ASSESSING DISTANCE LEARNING IN A DIGITAL ENVIRONMENT IN THE ERA OF ARTIFICIAL INTELLIGENCE: SYSTEMATIC REVIEW

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ABSTRACT

Distance learning student assessment in a digital environment in the age of artificial intelligence offers significant opportunities but presents challenges, mainly related to the credibility and validity of the assessments, particularly in postsecondary education. The aim of this article is to examine studies on the assessment of learning in digital environments in the era of artificial intelligence conducted between 2020 and 2024, to provide an overview of the state of the field. The study identified five key themes reflecting the major concerns of researchers: 1) academic integrity, 2) integration and adaptability of digital technologies, 3) impact of artificial intelligence, 4) pedagogical alignment, and 5) interactions and feedback. The results indicate that academic integrity is linked to two distinct approaches: prevention and detection. Both strategies require the adaptability of integrated digital technologies. The study also shows that the rapid development of artificial intelligence and its increased use by students raises concerns about its potential impact on distance assessment. Furthermore, the studies reviewed highlight the importance of maintaining pedagogical alignment and encouraging immediate and meaningful feedback. This overall understanding of the major concerns of teachers and designers could be taken into account in any assessment strategy aimed at improving the quality of distance assessment. Finally, the results of the present study provide insights into the major concerns of researchers that can be used in future research concerning the issue of distance assessment in the AI era.

Keywords: *distance assessment, elearning, digital technology, academic integrity, artificial intelligence*

INTRODUCTION

In recent decades, rapid societal changes and the evolution of digital technology have transformed the world into a more globally interconnected place (Markauskaite et al., 2022). This evolution has also changed the way educators interact with students' learning methods and modalities by fostering a creative and innovative approach to learning without time and space constraints.

In this sense, and with the emergence of the Covid-19 pandemic, the integration of digital technologies into education has grown exponentially, and different forms of distance learning, such as elearning, blended learning, hybrid models, massive open online courses (MOOCs), as well as other forms of distance learning, have emerged. Despite this diversity of forms of distance learning, organizing and combining the resources needed to effectively support and complement

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learners has revealed challenges in assessing the learning outcomes of these modalities (Akimov & Malin, 2020; Al-Maqbali & Raja Hussain, 2022; Flores et al., 2022; Leroux & Nolla, 2022; Lucas & Vicente, 2023; Oliveira et al., 2021; Rahman et al., 2022; Samlak, 2021). In addition, the development of artificial intelligence (AI), and in particular the emergence of generative AI tools and their increasing uses, raises new challenges in the field of distance assessment (Ali et al., 2024; Boscardin et al., 2024; Farazouli et al., 2024; R. Garcia et al., 2024; Khan, 2024; Navidinia et al., 2024).

Assessment is an essential element in any teaching and learning strategy (Akimov & Malin, 2020). In a distance learning context, assessment is a is a systematic process of collecting and analysing information about learners and their learning processes in order to make informed decisions about their achievements and aptitudes (Conrad & Openo, 2018). It specifically uses information and communication technologies, enabling learning to be assessed in an innovative way that is adapted to digital contexts (Heil, J., & Ifenthaler, D., 2023). Thus, it is important to develop assessment systems that, on the one hand, meet the fundamental educational objectives and on the other hand, adapt to technological advances and take into account concerns relating to the credibility and effectiveness of distance assessment. These systems should not only assess the acquisition of knowledge but also be aligned with active learning approaches that develop the skills and abilities learners need to engage actively and act positively in society (Ang et al., 2021).

A variety of assessment types are used in distance education to track learning progress and assess learners' understanding, application, and extension of knowledge (Butler-Henderson & Crawford, 2020). However, students need to learn 21st century skills and abilities, such as critical analysis, problem solving, communication, collaboration, and creativity, to succeed in learning and integrate into a modern work environment (Larson et al., 2010). With this in mind, it is important to guarantee the credibility and effectiveness of learning assessments and student work to ensure that the assessment is fair and accurately reflects the learners' achievements (Serutla et al., 2024).

Research in distance learning and teaching is experiencing continuous and rapid development (Martin et al., 2020), particularly due to the COVID-19 pandemic (Weeden & Cornwell, 2020). However, the issue of implementing credible distance learning assessment is now important and requires in-depth evaluation. In order to help improve the quality of distance assessment, the research community presents a diversity of perspectives and approaches, and researchers are tackling this issue from different angles, and proposing various techniques and tools, and examining different types of digital tools and instruments for distance learning. Researchers have examined a variety of methods and digital tools used to ensure academic integrity (Butler-Henderson & Crawford, 2020; Tsigaros & Fesakis, 2021; Vellanki et al., 2023). They have also addressed the issue of pedagogical alignment (Akbay, 2022; Almossa & Alzahrani, 2022; Barthakur et al., 2022) and the maintenance of meaningful and effective feedback in any distance learning assessment strategy (Afzal et al., 2024; Almuhanna, 2023).

The use of AI applications and, in particular, the emergence of generative AI is revolutionizing various aspects of education (Abulibdeh et al., 2024). This technology plays a central role in supporting learning, particularly in higher education. AI tools offer new approaches to knowledge acquisition and transmission and help to develop students' habits of effective use, thereby reinforcing their perception of the usefulness and effectiveness of this technology in the educational context (Lavidas et al., 2024). These applications are based on deep learning models capable of producing a wide variety of content, such as texts, images, sounds, codes, and other types of high-quality content (Alier et al., 2024). The integration of this technology into science education offers considerable pedagogical potential (Rahioui et al., 2024), in particular by enriching the learning environment, facilitating the creation of quizzes, assessing learners' achievements, and making it possible to predict their academic performance (Almasri, 2024). Although these AI applications offer a variety of opportunities for education, their use for academic dishonesty raises new challenges in the field of distance assessment (Ali et al., 2024; Boscardin et al., 2024; Farazouli et al., 2024; Garcia et al., 2024; Lo, 2023; Navidinia et al., 2024). This technological development is prompting researchers to pay particular attention to the impact of these innovative AI applications

on the distance assessment process (Bearman et al., 2023; Ifelebuegu, 2023; Naidu & Sevnarayan, 2023; Wood et al., 2023; Zhai, 2022). To this end, we felt that it would be beneficial to carry out an analysis of existing studies to identify the relevant results from the literature on this problem. In addition, this process gives us the opportunity to classify the different approaches and modalities for assessing learning in a context rich in emerging technologies, in particular AI.

This study aims to gather, analyze, and discuss recent studies regarding the assessment of distance learning in a digital environment in the age of artificial intelligence. This makes it possible to highlight the different contributions of researchers aimed at improving the quality of distance evaluation in a changing context. The present work also seeks to identify research gaps while providing an overview of the research that is representative of recent concerns and contributions in the field. The final purpose is to provide the research community and practitioners with valuable guidelines for formulating theoretical proposals based on recent distance assessment practices.

The existing literature shows that the impact of this technology on distance assessment in higher education has not sufficiently studied from various angles and aspects. This study is distinguished by its synthetic approach to the representative and recent work on the issue of distance learning assessment at a time when the potential of AI is being developed. It approaches this subject from various aspects and contexts to highlight the major concerns of researchers and course designers. This has led us to propose an innovative distance assessment model based on the digital portfolio, as a the result of our cross-sectional analysis of the results of the studies reviewed. The choice of this system takes advantage of the opportunities offered by digital technologies and AI applications and responds to the challenges we identified. Furthermore, this approach allows us to contribute to the ongoing discussion on the issue of distance assessment in the AI era, while providing concrete perspectives and recommendations for examining innovative distance assessment systems through empirical studies. This study therefore seeks to answer these three questions:

1. How do researchers approach the issue of distance learning assessment in the postsecondary context?
2. What are the main concerns of researchers and course designers with regard to distance assessment?
3. How can the results of this study be synthesized to formulate practical recommendations and propose evaluation approaches to improve and innovate the pedagogical offerings in terms of distance learning evaluation?

RESEARCH METHODOLOGY

The present study used systematic literature review procedures to examine existing studies on the issue of assessing distance learning in a digital environment in the age of AI. This systematic methodology was applied in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines (Page et al., 2021) and Okoli's steps (Okoli, 2015). We have chosen to adopt this approach because of its ability to bring together and comprehensively cover the different aspects and dimensions associated with our research topic (Grant & Booth, 2009).

The review procedure adopted in this research involved the following stages: defining the research objectives and formulating the problem, designing a protocol, developing a practical selection procedure, conducting literature reviews, extracting the relevant data, assessing the quality of the included studies, synthesizing the studies, and, finally, writing the review.

Defining the Research Objective

The rapid development of digital technologies, and AI systems in particular, has opened up new prospects for education. This technology has profoundly transformed the dynamics of interaction between students, teachers, and technology, contributing to a redefinition of educational practices. In this context, the issue of distance learning assessment has aroused growing interest in educational circles. Many researchers are now looking into this issue and exploring it from a variety of angles and approaches. The aim of this study is to list, analyze, and discuss recent research into the assessment of distance learning in a digital environment in an era of artificial intelligence. It thus

highlights the various contributions of researchers who are striving to improve the quality of distance assessment in a constantly changing context. In addition, this work identifies opportunities, concerns, contributions and gaps in the literature, while offering a representative synthesis of recent studies.

