USING MOODLE-BASED E-ASSESSMENT IN ENGLISH LISTENING AND READING COURSES: A VIETNAMESE CASE STUDY

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ABSTRACT

With the advances of technology and the Internet, computer-based assessment (e-assessment) has been in high demand in higher educational institutions (HEIs), especially during the Covid-19 pandemic lockdown, due to the convenience, ease of use, and accuracy. Consequently, this study aims to explore how MOODLE, an open-source learning management system (LMS), is utilized as a means of e-assessment in English reading and listening courses to assist undergraduates of English as a Foreign Language (EFL) and educational teams in HEIs to maintain high levels of students' retention and to reduce the percentage of poor learning performance. The participants were 120 undergraduates and four teachers of six listenings and six reading courses in a public university in Vietnam. The research data was the results of the *pre-test*, *mid-term*, and *final test* on both English listening skills and reading skills recorded in the MOODLE system during the second semester of the academic year 2019-2020. The average scores of *pre-test*, *mid-term*, and *final tests* on each skill were taken and used as the benchmark for measuring listening and reading performance. In addition, a self-report survey was conducted after an experiment to investigate the participants' attitude towards MOODLE-based e-assessment. The experimental results showed that students' listening and reading performance in the *final tests* was higher than that in the *pre-tests* and the participants also had positive attitudes towards e-assessment. Particularly, the average scores of listening skills were 3.82/10.00 (*pre-test*), 4.51/10.00 *(mid-term test*), and 6.00/10.00 *(final test*) while those of reading skills were 4.55/10.00 (*pre-test*), 4.85/10.00 *(mid-term test*), and 5.43/10.00 *(final test*). The analysis results are expected to be a roadmap for e-assessment in teaching English listening and reading skills during the Covid-19 pandemic lockdown to maintain high levels of students' retention and to reduce the percentage of poor learning performance.

Keywords: Institutional research, MOODLE, e-assessment, learning management system, English listening and reading performance development

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Introduction

With the advances in the Internet, technology, and e-learning, computer-based assessment (e-assessment) has increasingly become popular and there is a high demand for it in colleges and universities at all levels. Especially, during the lockdown period of the COVID-19 pandemic, e-assessment provides a unique solution to address the urgent need of monitoring the learning progress of students (Abduh, 2021). E-learning is defined as virtual distance learning using digital devices, such as computers, laptops, tablets, smartphones, and the Internet, which can help learners acquire "new knowledge and skills linked to individual learning goals to improve organizational performance" (Clark & Mayer, 2016). It is a form of interactive learning in which the class material is available online and therefore it facilitates and expands the boundaries both inside and outside the classroom (Á. Tóth & P. Tóth, 2006). The e-learning platform can also provide immediate feedback about the student's learning activities (Berry, 2005; Bajahzer, 2008) which encourages students to reflect their understanding and to attempt to assuring whether their knowledge has improved. Therefore, e-learning has attracted a large community of stakeholders, such as educators, trainers, instructional designers, multimedia technicians, and students (Dong & Li, 2005). E-learning also benefits teachers and students as they can learn independently, access knowledge assets flexibly as well as improve their technical skills, teaching, and learning motivation in terms of flexibility, convenience, ease of access, consistency, interaction, repeatability, student-centered learning, backup support, and low costs. Moreover, e-learning encourages students for self-directed learning and educational teams for updating the curriculum (Elzainy et al., 2020).

In e-learning systems, learners can access course materials in various formats such as texts, images, and sounds, as well as interact with teachers and/or classmates, via message boards, forums, chats, video-conference or other types of communication tools (Clark & Mayer, 2016). For pedagogical purposes, e-learning facilitates registering, monitoring, and evaluating activities of students and teachers, and course contents' management via the Internet. Various kinds of e-learning platforms, such as Moodle, Canvas, Blackboard, and Desire2Learn have become key components in implementing technology in pedagogy (AlJarrah, Thomas & Shehab, 2018; Elfeky et al., 2020). Some of them are commercial e-learning platforms like Blackboard and others are open-source platforms like MOODLE. However, technology alone is not enough, instead, technology should be used effectively to support pedagogy goals and to improve the quality of the learning process (Cohen & Sasson, 2016). To choose "which" platform fits the context of universities and meets pedagogical purposes well, an e-learning platform must be measured regarding its importance "why?", its implementation "how?", and its benefits "for whom?".

Similarly, electronic assessment (e-assessment) is an end-to-end electronic assessment process, in which information and communication technologies (ICTs) are fully used for the entire assessment process from the testing design, the testing implementation until the response recording and feedback providing (JISC, 2007; Cohen & Sasson, 2016). Compared with face-to-face learning and

paper-based/on-site assessment, e-learning and e-assessment provide more advantages (Khorsandi et al., 2012; Padayachee, 2018; Alruwais et al., 2018; Elzainy et al., 2020; Sánchez-Cabrero, 2021) as they provide constructive and immediate feedback which give more chances for students' self-directing learning, increase students' motivation, and help students improve their learning performance. Especially, e-assessment ensures students make fewer errors when they fill out the answer sheets. They also decrease the need for in-class attendance and hence reduce the costs and difficulties with traveling. E-assessment helps students who live in remote and rural areas learn and assess in their locations. For teachers, direct feedback assists them to identify what knowledge is confusing and solve out before the final exams. E-assessment also helps them keep track of the students' performance and facilitates the tasks of grading a large number of students in a short time. Moreover, e-assessment can randomize the test items which paper tests cannot do. Furthermore, e-assessment assists to minimize the chances of cheating by setting a timer, providing questions in different orders, and making log security facilities available, such as checking identification and password verification.

Importantly, the COVID-19 pandemic outbreak has changed the educational scenario all over the world. In Vietnam, the Ministry of Education and Training (2020) required educational teams in all schools and HEIs to implement e-teaching, e-learning, and e-assessment, especially in the pandemic lockdown period. However, e-learning platforms and e-assessment tools for self-study and self-assessment are not available in many colleges and universities. This study aims to introduce how MOODLE, an open-source learning management system (LMS), is utilized as a means of e-assessment in English listening and reading courses for undergraduate non-major English students studying at a public university in Vietnam. The objective is to assess the effectiveness of MOODLE as a means of e-assessment in English listening and reading courses during the period of the COVID-19 pandemic. We contend that MOODLE system will help HEIs maintain high levels of students' retention in English courses and reduce the percentage of poor learning performance. Within the context of Vietnam during the COVID-19 pandemic lockdown period, the current study aims to answer the following research objectives:

1. To examine if MOODLE is a suitable platform for enhancing English listening and reading performance effectively.
2. To explore if MOODLE is suitable for the e-assessment of English listening and reading skills.
3. To measure how successful MOODLE was in assisting undergraduate students to improve English listening and reading performance.

