

Learning assessment during COVID-19: A case study of six Moroccan institutions

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Abstract: The global impact of the COVID-19 pandemic affected Morocco's education sector, prompting a rapid shift to online learning in higher education. This study presents a case analysis based on a survey of the mode of learning assessment adopted by Moroccan universities during the pandemic. Participants included university officials and researchers interested in distance education from six Moroccan higher education institutions. The analysis examines in detail the Moroccan experience regarding the integration of technology into learning assessment during the pandemic, emphasizing organizational, pedagogical, technical, ethical, and emotional aspects of this transition. The findings reveal significant challenges, such as maintaining exam integrity and adapting to digital tools. The study concludes that sustainable progress in this area depends on teacher training, improved digital infrastructure, and the development of strong ethical frameworks for online assessment. These insights contribute to a better understanding of the resilience of the Moroccan higher education system and offer practical recommendations for stakeholders and academic leaders aiming to improve assessment practices in blended and fully online environments.

Keywords: COVID-19, Distance education, Learning assessment in remote context, Learning assessment, Moroccan higher education, Online assessment.

1. Introduction

The COVID-19 pandemic significantly impacted Morocco, especially higher education. Universities closed on March 16th with no reopening date, affecting millions of students [1]. Many institutions shifted to e-learning [2], providing online resources via platforms, websites, and social networks. Assessing students remotely posed challenges, prompting universities to adopt new evaluation methods [3].

This situation raises important questions about how higher education institutions managed assessments during the pandemic. Limited research exists on Moroccan assessment practices during COVID-19, emphasizing the need for more data to understand experiences and professional development needs during the transition to online assessment. This study examines learning assessment in six Moroccan institutions, aiming to address specific research questions.

Question 1: Was online assessment adopted in higher education during the pandemic?

Question 2: What tools were used and how?

Question 3: What are the challenges and problems encountered?

An online questionnaire with 13 items was emailed to university officials and researchers involved in distance learning.

2. Literature Review

This section reviews prior research on assessment methods in higher education during the COVID-19 pandemic. Key search terms included learning assessment, COVID-19, online testing, and online examination, among others relevant to higher education. Searches were conducted on Google Scholar and publisher platforms like SpringerLink and MDPI, using predefined keywords. Results were screened for publications from 2020 onward, focusing on assessment methods during or after COVID-19.

2.1. Impact of COVID-19 on Higher Education

The COVID-19 pandemic has had a significant impact on global education. Educators, students, and parents have been forced to adapt quickly to new circumstances due to the health crisis. UNESCO reported that "COVID-19 has led to the closure of schools in over 190 countries, affecting more than 1.6 billion students, which is over 90% of the global student population" [4]. Lockdown and social distancing measures have compelled educational institutions worldwide to adopt remote teaching modalities, disrupting traditional systems. Overnight, millions of teachers had to teach remotely, urgently, and from their homes. They needed to adjust their teaching methods within days to ensure "pedagogical continuity." Teachers also had to modify assessment methods for regulation and certification purposes [5].

2.2. Learning Assessment

Learning assessment is defined as the process of collecting, analyzing, and interpreting data related to the achievement of study program objectives and overall student development, aimed at making informed pedagogical and administrative decisions [6]. Similarly, Casanova [7] views assessment as the systematic collection of data that provides ongoing insights into teaching and learning. Learning objectives shape assessment methods and activities, making the definition of an assessment approach crucial to structuring the teaching and learning process.

Assessment serves two main purposes: formative and summative. Summative assessment validates or measures learning at the end of a program and is conducted solely by the teacher based on predefined objectives. Formative assessment, on the other hand, monitors student progress during learning, providing feedback to improve the process. This form of assessment involves both teacher and learner, through self-assessment or peer feedback, empowering students to evaluate their own progress and actively engage in their learning. In digital environments, reviews of online formative assessment emphasize that digital tools can support feedback loops, learner engagement, and evidence-based decisions, provided assessment design aligns with learning outcomes and activities [8].

2.3. Assessment strategies used in higher education during COVID-19.

Assessment is a crucial aspect of higher education [9], essential for equipping students with skills and attitudes to face present and future challenges. The United Nations emphasizes the need for inclusive, equitable, and quality education for all [4]. Assessment plays a key role in achieving these goals, especially in higher education [10], where online assessment is vital for fostering educational equity.

The COVID-19 pandemic prompted a global shift to online learning, affecting assessment methods in higher education [11]. Universities adapted assessments to new learning environments while preserving academic integrity, reflecting changes in curricula, academic calendars, and policies.

During the pandemic, various assessment methods were used, including online assessments, in-person exams with social distancing, remotely proctored exams, and online submissions, depending on health conditions and government guidelines.

2.4. Online and Remote Assessment

According to Crisp et al. [12] and the Office for Qualifications, Examinations, and Regulation (Ofqual), online assessment involves evaluations that utilize technology to create, deliver, store, and report scores and learner feedback. As per the Joint Information Systems Committee (JISC) [13], online assessment is defined as an "end-to-end electronic assessment process" involving the use of information and communication technologies (ICT) to present assessment activities and record responses. Various media formats, such as Word documents, portable document formats (e.g., PDF), videos, images, simulations, or games, can support electronic assessment. With new technologies, students' skills and competencies can be assessed electronically [12]. Recent syntheses show that "online assessment" in higher education encompasses diverse designs (formative vs. summative, different feedback and analytics practices). Studies should clearly report assessment design and implementation features to enable comparison across contexts [8]. Remote assessment refers to any evaluation conducted as an open-book or take-home exam, where candidates are not required to stay online. They download the exam, complete their responses either by typing or handwriting, and then upload their work before the deadline, accessing the internet only for submission.