Designing the Protocol

We used the following protocol to describe the study procedure in a rigorous and transparent manner, thereby reducing bias in study selection and data extraction. It is broken down into the following steps: formulating the research questions, defining a literature review strategy, identifying the research sources, establishing inclusion and exclusion criteria, assessing the quality of the studies, developing a data extraction strategy, and synthesizing the results of the studies.

Document Research and Identification of Resources

First of all, we clearly defined the research problem and the precise questions arising from it, focusing our research on the issue of remote evaluation in a digital environment plentiful in the potential use of AI. This step was essential to establish a rigorous research chain that was based on concepts in English and French, and linked to the subject and the identified keywords. In addition, translating the keywords between French and English broadened our theme and enriched our vocabulary by acquiring additional relevant keywords. This search string consisted of the following combinations: ("e-assessment" OR "online assessment" OR "e-evaluation" OR "e-measurement" OR "Academic integrity in era of AI" OR "assessment in AI era") AND ("assessment in the digital era" OR "evaluation in e-learning" OR "formative assessment in e-learning" OR "summative assessment in distance and/or remote education") AND ("authentic assessment in e-learning" OR "e-portfolio assessment") AND ("e-cheating in education"). We conducted electronic searches in the following databases: Web of Science (WoS), Scopus, ScienceDirect (SD), Springer Link (SL), and Google Scholar (GS).

The search was limited to studies published between 2020 and 2024, as our aim was to understand the current knowledge on the issue of assessing distance learning in the age of AI.

Inclusion and Exclusion Criteria

Using the search string that directed our study, the initial search in the above-mentioned databases identified 1086 documents (articles, chapters, books, web pages, or theses) published between 2020 and 2024. The title, abstract, date of publication, and, if necessary, the full text was examined for relevance using the following inclusion criteria:

a. Research theme: Articles, chapters, or theses where the evaluation of distance learning is the central subject.
b. Language and period of publication: Documents published in English or French from 2020 to March 2024.
c. Type of publication: Documents published in peer-reviewed journals.
d. Methodology: Studies based on empirical data.
e. Relevance of results: Studies that present relevant results and give a conclusion.

A research study was excluded if it did not meet all the inclusion criteria with the exception of journals or literature searches addressing the impact of AI on distance assessment.

The second step was to filter out the irrelevant studies. To do this, the full texts of the identified documents were retrieved from the databases to examine whether they met the inclusion criteria of our study. After deleting the irrelevant documents, there were 467 documents left. At the same time, the references of these selected studies were manually evaluated using the "ancestry" method of Cooper (1982). This approach allowed us to enrich our initial corpus by identifying five additional articles meeting the inclusion criteria. Finally, of the 1,086 documents initially identified, only 43 fully met the inclusion criteria required for inclusion in this study (Figure 1).

Most of the included studies we considered high quality and published in higher-ranking journals in the field of education and educational technology including *Asia-Pacific Education Researcher* (Q1), *TESL-EJ* (Q1), *Education Sciences* (Q2), *International Journal for Educational Integrity* (Q1), *Journal of Academic Ethics* (Q1), *Procedia Computer Science* (Q1), *Computer Applications in Engineering Education* (Q1), *Med. Technol. Learn* (Q2), *Computers and Education: Artificial Intelligence* (Q1), *Academic*

Medicine (Q1), *Online Journal of Communication and Media Technologies* (Q2), *European Journal of Dental Education* (Q1), *International Journal of Human and Society* (Q2), and others.

The research included in this study comes from a variety of contexts and countries, such as Morocco, South Africa, Uganda, Ethiopia, Nigeria, Turkey, France, Sweden, Lithuania, the United States, Canada, Australia, Saudi Arabia, Jordan, Oman, Pakistan, China, Cyprus, Indonesia, Vietnam, Iran, India, and the Philippines. We assumed that the sample of selected documents in this study is sufficiently robust to allow validated generalizations about current distance assessment trends and practices.

Quality Evaluation

The quality of the papers selected was carefully examined using the Fink criteria for literature review (Albadarin et al., 2024), which emphasizes the importance of providing accurate descriptions of the methodology, results, conclusions, strengths, and limitations of each study. This assessment began with an in-depth review of the study design, data collection, and analysis methods, to ensure their relevance and methodological rigor.

The results and conclusions were also critically examined, as were the limitations acknowledged by the authors. At the end of this process, all the documents selected provided sufficient detail on the methodology, results, and conclusions, as well as the strengths and limitations of the studies. These documents fully met the quality standards set by Fink and the inclusion criteria. The process of selecting and evaluating the quality of the included studies is shown in Figure 2.

Figure 1.
Meta Review PRISMA Diagram

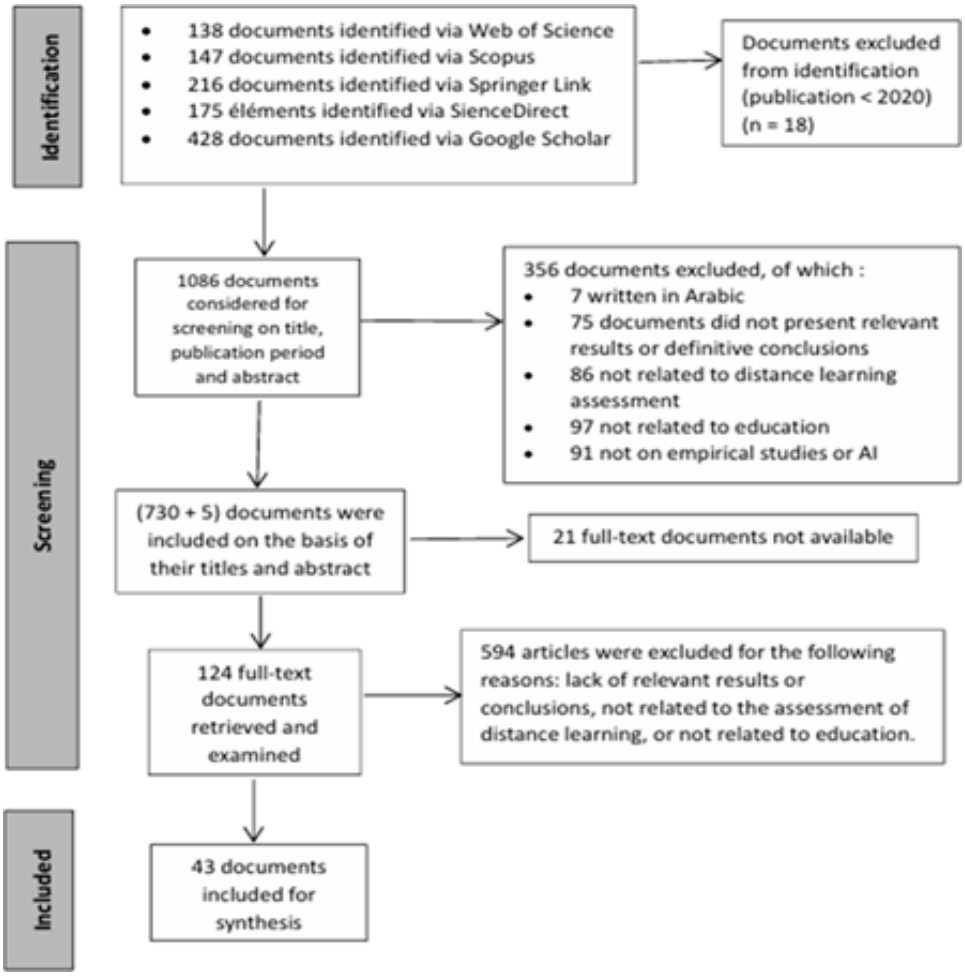
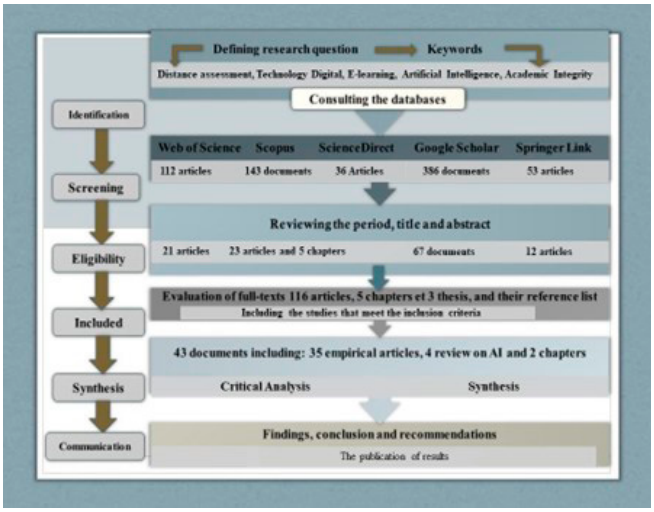


