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Transitioning to Hybrid Assessment: Reflections on Post-COVID-19 Academic Assessment Practices

Fatima-Ezzahra Mrisse[1]*, Nadia Chafiq[1]*, Mohammed Talbi[2]*, Mhammad El Kouali[2]

[1] Laboratory in Sciences Information and Education Technology (LASTIE), Faculty of Sciences Ben M'Sick, Hassan II University, Casablanca, Morocco

[2] Observatory of Research in Didactics and University Pedagogy (ORDIPU), Faculty of Sciences Ben M'Sick, Hassan II University, Casablanca, Morocco

* Corresponding authors: fatimaezzahra.mrisse-etu@etu.univh2c.ma, nadia.chafiq@etu.univh2c.ma, mohammed.talbi@univh2m.ma

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Abstract: Assessment is a crucial part of any teaching-learning process, and the COVID-19 pandemic has led to the transition to online assessment in the Faculty of Sciences Ben M'Sick (FSBM) in Casablanca. However, this transition is not without challenges, as evidenced by the obstacles encountered by students. The aim of this paper is to mitigate these challenges by promoting hybrid assessment of quality equivalent to that of traditional assessment. The study utilized a qualitative experimental method that involved 176 students from the Master Instrumentation et Méthodes Physico-Chimiques d'Analyse (MIMPA), which were divided into two groups: experimental and control. The means of the two groups are analyzed using Student's t-test. In this article, a techno-pedagogical assessment scenario combining online formative assessment and face-to-face summative assessment is developed to improve hybrid assessment practices. In addition, a hybrid model is adopted to assess student competencies. The results show that hybrid assessment, with a student success rate of 95.65%, can effectively replace traditional assessment while developing students' skills. In conclusion, adopting hybrid assessment, with scenario enhancement, can overcome the technological challenges associated with online assessment in higher education.

Keywords: online assessment, hybrid assessment, scenario, taxonomic skills, hybrid system.

向混合评估过渡：对新冠疫情后学术评估实践的反思

摘要：评估是任何教学过程中至关重要的一部分，新冠肺炎疫情导致卡萨布兰卡本·姆西克科学学院(FSBM)转向在线评估。然而，这种转变并非没有挑战，学生遇到的障碍就是明证。本文的目的是通过推广与传统评估质量相当的混合评估来缓解这些挑战。该研究采用了定性实验方法，涉及176名来自物理化学分析仪器和方法硕士(甲基丙烯酸甲酯)的学生，他们分为两组：实验组和对照组。使用学生吨检验分析两组的均值。在本文中，开发了一种结合在线形成性评估和面对面总结性评估的技术教学评估场景，以改进混合评估实践。此外，还采用混合模型来评估学生的能力。结果表明，混合评估的学生成功率为95.65%，可以有效取代传统评估，同时培养学生的技能。总之，采用场景增强的混合评估可以克服高等教育在线评估带来的技术挑战。

关键词：在线评估、混合评估、场景、分类技能、混合系统。

1. Introduction

In recent years, Morocco has experienced positive, significant, and rapid digital transformation in several areas, particularly higher education. However, the health crisis has profoundly affected higher education, forcing many institutions to adopt online teaching and assessment methods to ensure educational continuity. Berdi et al. [1] asserted that online teaching is conducted during the confinement period to maintain educational continuity. According to UNICEF data [2], "among 127 countries, 73% used digital platforms to ensure educational continuity". After the COVID-19 pandemic, online assessment has become a common practice in higher education and education in general. This proves, according to Yerly and Issaieva [3], that teachers must adapt their learning assessment practices from regulatory and certification perspectives. Online assessment employs digital tools to gauge the knowledge and skills of learners systematically. The practicality of an instrument is deemed applicable when it is utilized effectively. An effective instrument achieves results in line with the developer's objectives. Nevertheless, the online assessment revealed certain limitations of the experience with the students of the Ben M'Sick Faculty of Sciences, which warrant consideration. For instance, a significant portion of students, amounting to 52.78%, faced difficulties during the online assessment [4]. According to Nizet et al. [5], the ongoing challenges faced by both students and teachers in the practical application of online assessment, as well as the rapid advancements in technology, necessitate further research in this area. These challenges include but are not limited to hardware and technical issues, the massification of online education, and the difficulties in assessing practical skills and preventing cheating. Meanwhile, According to Papi et al. [6], the tools do not guarantee the identity of the person responding or the resources they have access to, such as documents or communication with other students who are also taking the quiz at the same time. Nonetheless, educators at the Ben M'Sick Faculty of Sciences enhanced their online assessment practices with the aid of new educational technologies and innovative methods during critical periods of the COVID-19 health crisis, emergency events, or earthquakes in Morocco. They chose hybrid assessment as an effective solution to address certain limitations of online assessment.

