

The Practices of Online Assessment in a Digital Device in the Context of University Training: The Case of Hassan II University

How to Evaluate Online Learning in the Context of University Training?

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Abstract—This research presents online assessment in a digital device in the context of university training, aimed at improving their practices with emerging technologies based on an experiment with students from Hassan II University. Or, online assessment is a systematic process that helps measure the knowledge and skills of learners through multiple technological tools in a digital device. Indeed, digital devices intend to revolutionize higher education with the use of Information and Communication Technologies (ICT). Nevertheless, digital devices pose the problem of student identity verification during online assessment. In reality, automated online assessment systems are extremely vulnerable to cheating. So, our aim of this research is to explore, firstly, the types of online assessment that could be implemented in a digital device and secondly, how to verify the identity of the student during an online course on a digital device? The sample of our experiment consists of (N = 108) students from the Hassan II University of Casablanca, divided into two classes of the ITEF and MIMPA Masters and, our study was based on an online questionnaire for (N = 37) teachers at Hassan II University in Casablanca. The results obtained is to put into practice in digital devices diagnostic evaluations and formative evaluations using biometric methods for identity verification with a limited number. However, biometrics is inapplicable in summative assessments due to the problem of massiveness and hindrances in the online exam. For this reason, measures must be put in place to promote the smooth running of the online assessment.

Keywords—Online assessment; digital device; Information and Communication Technologies (ICT); biometrics; identify digital; student

I. INTRODUCTION

Since March 2020 and due to the measures taken by the Moroccan authorities to combat the spread of COVID-19 such as the suspension of all activities involving a gathering of people, education in Morocco has undergone a remarkable evolution with the replacement of face-to-face courses by distance education. However, distance education allows students and all those who wish to train online and interact with others, particularly in the health crisis that has affected our country [1]. As well as classroom exams have been replaced by online assessments.

First of all, online assessment is a crucial step in distance learning in order to measure the degree of student acquisition through different assessment methods and in different fields (education, economics, engineering ...). This section aims to describe the theories from the literature review related to online assessment. Indeed, online evaluation should not simply invent new technologies that recycle our inefficient practices [2]. For example, the issue of assessing student learning in an online course has not been fully addressed [3]. And that assessment is at the heart of the teaching-learning process. What is assessed defines what is taught and how it is learned. The assessment process, in turn, shapes practice and affects the learner's view of the value of engaging in learning [4] and that online assessment remains an emerging new practice for most educators and trainers [5]. Furthermore, in professional settings and training institutions, assessment practices are numerous and diverse. Their most often stated purpose is to improve production processes and/or to certify the achievement of objectives [6]. Because of these observations, the authors underline the interest in online evaluation and the growth in its use, which is based on social, technological and economic factors. Assessment practices (diagnostic, formative, summative), whether face-to-face or online, can therefore be a mobilizing lever in an initial or continuing university education institution. These practices aim to achieve learning objectives through various authentic or collaborative activities in order to improve the development of students' skills [7].

Although Morocco is returning to its normal state thanks to the gradual decrease of the COVID-19 pandemic, distance learning retains a particular importance as it meets the growing and diversified needs of Generation Z learners, such as developing their skills and that they prefer to learn through digital resources and create their own personal learning environment [8,9]. It is now seen as a solution to ensure pedagogical continuity with learners in particular, those who cannot always be present. Hassan II University of Casablanca has developed several digital services grouped together at the Digital Workspace <https://ent.univh2c.ma>. This has allowed all the actors to have a simplified access to many institutional tools: electronic mail, e-portfolio, software, electronic books and magazines, e-learning platform. The digital resources of

the UH2C allow its students to regularly follow their courses in direct broadcast mode or in deferred access on the Moodle platform. The teachers of the Hassan II University of Casablanca use several digital devices in their teaching practice. Through these devices, teachers will be able to make their courses available online. However, it is difficult for the teacher to really practice summative evaluation online because on the day of the online exam, the learner can use any excuse to justify his absence or non-participation in the course.

According to previous research, students have been very satisfied with taking courses on online learning platforms and assessment methods [10]. Moreover, online and peer assessment plays a key factor in students' engagement during their learning and leads to learning performance [11]. The development of online assessment based on a standardized model helps to improve or enhance students' online learning [12]. Furthermore, the importance of integrating online assessment activities such as online knowledge surveys, online closed or open-ended questions, and peer review [13]. However, assessment activities should measure the degree to which students acquire learning objects with the same online opportunities and conditions [14].

