How understanding the limitations and risks of using ChatGPT can contribute to willingness to use

Ghadah Al Murshidi[1], Galina Shulgina[2], Anastasiia Kapuza[2] and Jamie Costley[1*]

*Correspondence:
jcostley@uaeu.ac.ae

[1] College of Education, United Arab Emirates University, H1 Sheik Khalifa Bin Zayed St, Al Ain, United Arab Emirates
[2] Institute of Education, HSE University, Moscow, Russia

Abstract

Generative Artificial Intelligence (GAI) holds promise for enhancing the educational experience by providing personalized feedback and interactive simulations. While its integration into classrooms would improve education, concerns about how students may use AI in the class has prompted research on the perceptions related to the intention to implement GAI, such as perceived benefits, limitations and associated risks in teaching and learning practices. This study examines the perceptions of GAI among 366 students in the United Arab Emirates based on survey results. To do that, initially factor analysis was utilized to identify the relevant scales, followed by comparing the mean values for each scale based on the extent of agreement with the statement regarding students' willingness to use ChatGPT. The study revealed a high awareness among respondents regarding the benefits, limitations, and risks of using ChatGPT. The research confirms that awareness of potential benefits is related to the intention to use ChatGPT in the future. Contrary to expectations, a positive relationship was found between awareness of limitations and the intention to use ChatGPT, challenging traditional views that limitations act as barriers. Similarly, awareness of risks is positively related to the willingness to use ChatGPT, suggesting a nuanced relationship between risk perception and technology adoption in education. The current study provides new insights into the importance of informing individuals about the limitations and risks of ChatGPT, in addition to its benefits, as these factors are closely related to making a positive decision regarding its further usage.

Keywords: Educational technology, Generative artificial intelligence (GAI), Limitations awareness, Perceived benefits, Technology adoption

Introduction

Generative Artificial Intelligence (GAI) is a promising technology with great potential to enrich the students' learning experience, provide feedback and simulate interaction. According to Baidoo-Anu and Ansah (2023), generative artificial intelligence refers to a machine learning process that creates objects or outputs using statistical methods, probabilities, and other similar techniques, without the need for complete supervision. There are many models of GAI, however, the latest and the most popular one is GPT, which analyzes large amounts of natural language data and generates high-quality texts

(Baidoo-Anu & Ansah, 2023). The emergence of ChatGPT in November 2022 as a free and open access GAI tool has attracted significant interest and led to its adoption in various sectors, including education (Dwivedi et al., 2023; Kocoń et al., 2023; Liu et al., 2023a, 2023b; Lund & Wang, 2023).

Recent research suggests that integrating this technology into classrooms has the potential to improve education by offering students a better educational experience through providing feedback or adaptive scaffolding systems (Baidoo-Anu & Ansah, 2023; Rudolph et al., 2023; Zhai et al., 2021). For instance, GAI's ability to provide immediate and personalized feedback could be utilized to offer writing assistance and support to students (Geng & Razali, 2022; Ippolito et al., 2022; Liu et al., 2023a, 2023b; Rudolph et al., 2023; Su et al., 2023). More explicitly, generating formative feedback and suggesting some recommendations by AI can help students to improve their self-regulation and subsequent academic performance (Afzaal et al., 2021). Escalante et al. (2023) discovered that some students had a preference for AI-generated feedback because it was more clear and specific compared to teacher's one. Also, generative artificial intelligence can help students give feedback to each other, assessing the quality of the comments and suggesting ways to improve it (Darvishi et al., 2022). Moreover, it may be used for automated essay grading or language translation (Baidoo-Anu & Ansah, 2023) or act as a partner for additional practice to develop students' language skills (Bin-Hady et al., 2023). Furthermore, generative AI may be used for subsequent analysis of real students' comments on their learning experience and infrastructure (Shaik et al., 2022).

However, the gradual adoption of new technologies is a complex process that has long been of interest to researchers. Previous studies have attempted to develop theoretical models for describing the decision-making process of adopting new technology and identifying associated factors. According to Roger's (2014) diffusion of innovation theory, the decision on the subsequent use of new technology is made on the basis of individual's awareness of its functionality. The most popular models of technology acceptance (for example, TAM, UTAUT and their extended versions) suggest that a person's willingness to use a new technology is linked to how they perceive its potential to improve their performance (Lai, 2017). Also, adoption of a new and complex technology necessitates an analysis and consideration of its limitations and risks which can narrow areas of its application and affect the quality of the end product (Al Zumor et al., 2013; Lapointe & Rivard, 2005; Sabah, 2016). Bauer's theory of perceived risk (1960) suggests that an increased level of perceived risk can impact an individual's attitude and prompt behavioral changes towards precautionary measures. For example, Chan et al (2023) demonstrated that perceived risk of COVID-19 is positively associated with students' online learning adoption.

Considering the limitations of ChatGPT, the quality of generated text may be influenced by the quality of input data or biased algorithms or demonstrate a lack of contextual understanding (Baidoo-Anu & Ansah, 2023; Lo, 2023; Wang, 2023). Also, there are some concerns about potential overdependence on the tool which may hinder students to develop their communication, problem-solving and critical thinking skills (Kasneci et al., 2023; Mogavi et al., 2023; Yu, 2023). This potential downside of AI means that there are varied views on how and the degree to which AI should be applied in the classroom (Dwivedi, 2023; Lund, 2023; Zhang & Aslan, 2021).