The transition from traditional to hybrid assessment presents several obstacles. One of the primary challenges pertains to the quality of the assessment, which must be equivalent to that of in-person assessment. To overcome this issue, we implemented the following criteria in our study: the taxonomic skills that students acquire through the hybrid system, the methods employed in both online and face-to-face settings, and the success rate of the students.

Thus, the objectives of our research are to mitigate the limits of online assessment through different innovative technical and pedagogical methods and to replace traditional assessment with a hybrid assessment of the same quality; through the use of innovative technologies in online monitoring. We focused on the flow of hybrid assessment, the functions of its scenario, and the different roles of the assessor in the second and fourth parts of this article. We present an experiment involving two independent samples of 176 students from the Ben M'Sick Faculty of Sciences, divided into two groups in the second part of this article. Based on this introduction, we asked the following questions:

- What types of assessments can be implemented in a hybrid system?
- How can we evaluate learners within the framework of a hybrid evaluation?
- What measures should be taken to promote hybrid evaluation?
- What skills do students acquire in the hybrid setting?

2. Literature Review

2.1. Hybrid Assessment

Hybrid assessment is a crucial element of a hybrid learning environment, where students engage in in-person and online activities in and out of the classroom [7]. As Llamas et al. [8] highlighted, hybrid assessment combines the benefits of information and communication technologies with traditional paper-and-pencil assessment methods. Furthermore, McCabe [9] emphasized that blended assessment promotes blended learning. Online assessment and blended learning are closely connected [9]. Consequently, when assessment and learning resources are combined, students are encouraged to learn more effectively [10]. Hybrid assessment, which integrates blended learning resources and online evaluations, is highly effective [10]. As a result, it can be asserted that this approach is a critical element in hybrid education for enhancing the teaching-learning experience of students using diverse assessment techniques. This emerges as a response to the limitations of online assessment by combining face-to-face and online assessment approaches. Monitoring and evaluation can also serve as a driver for continuous improvement [11].

The evaluation of hybrid learning and teaching must consider the specific contexts of their implementation.

For example, the level of technological development of the region and educational institution can influence the effectiveness of implementation [12]. Blended learning and instruction integrate technology to engage and involve students in teaching, learning, and assessment processes. The goal is to adapt to diverse learning preferences and enhance educational experiences [13, 14]. A sense of connection and community is necessary to facilitate engagement in learning [15]. Spurred by educational practices occurring during the COVID-19 pandemic, the approach of online learning fused with offline components (OMO) has emerged as a new form of blended learning [16]. This mode leverages hybrid infrastructure and open educational practices (OEP) to merge online and offline learning spaces in real time while simultaneously and seamlessly teaching students in physical classrooms and online. The evaluation of blended learning and teaching is essential to guide education practitioners in their planning and implementation of these methods. This specifically concerns the selection of students suitable for hybrid teaching, the structuring of courses, the development of teaching materials and the evaluation of results [17]. When implementing hybrid education, institutions can develop essential evaluation indicators to evaluate and monitor the quality of hybrid teaching and learning, track learning outcomes, and analyze relevant factors that influence the quality [18].

In addition, the educational scenario allows teachers to manage their theoretical practices and evaluation approaches. However, a learning scenario is a teaching and learning situation (fictitious or anchored in reality) that describes the context in which learning occurs, based on its constituent elements: the organizational design of the environment, the roles and objectives of actors, scenario, work strategy, performance, proposals, reflection, and regulation [19].

2.2. Scenario

In light of the challenges posed by online assessment in the aftermath of the COVID-19 pandemic, we proposed a hybrid assessment solution that merges online formative and face-to-face summative assessment (FSA) and leverages cutting-edge technologies to achieve this fusion. Specifically, the online formative assessment (OFA) involves monitoring students' progress through online means, while the FSA entails monitoring students' performance in a traditional, face-to-face setting. Both of these hybrid assessment practices, which are aligned with the hybrid system implemented, serve distinct purposes.

