

# Guarantee Fairness And Objectiveness In Online Testing And Assessment

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## **Abstract:**

Assessment is an activity that plays a vital role in the teaching process. Evaluation results will provide critical feedback on the effectiveness of the educational process. Teachers can adjust their teaching process to improve student learning outcomes. Since the outbreak of Covid-19 until now, there have been many periods when society has had to close schools. Most countries, including Vietnam, have gradually adapted to the online teaching model. However, that new context also puts a lot of pressure on schools, teachers, and students in management, teaching, and learning. One of the most challenging problems is how to organize online testing and evaluation while ensuring fairness and objectivity. In this study, we introduce some software for online testing and assessment; and propose options to combine software in online testing and assessment to ensure objectivity and fairness for learners.

**Key Words:** online test, assessment, moodle, Safe Exam Browser

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## I. Introduction

The 4th industrial revolution has strongly influenced all areas of social life, including education, making education 4.0 a popular keyword in education today. In 4.0 education, teachers and learners use integrated technology in the digital age in teaching and learning. Digitized classrooms with smart devices, courses on mobile devices, etc which formed in the digital era, make education change to match and approach the development trend of the world. As educational technology changes, the learning trends in the 4.0 education must also change, and some educational trends will be formed such as a learning society, open educational resources, online learning, online testing and assessment will appear<sup>4</sup>.

During the complicated development of the Covid-19 epidemic, we see the role of online learning forms more clearly. Thanks to online learning forms, learners can set their minds at rest to prevent the epidemic without interrupting their studies. In previous years, the organization of online teaching has brought certain effects, but the assessment of learning results at the end of each semester or school year is still conducted directly to ensure objectivity and fairness. However, in the complicated and prolonged period of covid-19 like in the past, it is not possible to gather learners at school for direct assessment while it is impossible to delay the periodic assessment of results forever after a learning process. Therefore, it is necessary to have plans to conduct online assessment tests effectively and to ensure fairness and objectivity.

To ensure that the tests accurately assess the capacity of the learners, training institutions often use one of these two solutions: the first one is that the test questions must be open, and learners are not restricted about referencing information sources; The second is to use the oral exam, the teacher directly interviews to assess the understanding of the learners. These two forms of assessment have the advantage of minimizing the possibility of learners' cheating. However, its limitation is that it requires a lot of time in organizing the exam. In addition, teachers also have to rebuild the system of question banks and assessment forms for subjects<sup>6</sup>.

In the training programs, there are many subjects with multiple choice or closed questions that do not allow the use of materials. In order to ensure that the assessment results are fair and objective, the following requirements must be met: learners are not allowed to look up information from the internet; they also cannot receive outside help during the process as well as can't cheat by asking someone else to do the test for them.

This article will suggest how to combine appropriate technology devices and software to ensure that online assessment is more objective and fair. The content of the article consists of 4 basic parts; in addition to the introduction the article presents an overview of the research problem, the solution of the online multiple-choice exam at Thai Nguyen University of Education - Thai Nguyen University and the conclusion.

## II. Literature Review

### Online assessment

Assessment is a part of the teaching process, including all activities performed by educators that provide feedback to modify teaching activities for the purpose of bringing about improvements to students. Assessment is a method used to improve the quality of education as it can enhance lifelong learning skills and promote academic performance in different educational contexts<sup>2</sup>. Assessment activities may include observations, discussions, quiz, homework, and tests<sup>1</sup>.

When online teaching activities are promoted, learners improve their skills in using digital tools, and can use digital devices at anytime in anywhere. So educators need to take advantages of this, meeting their students in a collaborative, connected world to make learning more effective, meaningful, and relevant<sup>3</sup>. Educators, especially in higher education should take advantages of this opportunity to potentially benefit the assessment of learners' learning. In Education 4.0, teachers can focus more on technology-based assessment than on traditional paper-based assessments. Technology assessment tools are digital device-based assessments, and online assessments<sup>5</sup>.