The remaining paper has been structured as follows. Section 1 introduces the motivations for e-learning and e-assessment. Section 2 provides the context of English teaching and assessment in Vietnam, the literature review of technology-enhanced language learning, MOODLE functions that facilitate e-assessment, and English listening and reading testing. The study's methodology,

conceptual framework, and samples are presented in section 3 and the results of the study are analyzed and discussed in section 4. Practical implications are highlighted in section 5. Finally, the conclusion and possible future research directions are discussed in section 6.

Background and Literature Review

The Context of English Teaching and Assessment in Vietnam

In recent years, 98% of Vietnamese students have majorly learned English at all school levels from kindergartens, primary schools, high schools, colleges, and universities to foreign languages centers nationwide (V. Nguyen, 2003; N. Nguyen, 2017. Hoang (2010) reported that approximately 94% of undergraduates and 92% of graduates studied English as a compulsory subject in their educational curriculum. In 2006, the Ministry of Education and Training required 67% of junior high schools and 86% of senior high schools to have three hours of English study per week. In addition, university students of non-English majors were required to study English for approximately 200 hours over four years (Ton & Pham, 2010) and achieve at least B1 Level Certificate of Foreign Language Proficiency apart from their core program diploma as one of the compulsory graduation requirements (Ministry of Education and Training, 2009). Furthermore, it was found that at least 5% of Vietnamese officers were required to achieve at least a B1 Level Certificate of Foreign Language Proficiency by 2015 and 30% of them obtained this Certificate by 2020 (Prime Minister, 2008). Therefore, the hours of English study per week in primary schools and high schools have effectively increased from three to four since February 2019 (Ministry of Education and Training, 2018).

To meet the learning needs of a diverse population, many English courses, training programs, and testing centers are being developed and offered by thousands of schools, both public and private universities, and foreign languages centers nationwide (V. Nguyen, 2003; N. Nguyen, 2017). Particularly, Dong Thap University (DThU), one of the public universities located in rural areas in Mekong Delta, offers a range of English courses annually and provides a high-quality setup environment for the English teaching and learning process. The increasing number of English enrollments in DThU results is not only due to students' high level of motivation but also to the communicative language teaching methods utilized in the English classrooms. These teaching methods, such as "calling for learner involvement, allowing learners' choice, changing teachers' and students' roles, and breaking down hierarchical barriers in the classrooms" (Larsen-Freeman, 2000) assist students to develop their English competency and commutative skills since many students in English classrooms in Vietnam are highly influenced by English teachers' methodology (Nguyen, 2017). Recently, the traditional classrooms with face-to-face lectures together with the distinctive relationship between teachers-as-superiors and students-as-inferiors have been replaced by student-centered activities in a communicative learning environment (Vu & Peters, 2021).

Interestingly, the number of individuals who take English proficiency has been increasing in DThU every year. Table 1 reports that there is a considerable number of undergraduates who registered for the English Proficiency Tests (EPTs) in the period 2017-2021. For instance, in 2018, the highest number is 4,743; whereas the lowest number is 326 in 2021 due to the COVID-19 pandemic lockdown. The number continuously remains at a high level in 2019 (n=2,646), in 2017 (n=1,823) and in 2020 (n=1,556), respectively.

Table 1. The Number of Official Enrolled Test Takers in the Period 2017-2021

Year	Number of official enrolled test takers	
2017	1823	
2018	4743	
2019	2646	
2020	1556	
2021	326	*Delayed in 4 months by Covid-19*

(Source: Foreign Languages and Informatics Centre, Dong Thap University, Vietnam, June 2021)

However, annually, the average success rate is appropriately medium. Table 2 displays that over the period 2017-2021, although the number of test-takers in 2018 is at the highest position (n=4,743), the number of successful test-takers in 2020 remains in the first place (n=831/1,556, 53.41%). The second and the third positions for the success rate are occupied by the year 2019 (n=1,328/2,646, 50.19%) and by the year of 2017 (n=901/1,823, 49.42%), respectively. The lowest success rate falls to 48.77% (n=159/326) in 2019 and is followed by 48.79% (n=2,314/4,743) in 2018.

Table 2. The Number of Successful Test Takers in the Period 2017-2021

Year	Number of official test takers	Number of successful test takers	Percentage (%)
2017	1823	901	49.42
2018	4743	2314	48.79
2019	2646	1328	50.19
2020	1556	831	53.41
2021	326	159	48.77

(Source: Foreign Languages and Informatics Centre, Dong Thap University, Vietnam, June 2021)

In practice, it is found that a large number of students showcase low English proficiency although they passed the general English entrance exams for DThU. In addition, listening and reading skills seem to be hard for students despite the qualified facilities provided by the university, enthusiastic and experienced teachers, and communicative teaching methods. Students' low English listening and reading proficiency level may result from their teacher-dependent learning habits originating from their high schools where English knowledge, such as grammar and structure had gained more attention, rather than English application/competence. Moreover, during high school education, the focus is more on studying for tests and the national high school graduation exams (Hoang, 2010; Nguyen, 2017). Students have very little opportunity to engage in the activities for listening and

reading skills development in the English language classroom which weakens their English listening and reading performance. These engagements are considered important as "the extent to which students are actively involved in a variety of educational activities that are likely to lead to high-quality learning" (Coates, 2005: pp.26) and provoke a high quality of effort in the learning process (Kuh, 2001). The other reason is that classroom time is limited to 30 hours per semester for each skill with a large number of students in each English class, teachers cannot cover the teaching materials or individually help students improve their listening and reading performance. Teachers also have insufficient time to evaluate students' self-study process and help students outside classrooms. Importantly, sample practice tests on listening and reading skills for self-study and self-assessment are found to be absent in DThU.

The Concepts of Assessment and E-Assessment

Assessment is one of the components of the educational process which is considered an effective main tool to evaluate the progress and the effectiveness of courses, curriculum, learning programs learning process as well as educational policies (AlAli, 2021). Assessment is a systematic process for collecting, analyzing, and using information from the outcomes which are measured at the end of the courses/programs by a variety of methods to improve students' learning performance (Darandari, 2017; Akib & Ghafar, 2015) and support students to become self-learners (AlAli, 2021). Assessment and teachers' teaching methods have a strong and important relationship with students' learning styles. Assessment tools and methods engage students in a constructive assessment environment to develop a positive trend towards the evaluation process (AlAli, 2021). Assessment is indispensable for universities since "its application successfully leads to expected goals achievements, such as raising the academic level, developing creativity, and achievement communication between the aspects of the educational process (Azizi, 2018; AlAli, 2021).