The ADDIE model (analysis, design, development, implementation, evaluation) served as the foundation for the design of hybrid devices that incorporate both face-to-face and remote elements [20]. To guarantee the smooth operation of the hybrid evaluation, we contemplated creating a scenario for the hybrid evaluation. The use of scenarios in computer science pertains to the depiction of the interactions between users and a system [21]. This differs from predictions about the system's functionality, which concentrate on its operation in daily activities [22]. These scenarios are typically formulated in natural language, featuring minimal technical details to ensure ease of use [23].

Therefore, our scenario delineates the technical and pedagogical aspects of the primary user's role and the key functions associated with each hybrid assessment practice in a comprehensive manner. Fig. 1 presents a detailed depiction of the progression of the hybrid assessment scenario (HAS). This scenario refers to an approach that combines different hybrid assessment practices at two levels: technological and educational. The main objective of the HAS is to provide a more comprehensive and balanced assessment of learners' skills by exploiting the advantages of different assessment methods.

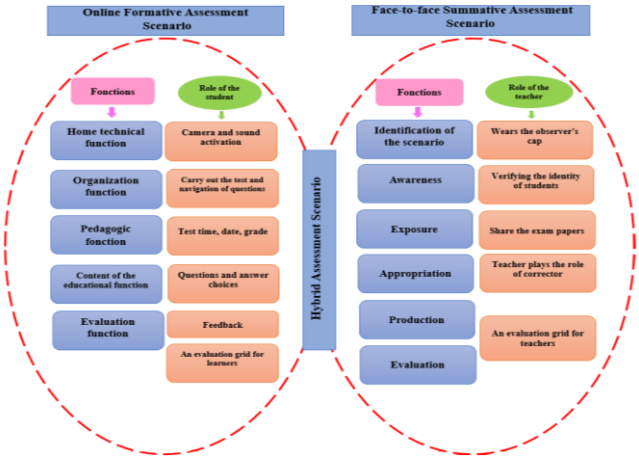

Fig. 1 Hybrid scenario (The authors)

2.3. Taxonomic Skills

In our hybrid system, we intended to assess students' skills using Bloom's taxonomy [24]. Taxonomy is a classification of skills into different levels of complexity, ranging from the simplest to the most complex. In this article, we adopted a differentiated approach where taxonomic skills are divided into two distinct groups according to two types of assessment (Fig. 2).

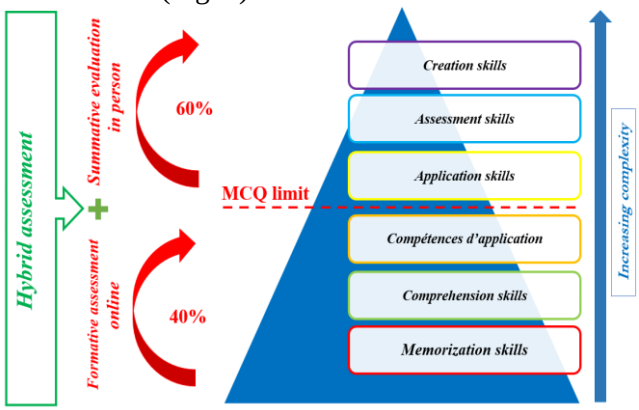

Fig. 2 Taxonomic skills approved in the hybrid system (The authors)

In our OFA, we evaluated lower-level skills,

including memorization, comprehension, and application, by employing multiple-choice questions (MCQs). The application level represents the higher level of automatic MCQs. In contrast, during the summative face-to-face assessment, we measured higher-level skills, such as analysis, evaluation, and creation, through open-ended written questions.

These skills refer to a learner's ability to memorize, understand, apply, analyze, evaluate, and generate information, thereby contributing to their logical thinking and in-depth understanding. The use of Bloom's taxonomy or taxonomic skills is essential for assessors to create structured and well-defined MCQs in hybrid assessments. Furthermore, the implementation of Bloom's taxonomy can promote learning progression and develop students' skills.