Figure 2.
PRISMA Approach Illustrating the Research Methodology and Selection Process



To ensure the rigor and consistency of this systematic study, as well as to answer in depth our research questions and to present relevant results, we followed the following guidelines:

- **Defining a research problem and constructing keywords:** The formulation of precise research questions led to the creation of a list of keywords.
- **Identification:** Searches were carried out using the keywords we developed to identify relevant studies. These electronic searches were conducted in the aforementioned databases. The documents retained for this stage can be broken down as follows: 112 in WoS, 143 in Scopus, 36 in SD, 386 in GS.
- **Screening:** The review of periods, summaries, methodologies, results, and conclusions was carried out to filter the documents through the inclusion criteria. This made it possible to preselect 21 articles from WoS, 23 articles and 5 chapters from Scopus, 67 documents from GS, and 12 documents from SL.
- **Eligibility:** Examinations of 116 articles, 5 chapters, and 2 theses, as well as their reference lists, were carried out. This in-depth assessment was aimed at determining whether these documents fully met our inclusion criteria.
- **Included:** At this stage, 43 papers comprising 35 empirical articles, 4 AI impact reviews on distance assessment, and 2 chapters were included for analysis.
- **Synthesis and communication:** In-depth analysis of the included studies enabled us to explore their findings in detail and identify emerging trends on the issue of distance assessment in an environment full of AI potential. This methodical approach provided us with a basis for constructing a relevant synthesis, thus making it possible to respond to the questions of this research. The results obtained will be considered a valuable contribution that we will share with the scientific community.

Collection and Analysis of Data

The data extraction process involved capturing key information from the studies and organizing them into thematic categories. To ensure consistency and reduce errors, we used the coding techniques proposed by Creswell (2015):

- **Open coding:** We analyzed the data from the included studies and generated codes to describe and categorize them without preconceived ideas.
- **Axial coding:** The relationships between the codes were analyzed to group them into categories or broader themes, depending on the relationships observed.
- **Selective coding:** The categories and themes were refined and integrated to identify emerging key concepts. This allows us to identify the main themes that reflect the major concerns of researchers regarding the assessment of distance learning in the AI era.

The data extraction and interpretation process identified five main themes, reflecting the major concerns of researchers and practitioners. Each category was chosen based on the concepts and concerns frequently addressed in the studies. The research objectives and main areas of interest declared by the authors were also used as coding units to identify these themes related to our problem. For example, the theme Academic Integrity was identified through key concepts (axial codes) including fraud, cheating, plagiarism, examination security, validity, and assessment credibility.

It also included strategies for detecting and preventing forms of academic dishonesty. In addition, the theme Adaptability of Digital Technology was diluted by studies focusing on the integration of digital platforms and tools in distance assessment. Studies focusing on the impact of AI on online assessment practices were grouped together under the theme Impact of Artificial Intelligence, while those concerning pedagogical alignment and feedback were classified under Pedagogical Alignment and Feedback, respectively.

Synthesis Studies

At this step, we collected, discussed, and analyzed the main results and conclusions drawn from the included studies. The synthesis stage adopted an approach focused on identifying trends and relationships between results by cross-referencing data from all the studies. This process enabled us to map all the information gathered, making it easier to draw up an overall synthesis of our research. First, we extracted general information about the selected studies, such as the type of resource, title, citation, location, methodology, data collection instruments, results, and conclusions. The data were then coded using Creswell techniques to identify relevant themes relating to the assessment of distance learning in the AI era. The extracted information was organized and verified in team discussions, with each study identified by a number (N) to facilitate further analysis (which is presented in Table 1).

RESULTS

In this section, we provide a descriptive presentation of the included studies and a review of the major concerns of the researchers of the included studies as well as strategies to improve and develop the distance evaluation process. We highlight the effectiveness of different approaches, modalities, and evaluation instruments used, the digital tools implemented, and the opportunities and challenges encountered in the studies. Then, we present an impact analysis of digital technology in general and specifically the impact of AI on distance assessment. Finally, we develop a synthesis of the existing results and present the conclusions drawn from this study to help improve this process. Table 1 is a general description of the 43 studies included in this research.

Main Results

The cross-sectional analysis of the results of the studies included in this research enabled us to identify five themes reflecting the major concerns. Following the synthesis of the selected studies on the assessment of distance learning in an era rich in AI potential, these concerns are classified into five categories: Academic Integrity, Integration and Adaptability of Digital Technology, Impact of Artificial Intelligence, Pedagogical Alignment, and Interaction and Feedback. These categories of

Table 1.
General description of the included studies

No.	Type of Resource and Title	Citation and Country	Methodology	Data Collection Instruments	Results and Conclusions
1	Article 1: *The compromise of online assessment integrity among technical vocational education and training college students: An instructor's perspective*	Mbabmo & Du Plessis (2024), South Africa	Qualitative	Semistructured face-to-face interviews with 10 professors who monitor exams and grade exam scripts.	The study reveals widespread cheating on exams, threatening the quality of teaching and the integrity of assessments. New technologies, such as artificial intelligence and social media, are driving this behavior. In addition, the implications of cheating behavior and the differences between face-to-face and online cheating are discussed.

No.	Type of Resource and Title	Citation and Country	Methodology	Data Collection Instruments	Results and Conclusions
2	Article 2: *Academic dishonesty in virtual assessment during the COVID-19 pandemic: A cross-cultural study*	Navidinia et al. (2024), Iran	Quantitative	A questionnaire on academic integrity in online assessments given to 629 university students in the culturally diverse countries of Iran, Romania, and Lebanon.	The study reveals that 60% of participants did not express an unfavorable opinion of cheating in online assessments, and the majority of students considered this assessment method to be less reliable. Several means of cheating are used. Stress, time constraints, and the desire to get a better grade were the main motivators for cheating, while factors deterring cheating included moral and social stigma and the rights of other students.
3	Article 3: *La crise sanitaire: Une occasion de penser des pratiques d'évaluation dans le cadre d'un enseignement à distance*	Verchier & Lison (2022), France	Mixed	Questionnaires were sent to 900 students and 80 teachers, and focus groups, in webinars and educational coffeetalks.	It is time to rethink the evaluation criteria and diversify the modalities that promote skills development, while limiting the risks of plagiarism and cheating.
4	Article 4: *Promoting academic integrity in remote/online assessment–EFL teachers' perspectives*	Vellanki et al. (2023), Oman	Mixed	A questionnaire included both quantitative (through MCQs) and qualitative (through open-ended questions) data from 37 participating teachers.	The study concludes that technical difficulties, lack of physical presence, student behavioral issues, and concerns about the design and assessment process have a detrimental effect on academic integrity. To prevent dishonesty, changes in the design, conduct, and evaluation of questionnaires and examinations is needed.

No.	Type of Resource and Title	Citation and Country	Methodology	Data Collection Instruments	Results and Conclusions
5	Article 5: *Remote assessment of learning during the pandemic: Junior high school teachers' experiences*	Garcia et al. (2024), Philippines	Case Study	Data was collected via synchronous and asynchronous interviews, as well as virtual focus groups using open-ended questions from 10 teacher participants during the 2021-2022 school year.	The study identifies four categories of important themes: (1) carefully designing online assessments to ensure academic integrity, (2) Structuring assessments to target skills and performance, (3) using methods, tools, and technologies as a benefit to verify results and avoid misbehavior, and (4) tailoring distance assessment strategies to learners' interests.
6	Article 6: *The practices of online assessment in a digital device in the context of university training: The case of Hassan II University*	Mrisse et al. (2023), Morocco	Quantitative	• Questionnaire administered to 37 teachers to collect information from distance assessment. • Experiment on a digital device with MCQs on a sample of 108 students	The authors find that the use of biometric methods for diagnostic and formative assessments is possible on digital devices to verify identity with a limited number, but these are not suitable for summative assessments due to massification.
7	Article 7: *Evaluating emergency remote assessment adaptations in higher education due to COVID-19: Faculty insights and challenges*	Papanastasiou & Solomonidou (2023), Cyprus	Quantitative	Online questionnaire sent to 205 teachers (54% women) of which 95 answered the questionnaire.	Professors appreciated the new review process, expressing a positive opinion on the effectiveness of the antiplagiarism software and the extra time allocated to students to resolve any technical difficulties. Nevertheless, cheating and plagiarism were issues that preoccupied the instructors.