Electronic assessment (e-assessment) has been in existence for decades and is increasingly becoming a popular trend in HEIs due to its convenience, ease of use, and accuracy. E-assessment originated with a machine for automatic testing designed by Sidney L. Presses in the 1920s (Skinner, 1958; Alruwais et al., 2018). E-assessment refers to the electronic assessment in which information and communication technologies (ICTs) are used for assessing learners' knowledge and recording their responses via online LMS (JISC, 2007) and to implement the assessment process more effectively and efficiently (Al-Azawei et al., 2019). Marriott (2009) emphasizes that e-assessment can increase learners' motivation showcasing a positive impact on their academic performance. E-assessment has more benefits than traditional assessment methods, such as providing direct feedback, supporting a fast, flexible, and enjoyable environment as well as reducing teachers' time of grading students (Alruwais et al., 2018). However, for pedagogical benefits, e-assessment technologies need to be carefully selected as they need to be linked to appropriate resources, core programs, good quality, and timely feedback (JISC, 2007) and should be aligned with the purposes and objectives of the assessment. They also need to maintain the

features of traditional assessment, such as validity, reliability, fairness, and accessibility (Baker, *et. al*., 1993; Shute, 2009).

MOODLE Platform and Its Functions for E-Assessment

MOODLE stands for Modular Object-Oriented Dynamic Learning Environment, one of the most user-friendly and flexible open-source LMS enabling users to download, use, modify, and distribute it freely (Sharer, 2003). MOODLE is available free of charge under the terms of the General Public License (GNU) and has no licensing cost. Therefore, MOODLE is accessible to everyone in contrast to commercial software, such as Blackboard (http://www.blackboard.com) and WebCT (http://www.webct.com), for which the licensing fees have been highly increasing (Brandl, 2005). MOODLE constitutes itself as a virtual learning environment where the learning process is completely online to support a collaborative learning environment based on the constructivist pedagogy (Oproiu, 2015). MOODLE also offers integration with the core curriculum, class schedule, registration, and evaluation. As a courseware package and learning system, MOODLE provides several features for conventional classroom instructions, extra work outside classrooms as a delivery system for blended course formats, and/or a single e-learning platform (Brandl, 2005; Coskun & Arslan, 2014). MOODLE is designed to assist educators who want to create high-quality online courses and enables various online interactions between teachers and students. Table 3 presents the activities and modules that can be performed in MOODLE.

Table 3. Activities, Modules, and Tasks in MOODLE Platform

Activity	Module	Tasks
Creation	Database	Building, displaying, searching, and sharing data collection
Organization	Lessons	Uploading, arranging, and accessing materials together with electronic lectures (e-lectures) via SCORM package
Delivery	Assignments	Giving, collecting, evaluating students' works, giving feedback and/or comments together with grades Used for submitting assignments via online text tool and attachments
	SCORM package	Uploading e-lectures
	Workshops	Conducting online (live) meetings via the BigBlueButtonBN tool
Communication	Chats, Forums, News	Exchanging ideas, communicating, adding posts and emailing
Assessment	Quiz	Designing and building quizzes with a variety of item tasks, such as multiple choice, matching, true/false, drag and drop, short answer, and embedded answers. Extracting overall grades and feedback

For assessment and quiz modules, teachers can design and build quizzes by typing new test items and question types, such as multiple-choice, matching, True/False, and embedded answers (Cloze)

directly on MOODLE or by browsing from their computers (Brandl, 2005). For listening tests, teachers can upload and/or embed audio and video files from other websites. Teachers can also create various quizzes and set the test duration, submission deadline, the number of attempts, and feedback and explanation for incorrect answers. Moreover, teachers can retrieve the overall grades of all the tests and the learning process and testing duration of not only the entire class but also every individual student. Furthermore, teachers can extract individual responses and track students' learning process and self-assessment. Therefore, teachers can identify the weak students and know which part and/or knowledge students are still confused about so that they can individually help them. Through the grade export feature, teachers can download the entire assessment results of their classes in Excel documents.

For students, they can do the exams/exercises and receive immediate test scores and feedback without waiting for a long period for marking/evaluation. Students can track and review their mistakes through immediate feedback and/or explanation functions. This feature affects significantly and positively students' learning performance since "blocking students from viewing the questions after submitting the answers or limiting the time to ensure that all students are taking the test at the same time, will restrict the effectiveness of the test as an assessment tool" (Ronles & Braathen, 2002). These tests and exercises can be taken as many times as students want and need (Broskovic, 2014).

According to Bajaahzer (2008, pp.56), indispensable users on MOODLE include administrators, teachers, and students. The essential features, functions, applications, and relationships among these users are displayed in Figure 1.

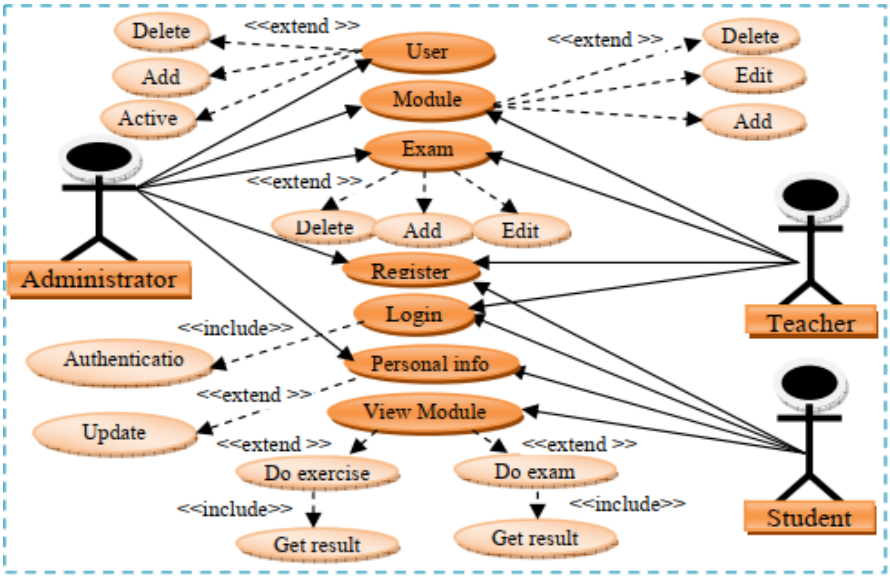

Figure 1. Assessment/Testing Functions for Administrators, Teachers, and Students in MOODLE (Bajaahzer, 2008, pp.56)

Administrators can use all the functions on the system. They can create courses, assign roles for users, add or remove students, teachers, and courses as well as backup data. Teachers can post e-lectures and materials on MOODLE, add questions in the question banks, create quizzes as well as retrieve students' grades/scores. Students log in, do an exam, and get the results and feedback.

Institutional Research in Students' Learning Performance

Institutional research (IR) includes some activities that provide numerical evidence to support institutional planning, policy development, and decision-making within HEIs (Haskell, 2017). Among IR issues, improving students' learning performance is crucial since it affects both individual and organizational performance (Cheng et al., 2020). Usually, students' learning performance should be seriously evaluated since they not only impact students' motivation but also affect teaching quality and shape the design and delivery of university courses (Agrawal et al., 2019). In the work of Cheng et al. (2018), they indicated that poor interest can undermine the learning motivation of students, thereby increasing the risk of dropping out. Many published IR studies focus on assessment for learning (AlAli, 2021; Azizi, 2018; Alruwais et al., 2018; Al-Azawei et al., 2019). Following this trend in IR issues, this study attempts to discover the effectiveness of utilizing MOODLE as a means of e-assessment in English learning performance in HEIs.

