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The impact of artificial intelligence on online assessment: A preliminary review

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Highlights

- AI provides several possibilities to improve assessment, but it also poses some threats to online assessment.
- While educational institutions are looking for ways to make maximum use of the opportunities offered by AI tools for assessment processes, they should take measures to prevent these tools from being an element of cheating in online assessment.
- Open and distance learning institutions, especially those that assess students online through assignments and projects, should bear greater responsibility for developing new assessment designs for fair assessment.

Article Info: Research Article

Keywords: *Generative AI, Online assessment, ChatGPT, Opportunities, Threats*

Abstract

The purpose of this study is to examine the impact of artificial intelligence (AI) on online assessment in the context of opportunities and threats based on the literature. To this end, 19 articles related to the AI tool ChatGPT and online assessment were analysed through rapid literature review. In the content analysis, the themes of "AI's assistance role", "automatic grading and feedback", "improving assessment" and "time benefit" were obtained in the opportunities category, while the themes of "academic integrity concern", "reliability issues" and "adaptability issues" were obtained in the threats category. The impact of AI on online assessment was explained within the scope of these themes. The results revealed that the most emphasis was placed on "improving assessment" themes in the opportunities category, and "academic integrity concern" themes in the threats category. At the end of this preliminary review, it was revealed that more studies investigating the integration of AI to online assessment are needed and all educational institutions, especially distance education institutions, should take measures to ensure the ethical use of AI.

1. Introduction

Developments in information and communication technologies are affecting our lives more and more every day. Technological developments may require us to question the way we do business, review processes and often make radical changes in these processes. In this context, one of the developments that has deeply affected the field of education at the global level was the COVID-19 pandemic. With the emergence of the pandemic, many educational institutions had to adopt new teaching methods (Gungea, 2023). They have switched to emergency distance education (Bozkurt & Sharma, 2020) and implemented new practices in learning and assessment activities. With the pandemic, studies on the integration of technology into education have gained momentum (Fergus et al., 2023). There was an increase in online assessment practices, especially in higher education institutions (Guangul et al., 2020).

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Proctored or unproctored, online assessment has become one of the issues of increasing importance in this process. Many studies were conducted to examine the difficulties encountered in online assessment from the perspective of the learner and the instructor and to investigate how online assessment can be improved. After a comprehensive literature review of these studies, Huber et al. (2023) has identified five key elements in the design of online assessment. These are; (1) assure academic integrity; (2) allow for provision of quality feedback; (3) support a positive learning experience for students; (4) assure the integrity of student information; and (5) ensure all students have an equal chance to complete the assessment successfully. Although all of these elements are important, especially the last one is of more importance in order to prevent inequalities in assessment in situations that cause crises, such as epidemics and natural disasters.

Online assessment, whether implemented out of necessity or for other reasons, refers to the assessment of students' learning through methods involving information and communication technologies (Conrad & Openo, 2018). Online assessment is also defined as a systematic method of gathering information about the learner and learning processes in order to make inferences about the learner's dispositions (Heil & Ifenthaler, 2023). Online assessment can be implemented as (i) synchronous or asynchronous online exams with locked browser, webcam and video analysis to detect and prevent cheating, (ii) synchronous online exams with any online testing system and video conferencing tool, and (iii) synchronous online exams in paper form under supervision via video conferencing tool (Lee et al., 2022). In studies on online assessment, it is seen that three main dimensions emerged as technical, academic/pedagogical and ethical (Semlambo, Almasi & Liechuka, 2022; Lee et al., 2022) and one of the most significant issues is authentication (Bozkurt & Uçar, 2018).

Another important recent development that affects educational practice and requires a new perspective on online assessment is the emergence of AI tools. AI, which was first introduced by John McCarthy at a conference in 1956, has recently emerged as an important technological development (Arslan, 2017). AI is characterised as an interdisciplinary field that develops through the integration of various disciplines including computer science, control theory, information theory, neurophysiology, psychology, linguistics and philosophy (Wei, 2018). The main purpose of AI is to simulate and improve human intelligence, and significant progress was made in this field over the years (Shi & Zheng, 2006). Today, there are many AI tools with different features and capacities such as converting old black-and-white photographs into colour photographs, tracking what people do during the day and offering suggestions to increase their productivity, creating royalty-free music, preparing texts to create effective advertisements and campaigns, easily finding keywords in a text, designing logos quickly and easily, and converting texts into audio files. Among these tools, ChatGPT, which has the capacity to understand, process and produce natural human language with reasonable accuracy and usability despite a high level of complexity (Haque et al., 2022), is more prominent than other tools.

With the working principle of the Generative Pre-trained Transformer (GPT) 3.5 language model, ChatGPT can be used for many situations such as compiling information, translating, correcting grammar, and answering questions (Roumeliotis & Tselikas, 2023). Five days after its first launch on 30 November 2022, it reached one million users; two months later, in January, it reached 100 million active users (UNESCO, 2023), thus becoming the fastest growing consumer application in history (Farhat et al., 2023; Naidu & Sevnarayan, 2023). Running with around 17 trillion parameters (Rudolph et al., 2023) the current version, ChatGPT-4, can answer questions in 37 languages, from Italian to Ukrainian and Korean (Lai et al., 2023). It can be said that ChatGPT technology, which is designed to chat with users and create meaningful answers to their questions (de Winter, 2023), will develop and become more impressive in the future (Qadir, 2022).

