Investigation of student experiences with ChatGPT-supported online learning applications in higher education

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The purpose of this study was to determine university students' experiences with the use of ChatGPT in online courses. The sample consisted of 84 associate degree students from a state university in Turkey. A multi-method approach was used in the study. Although quantitative data were collected using the Chatbot Usability Scale, qualitative data were collected using a semi-structured interview form that we developed. The data were analysed using descriptive and content analysis methods. According to the findings, ChatGPT exhibits advantages such as a user-friendly interface and fast, concise, relevant responses. Moreover, emphasizing its contribution to the learning process, the information provided was sufficient and topic-oriented. The understandability of the chatbot's functions and the clarity of their communication were emphasized. However, there are disadvantages such as performance issues, frequency of errors and the risk of providing misleading information. Concerns have also been raised about the potential difficulties chatbots may face in ambiguous conversations and providing insufficient information on privacy issues. In conclusion, ChatGPT is recognised as a potentially valuable tool in education based on positive usability impressions; however, more research is needed for its safe use.

Implications for practice or policy

- Based on positive usability impressions, students and instructors can use ChatGPT to support educational activities.
- ChatGPT can promote and enhance students' personalised learning experiences.
- ChatGPT can be used in all higher education courses.
- Users should be cautious about the accuracy and reliability of the answers provided by ChatGPT.
- Decision-makers should take precautions against risks such as privacy, ethics, confidentiality and security that may arise from using artificial intelligence in education.

Keywords: artificial intelligence, chatbots, ChatGPT, online learning, student experience, usability

Introduction

The concept of artificial intelligence (AI), first introduced by McCarthy (1956, as cited in Russell & Norvig, 2010), has been defined in various ways by authors such as Charniak and McDermott (1985), Haugeland (1989), Rich and Knight (1991) and Winston (1992). Bellman (1978) defined AI as the automation of processes related to human thought such as decision-making, problem-solving and learning. Kurzweil et al. (1990) characterised AI as the art of producing machines that can perform tasks using human intelligence.

The potential of AI to increase societal welfare through equitable and unbiased applications in many aspects of life has made it one of the important areas of research today (Arslan, 2020). Thanks to large budget investments carried out by numerous countries and companies worldwide, AI applications are being utilised in many areas such as Internet search engines, smartphone applications, autonomous vehicles and home appliances (Mintz & Brodie, 2019). These applications are transforming human life in various ways (Johnson, 2023). One of the AI applications that serves this transformation and has been in the spotlight recently is chatbots, which use deep learning algorithms trained with large amounts of data to generate human-like responses to user queries (Gilson et al., 2022).

Generative Pre-trained Transformer (ChatGPT), a chatbot developed by OpenAI and launched in November last year, is one of the applications developed within this framework (Cotton et al., 2023). It achieved great success, being used by over 1 million people in the first week after its launch (Ruby, 2023). Trained on a massive Internet text data set to understand various topics and contexts, including blogs, novels and classical literature (Marr, 2022), one of its most important features is its ability to generate human-like texts (Pavlik, 2023; Qadir, 2022). Its responses are based on a large training data set (Bogost, 2022), making it a useful tool for content creation, language translation and customer service automation tasks (Wenzlaff & Spaeth, 2022). It is also capable of rejecting inappropriate queries, questioning erroneous assumptions, accepting and learning from its own mistakes (Jiao et al., 2023). These features that distinguish ChatGPT from classical chatbots have increased its popularity in various sectors such as finance, healthcare and e-commerce. ChatGPT has also attracted significant attention and interest in the education sector (Correia, 2023).

In fact, since the 1980s, AI applications in education have been identified as a coherent area of academic research (Williamson & Eynon, 2020). However, the emergence of AI technologies, especially deep learning, has significantly affected learning methods (Chen et al., 2020), and the use of AI applications in education has become increasingly widespread in recent years (Luckin et al., 2016). According to the Horizon report published in 2018, AI and adaptive learning technologies have emerged as important developments in the field of education (Becker et al., 2018). Indeed, the use of AI in educational activities has many benefits for both students and teachers (Matthew et al., 2021), such as facilitating learning processes, increasing teachers' productivity and improving the overall functioning of schools (Karsenti, 2019; Khan et al., 2021; Kim et al., 2021; Lin & Chang, 2020; Xia et al., 2022). It can also contribute to creating a flexible learning environment, identifying students' learning styles and needs, monitoring their progress, creating rich learning environments, collaborating with students and experts from different countries, helping teachers, reducing costs and increasing efficiency in educational activities (Cunningham-Nelson et al., 2019; Elise V., 2023; Kuprenko, 2020; Okonkwo & Ade-Ibijola, 2020; Porter & Grippa, 2020). They can also provide assessment models for teachers and contribute to their professional development by providing suggestions for improving teaching practices (Gunawan et al., 2021). Also, AI can contribute to administrative activities such as curriculum and personnel programs, exam management, cybersecurity, facilities management, and security (Holmes et al., 2019).

ChatGPT has the potential to realise many of the above-mentioned contributions regarding the use of AI applications in education (Trust et al., 2023). Moreover, the ability to perform natural language processing tasks can influence the way students and teachers in particular work in higher education (Gill et al., 2024). It can also make extra contributions in terms of providing instant feedback for students and creating scenario-based learning environments (Rahman & Watanobe, 2023). Another potential of ChatGPT in higher education is that it can provide speaking practice in language learning (Zou et al., 2023). It can also be used to create summaries and transcripts of online courses and to create multilingual online course materials (Tate et al., 2023).