It is for this reason that we are going to carry out this experiment, at the level of the Hassan II University of Casablanca, which will focus on formative evaluation practices. In this regard, the purpose of this research is to present the online assessment in a digital device in the context of university training, aiming to improve their practices with emerging technologies based on an experience with students of Hassan II University. In this context, we posed the following questions:

- What are the types of online assessment that could be implemented as part of a digital system?
- How to verify the identity of the student in the context of online assessments?
- What measures should be put in place to promote online assessment?

II. THEORETICAL FRAMEWORK

This part aims to describe the theories resulting from the bibliographical review in relation to the types of online evaluation and the phenomena of cheating that could be seen during online evaluation.

A. Online Assessment Practices

Generally, there are three types of evaluation, which can have different purposes. Most often, we distinguish:

1) *Diagnostic assessment or pre-test*: done before or at the start of a course or program to determine the prerequisites or knowledge required. A distinction is sometimes made between diagnostic and prognostic evaluation. The first concerns first of all the learner, allowing him to adapt his path or to take remedial measures and, the second serves rather the evaluator aims to produce information which makes it possible to orient or train or to adjust the training to his profile [15]. It makes it

possible to determine the profile of the learner in order to guide the course that adapts to his knowledge path.

2) *Formative assessment*: done during a course or program to support or enhance learning and foster learner motivation based on observed needs. It insists on the value of consolidation and feedback on error in order to support learning [16]. Its purpose is to check whether the learner is progressing and approaching the chosen educational objective of the established program. It promotes integrated motivation and encourages the learner to adopt a more effective approach to learning [17]. [18] Describe five functions of formative assessment: explaining goals, tasks and assessment, seeking evidence of understanding, seeking evidence of progress of the task, feedback anticipating future steps and empowerment of learners. However, the feedback therefore plays a central role. It is often more continuous or repeated at regular intervals during training.

These functions can be put to good use in the current situation of pedagogical changeover for the benefit of student learning.

3) *Summative assessment*: done after a course or program or during exams. This terminal practice aims to categorize, certify and validate practices, behaviors or knowledge [19], and to report. Its purpose is to say if such a learner is worthy of such a grade or if he can access the higher class. Consequently, it makes it possible to provide a balance sheet and to allow a decision (does he access the upper class or not?)

B. Cheating

Cheating or copying¹ would therefore be associated with unauthorized mutual assistance, particularly with cheating in real time, often during exams. [7] For (CCA², 2010), in the context of online assessment, for example:

Swap answers during an exam:

- By computer (instant messaging, email, etc.).
- By mobile phone.
- By text messaging.

And, according to [20] it gives the example of a student who “connects with the same username and the same password as another student to steal information or work” or, more simply, the one who obtains from a colleague the questions of a previous examination; “to consult non-admissible notes during an exam”. For example, his or her own notes or the web, when it is not allowed to:

- Submit work done in whole or in part by another person.
- Submit the same work, which may be an exam, for various courses without having obtained permission, where the work may be an exam.

¹ Defined by the great terminology dictionary of the Office of the French language as: “Fraud of a pupil who copies, during an examination or a test, the duty of a comrade, a book or course notes”.

² The Canadian Council on Learning.

However, cheating mostly targets contexts where external sources are not allowed. Additionally, plagiarism or copying generally applies in the context of a work where the use of other sources is permitted, but on condition that credit should be clearly attributed to the original author. What are the cheating detection tools that can be implemented in a digital device?

III. METHODOLOGY

A. Measuring Instrument

To answer the above questions, we opted for a quantitative methodology through a questionnaire. We drafted a questionnaire for teachers and then administered it to 37 teachers at Hassan II University in order to enrich our problematic.

B. Methods of Experimentation

Therefore, we searched for suitable tools and methods to address the aforementioned issue. So, we have chosen to integrate the biometric method which makes it possible to specify the automatic identification of a student during online evaluations. The latter measures the uniqueness of an individual from the unchangeable parts of his body. This method is based on two methods: Behavioral modalities and, morphological modalities. In addition, we decided to work with a morphological modality through the recognition of the student's face and the other behavioral modality through the recognition of the student's voice. Then, we set up a system with emerging technologies. Next, we opted for the latest version of the moodle platform because it is more suitable for the implementation of a real digital device than the Open edx platform. In addition, we installed the moodle platform online with the xamp server, by integrating two plugins: one to block the search browser window during the online assessment. And the other which is based on the camera and the microphone to ensure the online identification of the students.