In the literature, there are many ChatGPT-oriented studies on the use and impact of AI in the field of education (Lo, 2023; Mhlanga, 2023; Sallam, 2023; Yu, 2023). In the majority of these studies, there are also findings and recommendations related to assessment. However, studies directly addressing online assessment are quite limited. This study aims to examine the impact of AI on online assessment in the

context of opportunities and threats according to the existing literature. Answers to the following questions were sought in the research:

RQ1. What kind of opportunities does AI involve for online assessment?

RQ2. What kind of threats does AI contain for online assessment?

RQ3. What measures can be taken to assure academic integrity in online assessment?

The answers to these questions are presented through the findings obtained by reviewing the articles that address online assessment and ChatGPT together.

2. Methodology

In this study, the impact of AI on online assessment was tried to be determined in the context of opportunities and threats with a focus on the AI tool ChatGPT. A rapid literature review approach was adopted in the study to examine the sources related to the subject. This approach provides information synthesis in which components of the systematic review process are simplified or skipped in order to obtain information in a short time (Tricco et al., 2015). This approach enables timely synthesis and review of recently published sources and their key findings (Lo, 2023). Thus, useful information can be provided to instructors, researchers, practitioners and educational administrators regarding the impact of AI on online assessment, and proactive policies can be determined for fair assessments in the face of rapid developments.

2.1. Data Collection

Data were collected from Google Scholar database June 5, 2023. More comprehensive results can be obtained from the Google Scholar database to access to recently published sources (Lo, 2023). The long period of publication in peer-reviewed academic journals was also a determining factor in the preference of this database. In the database search, 108 articles covering the period between December 2022 and May 2023 were accessed with the following search string.

("ChatGPT" and "assessment" OR "online assessment" OR "online examination" OR "online testing")

After analysing these articles, 19 articles containing the concepts of “assessment”, "online assessment", "online examination", "online testing" with "ChatGPT" in the title, abstract or keywords were included in the study. The inclusion and exclusion criteria are given in Table 1.

Table 1.

Inclusion and exclusion criteria for article selection

Criterion	Inclusion	Exclusion
Articles type	Academic articles	Non-academic articles
Articles topic	Contain the concepts of “assessment”, "online assessment", "online examination", "online testing" with "ChatGPT" in the title, abstract or keywords	Do not contain the concepts of “assessment”, "online assessment", "online examination", "online testing" with "ChatGPT" in the title, abstract or keywords
Time period	1 December 2022 to 31 May 2023	Articles outside the time period
Language	English	Non-English

The rapid literature review was conducted according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA). This process is summarised in Figure 1.