No.	Type of Resource and Title	Citation and Country	Methodology	Data Collection Instruments	Results and Conclusions
8	Article 8: *Students online exam proctoring: A case study using 360 degree security cameras*	Turani et al. (2020), Saudi Arabia	Qualitative	Case Study: Experience of a group of students using the 360-degree security camera for authentication to secure their online exam.	Using 360-degree security cameras helped improve online exam security, maintained student performance, and provided great scheduling flexibility.
9	Article 9: *A framework for ensuring online exam authentication at Taibah University*	Alkhateeb (2020), Saudi Arabia	Quantitative	Experimentation: Analyzes the results of 10 experiments on the use of a biometric identification system that combines the Discrete Cosine Transform (DCT) for feature extraction and Artificial Neural Network (ANN) method for classification.	The use of the system, which combines biometric iris identification and traditional identification information, gave a recognition rate of 82.5%, which indicates the effectiveness of this system for the safety of online examinations.
10	Article 10: *Lessons on maintaining assessment integrity during COVID-19*	Almossa & Alzahrani (2022b), Saudi Arabia	Qualitative	Semistructured interviews with 7 university teachers who used online assessment, including their professional experience between 6 and 11 years.	The sudden transition caused by COVID-19 to online education presented new challenges that teachers faced. These challenges reveal the complexity of ensuring academic integrity in online assessments and the need for innovative solutions to solve them effectively

No.	Type of Resource and Title	Citation and Country	Methodology	Data Collection Instruments	Results and Conclusions
11	Article 11: *Academic integrity training module for academic stakeholders: IEPAR framework*	Khan (2024), UAE	Qualitative: A variety of methods to research, review, propose, and verify	Survey of existing models, followed by a discussion of overall gaps. This is followed by a presentation of theories for understanding student and staff behavior, followed by the development of learning outcomes for the framework. Finally, a full review of the IEPAR (Inspiration, Education, Pedagogical considerations, Assessment design, Response, and Restorative practice) framework.	The study highlights an increase in academic dishonesty during the pandemic, pointing to detection challenges and inexperience of distance learning faculty. It emphasizes the importance of establishing a culture that promotes integrity and cultivates the values of academic honesty regardless of the mode and context of teaching and learning.
12	Article 12: *Developing performance assessment instruments to measure 4C skills in online discussion activities of science learning*	Maryuningsih et al. (2020), Indonesia	Quantitative	ADDIE model (Analysis, Design, Development, Implementation, Evaluation). One 4C test on 104 students in four online discussion activities.	4C (critical thinking, communication, collaboration, and creativity) performance instruments are valid, reliable, and effective for assessing student competencies in online discussion forums.
13	Article 13: *Authentic assessment strategies used to improve distance learning outcomes*	Al-Ghazo (2023), Jordan	Quantitative	Questionnaire of 25 items given to 35 teachers, the majority of whom had more than nine years of experience.	Teachers adopt authentic assessment strategies, whether formative or summative, and their experiences are important in moderating this strategy.

No.	Type of Resource and Title	Citation and Country	Methodology	Data Collection Instruments	Results and Conclusions
14	Article 14: *Exploring the dark side of online distance learning: Cheating behaviours, contributing factors, and strategies to enhance the integrity of online assessment*	Sevnarayan & Maphoto (2024), South Africa	Qualitative phenomenological research	Three instruments used to collect data: group discussions with students, one-on-one interviews with lecturers, and open-ended assessment questions that were emailed to external markers.	The study identified three themes regarding the issue of cheating in online assessment: 1) underlying reasons for cheating in online assessment, 2) factors contributing to cheating in online assessment, and 3) effective strategies to minimize cheating and improve academic integrity in online assessment. These strategies include designing interactive modules, training lecturers, adopting academic integrity policies, and using electronic monitoring software, as well as providing immediate feedback and improving communication, support systems, and available resources.
15	Article 15: *L'intégration des technologies numériques à l'évaluation des apprentissages à distance en enseignement supérieur: Quelles transformations des pratiques évaluatives?*	Leroux & Nolla (2022), Canada	Interpretative Qualitative	• Semistructured interviews with 12 teachers and 12 students at a Canadian university. • Collection of documents.	The study examined the emergence of evaluative practices that integrate TNs to replicate, amplify, and transform competency assessment through integrated interactions, assessment tasks, assessment instruments, ICT, and Web 2.0 tools.

No.	Type of Resource and Title	Citation and Country	Methodology	Data Collection Instruments	Results and Conclusions
16	Article 16: *Lecturers' views on the functionality of e-portfolio as alternative assessment in an open distance e-learning*	Mudau (2022), South Africa	Qualitative Interpretative	Semisupervised interviews with 4 teachers.	The electronic portfolio is beneficial for ODeL evaluation. It provides students with autonomy in their learning and promotes authentic assessment, though there are challenges to overcome.
17	Article 17: *Analyzing the effects of assessment and evaluation applications and exam formats in distance education*	Yilmaz & Toker (2022), Turkey	Interpretative & Descriptive Quantitative	Statistical analysis and comparison carried out during 3,830 online assessment activities organized by 805 academics with 29,511 students.	MCQ exam formats were the most preferred for academics and students achieved higher pass scores when questions from these exams were presented separately but in groups.
18	Article 18: *Measuring the effectiveness of smart digital organizations on digital technology adoption: An empirical study of educational organizations in Indonesia*	Alexandro & Basrowi (2024), Indonesia	Quantitative	Questionnaire completed by 236 randomly selected participants including professors and students from Palangka Raya University, Kalimantan, Indonesia.	Digital leadership, digital talent scholarships and learning management systems have a positive and statistically significant impact on digital technology adoption. In addition, smart digital organizations act as mediators in the relationship between these factors and the adoption of digital technology.
19	Article 19: *Defining e-portfolio factor for competency certification using fuzzy delphi method*	Rahayu & Wulandari (2022), Indonesia	Qualitative	• Semistructured interviews with experts • Systematic review of the literature	The results of empirical studies provide a list of factors that can be used to build an eportfolio model that can support the certification process.

No.	Type of Resource and Title	Citation and Country	Methodology	Data Collection Instruments	Results and Conclusions
20	Article 20: *Kahoot: A game-based web tool to assess motivation, engagement fun, and learning outcomes among engineers*	Lashari et al. (2024), Saudi Arabia	Quantitative	Likert-scale questionnaire to test students' motivation, enjoyment, engagement, and concentration. In addition, statistical tests to compare perceptions between the Kahoot (n=32) and paper (n=32) groups.	The study found that effective learning, motivation, engagement, and enjoyment were all higher in the Kahoot-based group compared to the paper-based group, with a statistically significant difference. It highlights the effectiveness of using Kahoot educational technology application in formative assessment to improve students' psychological abilities.
21	Article 21: *Using Blackboard as a tool of e-assessment in testing writing skill in Saudi Arabia*	AlTameemy et al. (2020), Saudi Arabia	Quantitative	A questionnaire consisting of three sections addressed to 660 Saudi students in EFL enrolled in the preparatory year of university.	The majority of participants have a positive attitude towards e-assessment. Using Blackboard as a platform made it possible to assess English writing skills with a wide variety of question types such as MCQ short answer, and tick questions.
22	Article 22: *E-portfolio alternative assessment strategy enhancing higher-order thinking skills in an open distance learning environment*	Mudau & Wyk (2022), South Africa	Mixed	Semistructured interviews with 6 teachers and online questionnaires completed by 106 students.	Eportfolios are effective tools to promote high-level skills. Learners actively engage in the creation of their eportfolios to develop their high-level skills and foster innovative and authentic performance-based assessment.

No.	Type of Resource and Title	Citation and Country	Methodology	Data Collection Instruments	Results and Conclusions
23	Article 23: *Artificial intelligence system in aid of pedagogical engineering for knowledge assessment on MOOC platforms: Open edX and Moodle*	Bachiri & Mouncif (2023), Morocco	Mixed	The researchers examined the similarity and quality between machine-generated and human-created questions. They generated 303 questions to measure the effectiveness of their artificial intelligence system.	In terms of skills assessment and similarity on MOOC platforms such as Moodle or Open edX, machine-generated questions worked in the same way as human-created questions. Most of the questions improved the online assessment up to 82% when the suggested new technology is used.
24	Article 24: *Automated e-assessment: Students' needs and e-evaluation solution possibilities*	Margiene & Ramanauskaitė (2022), Lithuania	Qualitative	Surveys of 25 students from higher education and 49 students from secondary school.	Shows the importance of adapting electronic assessments to meet the diverse needs and preferences of upper and last year high school students. The use of an eportfolio assessment is more beneficial.
25	Article 25: *Utilization of e-portfolios in teacher education institutions of higher education in Central Visayas, Philippines*	Boholano et al. (2022), Philippines	Mixed	Likert-scale questionnaire and group discussions with a sample of 85 teachers.	Eportfolios helped college teachers improve the student learning and assessment experience, especially during the Covid-19 pandemic.
26	Article 26: *Zoom invigilated examinations: A protocol for rapid adoption to remote examinations*	Linden & Gonzalez (2021), Australia	Quantitative	Comparison of online and face-to-face final exam results among 1,728 students in 24 subjects.	The use of online meeting platforms is an effective tool for distance assessments. The results of the exams monitored on paper and those monitored through online meetings show no significant difference.