Research Gaps

The research gaps are highlighted from the Vietnamese context of teaching English and literature review as follows:

1. English is one of the compulsory subjects in the Vietnamese educational system nationwide (Prime Minister, 2008; Ministry of Education and Training, 2018) and English proficiency e-assessment is a prior solution for the English proficiency testing system in Vietnam (Ministry of Education and Training, 2017). However, the research study on e-assessment with English listening and reading courses in Vietnam is very limited.
2. E-learning and e-assessment are the unique solutions for addressing the urgent need of keeping education in progress (Abduh, 2021) during the COVID-19 pandemic lockdown. Nevertheless, e-learning and e-assessment systems for self-study and self-assessment are absent in Vietnam in general and in DThU in particular.
3. E-learning, a learning management system (LMS), and e-assessment, which provide flexibility for students to have the exams, highly increase students' motivation showcasing a positive impact on their academic performance (Marriott, 2009) and effectively support

educational teams (Alruwais et al., 2018). MOODLE provides several features for conventional classroom instructions, extra work outside classrooms as a delivery system for blended course formats, and/or a single e-learning platform (Brandl, 2005; Coskun & Arslan, 2014). However, the research gap is that most research was carried out with the use of technology and examination for users' perceptions. Therefore, a study on MOODLE-based e-assessment which is linked to pedagogical objectives and specific learning content is needed.

Methodology

Research Design

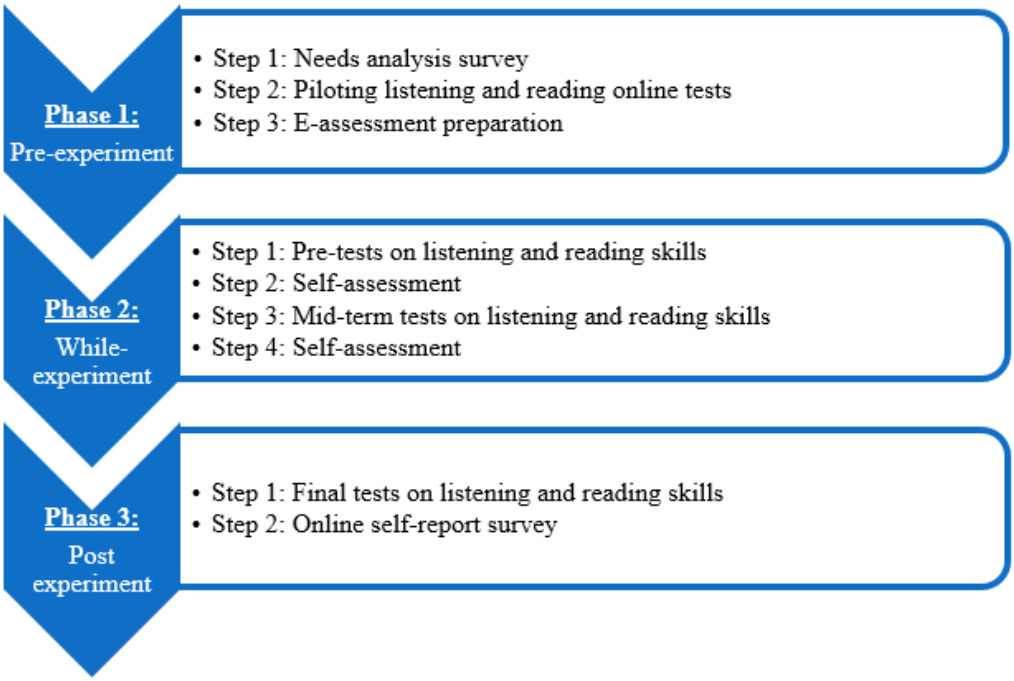

Figure 2. Research Design

This was a descriptive study conducted over 15 weeks during the second semester of the academic year 2019-2020. Figure 2 summarizes the research process mainly based on the background and context of Dong Thap University, Vietnam. The present study includes three phases: Pre-experiment (Phase 1), While-experiment (Phase 2), and Post-experiment (Phase 3).

Phase 1: Pre-experiment consisted of two tasks: needs analysis survey, piloting online tests on listening and reading skills, and e-assessment preparation. This phase aims to:

1. Investigate whether MOODLE is a valid and fair assessment tool,

2. Learn if MOODLE environment is unknown for students and examiners,
3. Measure the validity and reliability of listening and reading tests,
4. Identify whether these tests should be designed either following the school testing framework or only for the skill and knowledge development,
5. Examine whether any necessary preparation should be added; for example, mock tests are necessary or not, supporting technical teams should be offered or not, and whether any technical obstacles should be solved before and during the e-assessment process, and
6. Compare on-site (face-to-face) assessment and online assessment.

- Step 1: A needs analysis survey was used to indicate issues relating to students' needs, students' expectations, and their background for research context of teaching and learning English listening and reading skills at DThU and research design. The survey was also used to determine whether MOODLE environment is unknown for students
- Step 2: Piloting listening and reading online tests on MOODLE was implemented to meet all six purposes in this phase.
- Step 3: E-assessment preparation offers an orientation on MOODLE-based e-assessment and training sessions for how to log in, assess the tests, do and submit the tests, retrieve test grades/results as well as extract feedback, and/or correction on MOODLE for the participants.

Phase 2: While- experiment includes four tasks: pre-tests, self-assessment, mid-term tests, and self-assessment. This phase aims to measure students' behaviors and performance during the online assessment. For example, several attempts on self-assessment tests serve benefits to students as they offer many chances for them to take responsibility for their self-learning process (Cohen, 2016), especially when the students receive immediate feedback during the e-assessment process. This phase also aims to compare the benefits between on-site (face-to-face) and online assessment.

- Step 1 and Step 3: Pre-test and mid-term tests on both listening and reading skills were conducted to measure students' performance.
- Step 2 and Step 4: Self-assessment was implemented for investigating students' behaviors and measuring their self-learning process.

Phase 3: **Post-experiment** comprises two tasks: final tests and an online self-report survey. This phase aims to measure students' listening and reading performance and examines students' and teachers' attitudes towards MOODLE-based e-assessment.

- Step 1: Final tests on listening and reading skills were for benchmarking
- Step 2: Online self-report survey for both teachers and students was delivered to investigate their opinions and attitudes towards MOODLE-based e-assessment.

All three tests: *pre-, mid-term*, and *final tests* in Phase 2 and Phase 3 were administered through MOODLE in the computer rooms with recorded cameras under the teachers' observations. The allotted time for each listening test was 30 minutes and for each reading, the test was 60 minutes. Students were not allowed to use dictionaries, smartphones, or any online support during these tests. The average scores of *pre-test, mid-term*, and *final tests* on each skill were recorded on MOODLE and were then retrieved and used as the benchmark for measuring students' listening and reading performance after the experiment.