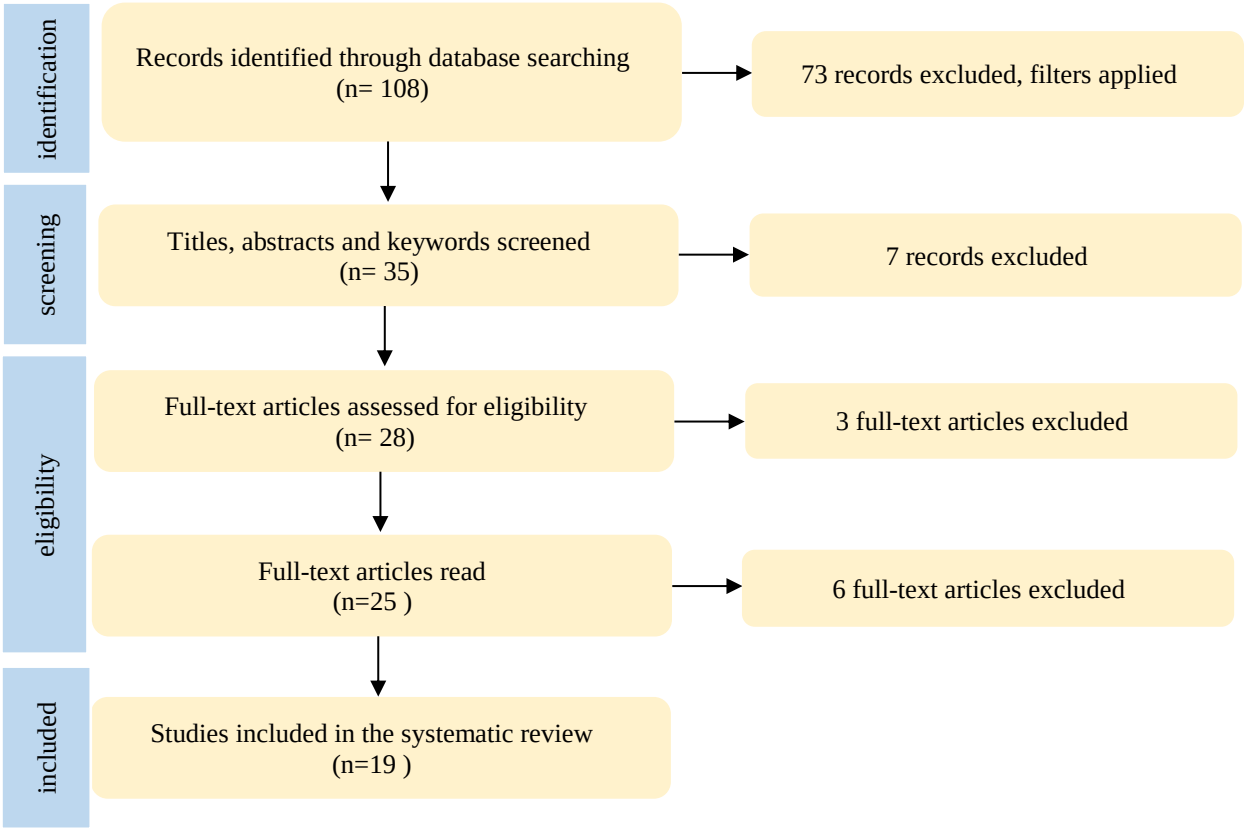

Figure 1. PRISMA diagram of the data collection procedures

2.2. Data Analysis

The content analysis method was used to analyse the literature data that emerged from the rapid literature review. As descriptive analysis is used to process data that do not require in-depth analysis, content analysis requires a more detailed examination of the data obtained and reaching concepts and themes that explain these data (Yıldırım & Şimşek, 2013). These categories and themes can be reached after open coding, axial coding, and selective coding, respectively (Creswell, 2012).

In this study, in the open coding phase, codes were assigned to the data pieces by determining whether they express opportunities or threats for online assessment. The codes assigned to the first 5 articles that intensively address ChatGPT and online assessment were reviewed and grouped according to their similarities. At this phase, a total of 27 different codes were obtained, 16 in the opportunities category and 11 in the threats category. The relationships between these codes were analysed in axial and selective coding phases and 4 themes and 11 codes were obtained in the category of opportunities and 3 themes and 8 codes were obtained in the category of threats. The impact of AI on online assessment is explained within these themes. Within the scope of the third question of the research, the recommendations for dealing with the threats of AI in the studies included in the research were analysed and these recommendations were summarized in technical, pedagogical and administrative dimensions.

2.3. Validity and Reliability

In qualitative research, the concepts of credibility and transferability are used for validity and consistency for reliability. The best way to increase credibility and consistency in qualitative research is to describe each stage of the research in detail, from data collection methods to the presentation of findings and results, and to present the reader with a convincing narrative (Büyüköztürk et al., 2020). The measures taken to increase credibility and consistency in this study can be listed as follows:

- The procedure followed in the selection of articles to collect data from the literature is explained in detail.
- The inclusion and exclusion criteria of the articles in the study were confirmed by another researcher.
- The articles selected for the study were also verified by another researcher according to the specified criteria.
- In the data analysis, the data were reviewed twice to ensure the consistency of the coding and direct quotations representing each code were used.
- The open coding data was shared with another researcher and the appropriateness of the themes obtained in the axial coding and selective coding phases was checked.
- The findings and results of the study are presented in a manner consistent with the research purpose and questions.

2.4. Findings

2.4.1. Findings of the included articles

In the study, 19 articles that met the inclusion criteria were analysed. The publication sources of the articles included in the study are given in Figure 2.

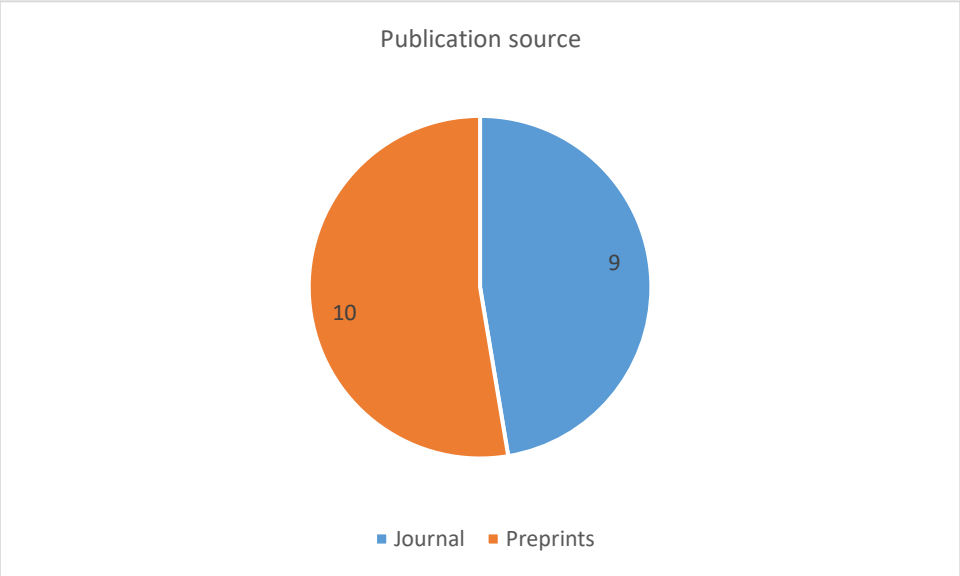

Figure 2. Publication sources of the included articles (N = 19)

According to Figure 2, it is seen that 9 of the articles included in the study were published in the journal and 10 of them are pre-printed articles. Information about the release period of the articles is given in Figure 3.