Table 1.

Details of the articles included in this review.

Study	Country	Date	Used Platforms	Assessment methods
Soltani [14]	Algeria	December 2020	Moodle	Filling out questionnaires, assignments, and individual projects
Abdessemed [15]	Algeria	July 2022	Google forms	assignments and individual projects
Chahbi and Bouaasab [16]	Morocco	December 2022	Google classroom	Online tests
Guangul et al. [17]	Oman	2021	Moodle	Online tests
Tejedor et al. [18]	Spain, Italy, Ecuador	2021	ZOOM, Teams, Virtual Campus, Skype	Online tests
Şenel and Şenel [19]	Turkey	2020	Moodle	Online tests, assignments, and individual projects
Linden and Gonzalez [20]	Australia	2021	ZOOM	Video conferences
Prigoff et al. [21]	United states	Marsh 2021	ZOOM	Video conferences
Tuah and Naing [22]	UK	October 2020	Moodle, ZOOM	Video conferences, assignments, individual projects, and filling out questionnaires.
Rezaï and Fadaie Heydarie [23]	Iran	October 2021	Adobe Connect	Filling out questionnaires

The analysis of the selected articles indicates that nearly half of online assessments utilized the Moodle platform, which offers functionalities such as test-type surveys, discussion forums, and chats. Video conferences, primarily via ZOOM, accounted for 37.5%, serving as a means to supervise online tests remotely. These two tools are the most prominent methods for conducting assessments in higher education. Alternative approaches include submitting written assignments and individual projects online, as well as completing questionnaires through email, online tutorials, and Google Forms. The studies also show that during COVID-19, various assessment tools were employed, with online tests being the most common, representing 36.36% of the methods used. This focus on digital assessments suggests an acknowledgment of their efficiency, scalability, and relevance. Assignments and individual projects follow closely at 27.27%, highlighting a significant emphasis on practical tasks for evaluating application and problem-solving skills. Video conferences with remote proctoring share the same percentage, reflecting efforts to uphold assessment integrity in remote settings. Filling out questionnaires, at 18.18%, appears less prevalent but can provide valuable insights into students'

opinions and experiences. Overall, the combination of these methods demonstrates a comprehensive and adaptable approach to assessment, accommodating different learning styles and contexts.

2.5. In-Person Assessment

During the pandemic, universities faced challenges in evaluating students, especially regarding academic integrity and fairness. To address these, they adopted innovative approaches, such as alternative online assessment methods. In some cases, in-person assessments continued, following health guidelines. In other countries, universities adjusted in-person exams by reducing the number of students per room to ensure social distancing. In-person assessment during COVID-19 required adjustments from teachers, particularly in exam scheduling, supervision, and communication with students.

In Morocco, the Ministry of National Education implemented measures for in-person assessments, including limiting students in exam rooms, increasing exam sessions, and enforcing social distancing and cleaning protocols to ensure safety.

2.6. Challenges and Opportunities in Assessing Learning during the Pandemic of COVID-19

2.6.1. Challenges in Assessing Learning

The assessment of students' learning is essential for educators to evaluate skills and knowledge. The COVID-19 pandemic has posed new challenges, including lockdowns, online classes, reduced class sizes, disruptions, and curriculum changes, which hinder assessment processes. The table below displays data collected on assessments during COVID that we managed to gather.

Table 2.
Challenges of online assessment.

N°	Category	Difficulties	Description	Reference study
1	Pedagogical Challenges	Difficult Implementation Lack of Technological Knowledge Lack of Pedagogical Tools and Evaluation Methods Adapted to Virtual Environments	Online assessment is a new practice for many individuals, which can make implementation challenging. Teachers need to learn how to use new platforms, leading to potential technical and security issues. Additionally, some students may face inequalities in access to technology. Regarding teaching staff, there is a lack of technological knowledge, both in terms of technical elements and the use of pedagogical tools and assessment methods adapted to virtual environments.	Cárdenas Cabello and Luna Nemecio [24]
2	Surveillance Challenges	Equity Integrity Privacy Protection	Monitoring students during online exams raises issues of fairness and scale. Ensuring students do not use external sources or communicate with others remains challenging, requiring effective proctoring methods to maintain exam integrity. Institutions require updated integrity policies and strategies explicitly addressing AI-enabled practices alongside traditional misconduct prevention measures. The use of surveillance and access control software raises privacy concerns.	Smith [25] and Balalle and Pannilage [26]
4	Technological	Connectivity Technical Failures	Online classes and remote tests may be disrupted by Internet connectivity	Ferri et al. [27]

	Challenges	Access Inequalities	issues, service interruptions, or device compatibility problems, which can affect the validity of online test results. Some students may also face inequalities in access to technology	
5	Challenges related to student well-being	Student Engagement Social Interaction Motivation Student Stress and Anxiety	Online learning limits face-to-face interaction between teachers and students, which can reduce education quality. Additionally, students may struggle to stay focused and motivated online, impacting their learning and performance. Remote proctoring and monitoring tools raise concerns about privacy and perceived fairness, and can contribute to students feeling stressed, especially when they face unstable connectivity or limited suitable workspaces.	Betlej [28] and Marano et al. [29]

2.7. Opportunities in Assessing Learning During the Pandemic

While making abrupt changes to assessment formats can be challenging, the advent of COVID-19 offers a genuine opportunity to explore diverse assessment designs for learning. Online assessment, by its nature, provides numerous significant advantages [30] contributing to its increasing adoption across various fields. Firstly, accessibility is a major strength of this method. It allows access to a broad range of participants, regardless of geographical location, fostering a diversity of perspectives. This variety of participants enables the collection of data from different regions and cultures, resulting in a more comprehensive and inclusive evaluation process [31]. Another major advantage of online assessment is the significant savings of time and effort it offers. Compared to traditional methods, this approach is often faster and more efficient. It eliminates the need for coordinating laborious physical meetings and distributing printed questionnaires, allowing students to undertake examinations from any location while being supervised via online technologies [32], which simplifies the evaluation process. Additionally, real-time data collection is a key benefit, enabling organizations to make quick decisions and adapt evaluation programs instantly based on results.