3. Materials and Methods

3.1. Sample

The study was conducted at the Faculty of Sciences Ben M'Sick, involving Master Instrumentation and Physico-Chemical Methods of Analysis (MIMPA) students enrolled in the second semester of the module "Management and tools." Table 1 presents the selection of two samples, which are divided into two types of groups: an experimental group composed of 84 students (47.73%) and a control group composed of 92 students (52.27%).

Table 1 Population groups studied (The authors)

Group	Number	Percentage
Control group	84	47.73%
Experimental group	92	52,27%
Total	176	100%

3.2. Methods of Experimentation

The following section describes the components and levels of the HAS.

3.2.1. Hybrid Evaluation Practices

OFA through online proctoring is a semester-long exam monitored using emerging technologies to detect cheating and ensure academic equality among all students. On the other hand, this practice allows students to receive feedback on their results. This assessment tracks students' learning progress throughout the semester.

Summative face-to-face assessment through face-to-face supervision is a traditional written exam on paper and pencil at the end of the semester that is monitored face to face. This practice is a way to mark students' performance, knowledge, and understanding of the course they are studying. Therefore, this evaluation assesses the outcomes achieved by students relative to the knowledge they were expected to acquire in the course.

Furthermore, incorporating these methods can yield a more comprehensive perspective on student performance. Moreover, emerging technologies present educators with a multitude of opportunities to effectively teach and evaluate students within a hybrid setting.

3.2.2. Levels of the Hybrid Evaluation Scenario

From a technological standpoint, the initial form of assessment employs two modalities: behavioral modalities, which involve recognizing the learner's voice, and morphological modalities, which involve recognizing the learner's face. We set up a hybrid system with emerging technologies (Fig. 3). We utilized the most recent iteration of the Moodle online platform and the XAMP server to develop this device. Furthermore, we incorporated two plugins for online proctoring. The first plugin was designed to restrict access to the search browser window during formative assessments conducted online. The second plugin ensured online identification by utilizing students' cameras and microphones. We conducted experiments with this device on 92 participants from the experimental group.

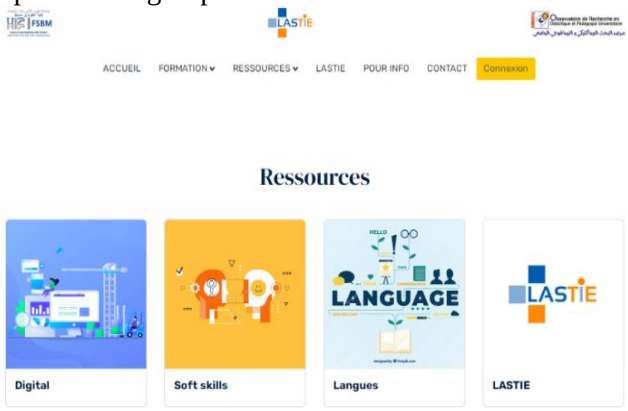

Fig. 3 Hybrid device overview (The authors)

At the pedagogical level, we selected the hybrid assessment scenario, which integrates two assessment scenarios: the first scenario for OFA involves the student activating their camera and sound to begin answering the test questions within a set time. Following this, the student must generate a list of questions that will be posed in class. In the second scenario for FSA, the teacher assumes two roles: first, they act as an observer who verifies the identity of the students and distributes the exam sheets, and secondly, they assume the role of corrector of the exam sheets.

This approach typically incorporates assessment techniques that are online formative and face-to-face summative and a range of approaches for evaluating students' skills. Furthermore, it considers the technological and pedagogical levels of the learners. On the other hand, hybrid assessment aims to balance the evaluation of theoretical knowledge, practical skills, and problem-solving abilities of students.

3.2.3. Evaluation Modality

In our investigation, the assessment procedure was

carried out in two different modes, namely the mid-semester examination and the final examination at the end of the semester. In this module, students completed mid-semester evaluations that comprised 40% of their final grade. These evaluations came in the form of MCQs, with 20 questions in total and three answer choices per question. The assessment period was 20 minutes. At the conclusion of the semester, students took FSAs that accounted for 60% of their final grade. These assessments involved written questions and lasted for 45 minutes.