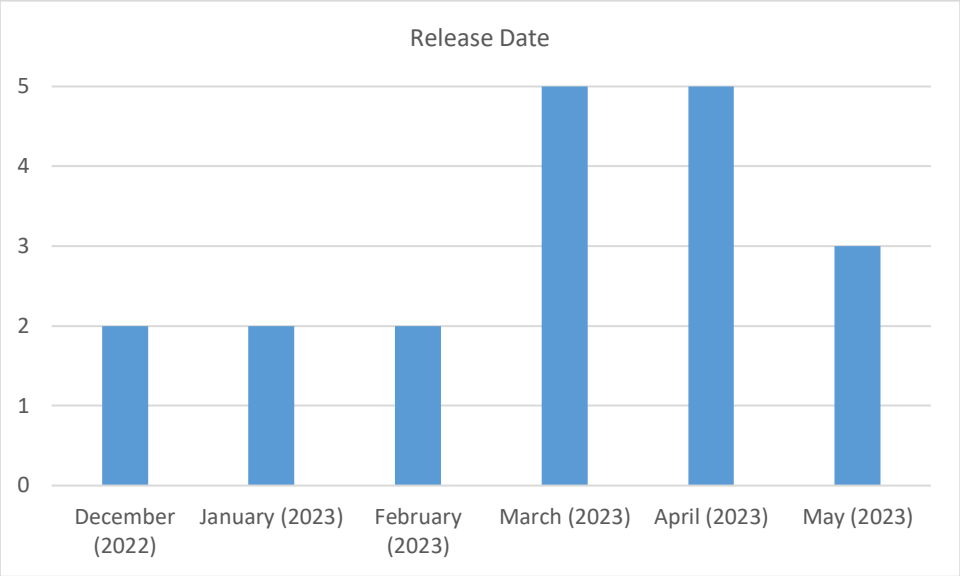

Figure 3. Release period of the included articles (N = 19)

As can be seen in Figure 3, the most of the publications on the subject were made in March and April.

The word cloud obtained from the keywords or index terms of the articles included in the study is given in Figure 4.

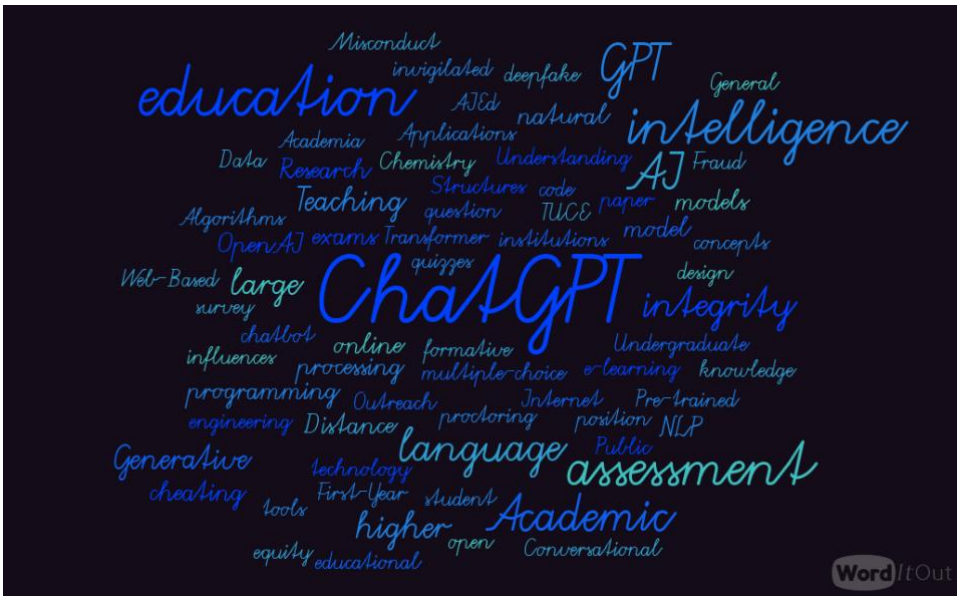

Figure 4. Word cloud from the keyword or index terms

It was found that 2 of the articles examined doesn't specify a keyword or index term, and there were 73 different keywords in the specified articles. The word with the highest frequency was ChatGPT with 16 repetitions.