Sample

The MOODLE-based e-assessment for self-assessment data set had four English teachers and 145 non-English major students who enrolled in six English listening courses and six English reading courses of Foreign Languages and Informatics Center (FLIC) at Dong Thap University (DThU), Vietnam. This data set was collected during the second semester of the academic year 2019-2020. In total, usable responses were obtained only from 120 undergraduate participants, resulting in a return rate of 82.8%. The students' majors were Literature (n=10, 8.3%) Business (n=16, 13.3%), Accounting (n=8, 6.7%), Chinese (n=15, 12.5%), Political Science (n=5, 4.2%), Physical Education (n=4, 3.3%), Geography (n=4, 3.3%), History n=3, 2.5%), Pre-school Education (n=27, 22.5%), Information Technology (n=12, 10%), and Primary Education (n=16, 13.3%). Data of 25 students were not included as they dropped out or were suspended before this study was conducted. The purposes and procedure of the study were clarified to the participating students and teachers, and their permission was obtained. Students' identities will not be disclosed for ethical reasons. The confidentiality of the collected information was maintained.

The students were randomly divided into three groups as described in Table 4. The participants in the three groups were different among Phase 1, Phase 2, and Phase 3 to satisfy reliability requirements for the testing scale.

- Group 1 includes 10 students. This group was assigned for Phase 1 to find the answer to Purposes 1-6 (refer to Section 3.1).
- Group 2 consists of 20 students. This is the preparation group that was also assigned for Phase 1 to double-check if all six purposes were satisfied or not.
- Group 3 comprises 90 students. This is the experimental group which was remained for Phase 3 to conduct, measure, and evaluate students' listening and reading performance through MOODLE.

Table 4. Student participants assigned in Phase 1 and Phase 2

Codes	Group	No of students	Assigned phase	Distribution
L1 → L10	Group 1	10	Phase 1: Pre-experiment	Basic foundation
R1 → R10				
L11 → L30	Group 2	20		Preparation
R11 → R30				
L31→L120	Group 3	90	Phase 2: While-experiment Phase 3: Post-experiment	Experiment
R31→R120				

**Notes: L=Listening; R=Reading*

Similarly, a total of 1,450 listening test scores and 1,450 reading test scores of 120 undergraduates were extracted on MOODLE. Out of which, 1,200 test scores on each skill were selected for the research sample data since they fulfilled all the test items, yielding a rate of 82.8%. The remaining 250 test scores of each skill (20.8%) which had a high percentage of missing answered items in the ten listening tests and the ten reading tests were excluded in the study.

Table 5. The Total Selective Sample

Sample	Year of study	Number of respondents	%	Number of listening test scores	%	Number of reading test scores	%
Teacher		4	100				
Students	I	10	8.3	100	8.3	100	8.3
	II	37	30.8	370	30.8	370	30.8
	III	58	48.3	580	48.3	580	48.3
	IV	15	12.5	150	12.5	150	12.5
	Total	**120**	**100.0**	**1,200**	**100**	**1,200**	**100**

Table 5 reports a total selective sample including respondents' rates and the rates of test scores in both listening and reading tests. The data was collected from four levels of the university timeline. 8.3% (n=10) of the respondents were first-year students, 30.8% (n=37) were second-year students, 48.3% (n=58) were third-year students, and 12.5% were fourth-year students (n=15). Table 5 also shows that the student's test scores for both skills were the highest from the third-year students (48.3%, n=580), and the lowest was from the first-year students (8.3%, n=100). The test-scores from second-year students and fourth-year students were 30.8% (n=370) and 12.5% (n=150), respectively.

Data Collection

This study employed two data collection methods. The first method of data collection was the results of ten multiple-choice questions (MCQs) listening tests and ten MCQs reading tests recorded in the MOODLE system during the second semester of the academic year 2019-2020. These tests were selected from the available question banks of the Foreign Languages and Informatics Center

(FLIC) of DthU. These were examined for validity and reliability by experts and uploaded into MOODLE after Phase 1 was completed. These tests were scheduled as a *pre-test*, *self-assessment, mid-term test*, *self-assessment*, and *final test*. The mean values of *pre-test*, *mid-term test*, and *final test* of all 90 participants in Group 3 in Phase 3 were taken for benchmarking.

The second set of data was from the online self-report survey which was conducted with 90 students and four English teachers in Phase 3 via the MOODLE system after the course completion. The estimated time for participants to complete the self-report survey was five minutes. To prevent unauthorized access, participants used their passwords during both the data collection times. The participants completed the questionnaire in either Vietnamese or English, according to their personal preferences. The participants were asked about their opinions towards e-assessment, the difficulties they encountered in working on the MOODLE system, the most useful features of the system, and the benefits of using the MOODLE-based e-assessment on listening and reading skills. Furthermore, participating teachers were asked for their suggestions for improving MOODLE-based e-assessment.

Results

Results of Needs-Analysis Survey

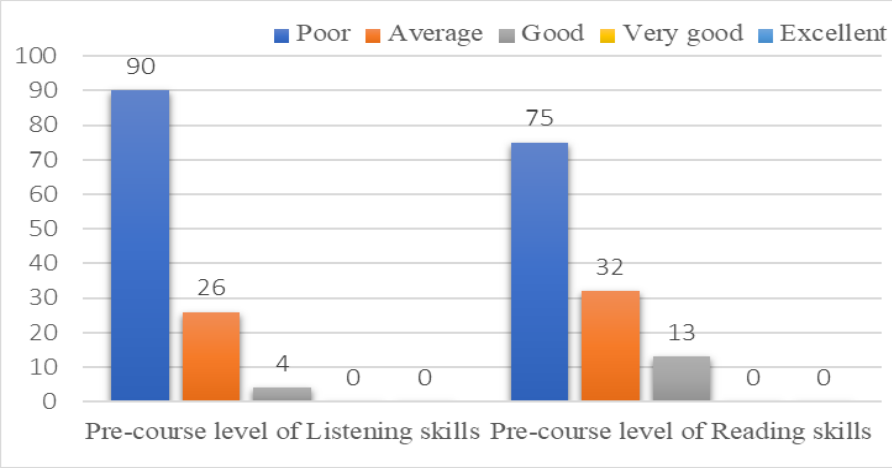

Figure 3: Undergraduates' Pre-Course Level of Listening and Reading Skills

A needs-analysis survey was conducted in the first class for all the 120 participated undergraduates to indicate issues relating to students' needs, students' expectations, and their background for reality (context) research of teaching and learning English listening and reading skills at DThU. The survey was also used to determine whether the students agreed to listening and reading e-assessment or not. The results of the survey showed that all students shared a similar background. In particular, they had learned English in the suburbs and remote areas where the English language was taught at

the basic level. The teaching mainly focused on English grammar and structure for tests, and English listening and reading skills gained less attention. They had never experienced e-assessment and MOODLE-based self-assessment. They passed the general English entrance exams for DThU. Their pre-course level of listening and reading skills was poor. Figure 3 reports that there has been a considerable number of students who obtained low listening and reading level before taking the English listening and English reading courses. Figure 3 also shows that the highest number of students at the *poor* level of pre-course listening skills is 90/120 (75%) and of reading skills is 75/120 (62.5%). The second and the third positions for the pre-course listening (L) and reading (R) skills are occupied by the *average* level (Ln=26/120, 21.7%; Rn=32/120, 26.7%), respectively and by the *good* level (Ln=4/120, 3.3%; Rn=13/120, 10.8%), respectively. None of the students showcased a *very good* and *excellent* level of each of the skills.

