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Impact of E-Assessments on the Attitudes and Academic Achievements of Saudi EFL Learners in a Grammar and Vocabulary Test

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ABSTRACT

This study investigated the impact of electronic assessments (e-assessments) on the academic achievements of Saudi EFL learners. It also examined their attitudes towards e-assessments and the use of Blackboard for testing. The sample was drawn from the population of preparatory year EFL students at Jubail English Language and Preparatory Year Institute (JELPYI) in Saudi Arabia in the 2022–23 academic session. The study adopted a sequential explanatory mixed-methods research design. Quantitative data were collected through a knowledge test and two surveys, while qualitative data were collected via semi-structured interviews. Participants were divided into two groups: the experimental ($n = 42$), which had access to electronic exercises, worksheets, and assessments via Blackboard, and the control ($n = 34$), which had access to the same kinds of resources in paper-based formats. It was hypothesised that the experimental group participants would have higher achievements in a post-test and more favourable Blackboard and e-assessment attitudes than those in the control group. After establishing that the two groups were somewhat homogeneous in their academic achievements prior to the treatment, post-test results showed that the experimental group had a statistically significantly higher mean score than the control group, $t(74) = 6.235$, $p = .001$. It was also found that the participants had mixed reactions regarding e-assessments and using Blackboard for taking tests, with the experimental group exhibiting more favourable attitudes than the control group. The qualitative findings corroborated the quantitative ones. The study recommended that educational administrators promote technology integration in the classroom due to its immense pedagogical benefits and that teachers incorporate technology to meet the expectations of their digital native students.

Keywords: Attitudes; Blackboard; e-assessment; paper-based assessment; perceptions.

INTRODUCTION

This study investigated the effect of e-assessments on the academic achievements of some Saudi preparatory year English as a Foreign Language (EFL) learners in a grammar and vocabulary test. It also examined their attitudes towards e-assessments and using Blackboard for taking tests.

The omnipresence and prevalent use of digital technologies in the 21st century have necessitated a revolution in the field of education (Butler & van Wyk, 2021; Kademi, 2022; Stanković & Tatar, 2018). Due to the huge technological advancements in this century, Information and Communication Technology (ICT), which, according to Gull (2020), refers to different technologies that provide access to information via telecommunication, gets integrated into the classroom as a tool for teaching, learning, and assessments (ALTameemy et al., 2020; Asrial et al., 2023; Elshareif & Mohamed, 2021; Patel et al., 2023; Yassin et al., 2019; Wahas & Syed, 2024). Using ICT in pre-teaching stages (e.g., lesson planning and preparation, etc.), teaching stages (e.g., using computers, projectors, interactive whiteboards, etc.), and post-teaching stages (e.g., testing, record-keeping, etc.) gave birth to e-learning (otherwise known as technology-assisted teaching, technology-based learning, distance learning/education, web-based learning, etc.), which is an important means of knowledge and skill acquisition in the field of education today (Elshareif & Mohamed, 2021; Wahas & Syed, 2024).

Since technology is being used to enhance every aspect of life, education can also be made more effective by using digital technologies (Akpan, & Uko, 2019; Butler & van Wyk, 2021; Yassin et al., 2020; Zemni & Alrefae, 2020). In line with this, Stanković and Tatar (2018) argue that one of the reasons why ICT is almost a necessity in today's classroom is because the learning styles of digital natives, who dominate today's classrooms, have “dramatically changed and, more importantly, their working environment will be recognisably different” (p. 21). Consequently, teachers need to integrate technology to meet their expectations and prepare them for digital working environments (Akpan, 2017; Butler & van Wyk, 2021; Rodríguez-Peñarroja, 2022).