However, to date there has been little agreement on the relationship between aforementioned factors and willingness to use this technology for teaching and learning in the future. Previous studies have mostly examined the students' perceptions of potential benefits with the intention of using ChatGPT in the future (Al-Emran et al., 2023; An et al., 2023; Liu & Ma, 2024; Shaengchart et al., 2023; Strzelecki, 2023), as this factor is included in the most common models of technology adoption (TAM, UTAUT and their extended versions). However, there have been limited studies that have considered the limitations of ChatGPT and the risks of its usage (Famaye et al., 2023; Horowitz & Kahn, 2021; Shoufan, 2023; Wu et al., 2022), leading to a lack of understanding about this topic. This may be due to the fact that these factors are not included in the aforementioned models and require different methodology, making them less common in studies of this type.

Thus, the aim of current research is to determine the perceptual factors associated with the intention to implement chatGPT in future teaching and learning practices.

Literature review

Perceptions of the GAI benefits in education

The issue of integrating new technologies into the educational process is also of interest to both practitioners and researchers. Perceived usefulness of the technology is seen as one of the key factors interrelated to the willingness to use it in the future in educational settings (Granić & Marangunić, 2019). For example, Teo and Zhou (2014) stated that perceived potential of a new technology and attitude towards its use are significantly correlated with the intention of higher education students to its use. Furthermore, Luik and Taimalu (2021) analyzed the perceived usefulness of technology for teachers and students as separate factors. They found that both factors significantly related to teachers' intention to use technology in the future. Similar conclusions have been drawn from studies of the integration of specific technologies into the educational process. For example, students perceiving Moodle or LMS as a potentially useful innovation were more likely to use it (Panergayo, 2021; Teo et al., 2019). Also, a positive relationship was discovered between perceived usefulness of MOOCs and students' intention to continue studying (Daneji et al., 2019).

Generative artificial Intelligence (GAI) has gained significant attention in the field of education due to its potential to enhance learning experiences and collaboration. The opportunities of ChatGPT as a form of GAI to enhance teaching and learning experience and provide personalized learning environments for students to address their needs are actively discussed (Kasneci et al., 2023). For the purposes of this paper, the benefits of ChatGPT are considered as an indicator of perceived usefulness or performance expectancy which are used in the most popular models of technology acceptance—TAM and UTAUT. It is referred to "the extent to which individuals believe that using a system will help them attain gains in job performance" (Venkatesh et al., 2003) or in this study— facilitate the learning process.

As for the relationship between specific benefits of using ChatGPT and intention to use it, Al-Emran et al. (2023) noted that perception of the potential benefits may have a positive role in affecting chatbot (AI) use for knowledge sharing. Also, the usage of chatbots may improve students' performance and learning attitude (Lee et al., 2022).

Performance expectancy was positively correlated with teachers' intention to use AI in the classroom as well (An et al., 2023). Finally, previous studies have also demonstrated the positive correlation between perceived value of generative AI and students' intention to use this technology (Chan & Zhou, 2023; Strzelecki, 2023). However, some authors claim that the perception of potential advantages has no relationship with the intention to use ChatGPT (Shaengchart et al., 2023). This could be because the perceived benefits play an important role in the adoption of new technology in general, but may not necessarily be associated with individual students' decision to use ChatGPT in the learning process. Moreover, the attitudes of early adopters to the use of ChatGPT in education are often multifaceted and include both the advantages and limitations of this technology (Mogavi et al., 2023).Thus, there is a lack of clarity on how student perception of ChatGPT benefits relates to their willingness to use this instrument in the learning process in the future.

Perceptions of the GAI limitations in education

When adopting a new technology, users assess not only its perceived benefits but also its limitations. These limitations can affect the quality of the end product and restrict its potential applications, which may influence individuals' intentions to use this instrument in the future. Therefore, the limitations of a new technology are often considered by researchers when studying technology adoption (Al Zumor et al., 2013; Sabah, 2016). For example, limitations of mobile technology proved to be a barrier limiting students' subsequent participation in m-learning (Sabah, 2016). Exploring the spread of Blended Learning Environment Al Zumor et al. (2013) demonstrated that technical problems and complexity of the new system were highlighted by students among main limitations. However, according to the research, their presence did not act as a barrier to students' further use of the technology.

For the purposes of this paper, the limitations of ChatGPT are considered as an indicator of students' awareness of existing technical constraints presented by this type of generative artificial intelligence (Sabah, 2016).For example, the quality and quantity of the data that generative models are trained on heavily influences their performance (Baidoo-Anu & Ansah, 2023). For instance, produced text may be factually inaccurate or biased or demonstrate a lack of contextual understanding (Elbanna & Armstrong, 2023; Wang, 2023). Moreover, ChatGPT may generate fake information, for example bibliographic citations (Lo, 2023).

On the one hand, there is evidence that this factor may be positively related to intentions to use the tool. For example, Shoufan (2023) explored that students are aware of ChatGPT limitations (for instance, inaccurate answers), however, they are optimistic about the usage of this instrument and think that it will be improved in the near future. Also, students who are deeply informed about different aspects of this technology, including its limitations, provide constraints on its usage despite general optimism about the technology (Famaye et al., 2023). On the other hand, awareness of the current limitations of AI may be negatively correlated with willingness to use the tool in the future. For example, individuals concerned about biased AI algorithms and privacy issues are more likely to object to the implementation of technology (Horowitz & Kahn, 2021; Wu et al.,

2022). Thus, much uncertainty still exists about the relation between student risk perception of ChatGPT and their intention to use it in future.