In addition, the exposure students had about English learning (i.e., the period of learning English) varied for each student. Figure 4 shows that a maximum number of students have the shortest *<1-month* learning period of English listening and reading skills which is 63 (52.5%) and 36 (30%), respectively. On the contrary, the lowest position remains for the students who have *>6-months* listening learning period (n=3, 2.5%) and of the *4-5 months* reading learning period (n=12, 10%). It was also found that approximately equal number of students have *1-2 months* period of learning listening and reading which is 29 (24.2%) and 30 (25%) respectively. Similarly, an almost equal number of students have *2-3months* of learning period which is 15 (12.5%) and 17 (14.2%), respectively. The *>6-month* reading period belongs to 25 students (20.8%).

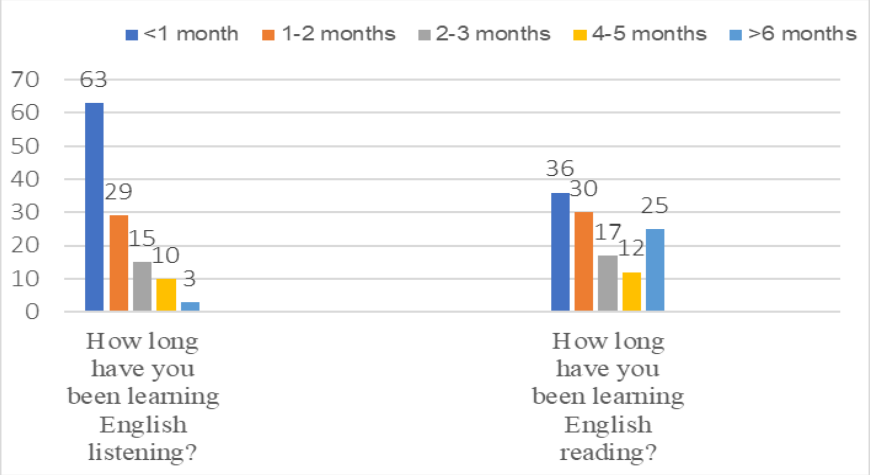

Figure 4: Responses to Learning English Listening and Reading Period on Needs-Analysis Scale

Results of Testing Scores for Group 1 and Group 2 in Phase 1 (Pre-Experiment)

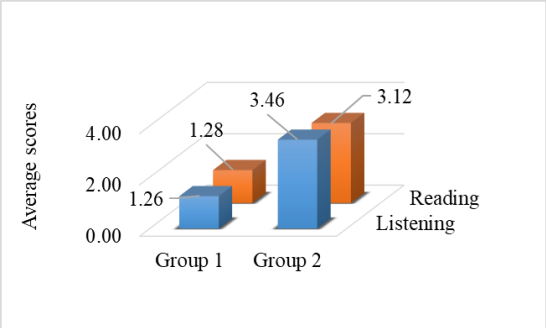

Figure 5: The Listening and Reading Overall Average Scores for Group 1 and Group 2

Figure 5 reports the overall average scores of listening and reading tests for Group 1 and Group 2 in Phase 1. Particularly, the overall average scores of the listening tests for Group 2 and Group 1 were 3.46/10.00 and 1.26, respectively. For reading tests, the overall average scores of Group 2 were 3.12/10.00 and of Group 1 were 1.28/10/00. Group 2 outperformed Group 1.

Figure 6a shows the listening scores and Figure 6b reports the reading scores for each student in Group 1. Considerably, only one student gained the highest score 7.71 for a listening test (LS3) and 4.1 for the reading test (RS3). In all, 70% of students (n=7) received zero scores in the listening test (LS1, LS2, LS4, LS5, LS8, LS9, LS10) and 50% of students (n=5) received zero scores in the reading test (RS1, RS4, RS6, RS8, RS9, RS10). The reasons may be the validity and reliability of listening and reading tests do not meet the testing requirements. Another possibility is that students are unfamiliar with MOODLE system, and/or students are trying to cope with the technical problems. Therefore, after solving all the problems caused in Group 1, the researchers piloted e-assessment with Group 2 to well-prepare qualified conditions for the experiment, to ensure fairness in assessment, and guarantee validity and reliability of MOODLE-based e-assessment.

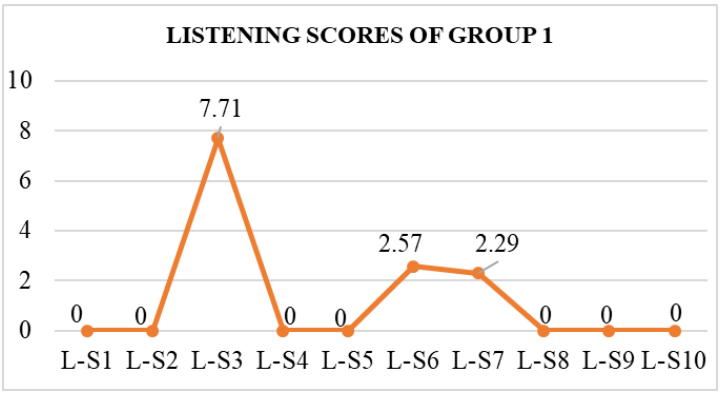

Figure 6a: The Listening Scores for Each Student in Group 1

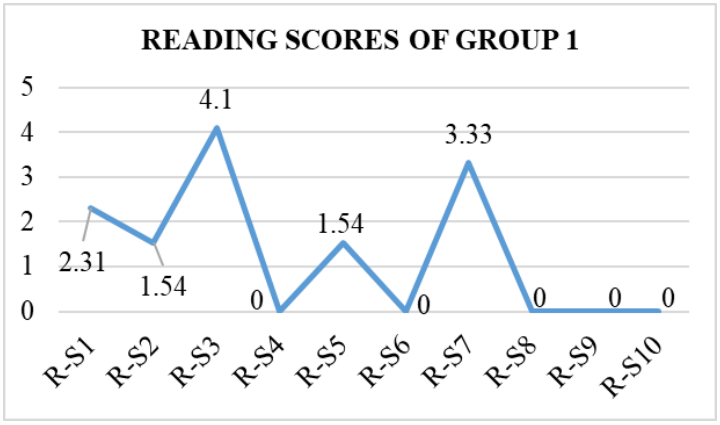

Figure 6b: The Reading Scores for Each Student in Group 1

Figure 7a displays the results of the listening scores of each student in Group 2. The highest score of the listening test was 5.43 for LS27; whereas the lowest score was zero for LS11. The scores of the remaining students were ranging from 1.43 (LS15) to 5.14 (LS28).