No.	Type of Resource and Title	Citation and Country	Methodology	Data Collection Instruments	Results and Conclusions
27	Chapter 1: *Challenges with designing online assessment to support student task understanding*	Apps et al. (2020), Australia	Mixed	Case Study: 11 case studies in 4 universities. Data collected from coordinators, teachers, students, and the LMS.	Technological integration in education is far from the ideal of innovation. Shows the challenges and benefits of reinventing online evaluation, as well as the importance of better understanding how to design, communicate, and support distance evaluation to maximize their effectiveness and profitability.
28	Article 27: *The use of Quizizz as an online assessment application for science learning in the pandemic era*	Darmawan et al. (2020), Nigeria	Quantitative	Online test questionnaire for the partial with the Multimedia Learning Quizizz and a questionnaire administered to 23 education science students.	The use of Quizizz for online assessment of science learning in the pandemic era is beneficial. It offers the opportunity to provide quick feedback, establish rankings, and implement measures to prevent cheating.
29	Article 28: *Future research recommendations for transforming higher education with generative AI*	Chiu (2024), Hong Kong	Qualitative	Six-question online questionnaire to gather all the ideas and concerns of 51 students from three universities followed by a group interview.	The study collects students' views on the impact of GenAI on higher education. The results provide insight into three areas: learning outcomes, pedagogy, and assessment.
30	Article 29: *Hello GPT! Goodbye home exam? An exploratory study of AI chatbots impact on university teachers' assessment practices*	Farazouli et al. (2024), Sweden	Mixed	Data collected via participant-filled scoring sheets, semistructured interviews, field notes, and participant scores on the texts they assessed, as part of a Turing test experiment and via interviews with 24 university professors.	The study highlights the impact of ChatGPT on the assessment practices of university teachers. ChatGPT has led teachers to be more critical when evaluating the writings of students in home evaluation. It also highlights the need for changes in evaluation design and practices.

No.	Type of Resource and Title	Citation and Country	Methodology	Data Collection Instruments	Results and Conclusions
31	Article 30: *ChatGPT and generative artificial intelligence for medical education: potential impact and opportunity*	Boscardin et al. (2024), United States	Literature Review	Analysis of the documentation.	The study highlights the impact of ChatGPT and generative AI on education. Although these technologies offer opportunities, the study highlights challenges, especially with regard to the issue of academic assessment especially in home assessments.
32	Article 31: *ChatGPT: A never-increasing encroachment of artificial intelligence in online assessment in distance education*	Naidu & Sevnarayan (2023), South Africa	Documentary Research	Christensen's disruptive innovation theory to online evaluation with ChatGPT and analysis of the implications and ethical and pedagogical issues.	The emergence of ChatGPT highlights the issue of distance assessment, due to its ability to disrupt and transform traditional assessment methods. In this context, it is important to rethink educational practices to adapt to the evolution of this technology.
33	Article 32: *The ChatGPT artificial intelligence chatbot: How well does it answer accounting assessment questions?*	Wood et al. (2023), United States	Quantitative	Data from 328 authors from 186 institutions, representing 14 countries from five continents. A comparison of ChatGPT and student performance for 28,085 questions from accounting valuations and textbook test banks.	Students significantly outperform ChatGPT with an average of 76.7% while ChatGPT provides 56.5% of the correct answers. Despite this, ChatGPT's performance is better than among students at 15.8% when partial responses are included. In addition, this performance varies depending on the type of question. The authors point out that AI continues to improve, which invites educators to prepare for the future, with a focus on the impact of this innovative technology on distance assessment.

No.	Type of Resource and Title	Citation and Country	Methodology	Data Collection Instruments	Results and Conclusions
34	Chapter 2: *Preparing university assessment for a world with AI: Tasks for human intelligence*	Bearman & Luckin (2020), Australia	Conceptual and Analytical	Analysis of the results of previous studies.	Human intelligence is complex and multidimensional, while AI functions on a large scale and at high speed. In this sense, it is important to adapt assessments that prepare students to integrate into an ever-changing digital world.
35	Article 33: *ChatGPT—A double-edged sword for healthcare education? Implications for assessments of dental students.*	Ali et al. (2024), Qatar	Exploratory Study	Analysis of the results of the free version of ChatGPT released February 9 through a range of evaluations recognized in health education programs.	Despite their limitations, ChatGPT provided accurate responses to the majority of evaluations. Generative AI has the potential to revolutionize virtual learning and teachers need to tailor teaching and assessments in medical and dental education to benefit learners while mitigating the dishonest use of this technology.
36	Article 34: *Rethinking online assessment strategies: Authenticity versus AI chatbot intervention*	Ifelebuegu (2023), Uganda	Literature Review	Critical analysis of the intersection between AI chatbots and online reviews.	The age of AI chatbots offers the opportunity to rethink and improve online reviews, making them more authentic, meaningful, and resistant to AI-assisted malicious practices.
37	Article 35: *Trends of artificial intelligence for online exams in education*	Babitha et al. (2022), India	Documentary Research	Analysis of recent trends in the use of AI in the education system, with a focus on the evaluation of online examinations.	Artificial intelligence provides information on student test results. It also makes online exams more secure through methods of remote monitoring by voice and facial recognition, as well as an on-screen scoring system and AI tools to evaluate answer sheets.

No.	Type of Resource and Title	Citation and Country	Methodology	Data Collection Instruments	Results and Conclusions
38	Article 36: *Constructive alignment of basic design education: Students' approaches to learning and perceived learning demands in online distance education*	Akbay (2022), Turkey	Quantitative	Questionnaire administered to 56 students to gather information on constructive alignment, learning processes, and perceived workload.	The study reveals the importance of constructive alignment in course design in an EAD context, including targeted learning outcomes, alignment of teaching-learning activities and assessment tasks, and effective feedback.
39	Article 37: *Aligning objectives with assessment in online courses: Integrating learning analytics and measurement theory*	Barthakur et al. (2022), United States	Case Study	Data collected from course assessments, including both formative and summative assessments in a cohort of 771 learners as part of a MOOC.	The results of this study demonstrate the importance of aligning assessments with the stated objectives of the course.
40	Article 38: *Assessment practices in Saudi higher education during the COVID-19 pandemic*	Almossa & Alzahrani (2022), Saudi Arabia	Quantitative	Approaches to Classroom Inventory survey. 267 participants from 27 Saudi universities and 13 different colleges.	Approved practices include instructional alignment, feedback, use of rating guides, and monitoring of assessment approaches. During the pandemic, a transition to performance evaluations is highlighted, marked by a decrease in formative evaluations.
41	Article 39: *Improving e-assessment based on university students' experiences*	Almuhanna (2023), Saudi Arabia	Mixed Descriptive	Online questionnaire: Data collected from 308 students at King Saud University, and a questionnaire consisting of 34 Likert scale items and two open-ended questions was used.	The importance of guidance, user manuals, mock exams, training sessions and immediate feedback to improve the online assessment system for students. Students had concerns about security and privacy in the electronic assessment.

No.	Type of Resource and Title	Citation and Country	Methodology	Data Collection Instruments	Results and Conclusions
42	Article 40: *Exploring the effectiveness of online assessment methods in higher education*	Afzal et al. (2024), Pakistan	Quantitative	Questionnaire including sections on technology acceptance, impact on performance and motivation, quality of feedback, and overall satisfaction was distributed to 520 students from various disciplines.	The study reveals the positive impact of online assessments on student performance and motivation. It also highlights the crucial role of online feedback in improving student performance. In addition, the preference for this feedback over traditional methods suggests a shift in students' preferences towards digital modes of communication.
43	Article 41: *How does online formative feedback impact student motivation and self-directed learning skills during the COVID-19 pandemic?*	Hung (2021), Vietnam	Mixed	Survey conducted of 645 students who attended at least 7 blended learning courses during the COVID-19 pandemic. Qualitative information from survey responses.	Online formative feedback from teachers and peers has a positive impact on student motivation and self-directed learning skills, with the exception of self-assessment. In addition, it shows the importance of a strategy to ensure the effectiveness of online feedback to improve learning outcomes.

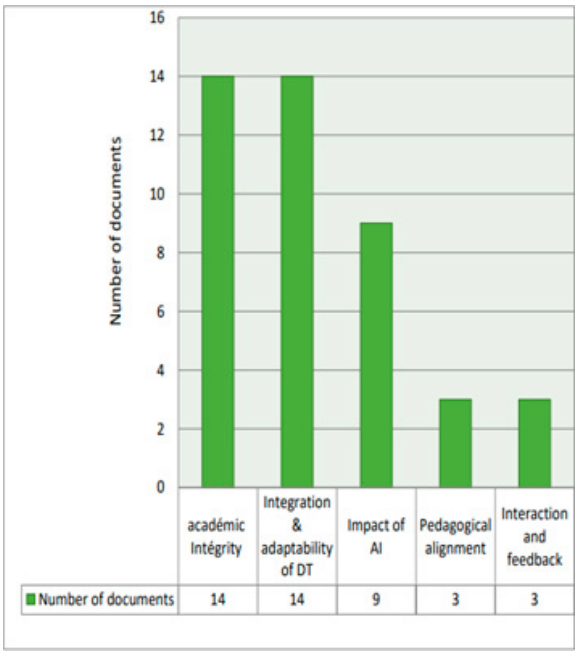
Table 2.
Ranking of Documents Included for Each Theme Reflecting the Major Concerns of Researchers

Topic Categories Reflecting Major Concerns	Academic Integrity	Integration and Adaptability of Digital Technology	Impact of Artificial Intelligence	Pedagogical Alignment	Interaction and Feedback
Documents	Documents 1 to 14	Documents 15 to 28	Documents 29 to 37	Documents 38, 39, and 40	Documents 41, 42, and 43
Total Documents	14	14	9	3	3

themes have been systematically classified and are presented in Table 2.