Although the impact of AI applications on education is still uncertain (Holmes et al., 2021), it has significant potential in learning processes, pedagogical innovations, measurement and evaluation activities and educational management (Chen et al., 2020). In this regard, educators are currently working to gather and share ideas on using productive AI tools to improve teaching methods and academic research. There is a need for more studies on how AI applications should be adapted to higher education (Zawacki-Richter

et al., 2019). Considering that most of the AI applications in education focus on students and provide different opportunities for students (Cox et al., 2019; Dodgson & Gann, 2017; Fulmer, 2019; McKenzie, 2018; Pence, 2019; Zeide, 2019), student experiences are important. However, more experimental studies should be carried out to determine the user experiences at the point of creating design guidelines by incorporating the concept of usability into the development process of chatbots (Ren et al., 2019). This was confirmed by Valério et al. (2017), who described the usability of chatbots as a relatively new research area. Productive AI has the potential to revolutionise our learning and teaching methods. Educators who benefit from the power of productive AI can provide more personalised and satisfying learning experiences. Students can maximise their productivity and reach their academic goals more efficiently (Correia, 2023). The presence of all these possible contributions makes studies on the use of ChatGPT in education valuable. Accordingly, this study aimed to determine the experiences of university students using ChatGPT in online courses. The research questions were as follows:

- What are the experiences of higher education students regarding the use of ChatGPT in online education?
- What are the experiences of higher education students regarding the usability of ChatGPT?

Methodology

The study utilised a multimethod approach (Campbell & Fiske, 1959). Unlike the mixed method, the multiple research method is not a method in which qualitative and quantitative data are presented together for each research question, but a method that answers some of the research questions with qualitative and other parts with quantitative data sets (Creswell & Creswell, 2018). To answer the first research question, a qualitative research method, specifically the case study method (Merriam, 1988), was employed. A case study is used to provide a detailed examination of the characteristics of the current situation. Its most important feature is the in-depth investigation and analysis of an experience (Yin, 1984). Tlili et al. (2023) and Dai et al. (2023) used case study in their studies on students' ChatGPT experiences. The second research question was addressed using a quantitative research method, specifically the survey method (Cohen et al., 2007). Within the scope of usability testing methods, experimental approaches (i.e., user tests) are one of the frequently preferred methods (Çağıltay, 2016). Choudhury and Shamszare (2023) and Rahman and Watanobe (2023) used surveys to determine the student opinions of ChatGPT.

Working group

The sample of the study consisted of 84 students attending associate degree programmes of a state university in Türkiye. Data was collected from 74 students who voluntarily responded to an online interview form. The study group was determined by convenience sampling method in non-random sampling methods. The random sampling method involves determining the groups to be sampled without depending on the principle of randomness, while the convenience sampling method involves the researcher choosing a close and easily accessible situation and thus accelerating the research process (Büyüköztürk et al., 2008; Gravetter & Forzano, 2012). This sampling method was used because we conducted the study with the students in the courses they taught. Demographic characteristics of the participants such as program, course, grade level and gender are given in Table 1. It is important to consider this information to understand the scope of the research, to evaluate the results and to make generalisations.

Table 1
Demographic characteristics of the participants

Programme	Course	Grade	Female	Male
Computer programming	Computer Applications	1	7	6
Web design and programming	Internet Programming	1	4	4
Pharmacy services	Basic Information Technologies	1	14	4
Physiotherapy	Basic Information Technologies	2	34	11
Total			59	25

Data collection tools

The Chatbot Usability Scale developed by Borsci et al. (2022) was used to collect quantitative data. The 5-point likert-type (1–5) scale consists of five factors and 15 items. In addition, the Cronbach's alpha value of the scale is 0.8, which indicates a good reliability according to Borsci et al. On the other hand, qualitative data was collected through a semi-structured interview form we developed. The form, consisting of five open-ended questions, was prepared to determine the experiences of students regarding the use of ChatGPT. Firstly, the form was applied to five people for pilot application. As a result of the application, linguistic corrections were made in the questions that were not understood. The form was finalised by taking into account the opinions of language and subject matter experts.

Data analysis

The quantitative data within the scope of the study were analysed using descriptive statistical tools such as arithmetic mean (Holcomb, 2016). We collected quantitative data via Google Forms and analysed them using SPSS. The options used for each item were scored as *strongly disagree* (1), *disagree* (2), *undecided* (3), *agree* (4), and *strongly agree* (5). *Strongly agree* indicates that the participant has an extremely positive attitude and will receive the highest item score, while *strongly disagree* indicates that the participant has a negative attitude and will receive the lowest item score. The other options were evaluated equally between these two extremes. The analyses were performed on the arithmetic averages ($\bar{X}$) of these values. The scores of each option were multiplied by the frequency of that option and the mean of the related item was calculated by dividing the total number of samples (N).

Qualitative data were also collected via Google Forms to determine the students' experiences. The obtained qualitative data were analysed using content analysis method with techniques such as coding, categorisation and theme extraction (McMillan & Schumacher, 2010). The codes, categorisation and themes were established through a collaborative decision-making process among us. The consistency between coders was calculated as 88%. According to Miles and Huberman (2010), consistency between coders should be at least 80%. Thus, consistency between coders was high. Moreover, specific participants' perspectives were presented by directly quoting them within the relevant themes.