As a versatile and efficient solution, online assessment meets modern demands for comprehensiveness and responsiveness. Its growing adoption highlights recognition of its benefits, driving the evolution of evaluation practices across sectors. This shift reflects increasing awareness of online assessment advantages in a dynamic landscape.

3. Methodology

3.1. Research Design

After conducting a literature review, we found a significant lack of information on the research topic within the Moroccan context. This study uses a case study approach to examine learning assessments during the COVID-19 pandemic, focusing on six Moroccan educational institutions. The research aims to provide insights into assessment methods used in Moroccan universities during the pandemic, exploring their integration into pedagogical practices and identifying challenges faced by educators during implementation.

3.2. Participants

This study involves university officials and researchers engaged in distance education and assessment during the COVID-19 pandemic. The selection criteria target individuals directly involved in teaching, assessment, or educational leadership within their institutions. This ensures insights come from those with firsthand experience in decision-making and implementing learning assessments during this challenging period. Focusing on participants in these roles aims to provide informed perspectives

that deepen understanding of the complexities of distance education assessments during this unprecedented time.

3.3. Data Collection Instrument

The data collection for this study was conducted using a well-structured online questionnaire with 13 carefully designed questions to gather relevant information. The questionnaire included a mix of closed-ended and open-ended questions, allowing for the collection of both quantitative and qualitative data, ensuring a comprehensive understanding of the topic. Participants received a brief introduction outlining the study's purpose and emphasizing the importance of their responses before completing the questionnaire.

3.4. Questionnaire Distribution

To reach participants, we sent the questionnaire via email, clearly communicating the study's objectives and goals. A reasonable timeframe was provided to allow participants to complete the questionnaire thoughtfully. This approach aimed to ensure participants understood the study's purpose and could contribute their insights in a meaningful and considerate manner.

4. Data Analysis

The data analysis for this study employs two methods. First, quantitative data from closed-ended questions will be analyzed with statistical tools to produce descriptive statistics, offering numerical summaries and response pattern insights. Second, qualitative data, including Brief Description with Example (BDE) responses, will be subjected to thematic analysis to identify recurring themes and narratives. Combining both quantitative and qualitative results aims to provide a comprehensive understanding of assessment practices during the COVID-19 pandemic in Moroccan universities. This dual approach ensures a balanced exploration of numerical trends and qualitative insights, enhancing the study's depth and reliability.

5. Results

The questionnaire consisted of three sections: Section 1, general information; Section 2, assessment method; and Section 3, advantages and challenges of online assessment.

5.1. General Information

Participants were invited in RQ1 and 2 to mention the universities to which they belong and the names of establishments they represent.

Table 3.
General information about institutions.

University	Institution name	City
Mohammed First University	Higher School of Technology	Oujda
Cadi Ayyad University	Faculty of Arts and Humanities	Marakech
Ibno Zohr University	Higher School of Technology	Agadir
Not affiliated with any university	The National Higher School of Textile and Apparel Industries	Casablanca
Hassan First University	National School of Applied Sciences	Berrechid
Euromed University	Polytechnique school	Fes

As shown in Table 3, each participant is associated with a distinct university and represents a specific establishment; some are open-access institutions, while others are regulated-access institutions, contributing to the heterogeneity of the study sample. This diversity is evident in affiliations with prestigious universities such as Mohammed First University in Oujda, Cadi Ayyad University in Marrakech, Ibn Zohr University in Agadir, and Hassan First University. The presence of an institution

not directly affiliated with any university, the National Higher School of Textile and Apparel Industries in Casablanca, adds an interesting dimension, reflecting a varied landscape of educational establishments. The inclusion of Euromed University's Polytechnique School in Fes further emphasizes the range of academic disciplines covered. Overall, these diverse affiliations enrich the research findings, providing insights into the integration of digital technology in assessments across various educational contexts in Morocco.

5.2. Assessment Methods

RQ 3: Before COVID-19, was digital technology integrated into the assessment of learning at your university?

Our question aimed to explore the integration of digital technology into assessments before the COVID-19 pandemic across six institutions. The collected data showed binary responses (Yes/No) distributed as follows:

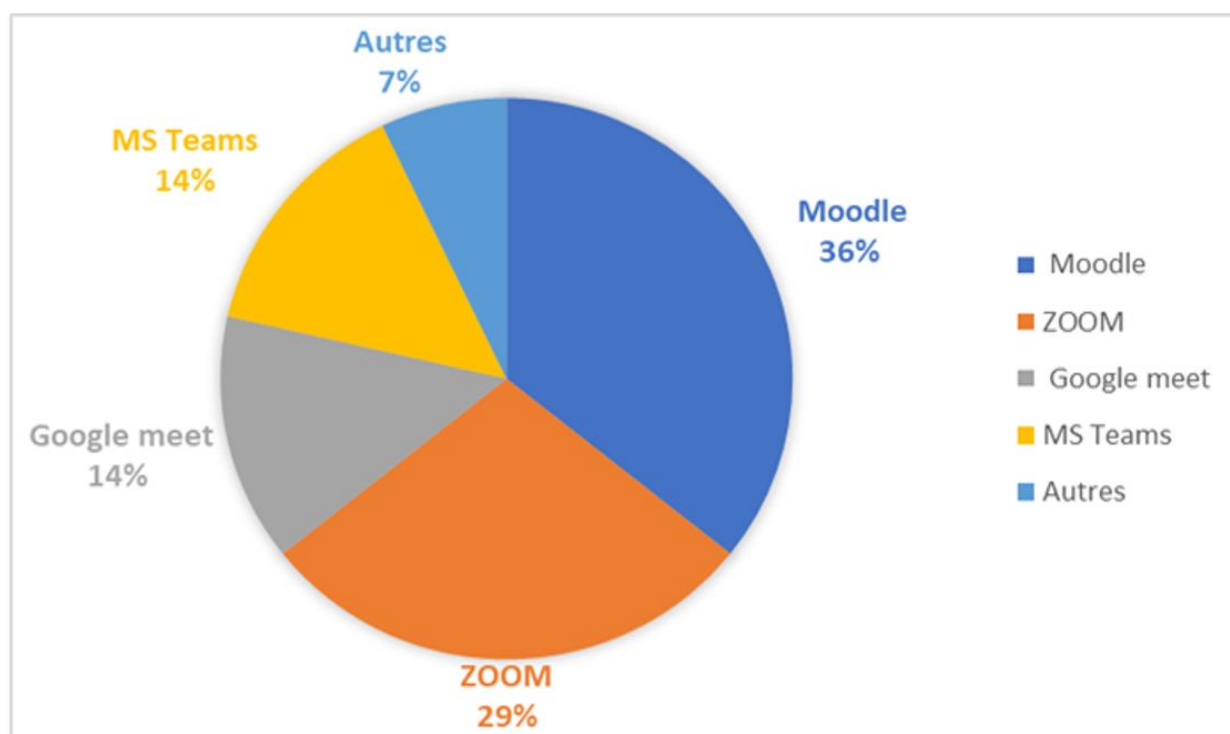


Figure 1.

Digital technology integration into the assessment of learning before COVID-19.

Frequency of Integration (Yes): $(2 / 6) * 100\% = 33.33\%$

Frequency of Integration (No): $(4 / 6) * 100\% = 66.67\%$

This indicates that, before COVID-19, digital technology was integrated into assessments in approximately 33.33% of cases, while in 66.67%, it was not. This suggests a relatively low adoption of digital technology in assessments prior to the pandemic, reflecting limited integration and usage.

RQ4: What were the three most used online platforms in your university to ensure teaching and learning activities during COVID-19?

The data analysis shows that 36% of online teaching activities used Moodle, known for its functionalities such as creating, managing, and administering online courses. Moodle features include forums, quizzes, assignments, educational resources, and learning reports. ZOOM was used for 29% of online teaching, offering virtual classrooms, webinars, and meetings with features like video

conferencing, screen sharing, chat, and recording. These two platforms are the primary tools for online teaching in higher education. Google Meet and Microsoft Teams were used with a combined frequency of 14%, while other platforms and tools accounted for no more than 7%.

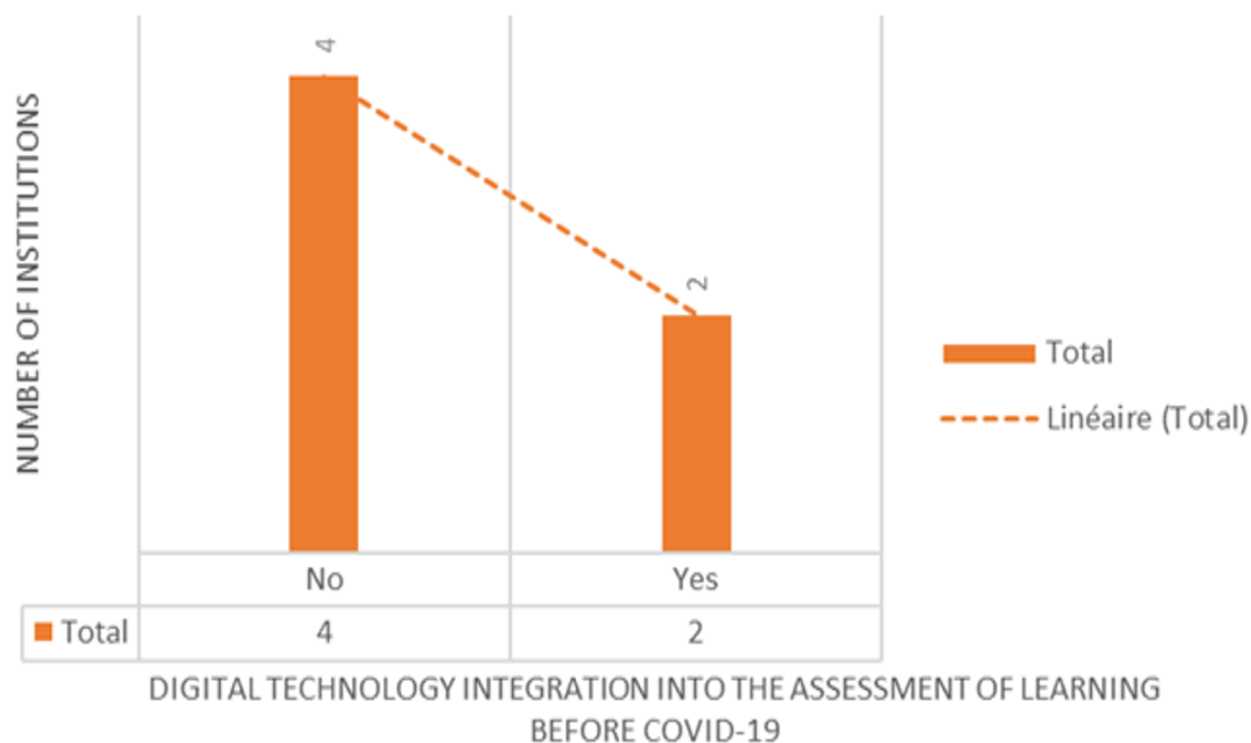


Figure 2.