Perceptions of the risks of AI in education

Previous research in technology resistance has shown that individuals tend to decide whether to adopt a new technology in the future based not only on their perceived benefits, but also on risks associated with it (Lapointe & Rivard, 2005). Perception of risk was used in an extended version of the TAM model in research of internet banking and cloud computing adoption, etc. (Ho et al., 2017; Kesharwani & Singh Bisht, 2012). For example, perceived risks were a significant factor in the decision to adopt mobile technology or electric vehicles (Featherman et al., 2021; Naicker & Van Der Merwe, 2018). Analyzing cloud computing, this factor was significantly associated with user's trust which deliberated the decision of whether to use the technology (Ho et al., 2017). For the purposes of this paper, the perceived risks of ChatGPT may be defined as "an individual's subjective belief and expectation of potential harm (i.e., loss or risk), resulting from a particular situation or a set of circumstances, and thus influence the process of decision-making" (Ho et al., 2017). When considering the use of new technology in education, it is important to acknowledge that subjective perceptions of risk may lead to resistance from teachers (Howard, 2013). Also, Chan et al. (2023) demonstrated that perceived risk of COVID-19 is positively associated with students' online learning adoption. The emerging trend of integrating AI into the learning process has also stimulated research in this direction. However, they have reached different conclusions.

According to Famaye et al. (2023), students with general positive perception of ChatGPT still have concerns about its risks, however, they stay optimistic and are more likely to recommend developing further tools to facilitate responsible utilization of the technology. Also, minimal perceived level of risk is associated with successful ChatGPT adoption among students (Abdaljaleel et al., 2023). However, previous studies have identified a negative correlation between perceived risks (functional, phycology and social) and students' willingness to utilize AI-powered learning environments (Wu et al., 2022). Perceived threats and risks stemming from the use of generative AI may negatively impact the use of AI-based Chatbots for knowledge sharing (Al-Emran et al., 2023). Moreover, some early adopters of AI are worried about potential overdependence on the tool which may hinder students to develop their communication, problem-solving and critical thinking skills (Kasneci et al., 2023; Mogavi et al., 2023; Yu, 2023).

The present study

Previous research indicates that the implementation of generative AI, such as ChatGPT, could improve students' educational experience and performance. However, the integration of this technology into the learning process may be affected by various factors. Currently, there is a lack of clarity regarding how differences in perception of the benefits, limitations, and risks of ChatGPT are linked to students' intention to use this tool in future learning processes. The current study is aimed to explore the relationships between students' perception of aforementioned ChatGPT aspects and the willingness to use this technology for teaching and learning in the future. To achieve this, a survey

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of 366 students of United Arab Emirates universities was conducted. Taking together, the study proposes three following hypotheses based on the existing literature analysis, discussed above:

- H1: There is a positive relationship between students' perception of the ChatGPT benefits and their intention to use this instrument in the future.
- H2: There is a negative relationship between students' perception of the ChatGPT limitations and their intention to use this instrument in the future.
- H3: There is a negative relationship between students' perception of the ChatGPT risks and their intention to use this instrument in the future.

Methods

Participants

In total 366 undergraduate, graduate and postgraduate students of UAE private and governmental universities filled the survey in September 2023, and agreed to share their information with researchers. The majority of respondents were females (87%). Looking at the age distribution, 73% of the students were aged between 18 and 23, with a further 20% aged between 24 and 29. The remaining 7% were aged 30 and over. Concerning the type of educational institution, the majority of respondents (76%) studied at public universities, with only 24% attending private institutions. In terms of educational level, the majority of respondents were undergraduates (84%), with graduate and postgraduate students accounting for 11% and 5% respectively. The distribution of students by field of study is shown in Table 1.

Procedures

The survey was administered via an online questionnaire, consisting of closed-ended questions. The study employed a convenience sampling method to select respondents based on their availability and willingness to participate. After gaining approval from the UAEU research group, the primary researcher contacted faculty members in private universities (such as Al Ain University, Abu Dhabi University, etc.) and governmental universities (such as UAE University, Zayed University, etc.) to request their assistance with the study and to share a survey link with potential participants. The use of social media platforms for the research is justified by its reach and relevance to the target audience, ensuring maximum engagement and data collection efficiency. Upon approval, the link was sent to the faculty members mentioned earlier via email and instant messaging platforms such as Instagram, WhatsApp, Telegram, etc. They then distributed the survey to students in various universities through email and specific groups and channels for university students on instant messaging platforms (Instagram, WhatsApp, Telegram, etc.). Additionally, the survey was sent through undergraduate students who were research assistants. Upon gaining access to the survey, respondents were required to read and acknowledge informed consent before proceeding with the survey.

Measurement

In this research, we utilized a survey design that was adapted from Chan and Hu (2023). We asked students to provide some basic information (age, gender, educational level and

college) and indicate their agreement or disagreement with different statements using 1 to a 5-point Likert scale (where 1 is strongly disagree, 5 is strongly agree). The statements were focused on perceptions of potential benefits, limitations and risks of ChatGPT as an AI-driven tool and the intention to use this instrument in the future. However, the survey did not include any questions about students' experiences or strategies for using ChatGPT, which is one of the study's limitations.

Considering that the participants were university students in the UAE, it was important to take into account the use of ChatGPT in both English and Arabic languages. This was because the latter may be actively used in their learning or professional activities. The survey items were adapted and now included the phrase "both in English and Arabic languages". Also, the use of previously validated survey items allowed us to compare our findings with those of the original study and contribute to the growing body of knowledge on this topic.