Research process

A non-random sampling method was used to select participants from different associate degree programmes. The students were given a ChatGPT-supported online course for 4 weeks. Prior to the 4-week application, participants had attended a course called Using the ChatGPT Artificial Intelligence Robot as a Private Teacher on the online education and teaching platform Udemy to gain experience in using ChatGPT in their courses. During the online courses, instructors asked students three research questions related to that week's lesson at the beginning of each class. Participating students formed groups and researched the answers to the questions using ChatGPT 3.5 language model developed by OpenAI (Mhlanga, 2023) for 15 minutes. At the end of the process, each group shared their findings with the rest of the class. Following the 4-week collaborative ChatGPT-supported online course application, participant experiences were collected using qualitative and quantitative data collection tools. We analysed and reported these collected data. The steps of the research process are shown in Figure 1.

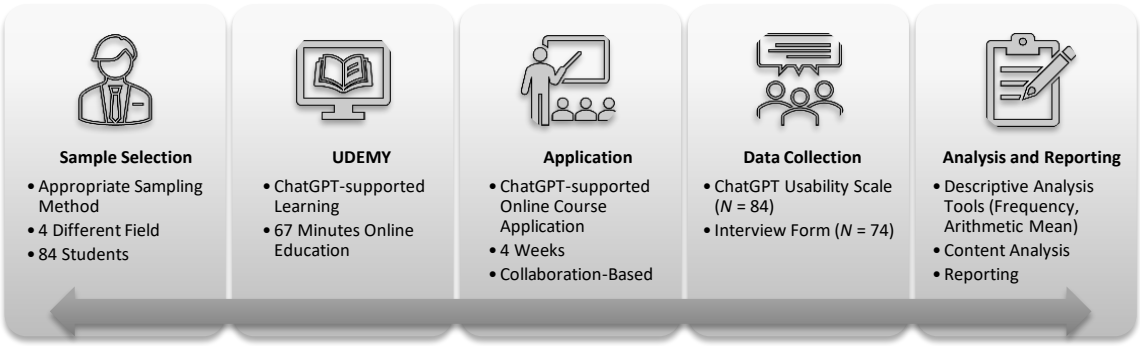

Figure 1. Research process

Below are some examples of questions directed to ChatGPT 3.5 by the students during the research process:

- In web design, how are Div and CSS concepts used? What are the functions of these concepts? Research sample uses.
- What are the basic HTML tags in web design? What are the functions of these tags? Research sample uses.
- Research formatting processes for headers/footers and page numbers in MS Word.

Ethics approval

Participants took part in our study on a voluntary basis. Ethical guidelines were strictly adhered to protect their confidentiality, privacy and rights. Data obtained from the participants were used and analysed particularly for the purposes of the research. Based on this, we would like to express that ethical rules were fully complied with throughout the research. In addition, an ethical report numbered E.102157 was obtained by Bingöl University Ethics Committee within the scope of the study.

Findings

The aim of the study was to determine university students' experiences with the use of ChatGPT in online classes. In this context, the first part of the research examined the students' experiences regarding the use of ChatGPT in education. The second part focused on the students' experiences with the usability of ChatGPT.

What are the experiences of higher education students regarding the use of ChatGPT in online education?

Data on the advantages and disadvantages of ChatGPT application in online education
The study collected opinions from 74 students to reveal their experiences with ChatGPT. Through the analysis of these opinions, two categories were obtained in the form of advantages and disadvantages of using ChatGPT in education. The findings related to the advantages category are presented in Figure 2.

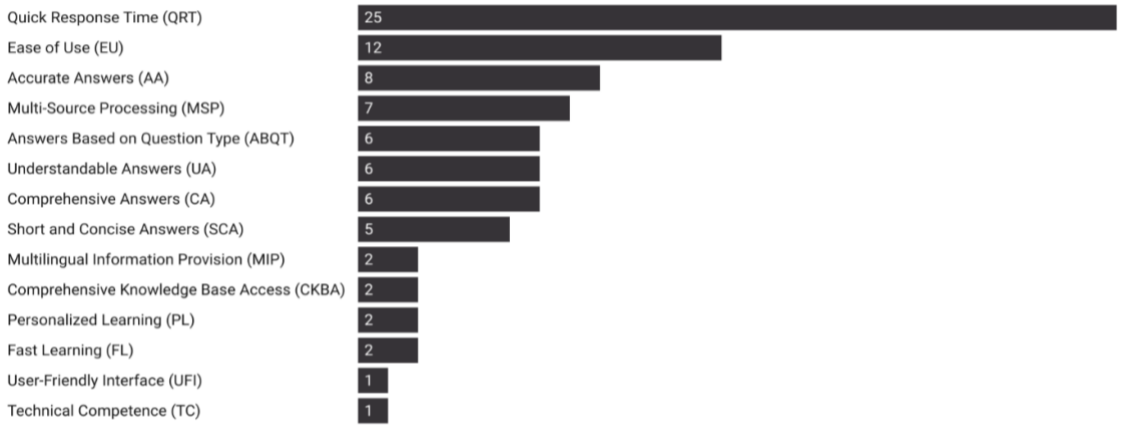

Figure 2. Advantages of ChatGPT

Figure 2 shows the frequencies of the students' experiences according to different evaluation criteria about the advantages of ChatGPT. According to the data obtained, the first three features of ChatGPT with the highest frequency of users are fast response (*n* = 25), ease of use (*n* = 12) and correct answers (*n* = 8), respectively. In addition, the use of multiple resources (*n* = 7), comprehensive answers (*n* = 6), and clear answers (*n* = 6) were also stated as relatively advantages. UFI and TC features were seen as less important by research participants. Having a UFI means a design that enables users to easily communicate with ChatGPT. Having knowledge on technical issues and expressing this knowledge in an understandable way was coded with the concept of TC. As a result, we determined that to increase the usability of ChatGPT, it is necessary to focus on responsiveness and ease of use features. These findings indicate that ChatGPT's features can affect user experience and learning performance.