The most used online platforms to ensure teaching and learning activities during COVID-19.

RQ5: Was the assessment of learning during the lockdown conducted online or in person? For online assessments, please specify whether it was synchronous (conducted simultaneously) or asynchronous (not conducted simultaneously).

The mode of assessing students' learning during distance education, prompted by the closure of universities and Moroccan institutions due to the pandemic, has been uncertain. Our questionnaire included a specific question asking participants to specify the assessment methods used by their institutions during COVID-19. Results show that assessment types varied, with choices depending on three criteria: assessment group, assessment type, and assessment modality.

Table 4.
Assessment modalities.

Assessment modality	Assessment group	Assessment type	Frequency
Online asynchronous		Portfolio	
		Quiz	
		Open-book exams	
	Performance assessment	Assignments	6-Jun
		Projects	
		Presentations	
		Portfolio/ Group Project/Work	
		Online discussions	
	Summative assessment	Exams	
		Mid-terms and final exams	0/6
	Dissertations/theses	Master's and PhD dissertations/theses	6-Jun
Online synchronous		Portfolio	
		Quiz	
	Performance assessment	Open-book exams	
		Assignments	
		Projects	0/6
		Presentations	
		Portfolio/ Group Project/Work	
		Online discussions	
	Summative assessment	Exams	
		Mid-terms and final exams	6-Jan
	Dissertations/theses	Master's and PhD dissertations/theses	0/6
In person		Portfolio	
		Quiz	
	Performance assessment	Open-book exams	
		Assignments	
		Projects	
		Presentations	
		Portfolio/ Group Project/Work	
	Summative assessment	Exams	
		Mid-terms and final exams	6-May
	Dissertations/theses	Master's and PhD dissertations/theses	0/6

The research findings indicate that participants recognized the need to adapt assessment practices during the COVID-19 pandemic. They adopted three modalities: asynchronous online assessment, synchronous online assessment, and in-person assessment. The choice of these modalities was tailored to address the specific learning challenges presented by the pandemic.

The data show that asynchronous online assessment was used universally (6/6) to evaluate students' skills, abilities, and academic work, such as dissertations and theses. However, this modality was absent from summative assessments. Conversely, synchronous online assessment was not used for specific performance evaluations or academic projects like dissertations and theses. It was only sporadically employed (1/6) for summative assessments.

In-person assessment was consistently used (6/6) for summative assessments but was absent from other assessment types.

RQ6: The three most used electronic platforms at your university for conducting learning assessments during COVID-19, in order of usage, are identified and analyzed?

This quantitative breakdown provides a clear percentage distribution of the mentioned platforms, highlighting the relative frequency of each platform in the responses. Moodle (33%), Zoom (27%), and MS Teams (20%) continue to be the most cited platforms, collectively representing a significant

majority of responses. The inclusion of Evalbox (6%), Google Classroom, and Google Meet (7%) indicates some diversity in choices made by participants for conducting learning assessments during the COVID-19 pandemic.