2.4.2. RQ1. What kind of opportunities does AI involve for online assessment?

According to the literature reviewed in this study, the opportunities offered by AI in online assessment are summarized with 4 themes and 11 codes as seen in Table 2. The most emphasized theme in terms of opportunities was "improving assessment". In the majority of the studies covering this theme, the potential of AI to change or transform learner assessment comes to the fore. In addition to the studies [4,19] which state that this change may take the form of a return to face-to-face assessment, there are also studies [2] suggesting that assessment will evolve from human-centered to machine-centered thanks to AI. Malik et al. [6] emphasized that ChatGPT has the potential to completely transform the way academic environments approach learning, research and assessment of student performance. Baidoo-Anu & Ansah [18] stated that there is a need to improve the assessment capacity and skills of instructors in this process.

Table 2.

AI opportunities on online assessment

Studies	Opportunities theme	Opportunities code	Sample representative quotes
[1, 2,4,7 13,16]	Assistance	Exam design assistant	"To alleviate the work of writing brand new exams, professors can even turn to ChatGPT for inspiration on new exam questions" [4] (p. 318).
		Proctoring assistant	"..... universities could also consider using AI to help prevent students from using ChatGPT or any other AI tool to cheat on online exams." [1] (p. 15).
		Student assistant	"Concerning the assessment aspect, students can benefit from using ChatGPT as a scaffolding tool for their initial draft and then refining the draft by correcting errors and adding references to the final versions of their written assignments." [7] (p. 7).
[2,17,18]	Automated grading and feedback	Automated grading	"AI can be used to automatically grade assignments and assessments, which can save time and reduce the workload for teachers." [17] (p. 5).
		Personalization and feedback	"..... the use of ChatGPT in online assessment has already shown promising results. ChatGPT can personalize learning experiences for their students, analyze students writing and responses and provide immediate and specific feedback to students, and it can also suggest materials that would align to the students' learning needs (Kasneci et al., 2023). [2] (p. 6).
		Enhanced grading efficiency	"However, with the development of AI technologies like ChatGPT, HEIs can provide more efficient and reliable assessments at a lower cost (Kumar et al., 2021)." [2] (p. 3).
		Continuous feedback	"Thus, generative AI-powered assessment systems may support the integration of continuous feedback into learning processes by utilising distinctive and atypical artefacts." [18] (p. 13).
[2,3,4,6, 12, 17,18,19]	Improving assessment	Changing assessment	"At the same time, we believe that major changes to traditional higher education assessments such as essays and online exams are in order to address the existence of increasingly powerful AI, unless universities want to be akin to driving schools that teach to ride horses" [3] (p. 356).
		New assessment skills	"Through professional capacity building, teachers could develop the skills needed to harness the power of ChatGPT, and other generative AI to engage in high-quality assessment practices that improve students learning." [18] (p. 16).
[2,16,17,18]	Time benefit	Time saving	"From a pedagogical perspective, ChatGPT can help students save time; this means that students can spend more time on critically reading questions and the given text in an online assessment (Cascella et al., 2023)." [2] (p. 7).
		Productivity	"However, ChatGPT was able to create the exams within 10 hours and reduced TA's time to 5 hours. This shows 100% productivity increase in the "exam writing operation" (Terwiesch, 2023, p. 23)" [18] (p. 12).

The assistive role of ChatGPT as an AI tool constitutes an important theme in the opportunities category. There are 3 different topics under this theme: exam design assistant, proctoring assistant and student assistant. Susnjak [1] argues that universities can use AI to help prevent students from using ChatGPT or another AI tool to cheat on online exams, while in the area of exam design, universities can also consider using AI to develop more secure and robust online exam platforms. Rahman & Watanobe [13] argued that ChatGPT can be used to check submitted assignments for plagiarism and to create questions/exams on the same topic according to different difficulty levels (high, medium, easy). Lo [7] also mentioned that students can benefit from using ChatGPT as a scaffolding tool for their first drafts and then correcting mistakes and improving their written assignments by adding references.

ChatGPT's potential to automate the grading process is one of the most critical impacts of AI on online assessment. Automated grading has the benefits of providing more objective assessment compared to human assessors, reducing assessment costs (assessor payments) and time, reducing the workload of lecturers, personalizing learning and assessment, and providing personalized continuous feedback [2,17,18]. However, this potential is seen as a threat by online assessors as it may eliminate the need for them and cause loss of income [2].

ChatGPT saves time for both instructors and learners. Zhai [16] stated that ChapGPT can save educators time and effort when creating assessment items and can support them in improving the quality of assessment items by ensuring that they are aligned with standards. Naidu & Sevnarayan [2] emphasized in their study that this feature of ChatGPT provides learners with the advantage of time to critically read questions and texts in online exams.

2.4.3. RQ2. What kind of threats does AI contain for online assessment?

The threats posed by AI in terms of online assessment are summarised with 3 themes and 8 codes as seen in Table 3. The most emphasized issue in the online assessment was academic integrity concern. The concern of academic integrity was discussed in detail in 11 of the 19 studies reviewed.