Using technology in the classroom has a number of benefits. First, it supports the modern principles of individualization, interaction, and motivation, all of which are paramount in modern educational theories (Mullamaa, 2010, Akpan, 2013; Kademi, 2022). Second, it provides authentic learning and testing environments for students, advances their achievements, improves the learning process, enriches the classroom, and transforms education from being traditional to being digital (Elshareif & Mohamed, 2021; Pennington, 2020; Zhang & Chen, 2022). Likewise, it contributes to learners' satisfaction and helps them acquire the desired learning outcomes (Patel et al., 2023). In language teaching, technology is nowadays so embedded and useful that, according to Paudel (2021), it is difficult to get any English language programme at any level of education that does not make provision for ICT and its use. However, despite the immense advantages of using technology in education, it needs to be properly aligned with learning outcomes to avoid focusing on digital proficiency at the expense of subject matter expertise (Cervero et al., 2020; Pennington, 2020; Ugiebeme, 2022).

LITERATURE REVIEW

E-Assessments in Education

E-assessment (alternatively known as e-testing, online testing/assessment, digital assessment, computer-based test, electronic assessment/test, e-exam, etc.) is defined as the use of digital technologies to create, dispense, evaluate, and deliver feedback for formative, summative, diagnostic, or self-assessment (Kocdar et al., 2018). It has gained widespread popularity due to the rapid rate of technological and digital advancements in the field of education (Gandraß et al., 2021; Wongvorachan et al., 2022; Wahas & Syed, 2024; Ugiebeme & Echeng, 2024). It is increasingly being used instead of paper-based tests (PBTs) because it allows educators to handle a large number of examinees and improve students' performance (Binnahedh, 2022; Butler & van Wyk, 2021; Patel et al., 2023; Stanković & Tatar, 2018; Ramya & Rajeswari, 2024; Wongvorachan et al., 2022).

Compared to PBTs, e-assessments have a number of benefits (Ali & Dmour, 2021; Asrial et al., 2023; Ndibalema, 2021; Patel et al., 2023). They enhance achievement, provide direct feedback, calculate results automatically and instantly, save teachers' time and efforts, and provide a greater level of accuracy in grading and record-keeping (Alruwais et al., 2016; ALTameemy et al., 2020; Gilbert et al., 2011). Also, thanks to e-assessments, testing can be made more authentic and detailed by integrating audio-visuals into it (ALTameemy et al., 2020). Furthermore, ALTameemy et al. (2020) submit that e-assessments make "the concept of assessment on-demand achievable" (p. 127) because e-tests can be disseminated concurrently at different locations, which provides an opportunity to students wherever they live.

However, opponents of e-assessments argue that e-tests could never be as valid and reliable as PBTs. They submit that the results of e-tests would not show the real state of affairs when it comes to students' knowledge or point out their weaknesses and strengths (Stanković & Tatar, 2018). Moreover, Ilgaz and Afacan-Adanır (2020) argue that students who have poor IT skills may be at a disadvantage when taking e-assessments. Perhaps this is one reason why Butler and van Wyk (2021) state that "it is plausible that assessment methods may be testing abilities other than intended learning outcomes, resulting in unfair assessment practices" (p. 56). Other challenges related to e-assessments include technical issues and the fact that they may not be suitable for all kinds of assessments (Al-Tameemy et al., 2020). In line with this, Laborda and Royo (2009) submit that using e-assessments for testing language may sometimes not be suitable since, according to them, not all four language skills could possibly and reliably be tested via e-tests.

Blackboard in Education and Assessment

Blackboard is one of the most popular Learning Management Systems (LMSs) or Course Management Systems (CMSs). It is a "comprehensive technology platform for teaching, learning, and measuring learning outcomes" (Abduh, 2021, p. 3). It is increasingly being utilised by educational institutions around the world due to its ubiquity, ease of use, and accessibility. This application helps in making e-learning possible, motivating learners to get fully involved in online learning environments easily, and improving both synchronous and asynchronous interactions (Elshareif & Mohamed, 2021). Al-Oqaily et al. (2022) found that using Blackboard improves students' overall learning results, increases both motivation and efficiency, and instills positive attitudes towards the skills being learned.