We have classified the documents included in our study according to the themes identified in the cross-sectional analysis. This approach enabled us to group these documents according to their areas of interest (Table 2). This provides a robust framework for discussing issues related to the assessment of distance learning in a digital environment in the age of AI. All the papers reviewed in this study focus on distance assessment, including summative, formative, and certificate assessment. The main concerns of the researchers identified in this study are presented in Figure 3. Each concern is represented by a specific theme, and the number of documents in each theme is also indicated.

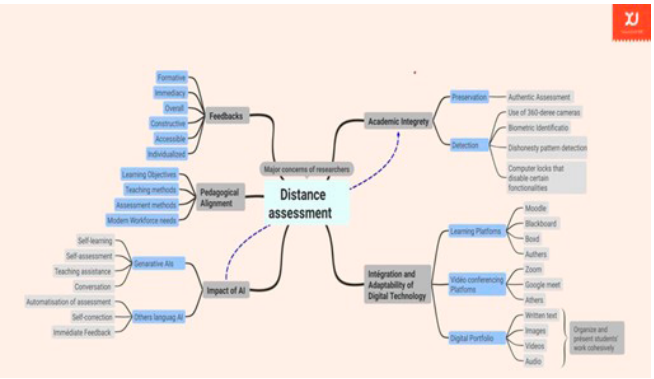
Figure 3.
Distribution of Selected Documents According to Themes Reflecting the Major Concerns of Researchers



The most frequently discussed themes are Academic Integrity and Integration & Adaptability of Digital Technology, with 14 documents for each theme, showing the importance given to the issue of academic integrity and the effective adaptability of digital technology in distance assessment.

The theme Impact of Artificial Intelligence is also significantly represented with nine documents, which reflects a growing importance for the issue of evaluation in an era of AI, particularly with the emergence of generative AI such as ChatGPT. The two themes Pedagogical Alignment and Interaction and Feedback are addressed with 3 documents for each theme.

Figure 4.
Conceptual Map Representing the Various Concerns of Researchers Regarding Distance Assessment



ANALYSIS AND DISCUSSION

This section covers an in-depth analysis and discussion of the key results from the studies included in our research. This will be done in light of the five themes identified, reflecting the researchers' main concerns about assessing distance learning in the AI era. This analysis is based on the studies presented in Table 1 and the themes shown in Figure 4.

Theme 1: Academic Integrity

The issue of academic integrity presents a central challenge for the stakeholders and educational institutions involved in the distance assessment process. The research addressed it in the literature through key concepts such as validity, credibility, security, cheating, plagiarism, and examination security, as well as other notions related to different forms of academic dishonesty. They explored in depth the challenges of preventing cheating, plagiarism, and other forms of dishonest behavior (R. Garcia et al., 2024; Khan, 2024; Navidinia et al., 2024; Sevnarayan & Maphoto, 2024; Vellanki et al., 2023; Verchier & Lison, 2022). Faced with these challenges, the researchers examined two strategies to address these challenges.

The first is the use of surveillance tools such as plagiarism and cheating detection software, computer locks disabling certain features during online exams (Papanastasiou & Solomonidou, 2023), and 360-degree cameras (Turani et al., 2020), as well as biometric identifications during synchronous assessments (Alkhateeb, 2020; Mrisse et al., 2023). These measures help to monitor students, deter dishonest practices, and strengthen the security of online exams. These approaches aim to enhance the security of distance examinations. However, it is important to note that on the one hand, these safety measures can have negative effects, including causing stress in students, thus disrupting their concentration and performance. In addition, students and their families have concerns related to the preservation of private data as well as technical and financial constraints. On the other hand, the application of these assessment methods in a context marked by the rapid development of AI may prove limited in its effectiveness. The opportunities offered by this technology and its increasingly frequent use by students increase the risks of it being misused for purposes of academic dishonesty in certain contexts.

The second strategy is based on preserving academic integrity, whether the assessment is asynchronous (Al-Ghazo, 2023) or synchronous (Maryuningsih et al., 2020) by using authentic assessments. This assessment method is based on problem-solving, i.e., applying knowledge and skills in real-life contexts rather than simply reproducing information. In addition, the asynchronous modality provides students with more flexibility to organize their study time, which can reduce pressure and stress related to assessments and promote more meaningful learning and assessment. In this sense, the commitment of educational participants and institutions to the development of authentic evaluation requires a radical revision of traditional teaching and learning practices (Akimov & Malin, 2020). This revision involves maintaining a constructive alignment between the learning and teaching processes and the assessment methods applied (Lebrun, 2015). The objectives of an authentic assessment should measure cross-cutting knowledge and skills through task- and project-based learning methods. This strategy stimulates student engagement and collaboration to solve complex problems (Ashford-Rowe et al., 2014).

In this context, it is essential to rethink distance assessment strategies in order to make them more resilient and adapted to these new realities (Evangelista, 2025). The adoption of authentic assessments, based on complex and contextualized tasks, is proving to be a relevant response to the limitations and constraints identified in this research. These assessments, anchored in real-life situations, such as interdisciplinary projects or digital portfolios, make it possible to overcome the disadvantages identified. However, closed assessment formats such as multiple-choice questions, limited-choice questions, or serialization exercises, while they can assess certain factual knowledge, do not allow high-level skills to be assessed or essential skills to be integrated into learning (Haataja et al., 2023). Today's educational system needs to prepare learners to think critically, creatively, and collaboratively and to solve complex problems. These so-called transversal or soft skills are now indispensable in the digital society. Assessment should therefore be seen not simply as a measure of what has been learned, but as a powerful lever for learning. In this sense, a technical-pedagogical alignment is essential to meet the requirements of a new elearning context.

Constructive alignment based on active, learner-centered teaching methods, such as the socioconstructivist and project-based approaches, to strengthen commitment and encourage the development of high-level skills. In this respect, the adaptation of assessment practices, accompanied by training in the ethical and critical use of digital technologies and AI, appears to be a necessary

condition for guaranteeing the validity, reliability, and fairness of distance assessments in a rapidly evolving digital environment.

Theme 2: Integration and Adaptability of Digital Technology

The integration and adaptability of digital technology in the context of distance learning is a key concern to improve the quality of assessment. In this study, the researchers are interested in adapting the digital tools used to assess distance learning according to the various types and objectives of assessment. In this sense, the researchers address three essential instruments: elearning platforms, videoconferencing platforms, and digital portfolios. These platforms can be configured to create virtual online assessment environments that adapt to specific needs. The latter provide multiple functions that facilitate the creation and management of questionnaires, quizzes, and online tests. Studies address the use of MOOC platforms, such as Moodle and Open edX, and show that they allow the application of multiple functions such as the type of test questionnaires and discussion forums. In addition, they offer a diverse range of digital media.

One study, conducted by Younes-Aziz Bachiri and Hicham Mouncif in Morocco, examines the similarity and quality of the questions generated by the automated system compared to those created by individuals and reveals that the integration of artificial intelligence-based applications into the Moodle and Open edX platforms has led to machine-generated questions working in the same way as human-created questions (Bachiri & Mouncif, 2023).

In a study conducted by AITameemy et al., they show that the use of Blackboard made it possible to assess students' knowledge and skills through a wide variety of question types such as multiple-choice, short answer, and check questions, and other forms of questions (AlTameemy et al., 2020).

In addition, researchers in some studies examine the importance of videoconferencing platforms. These platforms, such as Zoom, Microsoft Teams, and Google-Meet, keep learning interaction, engagement, and evaluation at a distance (Linden & Gonzalez, 2021). These allow teachers to establish direct contact with learners in a synchronous manner and offer in a virtual environment the possibility to adopt real-time assessments, such as oral exams (Akimov & Malin, 2020), debates, and monitored online exams. Some studies looked at the assessment process and examined the usefulness of Quizziz for assessing online learning in the pandemic era. One highlights that this category of platform offers quick feedback, rankings, and prevention against cheating (Darmawan et al., 2020).

It is important to note that the use of digital portfolios in the evaluation of distance learning has several advantages. This tool promotes autonomy and commitment and allows an authentic assessment of skills in a real-life situation (Boholano et al., 2022; Mudau & Wyk, 2022). A formative assessment via the eportfolio allows learners to continuously monitor the progress of their learning. In addition, the active engagement of learners in the creation of their eportfolios contributes to the development of their high-level skills and promotes an innovative, authentic, and performance-based evaluation (Mudau & Wyk, 2022).