Online assessment is an assessment process done through technological devices, learners do not need to gather in one place and at the same time be under the supervision of one or more examiners. The test is done on paper or through technology devices, the work is submitted through software via the Internet environment, the student's working process may not be under the supervision of the examiners or monitoring through technological devices.

The following section introduces some softwares for online testing and assessment.

### Software for online testing and evaluation

Software for taking the test, in the article<sup>7</sup> "*Developing teachers' competencies when using testing tools for online teaching to meet requirement of education 4.0*", we have introduced a lot of software that can be used to perform online tests and assessments, such as Kahoot, Quizziz, edmodo, Microsoft Form, Google Form, Moodle... However, for the periodic assessment test and for universities, Moodle is the most suitable software to organize an online multiple choice test<sup>7,8</sup>.

Moodle is not just a tool to support testing and assessment, Moodle is a complete LMS (Learning Management System) system. Moodle has modules for user system management, course resource management, quiz and test creation. Within the scope of this article, we only focus on introducing the evaluation function on Moodle. The evaluation function in Moodle allows users to import and export questions in many different formats such as: Microsoft Word, Aiken, Blackboard, Gift format, WebCT, Moodle XML format. The types of questions on moodle are also diverse, including forms such as single-choice questions, multiple-choice questions, fill-in-the-blank questions, paired questions, etc<sup>8,9</sup>.

From the created question bank, the test creation function of Moodle both allows teachers to create a test function for review and for assessment. The difference between these two types of tests is that the test for scoring can be time-limited, limited in number of test taking times, and reversed the order of questions, while the review test does not.

The most important point is that Moodle allows setting so that learners can only take the exam on Safe Exam Browser (SEB) software<sup>10</sup>.

### Safe Exam Browser software

Safe Exam Browser (SEB) is a web browser for taking online assessments safely. This software turns any temporary computer into a secure workstation. It controls access to resources such as system functions, other websites and applications, and prevents unauthorized resources from being used during the exam.

SEB runs on a local computer and it is connected via internet to a learning management system (LMS) or online assessment system. SEB works with any web-based LMS and other types of web-based exam systems. Some learning management systems (LMS) like Moodle, ILIAS, OpenOLAT and exam solutions like Inpera Assessment also offer a SEB-compatible test mode.

When the SEB software is activated, learners can only interact with this software but cannot open other application windows, so it is not possible to look up information via the Internet during the test. SEB software allows configuration to be able to run concurrently with Zoom Meeting software to monitor learners' work, so the combination of Zoom with SEB and other technical conditions is almost guaranteed to minimize cheating in online exams.

### Software to monitor the exam process

To monitor the student's work, any software that allows online meetings can be used. In Vietnam, the software used by schools to teach online such as Zoom Meeting, Google Meet, Microsoft Teams ... can all be

used to monitor the students' work progress to limit the learners' cheating during the test. In this article, we use Zoom software to monitor the test-taking process.

Zoom Meeting is a software that allows to organize online meetings that are widely used in the world. With easy-to-use features, many functions for teaching such as screen sharing, group sharing, chat, file sharing in chat window, raising hand... In the recent covid period, this software was used to teach online very effectively. For testing and assessment, Zoom software can be used to control cameras to monitor learners' work.