Blackboard has communication features that enable teachers to create discussion forums, portfolios, wikis, blogs, and groups for student-student and student-teacher interactions. Other features of Blackboard include bulletin boards, chat rooms, Collaborate Ultra, emails, etc. (Al-Oqaily et al., 2022). It also has an e-assessment facility that supports a variety of question types (Al-Tameemy et al., 2020; Wongvorachan et al., 2022).

Previous Studies

Many studies have been conducted to investigate the impact of e-learning on the academic achievements and attitudes of EFL learners. For example, Patel et al. (2023) examined the use of online assessments in English for an educational development module for law students at the University of the Western Cape, South Africa. The study explored the benefits of using online tests to manage and enable learning in a large class setting. Participants in the study were 530 students who were asked 12 survey questions to determine the benefits and challenges they experienced while completing their online tests within a formative and reflective context. Results revealed that online assessments

helped the participants engage with learning materials, stay motivated, and test their own understanding of meaningful knowledge in the English language. They also make learning and its management easier for both the learners and educators, as well as accommodate different learning styles. Patel et al.'s study is different from the current study in terms of research design, location of the study, and characteristics of the participants.

Binnahedh (2022) examined both students' and teachers' perceptions about e-tests and their wash-back effects. Participants consisted of secondary school students ($n = 75$) and EFL teachers ($n = 41$) from the Al-Dawadmi directorate in Saudi Arabia. The data collection instruments used were students' and teachers' e-test perception questionnaires. Findings revealed moderate wash-back effects and a high level of students' perceptions towards e-tests. But teachers' perceptions proved to be below average. It was also found that e-tests were more accurate and faster than the PBTs. The only two similarities between Binnahedh's (2022) study and the current one were that both were conducted in Saudi Arabia and both focused on the effect of e-assessments on EFL learners. The differences between the two studies were striking. For example, while Binnahedh's study used male and female secondary students and teachers as participants, the current study used male prep year students only. Also, Binnahedh's participants were drawn from one region only, while participants for this study were from different regions in Saudi Arabia. Moreover, while Binnahedh used surveys only, the current study used multiple data collection instruments.

Andiappan et al. (2022) examined the effect of a vlogging project on the speaking performance of Malaysian ESL students' in a secondary school. It also investigated the students' experience and perception of making and using vlogs in their language learning. Using a mixed-methods approach, data were collected from 73 participants. A quasi-experiment was conducted to determine the effect of the vlogging project, while a questionnaire and a retrospective self-report were utilised to obtain the participants' views pertaining to their experience in creating vlogs. The findings revealed a statistically significant improvement in the ESL students' speaking scores. Additionally, the participants had positive attitudes towards the vlogging project and perceived it as a student-friendly learning tool, which could improve motivation and promote self-evaluation. Although Andiappan et al.'s study was different from the current one in terms of context and approach, the studies have some striking similarities in methodology because both were quasi-experimental and used a mixed-methods research design.

Mahmoudi-Dehaki et al. (2021) investigated the pedagogical effects of using two user-generated content platforms in e-learning, namely LMS and LXP, on the results of the Electronic Ministry of Health Language Examinations (E-MHLE) in Iran during the COVID-19 pandemic. The study used a sequential explanatory mixed-methods research design, and 272 participants, comprising digital natives and digital immigrants, were conveniently selected from a university of medical sciences. Data were collected via a knowledge test and focus group e-interviews and analysed using descriptive and inferential statistics. Findings showed that the LXP group outperformed the LMS group. Moreover, the digital natives obtained higher scores than the digital immigrants, but the difference was not significant. Mahmoudi-Dehaki et al.'s study had some striking resemblance to the current study. Both studies used a sequential explanatory mixed-methods research design and collected data using multiple tools. However, they were different in participants' characteristics, contexts, sampling procedure, and sampling size.