When examining qualitative data obtained from student experiences, we determined that participants had positive views regarding the advantages of the application. Users were able to quickly learn about topics they desired and easily access all necessary materials. The application's responses were brief and to the point, providing needed information and generally offering accurate answers. Additionally, by filtering other information into a single piece of information, the application helped students use their time more efficiently. As a chatbot-designed application, it offers significant advantages for users by filtering and presenting the most accurate and accessible information more quickly and efficiently than other websites, consolidating all information into a single paragraph and providing the opportunity to write code in a short period of time, rather than spending long hours. The findings of our research also indicate that the application quickly and comprehensively understands and responds to questions, performs tasks quickly and provides the most important information in all answers. These advantages have significant contributions to education, such as providing a fast and effective learning experience, easy accessibility, and personalised learning experience. Qualitative data related to these views is presented below.

> QRT-CKBA: "The advantage of this application in terms of education is that it provides us with the opportunity to quickly learn about any subject we desire and to easily access all the materials we need."
>
> FL-EU-PL: "Among the advantages of this method in education are fast and effective learning, easy accessibility, and providing a personalized learning experience."
>
> SCA: "The application provides necessary information by giving short and concise answers."
>
> MSP: "It filters other information and presents it as a single piece of information, thus helping students use their time efficiently."

UA: "The advantage of the application is presenting all the information on a topic in the simplest way by bringing together all the information on internet sites in a single paragraph."

QRT-SCA: "The advantage of this application is that it provides the opportunity to write code in a short time instead of spending long hours."

SCA: "This resource provides an advantage in terms of summarizing all data on the internet and presenting it in a concise manner."

AA-QRT-UA: "Its advantage lies in enabling faster access to data, efficient use of time through practical exercises, and providing clear access to accurate data."

The analysis of data obtained from student opinions resulted in another category, namely the disadvantages of using ChatGPT in education. The findings related to the disadvantages category are presented in Figure 3.

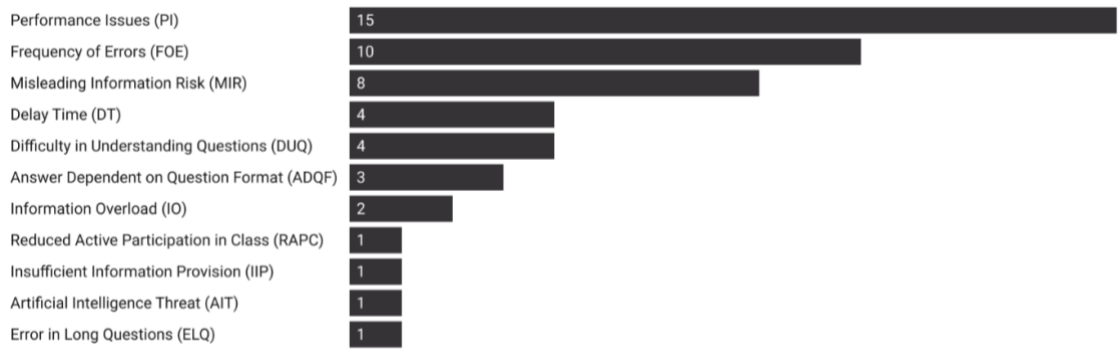

Figure 3. Disadvantages of ChatGPT

Figure 3 displays the frequencies of experiences of higher education students regarding the disadvantages of ChatGPT based on different evaluation criteria. According to the obtained data, the top three features with the highest frequency of users regarding the disadvantages of ChatGPT are performance issues (n = 15), error density (n = 10) and the risk of misleading information (n = 8), respectively. Additionally, difficulty in understanding questions (n = 4), delay time (n = 4) and question-dependent answer features (n = 3) were also mentioned as relatively disadvantageous characteristics. On the other hand, AI threat, error in long questions and reduction of active participation in the course were perceived as less disadvantageous by research participants.

When examining the qualitative data obtained from student experiences, we found that the most important disadvantages mentioned by participants regarding the advantages of the application were problems such as misunderstanding and incorrect answers in some cases, experiencing delays due to high traffic, not fully understanding the desired answer and providing unnecessary excessive information. In addition, some participants also mentioned issues such as stuttering and time loss when answering some longer questions. The qualitative data related to these views are presented below.

PI: "The disadvantage is that the collected information may be presented with some delay."

FOE-DT: "The disadvantage, on the other hand, is that sometimes it responds too late and fails to provide an answer to some questions, resulting in errors. This situation can be frustrating."

MIR-DUQ-FOE: “An inherent disadvantage is that sometimes it misunderstands the questions we ask and provides incorrect answers, experiences delays in responding due to high traffic, and even sometimes kicks us out of the system.”

MIR-DUQ: "Disadvantages include sometimes giving incorrect answers by misunderstanding the questions we ask, and sometimes providing incorrect answers by altering our questions."

AIT-MIR-DUQ: “A disadvantage is that it cannot fully replace a human teacher, and we may encounter problems such as giving incorrect answers or having difficulty understanding students' questions."

RAPC: "The disadvantage is that students may become more passive in face-to-face or online classes by using this application, leading to a decrease in their participation in the lessons."

IO-DUQ-DT: “Sometimes, it may not fully understand the answers we want and may create confusion by providing unnecessary information. In such cases, we may need to wait a bit longer to get the answer we want clearly.”