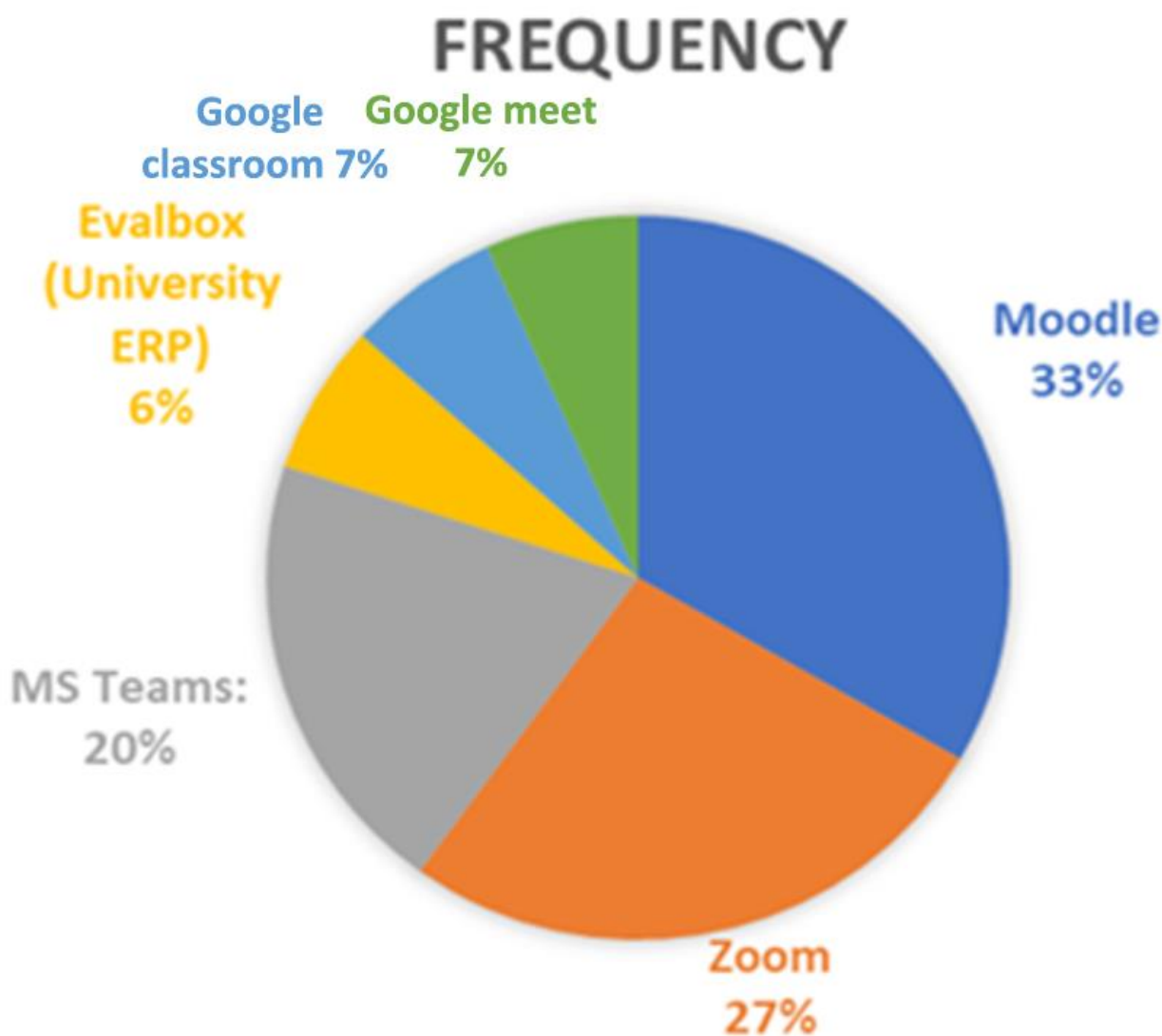


Figure 3.
Platforms in your university for conducting learning assessments.

RQ7: What are the most commonly used forms of online assessment: written tests, multiple-choice questions, case studies, online discussions, projects, and peer assessments?

In consideration of potential differences in the nature and method of assessment, our question provided methods for respondents to establish the priority order based on relevance. The responses indicate that three forms of assessment were adopted:

ONLINE ASSESSMENT FORMES

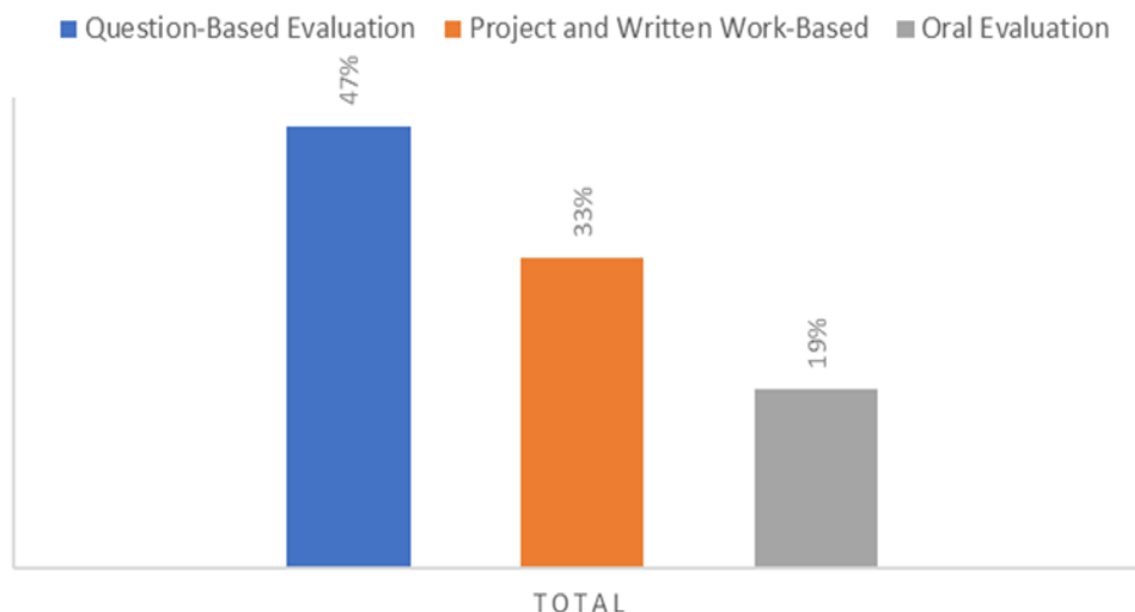


Figure 4.
Assessment forms used during COVID-19.

5.2.1. Question-Based Evaluation (47%)

This form of assessment primarily relies on multiple-choice questions (33%) or time-limited assignments (14%), allowing students to respond concisely. It can be used to assess factual knowledge and understanding of concepts. Question-based assessments have the advantage of being relatively simple to administer online.

5.2.2. Project and Written Work-Based Evaluation (33%)

Evaluation based on projects and written work emphasizes creation, research, and writing of specific documents or projects, including case studies (13%), research reports, written presentations, and projects (20%), etc.

5.2.3. Oral Evaluation (19%)

Oral evaluations typically involve students presenting their knowledge, ideas, or projects orally, including individual presentations (13%) and online discussions (7%).

RQ8: What remote monitoring tools and plagiarism detection programs were used during online assessments?

Regarding assessment monitoring, participants were asked about surveillance and plagiarism detection tools used by their institutions. Eighty-four percent reported that no tools were used during online assessments amid the COVID-19 pandemic, while 16% confirmed the use of such tools for monitoring online assessments.

RQ9: Have teachers and students received training on the topic of online assessment?