AlTameemy et al. (2020) explored the difficulties and opportunities of using Blackboard electronic tests to test writing skills. A questionnaire was used to collect data from 660 Saudi EFL learners at the Preparatory Year Deanship of Prince Sattam bin

Abdulaziz University. Findings revealed that most of the participants showed interest in using Blackboard for testing and had positive attitudes towards using e-assessments to test the English language. It was also found that testing writing skills via e-assessments was easy, effective, and efficient. Although the participants said that they did not face serious difficulties regarding the availability of devices and internet access, they reported experiencing some technical problems. ALTameemy et al.'s study was similar to the current study because both were conducted in Saudi Arabia and used prep year students as participants. However, there are some striking differences between them. For example, while ALTameemy et al. focused on using Blackboard for testing writing skills, the current study focused on using Blackboard for testing grammar and vocabulary. Regarding methodology, ALTameemy et al. used a quantitative method with a survey as the only data collection tool, while the current study used a mixed-methods research design with a knowledge test, surveys, and interviews as data collection instruments. Similarly, ALTameemy et al. used both male and female participants, while the current study used males only.

Huda et al. (2020) explored the impact of e-assessments from the perspective of students in higher education in Bangladesh. The study also investigated the potential challenges and benefits of using e-assessment methods, as well as the readiness of the students to adopt them. Participants were randomly selected from different universities in Dhaka, Bangladesh. Findings revealed that although the participants appreciated the importance of e-assessments, they had mixed reactions towards them. Huda et al.'s study was different from the current study in a number of ways. First, it was conducted using Bangladeshi undergraduate and graduate students. Second, it was a survey, and it used only one tool to collect data. Third, it used both male and female students as participants. Stanković and Tatar (2018) investigated the validity of e-testing by comparing the scores of a computer-based test (CBT) with those of a PBT. The study also surveyed students' personal opinions and measured their stress level before and after the tests. Participants ($n = 60$), whose knowledge of English ranged from A1 to B2, were drawn from two different universities in Serbia. The study was conducted in two parts.

In the first part (the experiment), a PBT and an e-test were given. In the second part, a single direct-method questionnaire was given to the participants immediately after they took the test. Descriptive statistics were used to analyse the data. Findings revealed that e-assessments were as valid as traditional PBTs. It was also found that while some participants felt comfortable and performed better in e-tests, others were more comfortable and did better in PBTs. The study also suggested that if "teachers are to respond to their students' needs, maybe the option of allowing students to choose which form of test they prefer should be considered" (p. 25). Although Stanković and Tatar's study had some striking resemblance with the current study in terms of design (both are experiments) and using multiple tools (both used a test and surveys), there were differences in the contexts of the studies, their main objectives, and in data analysis procedures. Likewise, Alsadoon (2017) explored the e-assessment perceptions of 55 undergraduate students at Saudi Electronic University. A survey was used to collect the data. The results were encouraging, as the participants showed positive perceptions of e-assessment and valued its features, such as immediate feedback and unbiased grading. Furthermore, many studies have been conducted to examine Saudi students' perceptions and attitudes towards the use of Blackboard. For example, Al-Oqaily et al. (2022) reviewed the quantitative and qualitative studies that investigated students' perceptions of Blackboard and its impact on their acquisition of English language skills.

The findings of most of the studies revealed that using Blackboard can increase both motivation and efficiency, improve students' overall results, and enhance their attitudes towards learning. The current study differs from Al-Oqaily et al.'s because it is an

empirical study. Alhumsi and Alshaye (2021) gauged the perceptions of students towards using Blackboard Collaborate in an EFL academic writing class. The study was quantitative, and an online survey was used to collect data from 248 male and female students at Saudi Electronic University. Using the Technology Acceptance Model (TAM) as a theoretical framework, the study found that all the constructs of the model were relatively strong and had positive relationships. The current study differed from Alhumsi and Alshaye's because it used a mixed-methods research design. Alqurashi (2005) examined students' attitudes towards using Blackboard for collaborative learning in a composition course. The study made a comparison between students who experienced face-to-face learning and others who used Blackboard for web-based learning. The study's findings did not reveal significant differences between the two groups. Alqurashi suggested that the possible reasons for this result were the low reliability of one of the measures adopted in the survey, technical obstacles, and the fact that collaborative learning was characterised as being a new technique.

METHODS AND DATA

Research Questions

This study aims to answer the following research questions (RQs). The first three are quantitative and the last one is qualitative.