AIT: "The disadvantage, however, is that in the future this application may completely replace human labor, which raises concerns about the impact on employment opportunities for people."

ELQ: "One of the disadvantages that I have noticed is that it sometimes gets stuck while answering long questions. However, it usually works properly when tried again. Therefore, it can lead to time loss."

IIP-PI-DUQ: An important point to note is that while the chatbot can provide quick answers, it may fall short when we need more detailed information. One of its disadvantages is that the robot works slowly while typing, and sometimes we may encounter situations where the answers may not be suitable for the question asked.

Data about courses where ChatGPT applications can be effective

The interviews conducted within the scope of the study asked students about the subjects in which ChatGPT could be more effective. The analysis results are presented in Figure 4.

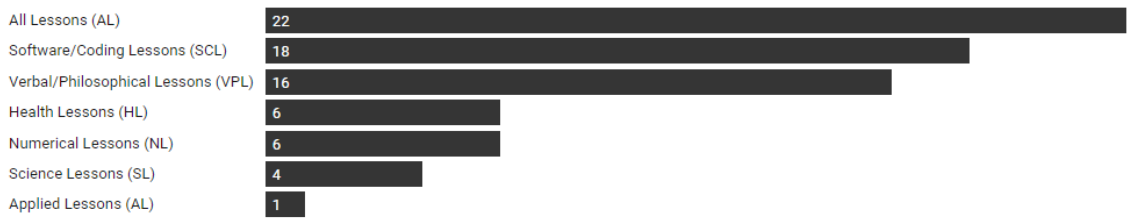

Figure 4. Lessons where ChatGPT can be effective

Figure 4 demonstrates that the ChatGPT application can be most effective in all lessons (*n* = 22), followed by software/coding lessons (*n* = 18) and verbal/philosophical lessons (*n* = 16). Health lessons (*n* = 6) such as anatomy, pharmacology and physiology and numerical lessons (*n* = 6) such as mathematics, geometry and physics were among the other effective lessons. Science and applied lessons, however, are expected to be less affected in terms of knowledge acquisition. Nevertheless, we concluded that this application can be effective for all lessons. These findings indicate that higher education students have different views on the effectiveness of the ChatGPT application in different lessons. Qualitative data related to these views are presented below.

AL-SCL-HL: "I believe that ChatGPT can be effective in all lessons, but it can be particularly useful in more knowledge-intensive lessons such as computer science or physiology."

NL: "I believe that ChatGPT would be effective in knowledge-based lessons, particularly in online classes where instructors can ask questions in real-time. The ability of ChatGPT to provide accurate and effective answers can be highly beneficial for students."

SL-HL: "I believe ChatGPT could be effective in research-oriented lessons such as Biology and Chemistry. Especially in topics related to drug research and development, I think we can achieve more effective results with ChatGPT."

NL: "I believe that ChatGPT would be more effective in numerical/quantitative lessons, but its use may be more challenging in lessons that require verbal and philosophical thinking."

SCL: "I consider ChatGPT as a resource that provides quick and easy access to codes that we need in software classes such as Python, JavaScript, HTML, and other lessons."
AL: "Instant question-and-answer capability in applied lessons would be useful in fostering active student participation."

HL: "As a physiotherapy student, I find this application useful in obtaining more effective and comprehensive answers about diseases that I cannot find or find insufficient information on internet websites."

Qualitative data obtained from the interviews reflects the notion that ChatGPT can be effective in all lessons. However, some students believe that ChatGPT would be more effective in knowledge-intensive lessons, especially those involving mathematics and numeracy. Additionally, some students expressed the belief that ChatGPT would be effective in lessons containing theoretical knowledge. Furthermore, the participants suggested that ChatGPT would be useful in applied lessons for enabling active student participation. While some students perceive that ChatGPT would be effective in knowledge-based lessons, others believe that it would be more effective in research-intensive lessons such as biology and chemistry. In conclusion, ChatGPT is believed to be a useful resource for students' learning processes. However, students are aware of the need to verify the accuracy of information provided by ChatGPT before relying on it.

Data on ChatGPT's top-rated features

The first part of the Findings section provided the advantages and limitations of ChatGPT for educational activities. This part presents the participants' favourite ChatGPT features. Factors such as personal preferences, usage purposes, experience levels and perceived benefits were taken into consideration. The most recurring features in the analysis of these opinions are provided in Figure 5.