It is important to note that these benefits can be hindered by technical problems, material incompatibilities, and accessibility issues, especially in developing countries. In addition, managing a large number of students and the need to meet their expectations within a limited timeframe can be a challenge for teachers. Also, the difficulties related to the evaluation of online practical work and the specificity of each discipline represent challenges in this approach, which can lead to unexpected and potentially unfair interruptions in the distance assessment process. Although these platforms offer opportunities to enhance the student learning experience, this requires careful planning, adequate resources, and appropriate training for teachers. Faced with these challenges, it is important to integrate innovative digital tools to overcome potential obstacles in different types and modalities of evaluation, whether formative or summative, synchronous or asynchronous, to optimize the effectiveness of distance evaluation.

The integration of digital portfolios in distance assessment presents a holistic and authentic approach to assessing high-level skills and competencies. However, the incorporation of this tool in the evaluation of distance learning can also pose challenges related mainly to the management of a variety of jobs and projects in a limited time along with technical difficulties. This can be complex and might require more time and effort.

In addition, strategies for evaluating eportfolios can be subjective and thus require clear criteria. For this reason, a guideline evaluation grid with precise indicators is necessary to ensure the effectiveness of this model.

Theme 3: Impact of Artificial Intelligence

The analysis of results from nine recent studies regarding the assessment of learning in the era of AI highlighted the potential impact of this digital technology on educational practices in general, and specifically on the process of assessing distance learning (Chiu, 2024; Farazouli et al., 2024). The researchers highlight the need to adapt and optimize the integration of emerging technologies in assessments while preserving academic integrity. They emphasize that teachers should be aware of the potential of AI including generative AI such as ChatGPT and other AI languages (Ali et al., 2024; Boscardin et al., 2024).

In this sense, teachers should also be aware that these tools can disrupt and transform traditional assessment methods (Naidu & Sevnarayan, 2023). The emergence of AI and its frequent use by learners requires reflection and adaptation of educational practices in general and the evaluation of distance learning in particular. As part of a benchmarking study between student and ChatGPT performance conducted by Wood et al. (2023), the analysis results of a representative sample of 186 educational institutions from 14 countries provide a solid database for further analysis. This study reveals that the complexity of human intelligence exceeds that of ChatGPT; however, ChatGPT shows an improvement in performance when partial responses are included (Wood et al., 2023). Faced with this situation, these researchers point out that AI continues to advance, prompting educators to prepare for the impact of this innovative technology on distance assessment in the future (Afzal et al., 2024; Bearman & Luckin, 2020). They also point out that the era of AI chatbots offers opportunities to reinvent distance assessments and make them more authentic (Ifelebuegu, 2023). This helps to limit academic dishonesty, and the opportunity offered by AI promotes personalized learning and self-assessment for students.

Integrating AI into distance assessment allows teachers to monitor exams remotely using voice and face recognition on-screen scoring systems. This ensures a relatively quick assessment of exams. In addition, AI has the potential to simplify the assessment process, saving teachers time and enabling a more efficient and secure assessment system (Babitha et al., 2022). These elements combined can help to minimize the problems of cheating in distance exams, a central concern for teachers and educational designers.

The emergence of a variety of AI tools creates a digital environment with multiple potentialities that is revolutionizing education and opening up new perspectives for educational practice. AI tools enable instant information to be provided through conversational interaction without the need to consult sources scattered across various websites. In this way, they encourage personalized learning and self-assessment tailored to the specific needs of each learner (Amah & Okesipe, 2025). AI tools also make it easier for teachers to monitor learning progress on an individual basis. However, these tools also raise many challenges in terms of distance assessment. In this respect, it is essential to rethink and reinvent assessment processes to capitalize on the opportunities provided by AI and guarantee the credibility and effectiveness of distance assessment (Evangelista, 2025).

These findings are corroborated by a recent empirical study conducted by Kizilcec et al., (2024) through an international survey of 680 students and 87 educators at three universities (Kizilcec et al., 2024). This study confirms the need to rethink distance assessment approaches to respond to the challenges of academic dishonesty, and capitalize on the opportunities offered by digital technologies, particularly AI. In this light, the integration of artificial intelligence into learning platforms helps to personalize learning, enrich feedback, and strengthen evaluation practices. This approach develops learners' critical thinking and autonomy with digital tools to promote inclusive and ethical practices that are consistent with educational objectives (Shivshankar & Acharya, 2025). These results reinforce the relevance of our conclusions and underline the importance of adopting an evaluation model that combines technological innovation with respect for educational norms, particularly in terms of academic integrity.

Theme 4: Pedagogical Alignment

The analysis of the results of the included studies highlights the importance of pedagogical alignment for a meaningful and effective distance

evaluation (Barthakur et al., 2022). The researchers point out that alignment between learning objectives, teaching methods, and assessments is an important element to ensure consistent and meaningful learning (Biggs & Tang, 2011).

A study conducted by Akbay (2022) reveals the importance of constructive alignment in course design in online education context, which includes targeted learning outcomes, alignment of teaching-learning activities, and assessment tasks, as well as effective feedback (Akbay, 2022). It is necessary to rethink the assessment process in a context of distance learning and move towards a professional reality that promotes authentic student engagement (Pasquini, 2019). In another study regarding evaluation practices within Saudi universities during the Covid-19 pandemic, Almossa and Alzahrani (2022a) highlight the importance of ensuring consistency between learning objectives and evaluation methods and of using a scoring guide. They also emphasize the impact of the pandemic on learning assessment practices.

The transition to a new techno-pedagogical alignment, designed to adapt to a digital environment enriched by pedagogical contributions from AI, appears to be an unavoidable requirement for improving the quality of distance assessment. From this perspective, the integration of AI tools within elearning platforms makes it possible to offer learning experiences that are both dynamic and highly personalized. These intelligent environments facilitate immediate feedback and implement adaptive learning paths and structured supervision of self-regulated learning processes, particularly with regard to the definition of learning objectives and the regulation of student progress (Xue et al., 2025). These changes reflect efforts to assess attitudes and practical skills in real-world situations.

Theme 5: Interaction and Feedback

Feedback is an essential element in the learning assessment process. It enables learners to understand their strengths and weaknesses, and it boosts their motivation. In addition, meaningful feedback promotes the development of critical thinking and autonomy in students. In the included studies, the researchers examine the effect of feedback and interactions on the assessment of distance learning. The analysis of the results highlights several important considerations.

A study conducted by Afzal et al., (2024) reveals the positive impact of online assessments on student performance and motivation. It also highlights the crucial role of online feedback in improving student performance. In addition, the preference for this type of feedback over traditional methods suggests a shift in students' preferences towards digital modes of communication (Afzal et al., 2024). This preference for this type of assessment can be attributed to its interactive nature, which allows students to get immediate feedback on their understanding and confirm their knowledge in a practical and engaging way. It is interesting to note that students' preferences vary depending on the type of question in the different assessments. Global feedback gives students a holistic view of their performance, while the immediacy of feedback can help keep them motivated and engaged (Patra & Tekulapally, 2021).

In a hybrid learning context, online formative feedback has a positive and significant effect on student learning. It strengthens motivation and self-directed learning, especially through teacher feedback. This highlights the need to develop strategies to ensure effective online feedback. In this sense, the use of the Moodle platform in the assessment process facilitates interactions between teachers and students, as well as between students themselves (Hung, 2021). This enables teachers to effectively design and manage online feedback by providing detailed activity reports and thereby supporting student learning. It is also important to provide students, before they take exams, with advice, user manuals, exam simulations, training sessions, and immediate feedback during assessments (Almuhanna, 2023). These elements play an essential role in improving the distance assessment system and contribute significantly to facilitating the online assessment experience by reducing students' stress levels. Providing clear instructions and prompt resolution of technical issues during assessments not only helps to allay student concerns, it also increases the overall effectiveness of the distance assessment process.

Our analysis of the results of these studies highlights the importance of meaningful feedback in the online assessment process. These studies also highlight the need to consider student preferences when designing and implementing online assessment activities. Teachers should be mindful

of the diversity of preferences regarding types of assessments and feedback formats and assessments to the needs of students and the expectations of the education system. This adaptation fosters student engagement and motivation, which leads to an improvement in their learning outcomes.