Table 2 Evaluation mode (The authors)

Nature of the evaluation	Percentage
Mid-semester exam	40%
Final exam	60%

The maximum score obtained in the evaluations was 20 points, (a score lower than 10/20 is insufficient, a score higher than 10/20 is sufficient, and a score higher than 15/20 is very good) to measure the success rate of students. In this experiment, the collected data were analyzed using the IBM SPSS Statistics software for Windows.

4. Results

4.1. Experiment Results

The findings of this study are presented below, including overall information on gender, average, and the results of the Student's t-test. Additionally, the taxonomic skills that impede the implementation of hybrid evaluation practices are identified to determine educational and technical measures to promote the adoption of the digital system.

4.1.1. Representation of the Sample

This population was divided into two groups: a control group of 84 students representing 47.73% of the population and an experimental group of 92 students representing 52.27% of the population (Table 3). The control group comprised 57.14% female students and 42.86% male students; the experimental group had 69.57% female students and 30.43% male students, suggesting that the number of female students exceeded that of male students.

Table 3 Gender (The authors)

Group	Gender					
	Female		Male		Total	
	Number	Percentage	Number	Percentage	Number	Percentage
Control group	48	57.14%	36	42.86%	84	47,73%
Experimental group	64	69.57%	28	30.43%	92	52,27%
Total	112	63.64%	4	36.36%	176	100%

4.1.2. Average

The control group's average passing marks for the formative and summative assessments were 12.00 for female students and 12.50 for male students, with a final passing mark of 12.25. Meanwhile, the average passing scores for the experimental group in the online formative and FSAs were 13.10 for female students and 13.36 for male students, with a final score of 13.23 for the passage of the experimental group's students. In summary, the final average of the experimental group was higher than that of the control group.

Table 4 Students' average scores (The authors)

	Average					
	Control group			Experimental group		
Gender	Formative Assessment	Summative Assessment	Final Average	OFA	FSA	Final Average
Female	12.00	12.00	12.00	13.06	13.13	13.10
Male	12.14	12.86	12.50	13.11	13.61	13.36
Total	12.07	12.43	12.25	13.09	13.37	13.23

Therefore, the OFA had a positive effect on the FSA of the experimental group compared to the classic formative assessment of the control group. This suggests that the hybrid assessment improved students' performances in the summative assessment. As a result, it has a positive effect on the final average of students compared to the classic assessment of the control group.

4.1.3. Student's T-Test: Significance Level and Hypothesis Theory

We conducted a Student's t-test to compare the average values of the experimental and control groups. The standard implementation of this test assumes that the variances of the two groups are equal, with the purpose of calculating the standard error of the sample mean.

4.1.4. Statistical Hypotheses

Our decision is predicated upon assumptions with a confidence level of 95%.

- For the population P_1 with a mean μ_2, we test hypothesis H_0 ($\mu_1 = \mu_2$).

If $t_{exp} < t_{th}$, the means of the two groups are identical ($\mu_1 = \mu_2$).

• For the population P_2 with a mean μ_2, we test hypothesis $H_1(\mu_1 \neq \mu_2)$.

If $t_{exp} > t_{th}$, the means of the two groups are not identical ($\mu_1 \neq \mu_2$).

The test value t_{exp} can be calculated as follows:

$$t_{exp} = \left| \frac{\overline{X_1} - \overline{X_2}}{\widehat{s}\sqrt{\frac{1}{n_1}+\frac{1}{n_2}}} \right| \quad (1)$$

▪ The symbols $\overline{X_1}$ and $\overline{X_2}$ represent the average values of the experimental and control groups, respectively, where $\overline{X_1} = \frac{\sum x_i}{84}$ and $\overline{X_2} = \frac{\sum x_i}{92}$.

▪ The values n_1 and n_2 represent the sizes of the experimental and control groups, respectively.

We can calculate the estimator $\widehat{s}$ of the standard deviations of the two groups as follows:

$$\widehat{s}^2 = \frac{(n_1-1)\,\widehat{s_1}^2 + (n_2-1)\,\widehat{s_2}^2}{n_1+n_2-2} \quad (2)$$

with

$$\widehat{s_1} = \frac{n_1}{n_1-1}\left[\frac{\sum x_i^2}{n_1} - \overline{X_1}^2\right] \quad (3)$$

$$\widehat{s_2} = \frac{n_2}{n_2-1}\left[\frac{\sum x_i^2}{n_2} - \overline{X_2}^2\right] \quad (4)$$

▪ The number n_1+n_2-2 represents the degree of freedom.