In his study on the impact of ChatGPT on online exams, Susnjak [1] pointed out that the emergence of technologies such as ChatGPT poses a significant threat to the integrity of online exams, especially in the context of higher education, where online exams are becoming increasingly common. The issue that affects online exam integrity the most is undoubtedly cheating and plagiarism. Susnjak [1] analysed the texts generated by ChatGPT according to the criteria of relevance, clarity, accuracy, precision, depth, breadth, logic, persuasiveness and originality and found that the high quality of the texts increased the risk of cheating in online exams. Marusenko [8] also stated that ChatGPT eliminates the effectiveness of theoretical assessment questions that are set in the form of "give a definition", "enumerate a list of properties" or "list known types". Newton [9] and Gonsalves [10] also noted that ChatGPT's capacity to answer multiple-choice questions threatens academic integrity by eliminating the learning and assessment value of knowledge-access MCQs. It was suggested that such questions should be used in formative assessment [10]. Nikolic et al. [15] argued that online exams or tests with a weighting that favors the risk/reward ratio for cheating should be discontinued.

Table 3.

AI threats on online assessment

Studies	Threats theme	Threats code	Sample representative quotes
[1,2,3,4,5,8,9, 10,11,13,15]	Academic integrity concern	Online exam integrity	"….. the emergence of technologies like ChatGPT presents a significant threat to the integrity of online exams, particularly in the context of tertiary education where online exams are becoming increasingly common." [1] (p. 17).
		Distruption of assessment integrity	"..... the use of it in online assessment may be seen as a threat to intellectual honesty and authenticity, as it may allow students to produce work that is not their own and may potentially lead to plagiarism. This could undermine the integrity of the assessment process and devalue the educational experience." [2] (p. 6).
		Cheating/Plagiarism	"The authors found that the high quality of texts generated by ChatGPT creates a higher risk that students will cheat on online exams." [5] (p. 2).
[2,13,14]	Reliability issues	Validity and reliability	"This ability of ChatGPT has implications for high stake tests and examinations if they were to be conducted online or follow the take-home examination format. The validity and reliability of these examinations can be questioned in the context of ChatGPT" [2] (p. 4).
		Fairness	"As ChatGPT can generate human-like text for academic topics, educators and institutions need to be aware of the possibility of cheating in online exams using ChatGPT. In short, ChatGPT threatens the fairness and validity of online exams and assignments". [13] (p. 16).
		Data privacy and security	Other limitations listed were that ChatGPT could not offer an opinion, is limited to events before 2021, cannot look up information in external databases, does not provide references, makes mathematical mistakes, and lacks creativity or critical thinking in its writing style. Some concerns were also raised about copyright, privacy, and security of student data." [14] (p. 34).
[2,4,15]	Adaptability challenge	Resistance	"However, as with any disruptive innovation, there may be resistance from stakeholders, such as lecturers and managers, who are not ready to adapt to the changes brought about by ChatGPT. " [2] (p. 3).
		Bias	"ChatGPT can be seen as a possible disruption to online assessment in the same way that calculators were seen as a disruption to mathematics education and computers were seen as a disruption to the teaching of handwriting." [2] (p. 5).

One of the threats posed by AI in online assessment is related to the issue of reliability. The use of ChatGPT as a cheating and plagiarism tool negatively affects the validity, reliability and fairness of online exams. This is also true for take-home exams [15]. Rahman & Watanobe [13] stated that ChatGPT's ability to produce human-like texts on academic subjects threatens the validity and fairness of exams and assignments. Another issue within the scope of reliability is data privacy and security. Susnjak [1] mentioned the concerns about privacy, validity and reliability of the software caused by AI technologies used in exam proctoring. Sullivan et al. [14], on the other hand, highlighted the distrust of ChatGPT due to its working logic and inclusiveness problem (limited to events before 2021, inability to search for information in external databases, inability to provide references, etc.) and drew attention to concerns about copyright, privacy, and security of student data.

The development of AI tools, especially the current potential of ChatGPT, will bring some resistance to the inclusion of these tools in education and assessment practices. In the literature on this subject, ChatGPT is defined as a disruptive innovation and it is stated that there may be some stakeholders such as lecturers, contracted assessors, administrators who may have difficulty in adapting to the changes brought by this

innovation [2]. In this respect, the ability of stakeholders to adapt to new technologies and innovations is critical for the integration of AI tools into the online assessment process. In this adaptation process, prejudices can also be counted among threatening factors. Naidu & Sevnarayan [2] point to this threat with the analogy that ChatGPT can be seen as a disruption in online assessment just as calculators are seen as a disruption in mathematics education and computers are seen as a disruption in handwriting teaching.

2.4.4. RQ3. What measures can be taken to assure academic integrity in online assessment?

The reviewed articles revealed that the use of artificial intelligence in online assessment has some consequences that negatively affect academic integrity. The authors' suggestions on this issue were examined and categorized under pedagogical, technical and administrative dimensions. Some of the suggestions that are considered to be inclusive are given in Table 4 with sample quotations.

Table 4.