Considering that online learning assessments are conducted in many institutions, it is valid to question the training of teachers and students for online assessments. This inquiry aims to determine whether training initiatives have been implemented to help teachers design, administer, and evaluate online exams and assessments effectively, ensuring quality and consistency. Additionally, this question

aims to determine whether students are aware of online assessment methods and how to respond in virtual environments. The responses show an equal distribution of 'Yes' and 'No' answers regarding whether training on online assessments has been provided.

Training regarding online assessment

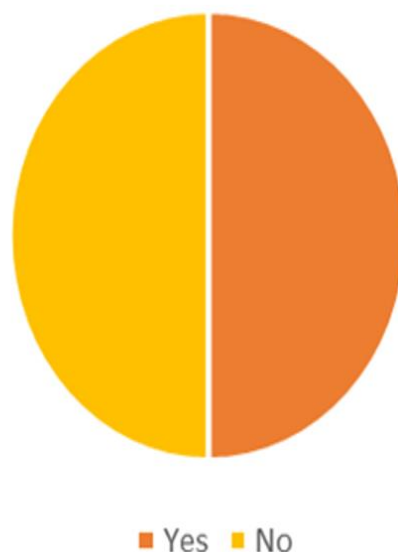


Figure 5.
Training regarding online assessment.

5.3. Advantages and Challenges of Online Assessment

RQ10: What are the advantages of online learning assessments (based on your university's experience)?

The analysis of the responses to the question about the advantages of online learning assessments reveals several key themes:

Rapidity: The emphasis on the speed of conducting assessments, obtaining results, and providing real-time feedback highlights efficiency gains with online assessments. The reduction in costs and time is emphasized, underscoring the practical benefits of a swift assessment process.

Reliability: The mention of online assessments ensuring consistent and fair grading, along with the minimization of human errors and biases, emphasizes the reliability and objectivity achieved through digital evaluation methods. This suggests that online assessments contribute to the overall quality and fairness of grading procedures.

Flexibility: Recognizing flexibility for students and teachers regarding pace and timing highlights the value of online assessments' adaptability. This flexibility accommodates diverse learning styles and schedules, fostering a more personalized learning experience.

Traceability: The acknowledgment of traceability, allowing for the tracking of student performance and in-depth analyses, reflects an awareness of the importance of data-driven insights. This suggests a value placed on using assessment data to inform educational strategies, interventions, and improvements.

Autonomy: The recognition that online assessments enhance student autonomy in their learning process implies understanding the positive impact of digital assessments on engagement and self-

directed learning. This aligns with the idea that online assessments empower students to control their educational journey.

RQ11 and RA12: What are the disadvantages and challenges of online learning assessments (based on your university's experience)

Based on the provided responses, we identified five categories of challenges and disadvantages of online learning assessments, and summarized them in the table below:

Table 5.
Challenges encountered during the online assessment.

N°	Category	Challenges	Description
1	Pedagogical Challenges	Difficult implementation Lack of technological knowledge Lack of educational tools and assessment formulas suitable for virtual environments	<ul style="list-style-type: none"> - Lack of preparation of teachers for online assessment - Lack of training on scripting software - Exam integrity, sometimes necessitating the use of multiple-choice questions (MCQ) - Reduced responsiveness
2	Ethical Challenges	Equity concerns Challenges related to plagiarism and fraud management. Issues with access control and identity usurpation. Privacy concerns	<ul style="list-style-type: none"> - Surveillance of students during online exams raises issues of fairness and scalability. - Plagiarism issues and fraud management - Access control - Identity theft - The use of surveillance and access control software raises privacy concerns.
3	Technical Challenges	Connectivity issues Technical breakdowns Inequalities in access	<ul style="list-style-type: none"> - Dependency on students' connectivity devices - Platform blockages - Quality of connection speed and camera for both students and teachers - Inadequate audiovisual equipment - Lack of computer hardware
4	Affective Challenges	Student engagement Social interaction Motivation Stress and anxiety among students	<ul style="list-style-type: none"> - Students may struggle to stay focused and motivated online. - Adaptation of students and professors to the online environment. - Difficulty in managing distance with students. - Lack of contact with learners. - Anxiety among students.
5	Administrative Challenges	scheduling and organizing exams Redesign of the learning and evaluation system	<ul style="list-style-type: none"> - Planning and organization of exams inadequate to digital challenges - Need for a redesign of the learning and evaluation system to adapt to digital challenges.

The results highlight various categories of challenges related to online teaching, including pedagogical, ethical, technical, emotional, and administrative issues. Addressing these challenges is essential for a successful transition to online education and to ensure a fair, effective learning experience for students.

RQ13: How to improve online assessment in the post-COVID-19 era?

To address online teaching challenges, we asked participants for suggestions to improve online assessment post-COVID-19, resulting in six key categories.

Participants emphasized the importance of preparing teachers and students. Teachers need technological training to develop online teaching skills, including digital content creation and assessment tools. Training should combine online and in-person sessions with continuous professional development. Students also require training to effectively use digital tools, improving their online assessment experience.

Second, online assessment should be institutionalized through modules, integrating a percentage into study programs to encourage wider adoption and ease the transition to distance learning. A unified national platform for online assessment would streamline processes and create consistency for students and teachers, addressing logistical challenges.

Third, investing in appropriate infrastructure and technology is vital for the security and reliability of online assessments.

A strong ethical framework is essential to prevent plagiarism and identity theft, safeguarding the integrity of online assessments. Effective methods and tools are vital for upholding academic honesty and trustworthiness.

Diversifying assessment methods by incorporating both synchronous and asynchronous evaluations, instead of relying solely on multiple-choice questionnaires (MCQs), offers a more comprehensive evaluation of students' skills and learning progress.

