificial intelligence for academic integrity. The facts show that at this stage there is little direct empirical evidence to provide evidence in one direction or the other [15]. The students expressed concerns about submitting ChatGPT-generated writing as their own. Transformative AI tools, such as ChatGPT, designed to generate complex text indistinguishable from human-generated text are applicable in a wide range of contexts. However, ongoing questions remain about its capabilities. ChatGPT generally motivates learners to develop reading and writing skills [16]. The students are generally reluctant to recommend the chatbot to their colleagues. These results form an empirical basis for further work on the relationship between AI and academic integrity.

The technology of ChatGPT brings about a range of possibilities and challenges concerning ethics and legality, potentially influencing organizations, society, and individuals in both favorable and adverse ways. Student perspectives obtained from the survey demonstrate a divergence of opinions regarding the adequacy of the information generated and whether there should be restrictions on the use of ChatGPT within university settings, classrooms, or even through legal measures. These survey findings align with conclusions from other research conducted by various author groups [17],[18]. The survey has pinpointed a necessity for extensive research in specific domains: knowledge and ethics, as well as teaching and learning. Both students and educators require empirical evidence regarding the advantages offered by these innovations, accompanied by accurate resources and appropriate policies guiding their integration [19],[20].

A prevalent form of academic dishonesty is academic cheating, and a significant portion of the surveyed students acknowledged the potential for this unethical behavior facilitated by ChatGPT. Existing research indicates that students' decisions to cheat are significantly influenced by their perceptions, evaluations, and competing motivations [21]. Consequently, it becomes crucial to promote a comprehensive understanding of the possible merits and drawbacks of tools like ChatGPT. This understanding is vital to facilitate a responsible and reliable utilization of generative AI within educational settings. It is imperative to establish broad criteria to prevent, or at the very least mitigate, ethical and societal risks arising from irresponsible utilization of the tool, especially within higher education [20],[22].

The analysis of survey results using descriptive statistics and a review of respondents' opinions reveal certain trends among students: (a) a belief that ChatGPT can elucidate specific questions they may have about particular concepts or provide an alternative form of academic support; (b) a majority of students utilize Artificial Intelligence Typing (ChatGPT) to assist with homework assignments, overcome writing challenges, prepare essays, particularly when facing stringent assessment deadlines; (c) an acknowledgment that they struggle to assess the quality of information provided by ChatGPT and perceive the tool's usage as potentially fraudulent; (d) a lack of clarity regarding the usefulness of ChatGPT in learning and teaching. This lack of clarity diminishes the positive impact of perceived usefulness of ChatGPT in students' learning processes.

4 CONCLUSIONS

This work offers insights into students' perspectives on AI and its incorporation into the educational landscape. The research methodology, designed after a thorough literature review, employed a questionnaire with nine inquiries to explore the intricate relationship between attitudes, behavior, and acceptance of AI in higher education. Conducted online from February to March 2023, the study garnered responses from 120 Bulgarian students aged 19-23, with 81 responses meticulously analyzed to draw meaningful conclusions.

ChatGPT, an AI technology as of late 2022, has raised considerable concerns regarding its implications for academic integrity. Despite the widespread use of this transformative AI tool in generating complex text resembling human-authored content across various domains, there exists a lack of direct empirical evidence to definitively support or refute concerns related to academic integrity. Students have expressed apprehensions about the authenticity of writing generated by ChatGPT and its acceptability for academic submission. It is worth noting that ChatGPT does encourage learners to develop their reading and writing skills, suggesting a potential educational value. We want to emphasize the opinion of the students, according to the results, that ChatGPT can be used as a source of ideas when creative tasks are assigned.

The divergent opinions among students regarding the adequacy of information generated by ChatGPT and the debate on whether to restrict its usage within academic settings highlight the need for further investigation into the capabilities and limitations of this technology. This includes comprehensive research in domains like knowledge and ethics, and teaching and learning, to provide empirical evidence for both students and educators regarding the benefits and appropriate integration of ChatGPT.

A concerning finding is the recognition among students that ChatGPT has the potential to facilitate academic dishonesty, emphasizing the necessity for a nuanced understanding of the ethical implications and risks associated with its utilization. To ensure responsible and trustworthy implementation of generative AI in educational contexts, establishing clear criteria and guidelines is paramount, especially within higher education.

Analyzing survey results reveals that students perceive ChatGPT as a tool capable of providing academic support, particularly in overcoming writing challenges and meeting assessment deadlines.

However, they struggle to assess the quality of information generated and remain uncertain about its usefulness in the learning and teaching process. This uncertainty diminishes the positive influence of perceived usefulness of ChatGPT in students' learning experiences. These trends offer valuable insights into how students perceive and utilize ChatGPT, forming the basis for future research on the intricate relationship between AI and academic integrity. Further studies are essential to comprehensively explore the impact of ChatGPT on learning, the accuracy of generated information, and the broader ethical implications within educational settings.

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