Authors' suggestions for academic integrity concern

Dimension	Sample suggestion quotes
Pedagogical	"Use multi-modal channels for exam questions: Embedding images to exam questions can make it more difficult for students to cheat and for ChatGPT to generate accurate responses, as the technology relies on text input only." [1] (p. 16).
	"In the context of ChatGPT, lecturers need to consider asking questions that will not be easily answered by ChatGPT. These questions may include historical or contextual information after the year 2021, as this information cannot be accessed on ChatGPT-3.5 (Visagie, 2022). [2] (p. 8).
	"Another idea to combat the use of text generators such as ChatGPT and GPT-3 is to design writing assignments that they are currently not good at handling." [3] (p. 355).
	"At present, a very important limitation of ChatGPT is that it does not provide sources and quotations. Whilst it is able to provide book recommendations and provide reasons for its recommendations, it does not provide in-text referencing and a reference list in its responses. This is a major shortcoming in writing academic assignments (that usually require a certain number of references)." [3] (p. 355).
	"Make sure students understand the consequences of cheating and the importance of academic integrity." [4] (p. 308).
	"Exam design can be one of the best techniques to address integrity concerns. No matter the exam design, however, professors should endeavor to write a new exam with original questions each semester if it is online." [4] (p. 318).
	"The author concludes that banning chatbots practice is not an effective way to deal with the threats they pose to student evaluation. We consider promising to use cases generated by the teacher for one-time use (not repeated in other groups), containing casual (not generalized theoretical) questions." [8] (p. 1).
	"Present questions using images, figures, or charts as auxiliary information and a non-specific question as stem (for examples, see Mate and Weidenhofer, 2022). For example, 'which section of the figure below demonstrates. . . ?'" [10] (p. 5).
Technical	"GPT output detection: Check responses against GPT language detector models online at various portals." [1] (p. 16).
	"A simple solution to the problem of students using ChatGPT ..... – for online exams, proctoring/ surveillance software can be used." [3] (p. 354).
	"Use proctored exams or other forms of secure testing." [4] (p. 308).
	"While some technology facilitates cheating, other technology combats it. For example, exam software can shut down other applications on students' computers and prevent them from copying and pasting text into the exam or using the internet." [4] (p. 313).
	"Therefore, we recommend the combined use of plagiarism checkers and AI detection tools." [5] (p. 3).
	"Plagiarism detection tools: Moss (Measure of Software Similarity) is a plagiarism detection tool developed by Stanford University. It is designed to detect similarities between programming assignments submitted by students, and it can be used to help instructors identify cases of potential plagiarism. There are several other tools that can be used to detect plagiarism including JPlag, Codequiry etc." [11] (p. 7).
Administrative	"HEIs must update their academic integrity policies to account for the use of these tools and decide what constitutes academic misconduct. Failure to adapt policies to address the use of AI tools could result in

	inconsistent enforcement and hinder progress in the development of future online assessment contexts." [2] (p. 7).
	"Set clear guidelines for how students should use language model-based tools, such as ChatGPT, in their coursework." [4] (p. 308).
	"At the institutional level, academic integrity policies and honor codes should be revised to address the use of AI tools. Clear and simple guidelines for the proper use of language models in teaching and learning should be developed, and consequences for cheating should be clearly outlined. Faculty should be trained to adopt AI tools to augment their teaching practices. Additionally, students should receive training on academic integrity to ensure they fully understand the importance of maintaining ethical standards in their work." [11] (p. 8).

When Table 4 is examined, it is seen that the suggestions made by the authors of the articles for academic integrity are mostly in pedagogical dimension. The fact that what can be done in the technical and administrative dimension is limited is also reflected in the suggestions of the authors. It is likely that some of the suggestions in the pedagogical dimension will lose their validity when new versions of ChatGPT emerge [3]. However, the authors agree on the importance of including questions in the exams that ChatGPT cannot answer directly. Susnjak [1] gave the example of pre-recorded videotaped questions that combine verbal questions with images. Rudolph et al. [3] suggest designing written assignments for which ChatGPT was inadequate in trials to date, and requiring in-text references and a list of references at the end of the assignment. Another suggestion in this regard was to prepare questions on historical and contextual issues related to developments after 2021 [2]. Ryznar [4]'s proposal belongs to the harmonization strategy rather than prohibition and includes informing students about the consequences of cheating and academic integrity. Ryznar [4] emphasized the importance of different exam design, arguing that professors can improve academic integrity by preparing separate exams for each semester. Similarly, Marusenko [8] argued that case questions created by teachers for one-time use are a more effective way than banning the Chatbot. Similar to Susnjak [1], Gonsalves [10] suggested the use of picture, chart, auxiliary visuals or conditional logic branching questions.

It was stated in the literature that the potential of technical measures to prevent students from cheating is low. In a study conducted in January 2023 with the participation of more than a thousand students, it was revealed that more than one third of the students used ChatGPT while doing their written assignments even though they knew that they were cheating [14]. However, the presence of a surveillance system can lead students to behave ethically. Therefore, Susnjak [1] suggested that students' responses should be checked against online GPT language detector models on various portals. Rudolph et al [3] pointed out the necessity of using proctoring software for online exams. Similarly, Ryznar [4] also suggested using technology to deal with technology that causes cheating. In this dimension, Qureshi [11] has also presented a variety of plagiarism detection tools to deal with plagiarism.