The variable of interest was the statement that reflects students' willingness to use ChatGPT for themselves ("I envision integrating generative AI technologies like ChatGPT into my teaching and learning practices in the future in both Arabic and English languages").

Analysis strategy

Firstly, exploratory factor analysis was used to grouped the other survey items as follows: perception of ChatGPT limitations (items 1–6, Cronbach's alpha 0.81), perception of ChatGPT benefits (items 9–14, Cronbach's alpha 0.79) and perception of ChatGPT risks (items 15–18, Cronbach's alpha 0.77) (see Appendix 1). Then standardised scales were constructed via exploratory factor analysis. We used exploratory factor analysis to define factors. The results of the exploratory factor analysis and statements are provided in the Appendix 2: the scree plot that demonstrates the reasonableness to identify exactly three factors (Fig. 5), factor loadings and communalities (Table 4) and the explained variance (Table 5). To confirm the adequacy of the three factors model's functioning, we also conducted a confirmatory factor analysis (Appendix 3). The results indicated that all fit statistics were within acceptable ranges (Table 6), and the three-factor structure performed well (Fig. 6).

To analyse the relationship between the variable of interest (students' willingness to use ChatGPT) and three constructed by exploratory factor analysis scales, we compared scales' means and 95% confidence intervals by the response options ("Strongly disagree", "Disagree", "Neutral", "Agree", "Strongly agree"). We also checked the significance of the differences with ANOVA and Tukey's Honest Significant Difference method using R software. This methodology was chosen taking into account the nature of the variable of interest (it was measured using ordinal scale; consists of a small number of response options; some options are sparsely filled).

Results

Descriptive statistics for students' willingness to use ChatGPT

Simple statistical analysis was used to describe the dependent variables used in the present study. According to Fig. 1, most students intend to use ChatGPT in the future.
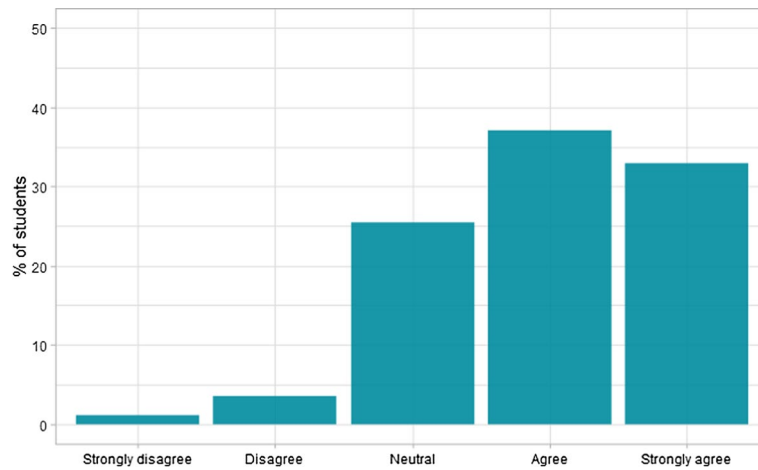
Fig. 1 Distribution of students' answers by dependent variable " I envision integrating generative AI technologies like ChatGPT into my teaching and learning practices in the future in both Arabic and English languages"

Also, the majority of them tend to believe that students need to master this tool for their future career.

Overall, respondents claim a relatively high level of awareness of the benefits, limitations and risks of using ChatGPT.

The relationship between students' willingness to use ChatGPT and perception of ChatGPT benefits

The results show that there is a significant difference in the mean scores for perceived benefits of ChatGPT for groups that were 'Neutral', 'Agree' and 'Strongly agree' to use ChatGPT in the future ($p < 0.01$ for all cases) (Fig. 2). Moreover, the tendency of positive linear relationship was observed: the more strongly students agree that they intend to use ChatGPT in the future, the greater their knowledge of ChatGPT potential benefits.
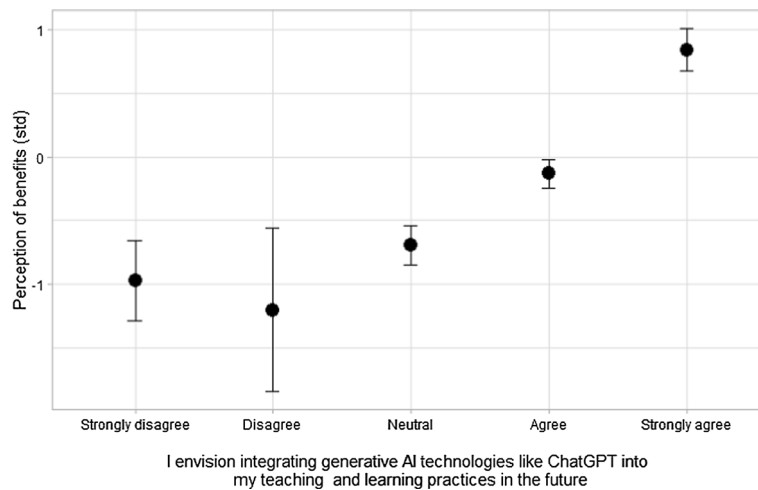