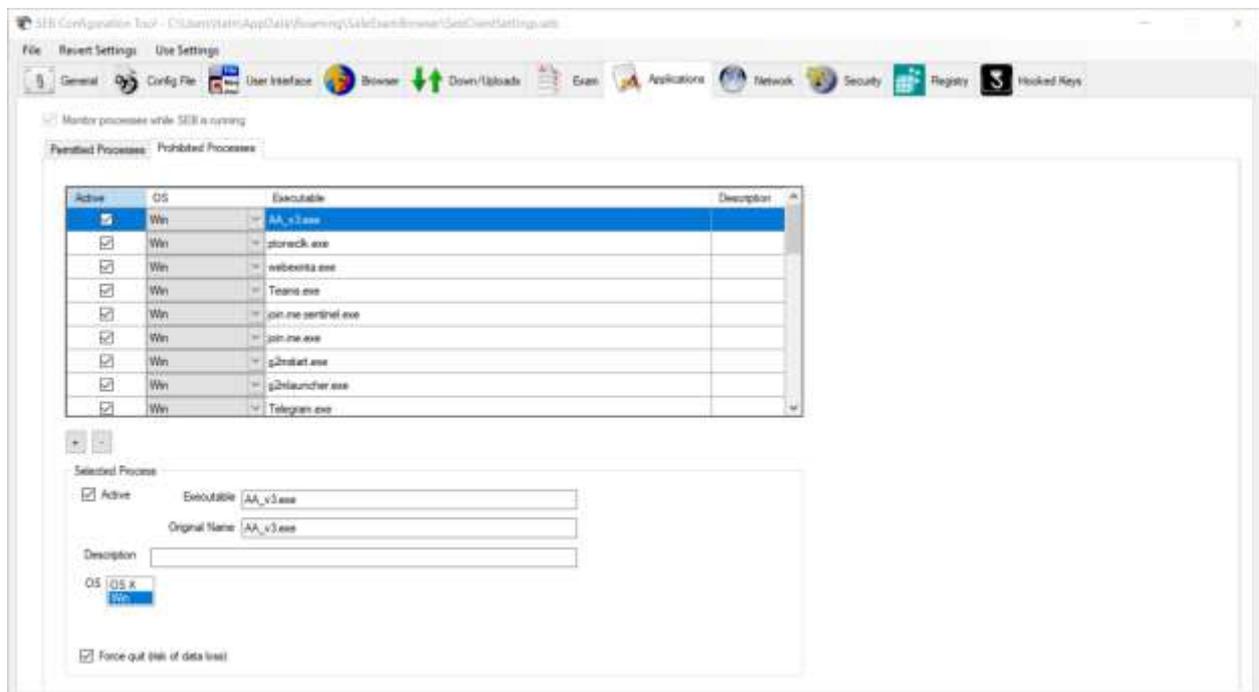
### III. Proposed online multiple-choice exam solution

#### Technology Solutions

In section 2, we have introduced software suitable for online assessment. However, using only these softwares will be difficult to ensure that the assessment results are fair and objective because the students' work process is not supervised. In order to limit cheating in the assessment process, we propose to combine the Moodle system to build online tests, Zoom software to monitor learners' test progress and Safe Exam Browser to limit technology frauds.