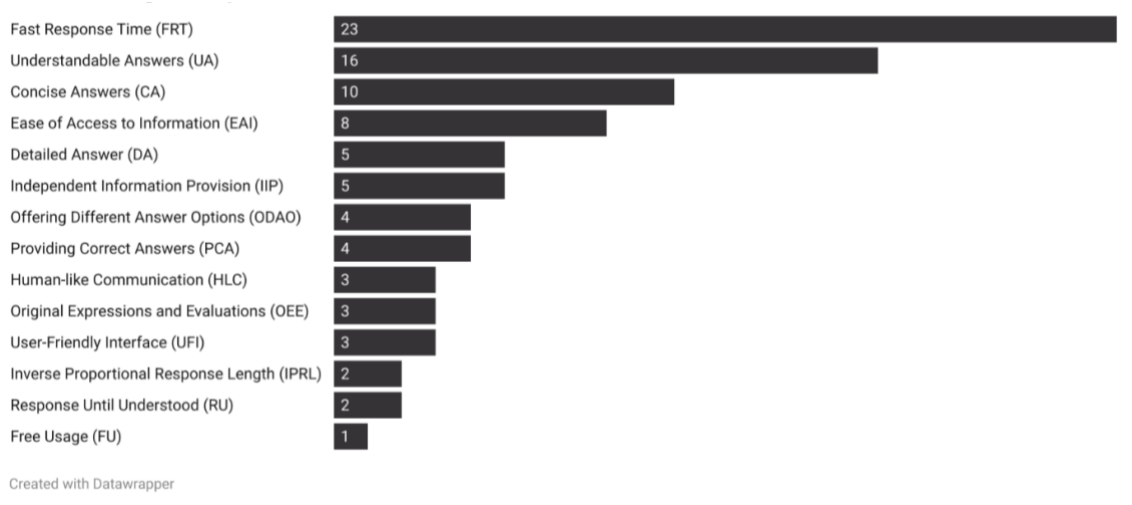

Figure 5. ChatGPT top-rated features

Figure 5 shows that the most appreciated features of the ChatGPT application by higher education students were fast response time (*n* = 23), understandable answers (*n* = 16) and concise answers (*n* = 10). Other features valued by students include ease of access to information (*n* = 8), detailed answers (*n* = 5), and providing independent information (*n* = 5). Additionally, other less frequent features mentioned by students include human-like communication, original expressions and evaluations, user-friendly interface, answering until understood and inversely proportional response length. The findings indicate that students expect fast, understandable and concise responses from the ChatGPT application. Qualitative data supporting these views is presented below.

> FRT-UFI: “The ease of use of data in facilitating prompt responses to inquiries and contributing to early resolution of issues constitutes a pivotal aspect of its application in an academic context.”
>
> UA-EAI: "I appreciate the clarity and comprehensibility of the writing style. Furthermore, its ability to educate us on topics that are unfamiliar is highly beneficial."
>
> UA-CA: "Even if I cannot articulate my questions clearly, the responses provided enable me to acquire the ability to ask more informed questions. Evaluating the robot specifically, it skilfully delivers responses that are not only comprehensive but also presented in a manner that facilitates absorption and understanding."
>
> EAI-UA-UFI: "The fact that ChatGPT provides detailed and comprehensive answers to my questions in any field, coupled with its simple and user-friendly interface, has won our admiration."
>
> IIP-CA: "I appreciate its ability to provide direct access without the need for intermediate applications, as well as its concise and informative content on relevant topics."
>
> HLC-FRT-FU: "I appreciate ChatGPT's prompt response and unlimited usage, as well as its courteous and human-like approach when I address it politely. Furthermore, I find it commendable that ChatGPT does not restrict my usage even when I ask challenging questions or follow up with additional queries in quick succession."
>
> EAI-UFI: "I find ChatGPT appealing due to its ability to answer my queries and its impressive design."

> UA-FRT-CA: "I appreciate ChatGPT's ability to provide clear and concise answers, its speed, its ability to save us from unnecessary information overload, and its provision of only the necessary information that we require."

Data collected from the interviews reveals that ChatGPT's most appreciated features are its prompt response time, ability to provide clear and concise summaries, ease of access to information, ability to provide independent information, provision of multiple answer options and user-friendly interface. Additionally, students expressed satisfaction with its human-like communication ability, free usage and ability to provide detailed responses. In summary, ChatGPT's features enable students to access information, receive answers tailored to their needs, and enjoy a hassle-free user experience easily and quickly.

Data on the contributions of ChatGPT applications to learning processes

When analysing qualitative data on the contribution of ChatGPT applications to students' learning processes, we found that, as a result of interviews with higher education students, ChatGPT has many contributions to their learning processes. Students expressed the view that the application provides access to healthier and clearer information, delivers sufficient and topic-focused information, enables them to access information in the most accurate and simple way and makes learning easier by reducing complexity. Additionally, ChatGPT was helpful in solving problems that could not be solved in class, saving time by providing information quickly and practically, facilitating learning and enabling students to quickly find information that cannot be found on websites. Students also mentioned that the application's proficiency in multiple programming languages could be useful for them to learn a desired programming language. In conclusion, ChatGPT has many contributions to the learning process and is considered useful by students. Examples of qualitative expressions related to these views are presented in detail below.

> P1: "I believe that ChatGPT enables me to access information in a healthier and more understandable way, which helps me to become knowledgeable."
>
> P2: "The information provided is sufficient and focused on the subject, which makes a positive contribution."
>
> P3: "It helps to access information accurately and simply by eliminating complexity."
>
> P4: “In terms of helping me with the questions I couldn't solve in my classes, ChatGPT supports me like a teacher by providing guidance and explanations.”
>
> P5: "The ability to provide information quickly and efficiently, resulting in time savings, is a valuable benefit for us.”
>
> P6: "In the learning process, it is a highly helpful application that enables us to quickly find information that we may not be able to find on a term paper or internet websites."
>
> P7: "I believe that using this application during the learning process is advantageous as I think it will be more helpful than Google; since only one desired answer is provided, it also saves time."
>
> P8: "It can be quite useful in learning the programming language that we want to learn, as it has expertise in many programming languages."

What are the experiences of higher education students regarding the usability of ChatGPT?

In this research section, we examined the experiences of students regarding the usability of ChatGPT. For this purpose, data were collected using a 15-item scale named Usability Scale for Artificial Intelligence-Supported Chatbots, which evaluated various features of the user's interaction and experience with the

chatbot. AI-supported chatbots, such as ChatGPT, have been increasingly used in many fields in recent years. However, limited information regarding higher education students' attitudes and usage experiences towards this technology is available. The findings of this study may help us better understand the experiences of higher education students regarding the usability of ChatGPT and contribute to our understanding of the potential impact of this technology in education. The data obtained related to the research question are presented in Table 2.