Fig. 2 Means and 95% confidence intervals for students perception of ChatGPT benefits by their intention to use AI
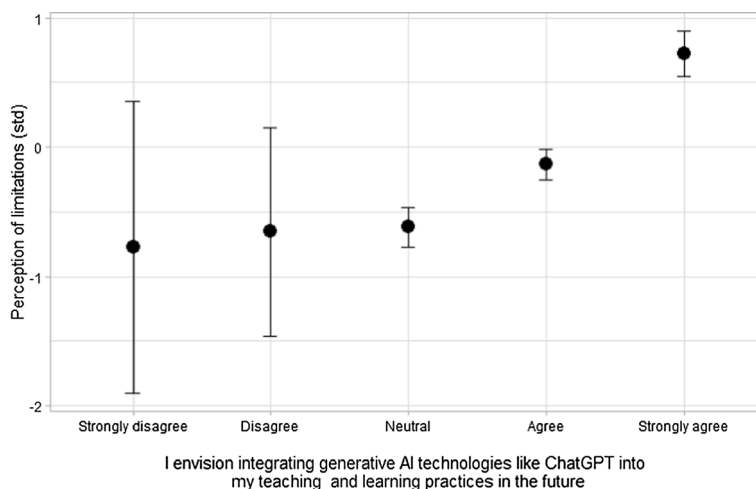
Fig. 3 Means and 95% confidence intervals for students perception of ChatGPT limitations by their intention to use AI

The relationship between students' willingness to use ChatGPT and perception of ChatGPT limitations

The results for the relationship between perception of ChatGPT limitations and respondents' intention to use it in the future are presented in Fig. 3. There is a significant difference in the means for perceived ChatGPT limitations for groups whose intention to use this instrument vary from neutral to total agreement. Among these groups the higher students' awareness of ChatGPT limitations, the more they plan to use ChatGPT in the future.

The relationship between students' willingness to use ChatGPT and perception of the risks of using ChatGPT

Similar relationship was discovered between the intention to use ChatGPT and the perception of its risks (Fig. 4). Differences in average perception of risks were
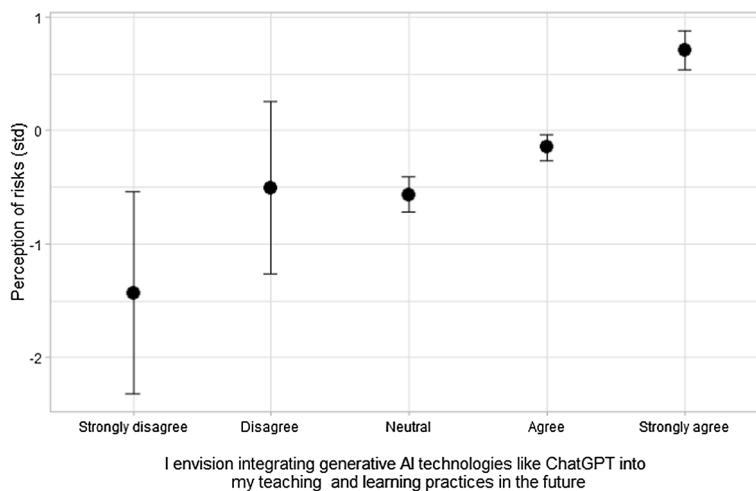

Fig. 4 Means and 95% confidence intervals for students perception of ChatGPT risks by their intention to use

Table 1 Sample characteristics

Characteristic	n	%
Gender		
Male	48	13.1
Female	318	86.9
Prefer not to answer	0	0
Age		
18–23 years old	267	72.9
24–29 years old	73	20
30 years old and more	26	7.1
Type of educational institution		
governmental	280	76.5
private	86	23.5
Academic level		
Bachelor	308	84.2
Master	41	11.2
Doctoral	17	4.6
Field of study		
Education	113	30.9
Humanities and Social Sciences	86	23.5
Business	49	13.4
Engineering	38	10.4
Science	28	7.6
Other	52	14.2

significant for groups demonstrating a positive attitude to ChatGPT (from neutral to total agreement to use it in the future). The more respondents were aware of the potential risks of using the tool, the more likely they were to use it in the future (Table 1).

The detailed information about the results of comparing each variable based on the level of agreement with the statement regarding the willingness to use ChatGPT in future work is presented in Table 2.

Table 2 Means, 95% confidence intervals and ANOVA results for each variable by students intention to use

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	ANOVA
Perception of benefits	− 0.97 [− 1.29; − 0.66]	− 1.21 [− 1.85; − 0.56]	− 0.69 [− 0.85; − 0.54]	− 0.13 [− 0.24; − 0.02]	0.84 [0.68; 1.01]	$F = 225.8, p < 0.01$
Perception of limitations	− 0.78 [− 1.91; 0.35]	− 0.65 [− 1.46; 0.15]	− 0.62 [− 0.77; − 0.77]	− 0.13 [− 0.25; − 0.02]	0.72 [0.55; 0.90]	$F = 134.6, p < 0.01$
Perception of risks	− 1.43 [− 2.32; − 0.54]	− 0.50 [− 1.26; 0.25]	− 0.57 [− 0.72; − 0.41]	− 0.15 [− 0.26; − 0.03]	0.71 [0.53; 0.88]	$F = 134.1, p < 0.01$

Discussion

Overall, respondents claim a relatively high level of awareness of the benefits, limitations and risks of using ChatGPT. The results show that students' desire to use ChatGPT and their perception of all the aforementioned features are positively correlated. The results of this study show that the intention to use ChatGPT in the future is associated with the higher perception of its potential benefits. This result is in agreement with Roger's (2014) diffusion of innovation theory, indicating that a strong awareness of a new technology is a key factor in deciding to adopt it in the future. Students with a higher level of awareness of AI benefits are more likely to use it later, which is in line with the findings of Granić and Marangunić (2019), who considered the perceived usefulness of the new technology as one of the key drivers of its subsequent adoption in educational settings. Similar conclusions have been drawn from studies of the integration of other specific technologies into the educational process, for example, Moodle, LMS or MOOC (Daneji et al., 2019; Panergayo, 2021; Teo et al., 2019). Finally, the results of current research support the findings of previous studies on the relationship between perceived usefulness of Chatbots and generative AI and students' willingness to use these tools (Al-Emran et al., 2023; Chan & Zhou, 2023). Nevertheless, according to Mogavi et al (2023), early adopters of ChatGPT typically demonstrate a comprehensive perception of its advantages and disadvantages.