6. Discussion and Recommendations

In the context of emergency distance learning, implementing online assessment is essential, especially as it currently relies on limited practical and theoretical knowledge. The COVID-19 pandemic caused significant shifts in higher education, including assessment methods and tools. The pandemic's global impact, including in Morocco, led to a rapid transition to online teaching in Moroccan universities, with most courses delivered online since spring 2020. Additionally, educational materials were made accessible via various platforms, websites, and social networks. A major challenge in this unprecedented situation was rethinking student assessment strategies.

The primary aim of this study was to examine Moroccan universities' experiences with integrating digital technology into learning assessments during the pandemic. The findings highlight key aspects of digital assessment integration before and during COVID-19 pandemic.

The research encompasses a diverse array of educational institutions in Morocco, representing various academic disciplines and affiliations. Unlike previous studies with limited samples, this diversity enhances findings by providing insights into digital technology integration in assessments across different educational contexts in the country.

The study shows that before COVID-19, only about one-third of Moroccan universities adopted digital assessment methods, highlighting the need for improved teacher training and infrastructure investment. Enhancing digital integration is essential for increasing efficiency and streamlining academic processes.

Additionally, the study analyzed the diversity of assessment methods employed in Moroccan institutions during the COVID-19 pandemic, including online tests, assignments, and video conferences with remote proctoring using tools such as Moodle, Zoom, Google Meet, and Microsoft Teams. The dominance of Moodle and Zoom for online teaching and assessment reflects a broader trend toward established, reliable platforms capable of supporting various educational needs. These findings are consistent with previous research emphasizing the importance of a comprehensive and adaptable assessment approach that accommodates different learning styles and contexts. Despite this rapid transition, the varied use of assessment modalities revealed significant disparities. Asynchronous assessments like quizzes, assignments, and projects were more manageable online, whereas high-stakes summative assessments still required in-person administration, highlighting ongoing challenges in conducting thorough online evaluations.

The study highlights several advantages of online assessment, including speed, reliability, flexibility, accountability, and increased student autonomy. These benefits align with global evidence on digital tools enhancing educational practices. Consequently, Moroccan universities should actively adopt digital innovations in assessment to maintain educational quality and relevance in the digital era. Nonetheless, the study also emphasizes significant challenges, pedagogical, ethical, affective, and administrative, that complicate implementation. Compared to prior research, this study broadens the understanding of the pandemic's global educational impact, specifically addressing the unique challenges Moroccan universities faced during the transition to online assessment, which are less documented in existing literature. Pedagogical issues, including educators' technological literacy and insufficient skills for effective digital tool use and online assessment design, highlight the need for Moroccan institutions to implement ongoing professional development programs. These should focus on digital literacy, online content creation, and assessment strategies. Ethical concerns like plagiarism and fraud call for stronger policies, such as remote monitoring software and AI tools, to ensure assessment integrity and fairness. Technical challenges, frequently reported in our study and previous research, reflect broader infrastructure deficiencies, including connectivity issues and equipment disparities. To ensure equitable access to technological resources for all students and teachers, Moroccan institutions should invest in high-quality Internet infrastructure and provide necessary audio-visual equipment. Establishing technical support teams is essential for troubleshooting and maintaining online systems. Affective challenges, such as increased student stress and motivation issues, are also significant. Several studies indicate that online assessments can foster feelings of isolation, heightening stress and anxiety. A majority of students believe that on-campus exams offer a better environment than online assessments because teachers can be contacted for clarification if needed [33]. Overcoming these challenges highlights the importance of collaboration between institutions and teachers to develop online learning environments that foster student engagement, social interaction, motivation, and well-being. Our study indicates that poor scheduling and the need for a redesign of learning and assessment systems were significant barriers during the implementation of online assessments amid COVID-19. Consequently, academic planning must be rethought to address digital challenges, ensuring systems are adaptable to future disruptions. This involves redesigning courses and assessments to better suit online formats, creating a more flexible and resilient educational framework.

7. Conclusion

This paper presents a case study on online evaluation in Moroccan higher education institutions. It highlights limited digital technology integration before the pandemic, with only about one-third of institutions adopting such methods. During the pandemic, Moodle and Zoom became essential platforms for online teaching and assessment, facilitating the transition.

The challenges identified in online evaluation encompass pedagogical, technical, ethical, affective, and organizational aspects. Addressing these issues requires a comprehensive approach to effectively manage the transition and overcome associated obstacles, ensuring a successful implementation.

To enhance online assessment in the future, continuous training for teachers and students is essential. Ensuring reliable internet access for all students is equally important. Developing ethical assessment policies can prevent potential issues, while encouraging student engagement in virtual environments boosts participation. Rethinking academic planning to better incorporate digital tools will facilitate this transition. Implementing these measures allows institutions to promote more effective, fair, and integrated online assessments, creating a learning environment aligned with the digital era's demands.

8. Limitations

Despite the significance of these findings, several methodological limitations should be acknowledged. First, the small sample size reflects only those willing to complete the survey, though it

provides insights into assessment trends during the COVID-19 pandemic. Future research could include a broader range of sources for more comprehensive conclusions.

This study concentrated on immediate pandemic responses; future research should explore the long-term effects of online assessment on student learning and educational quality. Investigating specific pedagogical strategies, innovative assessment methods, and formative practices could improve online assessments' effectiveness and their influence on student engagement and learning outcomes.

Institutional Review Board Statement:

Ethical considerations were addressed in line with institutional and national guidelines. Participation was voluntary, informed consent was obtained, and data were collected anonymously and used only for research purposes.

Transparency:

The authors confirm that the manuscript is an honest, accurate, and transparent account of the study. No vital features have been omitted, and any discrepancies from the original plan are explained. This study adhered to all ethical practices during writing.

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