C. Echontillon

To answer the research questions above, we carried out an experiment with the students of the Master class of Engineering and Technologies for Education and the Master class Instrumentation and Physico-Chemical Methods of Analysis in second semester of the quality module: Management and tools at Hassan II University. The number of our sample was (N=108) and our experiment on the digital device www.digitaloftkill.net (Fig. 1) which was in the form of a questionnaire of 20 multiple-choices questions. Each question with four answer choices in a period of 15 min.

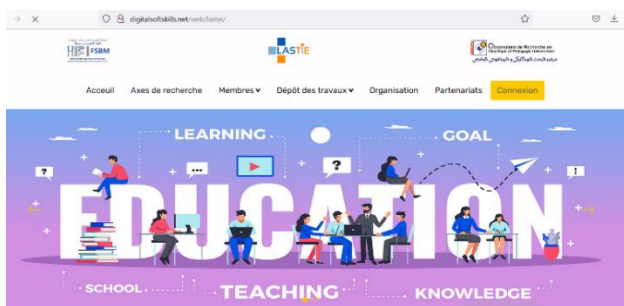


Fig. 1. Overview of the platform www.digitaloftkill.net.

We have created an account for each student that contains a username and password in order to take the online assessment. Each student must follow the instructions below before starting the evaluation, respecting the period of time determined and the number of possible attempts (Table I).

TABLE I. TABLE OF INSTRUCTIONS

Instructions
1. Install Safe exam browser version 3.1.1 on your desktop.
2. Inform people around you not to enter the place where you are doing the MCQ.
3. Download the QCM SEB file.
4. Click on the meeting link.
5. Activate your camera and sound.
6. Click on the test file (for example: mock test).
7. Click on no.
8. Enter your following username and password: Username: student2 Password: Student2 @ 21
9. Click on continue the attempt (to start the test).
10. Answer the exam questions.
11. Click on end test.
12. Click on send all and finish.
13. Click on quit Safe exam browser.

IV. RESULTS ANALYSIS

A. Results of the Questionnaire

To answer the questions above, we wrote a questionnaire for the teachers then, we administered these questionnaires for 37 teachers of the university Hassan II in order to enrich our problem. Based on this teacher questionnaire, we present some of the following results:

In the situation of the COVID-19 pandemic, we noticed that there are 60% of teachers preferred online courses; on the other hand, there are 40% of teachers preferred face-to-face courses (Fig. 2).

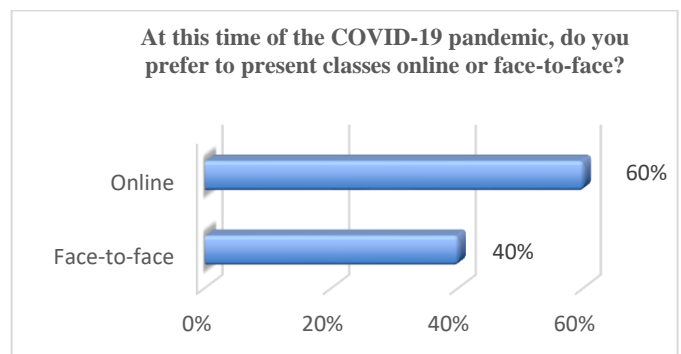


Fig. 2. The choice of online and face-to-face teaching.

From this diagram, we found that 38% of teachers prefer online assessment and 62% of teachers prefer face-to-face assessment (Fig. 3).

We noticed that there are 65% of teachers do not trust students during online assessment and 35% of teachers trust students (Fig. 4). Hence the question: What measures should be put in place to promote online assessment?