Also, the current research found that the high awareness of limitations is related to high intention to use ChatGPT in future. Existing research has tended to consider these disadvantages of new technologies (and generative AI in particular) as barriers to their adoption (Al Zumor et al., 2013; Horowitz & Kahn, 2021; Sabah, 2016; Wu et al., 2022). This finding contrasts with previous studies which have suggested that concerns about biased algorithms and privacy issues may be connected with the subsequent refusal to implement AI (Horowitz & Kahn, 2021; Wu et al., 2022). For example, Wu et al. (2022) demonstrated that the more students were worried about technical limitations of an AI-assisted learning environment, the less they intended to use this technology in the future or recommend others. Also, students with deep awareness of limitations may restrict the usage of a new tool despite the general optimism about it (Famaye et al., 2023). However, constraints of new technologies may not always act as a barrier to their further use. For example, Al Zumor et al. (2013) explored that despite the fact that students were concerned about technical issues and complexity of Blended Learning Environment, they demonstrated readiness to use this instrument. As for the perception of ChatGPT, the previous research showed that students who were deeply aware of its limitations of this instrument, nevertheless, were optimistic and hoped for its improvement in the near future (Shoufan, 2023).

Another important finding is that, contrary to expectations, deep awareness of risks is also related to the high willingness to use it in the future. This is in agreement with Famaye et al. (2023) which showed that even if students are worried about ChatGPT risks, they perceive this tool positively, demonstrate optimism and are more likely to

recommend developing further tools to facilitate responsible utilization of the technology. However, this finding contrasts with Bauer's theory of perceived risk (1960) which suggests that the higher a person's perceived risk, the more likely they are to behave more cautiously. Considering the integration of technology into the educational process, teachers may resist the implementation of a new technology due to their personal beliefs about the potential risks involved, as stated by Howard (2013). As for students, their minimal perceived level of risk is associated with successful ChatGPT adoption or willingness to utilize AI-powered learning environments (Abdaljaleel et al., 2023; Wu et al., 2022). Also, Al-Emran et al. (2023) showed that concerns about threats and risks of AI-based Chatbots may be negatively associated with its subsequent use for knowledge sharing.

Thus, the current study provides new insights into the importance of informing individuals about the limitations and risks of ChatGPT, in addition to its advantages, as these factors are closely related to making a positive decision regarding its further usage. However, it is important to consider the potential digital inequality of students when integrating this tool. Not all students may have access to high-speed internet and up-to-date technological devices that allow for the full use of the ChatGPT (Rasul et al., 2023). Nevertheless, it is also possible to use some of the features through a Telegram bot on a mobile device, which lowers the entry barriers for usage. When incorporating ChatGPT into their teaching, educators also should take into account the potential risks and develop strategies to mitigate them. This involves, for example, verifying the information provided by ChatGPT, which may result in additional time and effort for both educators and students (Kasneci et al., 2023).

Theoretical and practical value

This study enhances the current understanding of the factors related to the decision to adopt a new technology in education on the example of ChatGPT. In addition, the research enables an investigation into the role of risk and limitations perceptions of technology, which are often excluded from current technology acceptance models.

The empirical value of this study lies in its contribution to understanding the factors that interconnected with students' willingness to use ChatGPT in the future. The obtained results may be sought after by instructors who want to integrate ChatGPT into the learning process and motivate students to use it. The first practical suggestion is to inform students about the potential advantages of ChatGPT for improvement of performance and learning process. The high positive value of the technology is often associated with intention to use it in future (Chan & Zhou, 2023). The second practical suggestion is to make students more informed about the current limitations of Chat-GPT and the risks that come with its use. According to the obtained results, it may help them to be more open to this technology and its usage in their learning process in future. The listed recommendations are even more relevant for students of pedagogical programs, who will subsequently become teachers and begin to implement this tool in their professional activities. Suggested steps may facilitate adoption of Chat-GPT among teachers and make the spread of this technology easier, as it is usually up

to the teacher to introduce a new technology into the educational process. The subsequent use of ChatGPT, for example, for feedback generation, content revision and other types of writing assistance may help to facilitate the learning process (Su et al., 2023).

Conclusion

This paper fills a gap in research on ChatGPT adoption in the learning process by investigating the association between intention to use this technology and perception of its different aspects. The aim of this research was to explore the relationships between students' perception of potential benefits, limitations and risks of ChatGPT and the willingness to use this technology for learning in the future. The current study provides an insightful understanding of the relationship between student's perception of ChatGPT benefits, limitations and risks and their intention to use this instrument in the future. The present study investigated that there is a positive correlation between perception of the potential benefits of ChatGPT and intention to use it in the future. This supports previous literature where the technology's potential to enhance performance was often seen as one of key reasons for future use (Lai, 2017). Moreover, students with a deep understanding of the risks and limitations of this technology, are also likely to use ChatGPT in the future in their learning practice.