Table 2
Usability Scale for Artificial Intelligence-Supported Chatbots

		1-Strongly disagree	2-Disagree	3-Undecided	4-Agree	5-Strongly Agree	N	SD	$\overline{X}$
(1)	The function of the chatbot can be easily perceived.	3	6	22	42	11	84	0.92	3.62
(2)	The chatbot was easy to find.	3	8	14	47	12	84	0.96	3.69
(3)	Communication with the chatbot was understandable.	2	6	17	43	16	84	0.91	3.78
(4)	I was immediately aware of what information the chatbot could give me.	2	4	26	41	11	84	0.85	3.66
(5)	The interaction of the chatbot was like a fluent conversation.	3	10	24	36	11	84	0.98	3.51
(6)	The chatbot was able to follow the context/situation.	2	8	16	54	4	84	0.81	3.60
(7)	The chatbot was able to reference the website or service when requested.	2	9	25	41	7	84	0.88	3.51
(8)	The chatbot was able to handle situations where speech was not clear.	4	14	39	32	5	84	0.95	3.24
(9)	The chatbot's responses were easy to understand.	1	4	15	49	15	84	0.80	3.88
(10)	I see that the chatbot understands what I want and helps me achieve my goal.	3	8	14	47	12	84	0.96	3.69
(11)	The chatbot gives me the appropriate amount of information.	4	7	19	42	12	84	0.98	3.61
(12)	The chatbot only gives me the information I need.	6	13	17	43	5	84	1.04	3.34
(13)	I think the answers of the chatbot are correct.	1	1	19	39	24	84	0.82	4.01
(14)	I believe the chatbot has informed me of potential privacy issues.	7	10	30	30	7	84	1.04	3.24
(15)	My waiting time for a response from the chatbot was short.	5	5	15	36	23	84	1.08	3.80
Average									3.61

According to analysis of the collected data, the participants had a positive perception towards the AI-powered chatbots. The items with the highest frequency values are respectively determined as “I think the answers provided by the chatbot are correct” ($\overline{X}$ = 4.01), “It was easy to understand the answers provided by the chatbot” ($\overline{X}$ = 3.88), and “The waiting time for the response from the chatbot was short” ($\overline{X}$ = 3.80). The items with the lowest frequency values are “I believe the chatbot informed me about possible privacy issues” and “The chatbot could overcome situations where the conversation was not clear” ($\overline{X}$ = 3.24), respectively.

These data reflect the general perceptions of students regarding the usability of AI-powered chatbots. Students believe that the functions of chatbots can be easily perceived, and their communications are understandable. Additionally, students indicated that they experienced short response times and found the responses easy to understand. On the other hand, students believed that AI-powered chatbots could follow the context, provide an appropriate amount of information when need and deliver correct answers. However, they also thought that chatbots could not handle situations where the conversation was unclear and did not provide enough information about possible privacy concerns.

Based on the findings obtained in the research, there is parallelism between the qualitative data obtained from the experiences of the students regarding the use of ChatGPT in education and the quantitative data obtained on the usability of ChatGPT. These data support each other, indicating that students have a positive perception of the usability of ChatGPT and that it has the potential to be used in education.

Discussion

The aim of the study was to determine university students' experiences with the use of ChatGPT in online classes. In this context, ChatGPT-supported online classes were conducted with the students, and both qualitative and quantitative data were collected after the application. The students stated that ChatGPT provided quick and accurate answers to the questions asked. Chatbots are highly effective in increasing user satisfaction by being able to quickly and accurately respond to user needs (Balaji, 2019), which is reflected in the students' responses. Similarly, studies conducted by George and George (2023), Qadir (2022), and Talan and Kalınkara (2023) have reported that ChatGPT provides quick responses to questions within seconds. Additionally, studies conducted by Gilson et al. (2022) and Geerling et al. (2023) have found that ChatGPT provides accurate answers, as expressed by the participants. In contrast, Huh (2023) found that ChatGPT did not provide correct answers in a parasitology exam. Studies conducted by O'Connor (2022), OpenAI (2022), Qadir (2022) and De Winter (2023) have also indicated that ChatGPT's responses are not always correct or appropriate.

Another finding obtained within the scope of the study is that ChatGPT supports individual learning. ChatGPT encourages and improves personalised learning experiences (Cunningham-Nelson et al., 2019; Hirankerd & Kittisunthonphisarn, 2020; Lodge et al., 2023). The responses of the students can be evaluated within this context. Additionally, the ability to provide effective feedback instantly throughout the process may be one of the reasons for obtaining these results (George & George, 2023; Okonkwo & Ade-Ibijola, 2020; Porter & Grippa, 2020). This situation is emphasised to promote self-regulation (Chiu et al., 2023) and facilitate learning by increasing participation (Karsenti, 2019; Rudolph et al., 2023; Šlapeta, 2023). Similar results were obtained in studies conducted by Kuhail et al. (2023) and Winkler and Söllner (2018) in the context of personalised learning.

According to student feedback, ChatGPT has some disadvantages such as misunderstanding and providing incorrect answers, experiencing delays due to high traffic, not fully understanding the questions asked and providing unnecessary information. Additionally, longer questions can cause ChatGPT to stutter and result in time loss. In addition to technical difficulties, ChatGPT's usability performance is highly dependent on the user's request style and can vary significantly among different users (Gao et al., 2023). Furthermore, poor interaction designs of some chatbots can make them difficult to understand and use (Daniel et al., 2022). Moreover, chatbots may not always provide correct or useful responses, which can lead to disappointment for users (Yadlapally, 2023). All of these factors may have played a role in the results expressed above.