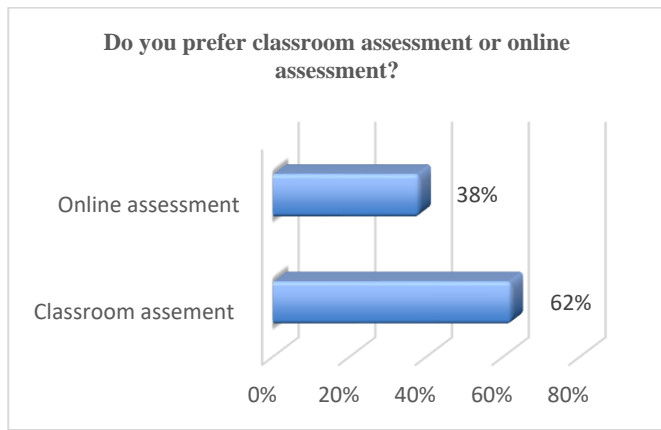


Fig. 3. The choice between in-class and online assessment.

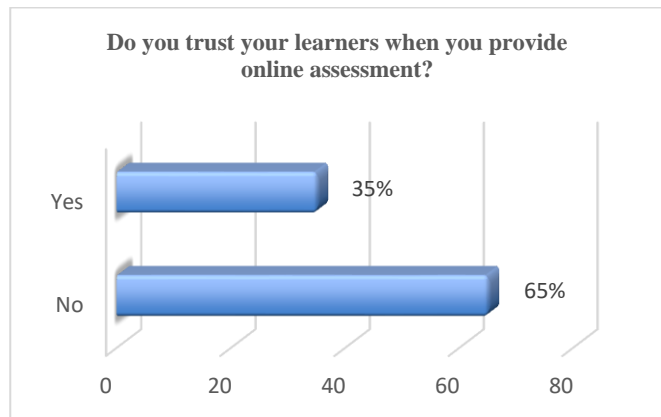


Fig. 4. Teacher confidence in online assessment.

B. Experimental Results

We present below the results of this experiment: these are general data relating to the gender questionnaire, average scores, number of attempts and the constraints (or obstacles) that hinder online assessment practices, in order to determine the measures to promote the establishment of an online assessment.

Regarding the percentage of students, we have 60% of female respondents and 40% of student respondents, which shows that female respondents are more numerous than male one (Table II).

Regarding the average pass mark, we have 14.57 for female students and 13.63 for male students and 14.16 for the general average of the two classes. So, we can deduce that the majority of students have good grades and have not found any difficulties in the MCQ. Although it is necessary to take into consideration the students who failed and those who could not pass the MCQ (Table III).

TABLE II. CHARACTERISTICS OF THE SAMPLE BY GENDER

Gender	Percentage	Number of participants
Female	60 %	64
Male	40 %	44
Total	100%	108

TABLE III. THE AVERAGE SCORES ON A PASSAGE TEST

The average score	
Female	14.57
Male	13.63
General average	14.16

Regarding the success rate of the students, we have 86.11% of the students who passed and, 5.56% of the students failed in the assessment as well as, 8.33% of the students could not pass the assessment. So, we can deduce that most students have succeeded in this online assessment, but we must try to understand the difficulties (or the obstacles) encountered by other students in online assessment practices (Table IV).

TABLE IV. THE STUDENT SUCCESS RATE

Success rate	Percentage	Number of participants
Passed	86,11%	62
Failed	5,56%	6
Did not pass the assessment	8,33%	9
Total	100%	108

Among the 99 students who passed the MCQ, we find that 48.49% of the students who answered on the first attempt while we have 51.51% of the students who answered after the 2nd attempt because they encountered obstacles during the 1st attempt (Table V).

TABLE V. THE NUMBER OF STUDENT RESPONSES ACCORDING TO ATTEMPTS

Responses by attempts	Percentage	Number of participants
Student responses after the 1st attempt	44,44%	48
Student responses after the 2nd attempt	47,22%	51
No answer	8,33%	8
Total	100%	108

C. Obstacles Encountered

According to this experiment, we find that 5.56% of students who did not follow the instructions requested. We also have 2.78% of the students who encountered hardware problems; they didn't have cameras in their computers. We also note that 19.44% of the students found problems installing the Safe exam browser because this software requires a more recent operating system whereas the students had an older version on their computers (windows 7, windows XP, etc.). We also have 5.56% of students who found constraints in the quality of the internet connection as the quality of the internet network is low or limited because, the connection which is consumed during the evaluation. Then, we have 13.89% of the students received error messages indicating that the server becomes slow when it is loaded because of a large number of users. On the other hand, we see that 44.44% of the students did not find any problems during the online evaluation on the first attempt (Table VI).