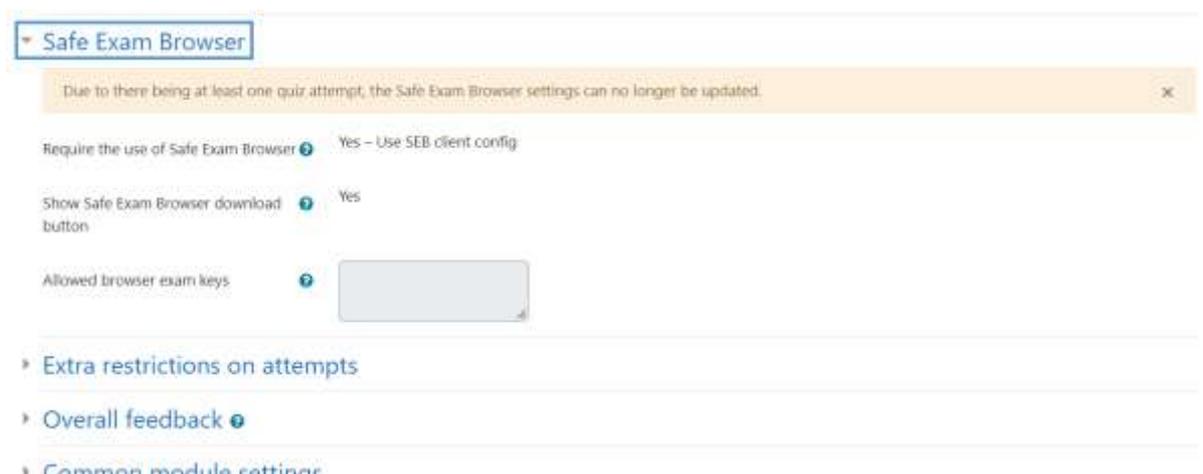
#### Preparation for the examinations

To prepare for the multiple-choice exam, the school needs to deploy the LMS system on a public server system, allowing access via the Internet environment. The lecturer builds the question bank system and the exam structure. The technical department will create a course on the system, add a list of candidates to the exams, configure the software to only allow exams on Safe Exam Browser software, and prevent the use of additional software and do not allow connection to the 2nd monitor when running SEB, candidates must not exit SEB during the test. This configuration file will be sent for the candidates to use to take the exam.



**Figure 1.** The configuration interface blocks the use of software that is not allowed to use in the exam on the Safe Exam Browser software

Configuration on the Moodle software allows each account to be logged into the system only from one location. The test is also configured to allow execution only when using the SEB software as shown in Figure 2.



**Figure 2.** Configuration allows only the use of SEB software to perform the test

The school buys the license of Zoom software Pro version to organize the supervision for the exam rooms. This version allows to decentralize co-host for exam administrators to help control the exam room better.

Exam administrators are trained in using Zoom software and Safe Exam Browser to handle problems that arise during the examination process.

To take the exam, learners need to prepare a computer with Safe Exam Browser software installed, in addition, they need to prepare two devices with cameras that can be connected to Zoom software to monitor candidates during the entire testing process. Before taking the exam, all candidates are guided on software installation, regulations when taking the exam and handling errors arising when taking the exam.

#### **Procedure for taking the exam**

**Step 1:** The examiners and the candidates enter the pre-created virtual exam room on Zoom. The examiners require candidates to turn off the Microphone and turn on the video, then call each candidate to turn on the Microphone in turns to check their identity documents (ID card, passport, citizen identification card) in front of the camera. After the test is completed, ask the candidates to turn off the Microphone to call the next test taker.

**Step 2:** The examiners require all candidates to recheck the Safe Exam Browser software to ensure they are eligible to take the exam. Next, the examiners disseminate exam regulations to candidates.

**Step 3:** The examiners turn on Record mode on Zoom or Teams to record the entire examination process.

**Step 4:** The examiners ask candidates to turn on the camera, turn off the Microphone. The examiners announce the starting and ending time for the test and ask the candidates to start taking the test. During the examination process, the examiners cover the exam room and may ask candidates to share the screen if they detect any unusual problems.

**Step 5:** The examiners guide candidates to download the Safe Exam Browser configuration file, provide a password to take the exam via Safe Exam Browser, and provide an account for candidates to log in to take the exam.

**Step 6:** Submit the exam

#### **IV. Result**

The proposed multiple-choice test solution was piloted for the test to assess foreign language ability with 3 skills of listening and reading with 278 participants. During the exam, each exam room is arranged no more than 25 candidates and is divided into 2 Zoom rooms supervised by 2 examiners, ensuring that the entire process of the candidates' work can be observed on the screen. In fact, some candidates who use a computer connection to the second monitor are detected by the Safe Exam Browser software right before the start of the test and are prompted to fix it before taking the test. The test results of the candidates are given in Table 1 .

**Table 1:**The test results of the candidates

Score level \ Skill	Under 4	From 4 to under 6.5	From 6.5 to under 8.5	Above 8.5
Reading	39	191	40	8
Listening	19	66	70	123

The distribution of scores from Table 1 shows that the test results are distributed across all four different ranges, and this distribution of scores is also close to those of previous direct exams. Thereby, it can be shown that the test results are fair and objective.

We also conduct a survey of candidates after the exam to assess the candidate's satisfaction with the test software, the way the exam is organized and whether the relative fairness is guaranteed in this form or not. As a result, 257/278 valid votes were collected, others were invalid votes due to not participating in the assessment, participating but not submitting successfully. We apply Slovin's formula to test the number of samples:

$$n = \frac{N}{(1 + N \cdot e^2)}$$

In this formula: n is the number of samples to be collected; N is the total number of candidates and e is the allowable error, with relative precision, here we choose the error value e = 0.05 (5%).