Limitations and directions for future research
The findings of this study have to be seen in light of some limitations

Firstly, the convenience sampling method, while quick and easy to organize, has a number of limitations. As the respondents were selected from the available students, the resulting sample may be biased. Also, this sampling method may lead to errors or the lack of diversity because researchers may be unaware of how unrepresentative the sample is of the population. This may limit external validity of the findings. A further study could use a convenience sampling method together with probability sampling to control biases or take multiple samples to get more reliable results.

Secondly, the survey included questions regarding students' perceptions of the benefits, limitations, and risks of using ChatGPT. However, it did not inquire about their experience using the tool

Prior experience with ChatGPT is not a requirement for respondents because the focus of the research is on the relationship between perceptions of aforementioned aspects of the technology and the willingness to use it in the future. However, the lack of information about this characteristic of the sample could affect the results of the research and limit the external validity. Thus, more extensive studies in the future could fill this gap and explore in detail the prior experience of respondents with ChatGPT including strategies used and effects together with their perception. Although prior studies indicate that the implementation of ChatGPT could improve students' educational experience and performance, further explanation is needed on how perception of this technology may relate to intention to use it.

Appendix 1

See Table 3.

Table 3 Percentage of students who chose each category

No	Statement	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
1	I understand generative AI technologies like ChatGPT have limitations in their ability to handle complex tasks in both Arabic and English languages	1.1	2.9	13.6	45.2	37.2
2	I understand generative AI technologies like ChatGPT can generate output that is factually inaccurate in both Arabic and English languages	1.6	4.6	20.9	43.3	29.7
3	I understand generative AI technologies like ChatGPT can generate output that is out of context or inappropriate in both Arabic and English languages	1.3	5.9	23.3	38.5	31.0
4	I understand generative AI technologies like ChatGPT can exhibit biases and unfairness in their output in both Arabic and English languages	2.1	8.0	25.7	34.8	29.4
5	I understand generative AI technologies like ChatGPT may rely too heavily on statistics, which can limit their usefulness in certain contexts in both Arabic and English languages	1.6	4.6	22.2	41.7	30.0
6	I understand generative AI technologies like ChatGPT have limited emotional intelligence and empathy, which can lead to output that is insensitive or inappropriate in both Arabic and English languages	1.9	5.1	22.5	38.5	32.1
7	I envision integrating generative AI technologies like ChatGPT into my teaching and learning practices in the future in both Arabic and English languages	1.1	3.5	25.4	37.2	32.9
8	Students must learn how to use generative AI technologies well for their careers in both Arabic and English languages	1.3	4.6	22.5	40.4	31.3
9	I believe generative AI technologies such as ChatGPT can improve my digital competence in both Arabic and English languages	1.3	7.5	26.5	36.4	28.3
10	I believe generative AI technologies such as ChatGPT can help me save time in both Arabic and English languages	2.7	4.0	24.9	35.0	33.4
11	I believe AI technologies such as ChatGPT can provide me with unique insights and perspectives that I may not have thought of myself in both Arabic and English languages	1.3	6.2	23.5	38.5	30.5
12	I think AI technologies such as ChatGPT can provide me with personalized and immediate feedback and suggestions for my assignments in both Arabic and English languages	3.7	3.7	25.1	37.4	30.0
13	I think AI technologies such as ChatGPT is a great tool as it is available 24/7 in both Arabic and English languages	2.4	4.6	24.6	35.3	33.2
14	I think AI technologies such as ChatGPT is a great tool for student support services due to anonymity in both Arabic and English languages	0.8	5.1	25.1	37.4	31.6

Table 3 (continued)

| No	Statement	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
15	Using generative AI technologies such as Chat-GPT to complete assignments undermines the value of university education in both Arabic and English languages	2.4	4.3	28.1	35.6	29.7
16	Generative AI technologies such as ChatGPT will limit my opportunities to interact with others and socialize while completing coursework in both Arabic and English languages	2.1	6.7	24.9	36.9	29.4
17	Generative AI technologies such as ChatGPT will hinder my development of generic or transferable skills such as teamwork, problem-solving, and leadership skills in both Arabic and English languages	2.4	6.2	26.5	35.6	29.4
18	I can become over-reliant on generative AI technologies in both Arabic and English languages	1.1	7.5	31.0	34.0	26.5

Appendix 2

See Fig. 5, Tables 4 and 5.
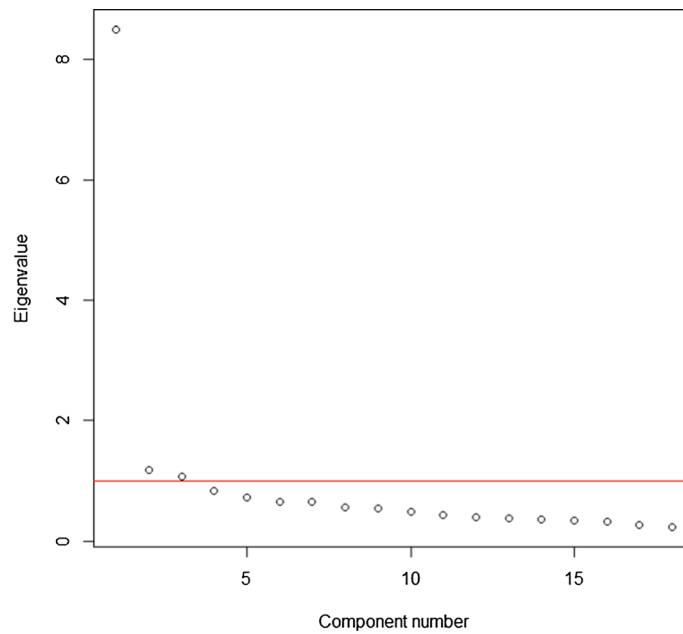
Fig. 5 Scree plot with Kaiser criterion (red line)