According to the data obtained in the study, students have expressed that the ChatGPT application can be used in all courses in general. One of the main reasons for this thinking among students is undoubtedly the use of a massive internet text data set, including blogs, novels, and classic literature, in the development process of ChatGPT, which enables it to acquire knowledge in many areas (Marr, 2022). Similar results were also obtained in the study conducted by Tlili et al. (2023).

Again, the study's findings show that ChatGPT has the ability to follow the context in the learning process, convey sufficient and relevant information, reduce complexity in the learning process and filter information to a single source. All these capabilities suggest that ChatGPT can enable students to use their time more effectively and improve their learning outcomes. Ma et al. (2023) and Saito et al. (2023) found similar findings regarding the ability to follow the context; Liu et al. (2023) found similar findings regarding the ability to convey sufficient and relevant information; Ouatu and Gîfu (2021) and Pawlak (2023) found similar findings regarding the ability to facilitate the learning process.

Within the scope of the study, almost all of the participants' answers to the usability scale of ChatGPT were between *undecided* ($\overline{X}$ = 3.00) and *agree* ($\overline{X}$ = 4.00). It is known that the increase in the number of options in Likert-type scales reduces the midpoint and endpoint orientations (Bora Semiz & Altunışık, 2016). It is also accepted that a midpoint option may cause biases towards the center and the desire for social desirability (Nadler et al., 2015). The two situations mentioned above explain the results obtained in this direction. In addition, it can be said that the scale aims to determine the direction of the attitude with the *agree* and *disagree* options and the strength of the attitude with the extreme options stated as *strongly* (Albaum, 1997. p. 332). Both the existence of this purpose and the fact that all items in the scale except for two items have values closer to the answer *agree* ($\overline{X}$ = 4.00), it is thought that it would be healthier to make an evaluation that the participants have a positive attitude towards the usability of ChatGPT. As a matter of fact, the fact that various measures such as code completion and correction, code snippet prediction and suggestion, automatic syntax error correction, code optimisation and refactoring suggestions have been taken to increase the usability of ChatGPT (Biswas, 2023) supports this evaluation. The study conducted by Shaikh et al. (2023) on the usability of ChatGPT in the context of formal English language teaching is like this study in terms of the averages of the answers given to the scale items and the results obtained.

However, participants have shown concerns about privacy. This can be explained by the view that ethical issues cannot be ignored in AI-supported educational applications (Adıgüzel et al., 2023). Moreover, technologies like ChatGPT carry serious ethical, justice and privacy risks (Belk, 2021; Breidbach & Maglio, 2020; Lodge et al., 2023; Wirtz et al., 2023). Similar results were obtained in a study conducted by Yu et al. (2021). Furthermore, Zhou et al. (2023) have indicated that ChatGPT could potentially collect and retain personal data for various purposes in relation to this matter. It has been noted that if these data are not adequately safeguarded or are utilised without proper authorisation, concerns regarding data privacy and security are exacerbated (Shahriar & Hayawi, 2023). The ethical ramifications of employing ChatGPT for educational purposes encompass issues of justice, transparency, and accountability (Panagopoulou et al., 2023). Addressing these concerns is of paramount importance to ensure that the use of AI in education is ethically sound and beneficial for all relevant stakeholders (Wu et al., 2023).

Conclusion and suggestions

In conclusion, the students had positive experiences with the use of ChatGPT in education, suggesting that ChatGPT can be used as an important tool that can enrich the learning experience. In particular, students described ChatGPT as an application that provides fast and effective communication and can provide clear and concise information. In addition, ChatGPT made significant contributions to students' learning processes and showed positive effects. Especially in software, coding and verbal philosophy course types, the effectiveness of ChatGPT stands out. This shows that ChatGPT can help students learn the programming languages they want.

However, considering factors such as performance problems, the density of incorrect answers, difficulty in understanding some questions and the risk of misleading information, we conclude that ChatGPT needs to be improved in some areas. Based on these results, we suggest further improving the user experience to prevent negative experiences such as misunderstanding ChatGPT's questions or giving wrong answers, delayed answers due to high traffic and providing excessive and unnecessary information. We also recommend strengthening the ability to deal with ambiguous situations.

These suggestions may allow ChatGPT to be used more effectively and efficiently in education. Future improvements should aim to increase the effectiveness of ChatGPT in different types of courses in order to provide students with better learning experiences. To this end, developing customised content for different courses can help students get better answers. It is also important to collaborate with educators to better align the app with course content and provide course-specific guidance to students. These steps can help optimise the impact of the ChatGPT app in courses.

There are also concerns that ChatGPT does not adequately respect students' privacy rights. Therefore, although ChatGPT has the potential to be used as a powerful tool in education, more efforts need to be made to ensure an environment where students can use it safely and securely.

Finally, future studies could focus on applications in different courses, considering increasing the sample size or including different demographic groups, aiming to further develop the use of ChatGPT in educational activities.

Author contributions

Bünyami Kayalı: Conceptualisation, Investigation, Writing – original draft, Writing – review and editing; **Mehmet Yavuz**: Data curation, Investigation, Formal analysis, Writing – review and editing; **Şener Balat**: Writing – review and editing; **Mücahit Çalışan**: Writing – review and editing.

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