Main Points Observed

The cross-sectional analysis of the selected studies, viewed in light of the five themes reflecting the major concerns of the researchers, leads to the need to adopt an authentic evaluation system using a digital portfolio. This approach offers relevant solutions for assessing the development of students' skills (Kundre & Lokollo, 2021). Instead of being limited to one-off exams, students can present a variety of assignments, such as projects, reports, videos, blogs, and much more. This diversity of materials offers students the opportunity to utilize their knowledge and skills in authentic situations and demonstrate their understanding in a thorough and creative way. In addition, the digital portfolio promotes self-reflection and self-assessment. When students are challenged to reflect on their own learning, identify their strengths and weaknesses (Namaziandost et al., 2020), and set goals for their future development. This awareness emphasizes the learning process rather than just the end result, thus encouraging continuous growth and improvement. In addition, the digital portfolio allows teachers to provide detailed and constructive feedback to students. Careful examination of the work submitted in the eportfolio gives teachers the possibility of providing detailed and constructive feedback to students to help their progress. The eportfolio is an important tool for strengthening interaction between students, teachers, and peers, thus encouraging the active coconstruction of learning in a digital environment (Pérez et al., 2024). Its flexibility means that the eportfolio can be adapted to various assessment contexts, whether formative or summative. It supports learners in the progressive construction of their academic and professional careers (Worrell et al., 2019), while encouraging collaborative work and the development of skills such as communication, cooperation, and creativity.

With this in mind, Salinas-Navarro et al. (2024) stress the value of exploiting the contributions of artificial intelligence to enrich educational practices, while taking care to preserve the integrity of assessments. They also value approaches based on experiential learning and authentic assessment (Salinas-Navarro et al., 2024). Furthermore, Hui et al. (2024) show that the use of eportfolios fosters a culture of constructive feedback, which benefits both teachers and students (Hui et al., 2024). This approach also allows teachers to assess a large number of students by reducing their workloads. However, it is important to emphasize that the effectiveness of this tool requires the establishment of a developed evaluation system. This requires the creation of an evaluation grid with clear and innovative criteria and indicators, which will significantly contribute to improving the quality of distance assessment.

This cross-sectional analysis of the included studies leads us to draw two main observations:

- The first observation is the recommendation to adopt an innovative eportfolio based on authentic assessments. This constructivist model can reinforce active learning and promote the assessment of high-level skills, thus improving the quality of distance assessment in a digital environment in the age of AI.
- The second observation highlights the scarcity of studies examining the problem of evaluating distance learning within secondary education. For this reason, it is important to collect more evidence on how best to integrate the digital portfolio in the context of distance education within secondary education to improve distance learning and assessment.

Synthesis

Note that this study began with the formulation of a research question. Then we built a search string through a series of combinations of the keywords we used. Using this chain, we conducted an exhaustive search of the relevant literature. We adopted a systematic approach according to the PRISMA guidelines to guide our study. Using this rigorous inclusion and exclusion criteria, we selected 43 studies published in higher ranking journals in different subjects. Our analysis of the results identified five major themes reflecting the main concerns of the researchers in their assessment of distance learning, namely, academic integrity, the integration and adaptability of digital

technologies, the impact of AI, pedagogical alignment, and interaction and feedback.

Many researchers are working on adapting approaches to using various digital tools and platforms to ensure the credibility of distance assessment. Their work shows the potential of these methods and the tools used to reduce academic dishonesty. However, the implementation of these processes in distance assessment reveals significant limitations, including equity issues, technological inequalities (Han & Kumwenda, 2025; Mhlanga, 2024), technical difficulties, and concerns about the security of personal data (Pordanjani & Salehi, 2025). Other limitations have been observed, including negative effects on the learner, such as cognitive overload, reduced autonomy, and stress, as well as reduced confidence in the pedagogical relationship. In addition, these approaches do not allow for adequate assessment of high-level skills. Faced with these limitations, the adoption of eportfolios in distance assessment is emerging as an innovative strategy that is capable of responding to the current challenges through authentic assessments. However, it should be noted that this tool has certain limitations, particularly when it comes to assessing high-level skills in certain specific disciplines.

After a cross-sectional analysis and discussion of the results of this study, it became clear to us that this research should strive to develop strategies that address the five major themes of this issue. To do this, it is necessary to rethink assessment methods and criteria to adapt them to the demands of a technologically advanced age where AI offers immense potential for education. The aim is to adopt an approach that takes advantage of the opportunities offered by AI to support student learning in a variety of contexts and modalities, while optimizing the distance assessment process. Such a model allows AI to be seen as a tool for revolutionizing education, rather than just as a threat because of the risks associated with its misuse. Several studies highlight that AI language models, like ChatGPT, have the potential to strengthen students' adaptability to changing educational needs, foster personalized learning, and assist teachers in developing personalized training curricula (Firat, 2023; Zhai, 2022). As the capabilities of AI evolve, the academic principles and standards defining the online assessment process must dynamically adapt to the changes introduced by the emerging technology.

In this regard, the use of authentic assessments as part of an eportfolio offers learners the opportunity to become actively involved in the construction, organization, and presentation of their learning. It meets the needs of learners, the objectives of the education system, the expectations of society, and the professional quality standards of the modern market. Additionally, this tool is characterized by flexibility and dynamics that allow it to adapt to various types of evaluation, modalities, and disciplines.

With this in mind, future research should focus on the development and examination of an innovative digital portfolio that includes incorporating an assessment grid with clear and precise criteria and indicators to ensure reliable and effective distance assessment. Additionally, empirical studies to test the effectiveness of eportfolios in distance assessment are needed to analyze data from key educational stakeholders, such as learners and teachers. Our research provides knowledge on the major concerns of researchers that can be used in future research on the issue of distance assessment in the era of AI. In addition, it offers an overview of its state of AI in education.

CONCLUSION AND PERSPECTIVES

This study presented a systematic review of the recent literature on the issue of assessing distance learning in a digital environment in the age of AI. Thus, we sought to identify the main concerns of researchers for ensuring a credible and effective distance assessment.

At the end of this study, we found that the distance evaluation process depends on pedagogical and technological factors. Although traditional assessment methods continue to be used, new approaches incorporating digital technologies are constantly evolving to meet the changing needs of education. This research identified strategies to improve the quality of distance assessment, which encompass both the detection and prevention of forms of dishonesty to ensure academic integrity. Furthermore, this study highlights the importance of embracing the integration of digital technologies into teaching and learning contexts and assessment objectives, with particular emphasis on the impact of artificial intelligence on the assessment

of distance learning, which has led us to rethink assessment systems to adapt to a new reality.

The use of repressive distance assessment methods based on the detection of academic dishonesty in asynchronous modalities has several limitations. These are mainly related to technical, financial, and security constraints as well as negative effects of the methods on learner concentration and performance.

In a context marked by a boom in emerging technologies such as generative AI and immersive technologies for developing attractive and interactive digital learning environments, it is necessary to rethink learning and assessment methods and integrate these technologies strategically and critically for educational innovation. The results of this research invite those involved in teaching and educational institutions to immediately rethink their standards and procedures for preventing and detecting forms of academic dishonesty, with a view to developing dynamic and more authentic assessment practices. This approach is part of an active, learner-centered pedagogy that values commitment, creativity, and learning by doing. It sees assessment not as an end in itself, but as a process serving the development of skills. With this in mind, the principle of techno-pedagogical alignment, which ensures coherence between learning and teaching environments, assessment methods, and technological developments, becomes essential. In this respect, integrating a digital portfolio into their process is an effective tool. Firstly, it enables learners to become actively involved in constructing their knowledge and to document, structure, and enhance their learning through contextualized tasks and authentic projects. Secondly, it provides teachers with learning records to monitor progress, assess skills, and support individualized learning paths. Also, by increasing the transparency and traceability of learning activities, this approach helps to prevent forms of academic dishonesty, while encouraging the ethical and thoughtful use of digital and AI technologies. In this way, it paves the way for fair, meaningful distance assessment that is aligned with the performance-rich digital environments of AI tools.

Perspectives and Recommendations

In summary, this research contributes to the development of distance assessment methods in a changing digital environment. We recommend the following:

- The future of distance assessments in the age of AI requires pedagogical changes at the level of the curriculum, teaching methods, and the methods and evaluation criteria. To accommodate this, research into the transition from a traditional pedagogical alignment to a techno-pedagogical alignment is essential.
- It would be useful to conduct empirical research and case studies to gather evidence on the use of digital portfolios as a distance assessment tool in the AI era. This tool makes it possible to create an environment more conducive to authentic assessment, which serves as a means of learning rather than being limited to assessments of learning, through, for example, high-level cognitive skills assessments that are focused on analysis, synthesis, collaboration, and creation.
- Research at the high school level is currently limited, requiring further investigation to better understand the implementation of innovative assessment tools in line with the technological advances of artificial intelligence and the needs of a modern society. It is also crucial to gather more evidence on how best to integrate digital portfolios as part of distance education within secondary education for teaching, learning, and assessment.
- Institutions should provide training and resources to assist teachers and designers in adjusting or adopting their assessment designs to the evolving context of digital technology and AI. Developers of technological and AI tools should consider educational and ethical needs when designing digital and AI tools for educational purposes, including the development of comprehensive assessment approaches and academic integrity policies that encompass a wider variety of tools than language models.

The conclusion of this study offers prospects for further research on the role of school and university in the AI era and highlights the importance of preparing educational staff for a future where artificial intelligence will occupy a central place in education and society.

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