TABLE VI. THE CONSTRAINTS EXPERIENCED

Constraints	Percentage	Number of participants
Problem of following requested instructions	5,56%	6
Material problem: Camera	2,78%	3
Connection quality problem	5,56%	6
Problem installation of the browser secure exam due of the update operating system (Windows 7 and Windows XP)	19,44%	21
Server load problem	19,44%	21
Didn't find any problem	44,44%	48
Total	100%	108

V. DISCUSSION

For the question “What types of online assessment could be implemented in the context of a digital device?”, we always advise teachers to implement diagnostic assessments and formative assessments on digital devices. However, it is not recommended to set up summative evaluations there because of the obstacles that can be encountered during online exams such as: (the loss of light, the poor quality of the Internet network, the overload of the server quality or the error messages that occur following the overload of the server, malfunction of the hardware equipment for example: the camera, the microphone, etc.).

For the question, "How to verify the identity of the learner in the context of online assessments?", we can verify the identity of the student with the biometric methods in front of the camera and by voice recognition with the microphone within the framework of diagnostic and/or formative assessments with a limited number of students. However, biometrics is inapplicable in summative assessments due to the problem of massiveness and the constraints that hinder online assessment. Regarding the measures to be put in place to promote the smooth running of the online assessment, we can mention:

- Design very clear instructions to guide students in preference, to be given before the day of the assessment or to take a practical test.
- Ask the learners to prepare the appropriate equipment for the smooth running of the assessment (a good camera, a good microphone).
- Require students to have good internet quality (a speed that allows the assessment to be taken without internet interruption) or to provide a good internet network to all students at the time of the online assessment.
- Ask students to update their operating system at the beginning of the module.
- For teachers, it is recommended to use online servers and avoid using local servers.
- Declare the time and period of the online assessment and, make more than one attempt to overcome all obstacles during the online assessment. For teachers, it is recommended to use online servers to avoid error messages from overloading local servers.

D. Verification of Student Identity during Online Assessment on a Digital Device

Among the 99 students who responded at to the 1st attempt or the 2nd attempt, the identity of 75.76% of the students was verified whereas we could not verify the identity of 24.24% of them (Table VII).

Among the 24.24% of students whose identity could not be verified, 21.21% of them were not verified by the Safe exam browser tool and 3.03% of other has not been verified by camera and microphone (Table VII).

Regarding the verification of the identity of the student by face and voice recognition, we verified with 96.97% students who have the camera and the microphone through the Google meet tool. But, we could not verify with 3.03% who do not have the camera and the microphone (Table VIII).

For the phenomenon of electronic cheating, we found the SEB tool (which allows to block the search browser window) to be feasible with 78.79% of students who were able to install SEB but, is not feasible with 21.21% students (Table IX).

TABLE VII. VERIFICATION USING TECHNOLOGICAL TOOLS

Verification by technologiques tools	Percentage	Number of participants
Couldn't verify by biometric modalities (camera, microphone)	3,03%	1
Couldn't verify by Safe exam browser tool	21,21%	7
Total	24,24%	8

TABLE VIII. VERIFICATION BY FACE AND VOICE RECOGNITION

Verification by face and voice recognition	Percentage	Number of participants
Don't have a camera and microphone	3,03%	1
Have camera and microphone	96,97%	32
Total	100%	33

TABLE IX. ASSESSMENT BY THE SAFE EXAM BROWSER TOOL

Assessment by the Safe Exam Browser tool	Percentage	Number of participants
Couldn't install SEB	21,21%	7
Were able to install SEB	78,79%	26
Total	100%	33

VI. CONCLUSION AND FUTURE WORKS

This research aims to present the online assessment in a digital device in the context of university training, aiming to improve their practices with emerging technologies based on an experience with students of Hassan II University. Our discussion to the results that we recommend teachers to

implement diagnostic assessments and formative assessments on digital devices and to avoid implementing summative assessments on them. Thus, we can verify the identity of the student with biometric methods in front of the camera and by voice recognition with the microphone in diagnostic and/or formative assessments with a limited number of students. But biometrics is not applicable in summative evaluations.

As a follow-up to this study, we plan to analyze students' and teachers' attitudes about the use of biometrics on learning platforms during the learning of a given module and with a focus on passing assessments.

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