Table 5 Estimators and t-test (The authors)

E_1	n_1 =84	$\widehat{s_1} = 36{,}846$	$t_{exp} = 0{,}45$
E_2	n_2 =92	$\widehat{s_2} = 34{,}35$	$t_{th} = (\alpha - 5\%; n_1 + n_2 - 2)$
			$t_{th} = 2{,}001$

Given $t_{exp} < t_{th}$, we keep $H_0(\mu_1 = \mu_2)$. Therefore, there is no significant difference between the two evaluation methods (traditional and hybrid) at the 5% error level. Thus, we maintain the hybrid evaluation. In other words, we conclude that the mean values of the experimental and control groups are not significantly different.

4.1.5. Success Rate

We conducted an experiment with the hybrid scenario and evaluated the success rate of the students in both groups based on their final grades from two tests. The control group achieved a success rate of 94.24%, with 4.76% of students failing in this module. Meanwhile, the experimental group had an even higher success rate of 95.65%, with a lower failure rate of 4.35%. Consequently, the percentage of successful students in both groups was slightly increased. Therefore, hybrid assessment has excellent results; it can replace classic assessment in difficult times like COVID-19. Thus, we can deduce that the hybrid evaluation is feasible. However, it is necessary to consider students who have failed or encountered difficulties in hybrid assessment practices.

Table 6. Success rate of students (The authors)

	Success rate			
	Control group		**Experimental group**	
	Number	**Percentage**	**Number**	**Percentage**
Successful	80	94.24%	88	95.65%
Not successful	04	4.76%	04	4.35%
Total	84	100%	92	100%

4.2. Taxonomic Skills in the Hybrid Assessment Context

We conducted an experiment with the hybrid scenario using the students from Mater MIMPA and analyzed the outcomes based on the taxonomic levels. Fifty percent of the questions focused on memorization skills, 30% on comprehension skills, and 20% on analytical skills. Out of the 120 participants, we observed that 39.58% of the students provided correct answers, while only 10.41% provided incorrect answers. From this, we can infer that the students demonstrated a high level of proficiency in memorization skills.

Table 7 Levels of skills (The authors)

Skill levels	**Correct answers**		**Wrong answers**		**Total**	
	Number	**Percentage**	**Number**	**Percentage**	**Number**	**Percentage**
Memorization skills 50%	95	39.58%	25	10.41%	120	50%
Comprehension skills 30%	43	17.92%	29	12.08%	72	30%
Analytical skills 20%	21	8.75%	27	11.25%	48	20%
Total	159	66.25%	81	33.75%	240	100%

Among the 72 respondents to the comprehension questions, 17.92% had correct answers, and 12.08% had false answers; thus, we obtained a good percentage of comprehension skills.

Regarding analysis skills, 8.75% of students had correct answers, and 11.25% had false answers. This shows a few difficulties with analytical skills. Therefore, we propose adding more formative assessments with analysis questions to support students at this level.

5. Discussion

The goals of our research were to lessen the constraints of online assessment and evaluate the skills

and knowledge of students within the context of hybrid assessment, while maintaining the same quality as that of traditional assessment. Therefore, it is suggested that educators incorporate hybrid assessments on hybrid devices, particularly during crises like the spread of pandemics or seismic events. Hybrid evaluation consists of a blend of online and in-person evaluation with minimized classroom time for students in diverse contexts. As a result, hybrid evaluation incorporates various teaching methods that differ from those utilized in face-to-face evaluation.

In light of the question "What types of assessments could be implemented as part of a hybrid system?", it is recommended that educators utilize online formative and FSAs on the hybrid devices. Nevertheless, it is imperative to consider the potential challenges that may arise during hybrid evaluations, such as inadequate lighting, subpar internet connectivity, server overload, hardware malfunctions, and other technical issues.

The following text seeks to answer the question, "How to evaluate the learner in the context of hybrid evaluations?," the educational scenario offers a means of verifying the pertinence of the various elements identified. This can be achieved by assessing the intervention of human resources based on their competencies at a specific time. Furthermore, it allows for an evaluation of the feasibility of the activity's implementation [25-27]. Additionally, the educational scenario provides an opportunity to examine the integration of different types of scaffolding. This includes conceptual scaffolding, metacognitive support, motivational support, and evaluation-related scaffolding [28-30].