There are also measures that can be taken at the administrative dimension regarding academic integrity concern. Naidu & Sevnarayan [2] stated that higher education institutions need to update their academic integrity policies to account for the use of AI tools and to clearly frame academic misconduct. Failure to adapt policies to address the use of AI tools may result in inconsistent practices and hinder progress in the development of future online assessment contexts. In this regard, some authors [4,11] have pointed out the importance of establishing clear and simple usage guidelines. Qureshi [11] also stated that students should be educated about academic integrity.

3. Conclusion and Suggestions

In this study, it is aimed to examine the effect of AI on online assessment in the context of opportunities and threats. For this purpose, 19 articles on online assessment were reviewed with the AI tool ChatGPT, which was put into use last November. After this review, the opportunities offered by AI for online assessment were analysed with 11 codes under 4 themes and the emerging threats were analysed with 8

codes under 3 themes. However, the suggestions of the authors on academic integrity were classified and explained in pedagogical, technical and administrative dimensions.

The AI tool ChatGPT provides exam design assistance to instructors by easing their work in preparing new exams [4], monitoring assistance to system administrators in universities to prevent student cheating in online exams [1], and assistance to students in drafting and developing their assignments [7]. As such, it is a useful tool for all stakeholders involved in the educational process. Therefore, the reactions [3] between the extremes of banning or preventing the use of ChatGPT in higher education and including it in the curriculum are not considered meaningful.

One of the opportunities offered by AI is the automatic grading on online exams. While this function, which saves time for the instructors [7], ensures that the assessment is more accurate and objective than human evaluators, it may cause loss of income for human evaluators [2]. Especially in open and distance education systems with tens of thousands of evaluators, this situation, which provides cost advantages to institutions, will cause the reaction of tens of thousands of evaluators. Therefore, automatic grading has both positive and negative effects on online assessment. It can be said that the positive effect of automatic grading in terms of reinforcing learning occurs when personalised instant feedback is provided. According to Al-Darei & Ahmed (2022), feedback has a great role in learning environments designed using technology. In this way, students receive direct feedback about their progress and have the opportunity to assess their own situation.

The authors of the articles analysed in this study mostly emphasised the impact of AI on online assessment in terms of changing or improving the assessment process. The authors believe that the potential of ChatGPT may lead to the need for lecturers and administrators in higher education institutions to consider new questioning strategies and pedagogies to prevent cheating in assessments [2], completely transforming the way academic environments approach learning, research and the assessment of student performance [6]. It has also emerged that this disruptive technology will provide rich discussions for learning and assessment [12] and will require enhancing the assessment capacities of tutorials [18].

In 11 of the 19 articles analysed in this study, academic integrity concern was included as a threat factor in online assessment. In a literature review by Sullivan et al. [14], academic integrity concerns were discussed more frequently than opportunities to improve learning and teaching using ChatGPT. One of the reasons for this situation may be the acceleration of the transition to online exams in higher education with the COVID-19 pandemic (Guangul et al., 2020). Due to the high number of students, cheating and plagiarism should be handled meticulously in open and distance learning institutions where multiple-choice tests are widely used. In addition, it should be taken into consideration that AI may increase inequalities and negatively affect fair assessment in evaluation made by preparing homework or projects by students and saving them to the online system [2]. Open and distance learning institutions with such practices are expected to be more sensitive about the fairness of completely unattended exams and assignment grades. The suggestion in the literature to switch to oral exams in the face of cheating and plagiarism [1] is an approach that cannot be implemented in open and distance learning institutions where the number of students taking a course is expressed in tens of thousands.

The issue of protecting the privacy and ensuring the security of data in online assessment was frequently raised, especially in remote exam applications during the COVID-19 outbreak. The protection of student privacy by the exam proctoring software used will prevent some ethical discussions along with concerns about the validity and reliability of the software [1].

One of the themes that emerged in this study in terms of the impact of AI on online assessment was the adaptability challenge. Tutors, assessors or administrators may experience difficulties and resistance in adapting to the disruptive innovation of ChatGPT due to their bias or other reasons. Therefore, it is useful to convey the benefits of such innovations to stakeholders with the appropriate approach.

In the articles reviewed within the scope of the study, the suggestions of the authors were mostly on academic integrity. An important part of the suggestions is related to pedagogical issues. Among these issues are question types and exam designs that can be used in online exams against the academic integrity concern. Suggestions on technical issues are on proctoring systems and software. Suggestions on administrative issues are related to legislative arrangements and stakeholder information that should be made for academic integrity.

The results of this paper reveal that AI offers important opportunities for online assessment, but also brings with it some problems on academic integrity. All institutions, especially open and distance education institutions, teachers and students have a responsibility for the ethical use of AI. More research may be conducted to integrate AI into education and assessment processes, and Neumann et al.'s [5] finding that in the near future, people who use AI tools will work much more efficiently than those who do not use these tools should not be ignored.

4. Limitations

This research is limited to 19 studies on ChatGPT and online assessment, published in the period between December 2022 and May 2023, accessed from the Google Scholar database. The effect of AI on online assessment was only examined within the scope of studies on ChatGPT among AI tools.

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