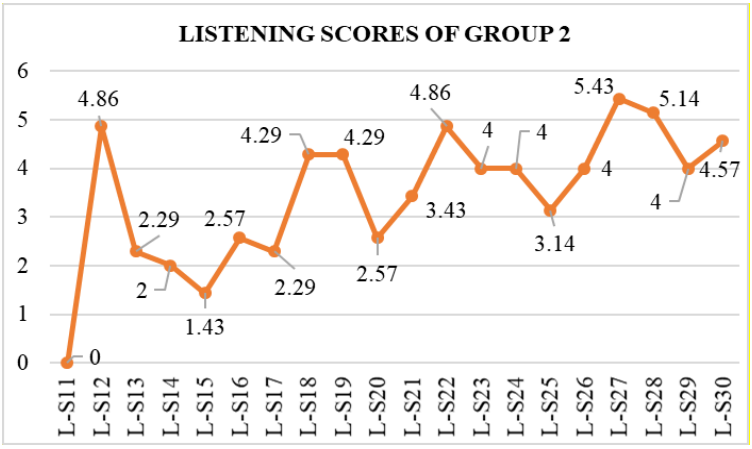

Figure 7a: The Listening Scores for Each Student in Group 2

Figure 7b presents the results of the reading scores of each student in Group 2. The highest score of the reading test was 4.87 for RS21, while the lowest was 0.51 for RS24. The scores of the remaining students were between 2.05 (RS11) and 4.62 (RS14). No student received a zero score for the reading test.

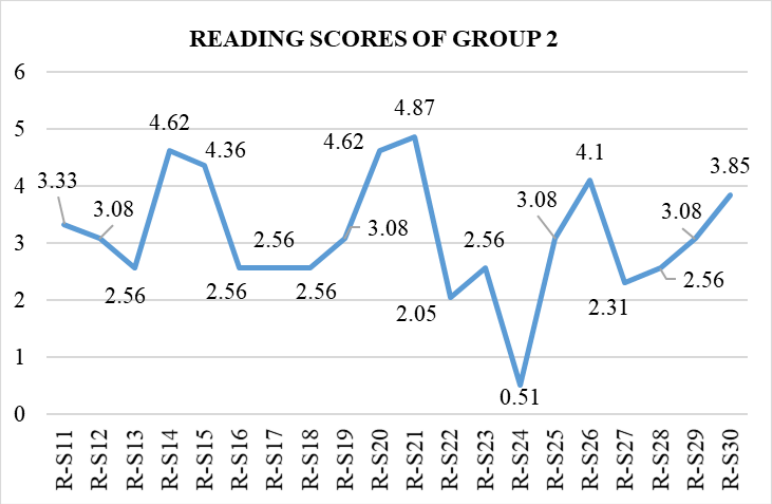

Figure 7b: The Reading Scores for Each Student in Group 2

This step showed that all the problems during the e-assessment in the pre-experiment phase were successfully solved. It also indicates that mock tests are indispensable to prevent lack of adequate experience, log, and submission obstacles when conducting e-assessment. Therefore, the MOODLE-based e-assessment was ready for further experiment with Group 3.

Results of Testing Scores for Group 3 in Phase 2 (While-Experiment) and Phase 3 (Post-Experiment)

Figure 8 below shows the comparative results of English listening and reading *pre-, mid-term*, and *final tests* scores for Group 3. The English listening and reading performance of students' *final tests* is considerably higher than that of the *pre-test* and *mid-term tests*. For instance, the listening average scores were 3.82/10.00 for *pre-test*, 4.51/10.00 for the *mid-term test*, and 6.00/10.00 for the *final test*, whist the reading average scores were 4.55/10.00 for *pre-test*, 4.85/10.00 for *mid-term*, and 5.43/10.00 for the *final test.* It can be concluded that MOODLE-based e-assessment for self-assessment as described above was successfully implemented and was found to be suitable for improving English students' listening and reading performance.

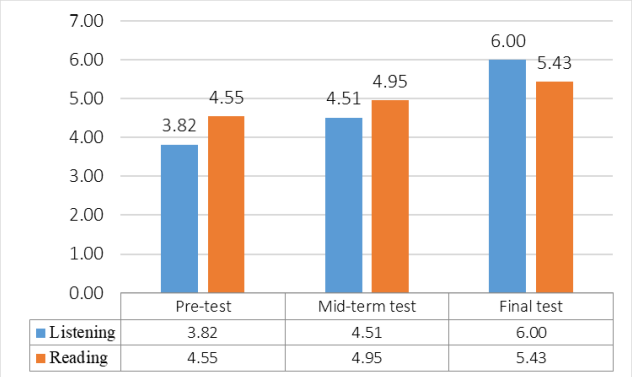

Figure 8: Average Scores of *Pre-*, *Mid-*, and *Final* Listening and Reading Tests of Group 3

Results of Students' Opinions Towards E-Assessment

Generally, for the opinions about e-assessment, the results of the self-reported survey indicated that 97.8% (n=88) of students preferred e-assessment rather than traditional assessment because e-assessment provided immediate feedback and the test takers do not need to wait for a long grading time.

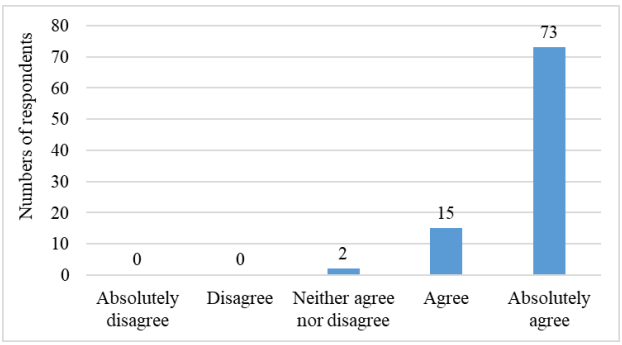

Figure 9: Results of Students' Opinions Towards MOODLE-Based E-Assessment

Figure 9 presents the results of students' opinions towards the use of MOODLE-based e-assessment. In all, 73 out of 90 (81.1%) respondents agreed and 15 out of 90 (16.7%) of them agreed that MOODLE-based e-assessment assisted them to improve their listening and reading performance, while 2 out of 90 (2.2%) students had a neutral response. No one disagreed or disagreed. Therefore, it can be indicated students had positive opinions towards listening and reading tests using the MOODLE system.