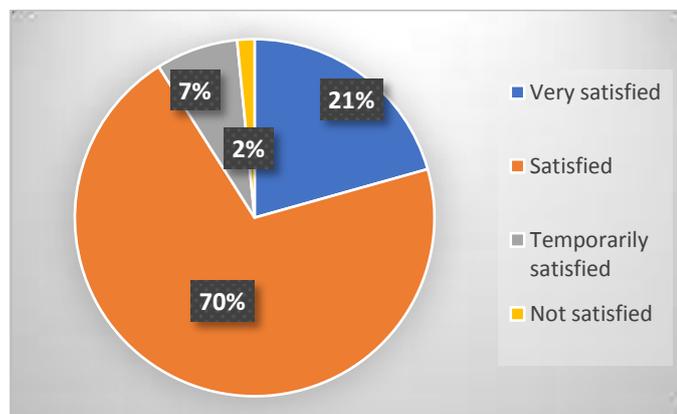
The number of samples collected shows the reasonableness, ensuring the research purpose. Then, we used IBM SPSS Statistics software to analyze and process the collected research data.

Using statistics describing the frequency of using tools used in the exam, tables 2 shows that most of the students did not use the Safe Exam Browser and Moodle tools before taking the exam. This means that in order to be able to deploy the exam applying the proposed technology solution, the training needs to be implemented for all candidates, examiners, supervisors, etc. to be able to synchronize in every stage to make the exam run smoothly and minimize errors.

*Table 2: Frequency of using Zoom, Teams, SEB, Moodle tools before taking the exam*

		Frequency of using		
		Never	Sometimes	Always
<b>Zoom</b>	Number	8	36	213
	Percentage (%)	3.1%	14.0%	82.9%
<b>Teams</b>	Number	41	49	167
	Percentage (%)	16.0%	19.1%	65.0%
<b>Safe Exam Browser</b>	Number	257	0	0
	Percentage (%)	100%	0%	0%
<b>Moodle</b>	Number	194	63	0
	Percentage (%)	75.5%	24.5%	0%

The figure 3 shows the survey results of candidates' satisfaction with the technology that the university organizes for the assessment exam. With a relatively high satisfaction rate (91%), it can be seen that the online exam solution that we propose is not too difficult for them to approach and the rate of dissatisfaction and temporary satisfaction also comes from having to meet technology requirements and learn more new software.



*Figure 3: Candidates' satisfaction with online exam technology*

When asked about the organization of the exam, the candidates all said that this is one of the big differences compared to the exams they have taken before. The exam implementation steps have specific, detailed and clear instructions, are closely supervised and ensure safety, security and fairness during the exam.

## V. Discussion

The proposed online multiple-choice exam solution has some advantages and disadvantages as below.

### Advantages

Students and lecturers who are familiar with online learning should have skills in using software and technology devices, so they will not face many difficulties when implementing online multiple-choice exams. Choosing Moodle software to create tests allows creating many different types of multiple-choice questions, and it is possible to create questions with both audio and images suitable for language exams. The SEB software can be used to technologically control the candidate's test-taking process combined with the Zoom software to monitor the entire student's work, the assessment results are reliable. Moodle and SEB software are both open source software, so it helps to minimize the cost of implementing the solution.

### Disadvantages

To take the exam, candidates need to prepare computers and devices with cameras to monitor the test process. This is more difficult for learners. SEB software is only compatible with certain operating systems, so specific and detailed instructions are needed for students to prepare before the exam.

## VI. Conclusion

This article has proposed the combination of Moodle, Zoom and Safe Exam Browser software applied to the organization of multiple-choice exams. The results of practical assessment tests applied at Thai Nguyen University of Education - Thai Nguyen University show that the proposed solution ensures objectivity and fairness at the highest level. However, this test solution also has limitations as it requires learners to have many technological devices and the test must be performed on computers. That makes it more difficult for learners. In the coming time, we will continue to research to overcome this limitation while still ensuring objectivity and fairness for the evaluation process.

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