Table 4 Statements, factor loadings (only loadings > 0.3 are displayed) and communalities

		Perception of limitations	Perception of benefits	Perception of risks	Communalities
1	I understand generative AI technologies like ChatGPT have limitations in their ability to handle complex tasks in both Arabic and English languages	0.44			0.52
2	I understand generative AI technologies like ChatGPT can generate output that is factually inaccurate in both Arabic and English languages	0.80			0.65
3	I understand generative AI technologies like ChatGPT can generate output that is out of context or inappropriate in both Arabic and English languages	0.70			0.55
4	I understand generative AI technologies like ChatGPT can exhibit biases and unfairness in their output in both Arabic and English languages	0.46			0.46
5	I understand generative AI technologies like ChatGPT may rely too heavily on statistics, which can limit their usefulness in certain contexts in both Arabic and English languages	0.43			0.52
6	I understand generative AI technologies like ChatGPT have limited emotional intelligence and empathy, which can lead to output that is insensitive or inappropriate in both Arabic and English languages	0.67			0.50
7	I envision integrating generative AI technologies like ChatGPT into my teaching and learning practices in the future in both Arabic and English languages		0.49		0.41
8	Students must learn how to use generative AI technologies well for their careers in both Arabic and English languages		0.73		0.62
9	I believe generative AI technologies such as ChatGPT can improve my digital competence in both Arabic and English languages		0.59		0.51
10	I believe generative AI technologies such as ChatGPT can help me save time in both Arabic and English languages		0.73		0.50
11	I believe AI technologies such as ChatGPT can provide me with unique insights and perspectives that I may not have thought of myself in both Arabic and English languages		0.49		0.41
12	I think AI technologies such as ChatGPT can provide me with personalized and immediate feedback and suggestions for my assignments in both Arabic and English languages		0.64		0.48
13	I think AI technologies such as ChatGPT is a great tool as it is available 24/7 in both Arabic and English languages		0.75		0.49
14	I think AI technologies such as ChatGPT is a great tool for student support services due to anonymity in both Arabic and English languages		0.68		0.52
15	Using generative AI technologies such as ChatGPT to complete assignments undermines the value of university education in both Arabic and English languages			0.72	0.54

Table 4 (continued)

		Perception of limitations	Perception of benefits	Perception of risks	Communalities
16	Generative AI technologies such as ChatGPT will limit my opportunities to interact with others and socialize while completing coursework in both Arabic and English languages			0.67	0.53
17	Generative AI technologies such as ChatGPT will hinder my development of generic or transferable skills such as teamwork, problem-solving, and leadership skills in both Arabic and English languages			0.69	0.63
18	I can become over-reliant on generative AI technologies in both Arabic and English languages			0.67	0.5

Table 5 The variance explained

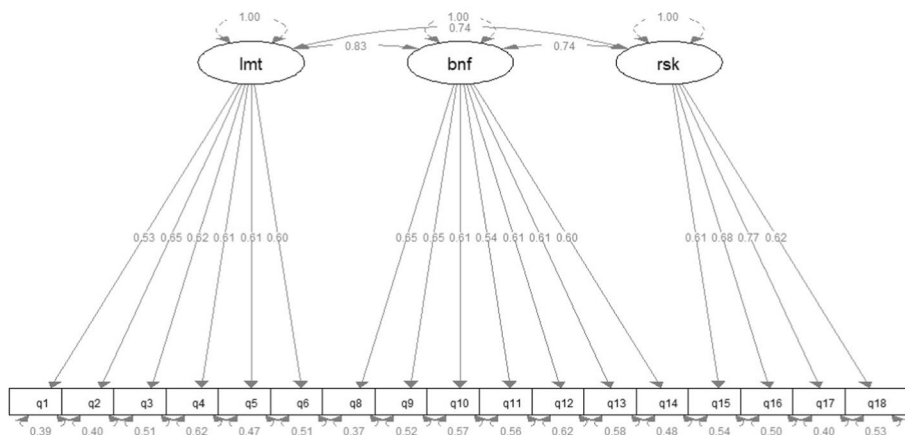|	Perception of limitations	Perception of benefits	Perception of risks
SS loadings	2.99	3.90	2.47
Proportion Variance	0.17	0.22	0.14
Cumulative Variance	0.38	0.22	0.52
Proportion Explained	0.32	0.42	0.26
Cumulative Proportion	0.74	0.42	1.00

Appendix 3

See Fig. 6, Table 6.

Fig. 6 Factor loadings and covariances of the confirmatory factor analysis model

Table 6 Goodness of fit statistics for the confirmatory factor analysis model

Fit statistic	The model value	The threshold value
TLI	0.955	>0.90
CFI	0.962	>0.90
RMSEA	0.045	<0.05
SRMR	0.037	<0.08

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s40561-024-00322-9.

Additional file 1.

Additional file 2.

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