Regarding undergraduates' favorite aspects about on MOODLE system, most frequent responses focused on "*I get the grades/marks directly*", *"direct feedback helps me know why I am wrong/which options are correct", "I can do the test whenever I am free even in the midnight", "I feel that my teachers are beside me"*, and *"it's very convenient"*. The students appreciated the

conduction of the self-assessment tests which are considered mock tests; for example, "*self-assessment tests and mock tests are helpful for training before the online exam"*. However, when using MOODLE-based e-assessment, the participants also faced problems, such as *"Internet connection"* and *"pictures in listening tests cannot be loaded so I cannot do the test"* in the majority.

Results of Teachers' Opinions Towards E-Assessment

All four teachers had positive opinions towards MOODLE-based e-assessment. All the teachers (100%) agreed that online listening and reading tests on MOODLE helped their students gain a higher level of listening and reading performance. They also mentioned that students' results showed improvement due to three reasons: 1) "MOODLE-based listening and reading tests were convenient to practice freely and independently.", 2) "MOODLE provides immediate scores and feedback which assist students to review lessons well.", and 3) "*The test content and items were integrated with the core curriculum of English listening and reading.*" They also provided suggestions for improving the MOODLE-based e-assessment. The suggestions were that *"More examples, contents, consolidated exercises, review sessions should be added.*", "*More guided instructions were needed.*", and "*Teachers and students should be aware of technical problems and have enough computer skills.*" Their favorites were that they could track the students' performance and conduct assessment analysis to find what knowledge was unclear for students and help them solve out before the final exams. Also, e-assessment could reduce their assessing time for a large number of students. Finally, MOODLE can sort questions and randomly select the difficulty level of the tests which paper tests cannot do.

Discussion

This study successfully experimented with e-assessment on MOODLE system. The experimental results showed that students' listening and reading performance in the *final tests* was higher than that in the *pre-tests.* Particularly, the average scores of listening skills were 3.82/10.00 (*pre-test*), 4.51/10.00 *(mid-term test*), and 6.00/10.00 *(final test*) while those of reading skills were 4.55/10.00 (*pre-test*), 4.85/10.00 *(mid-term test*), and 5.43/10.00 *(final test*). Also, the participants (98.7%) had positive attitudes towards MOODLE-based e-assessment. Results of the e-assessment represented evidence-based high-quality evaluation since these tests scores were retrieved from MOODLE which were totally and immediately graded by computers after students' submission. Students' grades were towards more objective assessment strategies. This minimizes the subjective grading and/or ill-concentrations that may happen during the grading process of paper-based tests.

The results also indicated that MOODLE is a suitable platform for English e-assessment and successfully assisted teachers and students within the context of Vietnam during the COVID-19 pandemic lockdown period. Since MOODLE is an open-source LMS, free of charge, with ease of

use, and pedagogicaurposes, MOODLE can be widely used as a means of e-assessment not only in Vietnam but also in developing countries.

For pedagogical objectives for long terms, compared with in-person or on-site assessment, e-assessment offers more benefits since e-assessment can increase students' motivation and help them enhance their learning performance through constructive and immediate feedback which paper tests do not support. Also, it can help students in remote areas to learn, self-assess, and prepare well for their real tests due to e-assessment's flexibility, validity, and reliability. For teachers, they could track the students' performance and conduct assessment analysis to find what knowledge was unclear for students and help them solve it before the final exams. Also, e-assessment could reduce their assessing time for a large number of students. Importantly, MOODLE-based e-assessment supports question sorts in different orders which minimize students' cheating and random selection for various difficulty levels which satisfy the reliability requirement in assessment. For HEIs, e-assessment can help decrease assessing cost in reduced time to increase numbers of students. Especially, MOODLE-based e-assessment supports HEIs where English for testing is focused. The findings in this study are similar to the results in Ridgway (2004), Gilbert (2011), Khorsandi et al. (2012), Padayachee (2018), Alruwais et al (2018), Ghouali et al (2020), Elzainy et al. (2020), and Sánchez-Cabrero et al. (2021).

However, some problems which were found during this research need to be completely solved before conducting an e-assessment as "ideal assessment was based upon optimal evaluation strategies" (Martin et al., 2019; Elzainy et al., 2020). Therefore, some recommendations are discussed as follows:

- The validity and reliability of e-assessment should be established to assure that students achieve their learning performance fairly since digital assessment environments are unknown for students and limited support from a technician will lead to pressure for students and hence result in inferior grades. Whenever, the digital environment is reliable and safe for students, valid and fair assessment tools can be achieved.
- Mock tests should be offered as a preparation and training tool because any technical problems met during mock tests will be solved efficiently and effectively which will help the e-assessment teams "manage the subsequent exams appropriately" (Gürsul & Keser, 2009; Elzainy et al., 2020).
- Professional training should be offered to e-assessment teams to minimize instructors' ill-preparation for and lack of experience of online exams caused by the sudden shift from face-to-face or on-site assessment into e-assessment (Ilgaz & Adanır, 2020; Sánchez-Cabrero et al., 2021).
- A backup version of the questions with the same difficulty level should be available and prepared for students who face submission problems. The answers should not be

displayed to students after submission until all the test takers have completed their answering and examiners' permission has been gained (Fontanillas et al., 2016; Elzainy et al., 2020).

It can be concluded that the findings in this study contribute to higher education institutions that share similar contexts and backgrounds with Vietnam as a developing country. English is a compulsory subject and is one of the graduation requirements in universities. Here, e-assessment forms one of the key success factors to achieve the undergraduates' learning performance.

Conclusion

The results provide a general framework to better address the roadmap of MOODLE-based e-assessment for self-assessment in teaching English listening and reading skills during the COVID-19 pandemic outbreak. For example, students can use MOODLE to self-assess their English competence and improve listening and reading skills. For teachers, MOODLE can help them to monitor their students' self-assessment duration and learning progress even outside classrooms. Furthermore, HEIs could follow this approach to manage teaching and learning processes to maintain high levels of students retention and reduce the percentage of poor learning performance.

Even though it is admitted that this paper does not provide empirical evidence in depth; however, it can help HEIs maintain high levels of students' retention and reduce the percentage of poor learning performance in English courses.

Although this paper focused on MOODLE functions supporting multiple-choice and embedded questions in listening and reading tests without covering all MOODLE functions, it allows an understanding of MOODLE-based e-assessment and explains the process of using the tool which helps the educators to enhance their students' English listening and reading proficiency.

In the university context, it would be better to develop further research related to MOODLE-based e-assessment not only for English but also for other languages. Future studies can conduct a thorough empirical analysis to validate the ideas discussed in this paper. There is also a need for researchers to analyze big data traced on MOODLE through students' behaviors, habits, performance, students' attempts, test results, and feedback on MOODLE to predict learners who have more difficulties. This big data analysis could play a vital role in online course development based on learners' needs to improve learners' success.

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