We recommend that educators adopt a hybrid assessment approach in accordance with the proposed hybrid scenario model. This involves respecting the technical and pedagogical functions of each online assessment scenario and the roles of the face-to-face assessment scenario in order of importance. In the online evaluation scenario, some of the key functions include:

• Technical functions such as the use of biometric methods like facial recognition using a camera and voice recognition using a microphone, with a limited number of students, and the use of technological tools that block the search window to prevent plagiarism and cheating, as we did by using plugins

• Organizational functions such as the use of navigation tools on the Moodle platform

• Educational functions such as setting the test time, date, number of attempts, and which lessons will be examined

For the face-to-face assessment scenario, there are three main roles for educators who operate in the hybrid system: educational designer, observer, and corrector. Indeed, in hybrid evaluation, the role of the evaluator is more intricate; thus, we delineated their responsibilities in the online formative and FSAs as follows:

Table 8 Roles of the evaluator in a hybrid system (The authors)

Role	OFA	FSA
Educational designer	Generating MCQs on the platform	Written assessment on paper
Observer	Verifying the identity of the student and observing them through a camera and microphone	Verifying the identity of the student according to the identity card
Corrector	The platform provides on-time grade feedback on MCQ answers.	Rectifying examination papers using an evaluation framework

Our analysis reveals that the efficacy of a hybrid evaluation is contingent upon the formulation of its scenarios and the diverse responsibilities of the evaluator. Consequently, individuals responsible for conducting hybrid assessments must be prepared to capitalize on the numerous prospects presented by the continually advancing digital landscape.

Regarding the question “What measures should be put in place to promote the hybrid assessment?,” to promote the implementation of hybrid assessments, students must be informed of their responsibilities within the hybrid system at the start of the course and semester. It is essential to explain the method of composing the hybrid assessment to the students, including the OFA throughout the semester and the FSA at the end of the semester. Additionally, the modalities of the percentage of scores for each assessment should be made clear. The hybrid assessment score percentages are 40% OFA and 60% FSA, and online monitoring is used for the OFA, while face-to-face monitoring is used for the FSA.

Regarding the question "What competencies are attained by learners within the framework of hybrid assessment?," our analysis of the experimental outcomes was conducted based on the parameters of average, standard deviation, success rate, and the acquisition of taxonomic skills, which is substantiated by the data collected.

Experience has demonstrated that the average results of formative and summative assessments were enhanced in the hybrid assessment compared to the classic assessment. Moreover, the final average obtained by the experimental group, which was 13.23, was higher than that of the control group, which was 12.25. Thus, it has been shown that students can achieve good grades in hybrid assessments on hybrid devices as opposed to traditional assessments. Additionally, the 95.65% success rate of the experimental group was very close to the 94.24% success rate of the control group, confirming that hybrid assessment can replace classic assessment with comparable quality.

The hybrid assessment method can also facilitate

the acquisition of taxonomic skills in students, as demonstrated by the percentages of memorization skills (39.58% of 50%) and comprehension (17.92% of 30%) obtained through the hybrid system. Although the percentage of analytical skills (8.75% of 20%) was not of significant importance, the results indicate that the hybrid assessment has a positive impact on the development of taxonomic skills among students.

Ultimately, it can be inferred that the hybrid assessment offers potential for enhancing the overall academic performance of students and can serve as a suitable alternative to traditional assessment methods, while maintaining an equivalent level of quality. This approach has the potential to facilitate the development of taxonomic skills in students.

6. Conclusions and Perspectives

The findings of this research emphasize the value of hybrid assessment in addressing the technological challenges associated with online assessment in higher education. By offering a more equitable and accessible approach to evaluation, hybrid assessment also enables rapid adaptation to contemporary educational requirements. In terms of academic significance, this study presents a substantial contribution to the literature on hybrid evaluation by proposing a theoretical and practical framework for its implementation. This enhances understanding of the integration of educational technologies in assessment, thereby opening up new avenues for research and applications. Ultimately, the adaptability of hybrid assessment enables educational continuity during crises, showcasing its resilience in the face of disruption.

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