RQ1: What are the differences between Saudi EFL learners who took e-assessments and their peers who took paper-based assessments in their academic achievements in a grammar and vocabulary test?

RQ2: What are the differences between Saudi EFL learners who took e-assessments and their peers who took paper-based assessments in their attitudes towards e-assessments?

RQ3: What are the differences between Saudi EFL learners who took e-assessments and their peers who took paper-based assessments in their attitudes towards using Blackboard for assessments?

RQ4: To what extent do the interview findings corroborate the quantitative results?

Research Problem

Although several researchers have investigated e-learning and blended learning, research studies on e-assessments and the attitudes of students towards it are few and far between, especially in Saudi Arabia and other Arab countries (Ayyoub & Jabali, 2021). Many of the available studies, such as Abduh (2021), Alruwais et al. (2016), Alruwais et al. (2018), etc., focused on teachers and academics rather than students. One study that explored the issue of e-assessments from the point of view of Saudi students is AlTameemy et al. (2020). However, its main objectives were to explore the difficulties and opportunities of using Blackboard as well as the attitudes of students towards it. It did not examine its impact on students' academic achievements. The current study, therefore, attempts to fill this gap. It investigates the effect of e-assessments on the achievements of EFL students and examines their attitudes towards e-assessments and using Blackboard for testing.

Research Design

This study adopted a mixed methods research design. The variant used was the sequential explanatory mixed-methods design. The rationale for using this design, according to McCrudden and Marchand (2020), is to effectively triangulate the data collected through various research tools and to overcome the potential bias resulting from using a single method or a single instrument. In the current study, quantitative

data, collected via a knowledge test and surveys, were subjected to descriptive and inferential statistics. Qualitative data, collected via semi-structured interviews, were subjected to thematic analysis and quantification. The aim was to have a better more robust understanding of the results (i.e., triangulation).

Participants

The study was conducted at JELPYI. Two intact classes were used as samples for the study. Each of the sections had 36 students. After the pre-test, the objectives and the procedure of the experiment were clearly explained to the participants and, based on the recommendation of Stanković and Tatar (2018), they were allowed to choose either the e-assessment section (i.e., the experimental group) or the paper-based section (i.e., the control group). Forty-two participants voluntarily opted for the experimental group, while thirty-four joined the control group. For the qualitative strand, random sampling technique was used to select 30% of the participants from both groups. Participation was voluntary and participants were allowed to withdraw from the experiment at any time without any penalties. Moreover, no reward of any kind was given to motivate the participants and confidentiality was maintained throughout the study.

Demographic data revealed that 100% of the participants were males between the ages of 18 and 22, with 20 as their mean age. All of them had Arabic as their first language and they were from different regions of Saudi Arabia. Regarding their ICT skills, 72% of the participants assessed themselves as average or advanced. Only 12% reported having low ICT skills. Regarding L2 competence, all the participants were A2 on CEFR scale and they spoke little to no English outside the English classroom. Considering their age and their ICT skills, they could be classified as digital natives (Mahmoudi-Dehaki et al., 2021; Prensky, 2001a; van Dijk, 2020).

Procedures

The study was conducted in five stages. The researcher obtained relevant permissions from the management of the institute and the informed consent of the participants prior to the commencement of the study. In the first stage, a paper-based knowledge test was given to all the participants as a pre-test. The aim of this was to establish the homogeneity of the groups prior to the experiment. In the second stage, the participants were grouped into experimental and control groups according to their preferences. In the third stage, the experiment was conducted. At this stage, the participants underwent an 8-week long treatment in which the experimental group studied 14 hours of integrated English skills, 3 hours of grammar, 3 hours of vocabulary, and one eLearning hour a week. During the eLearning hour, grammar and vocabulary exercises, worksheets, and reviews were given to them via Blackboard. On the other hand, the control group that opted for PBTs studied 14 hours of integrated English skills, 3 hours of grammar, 3 hours of vocabulary, but had no eLearning hour. Instead, they had an hour a week for the same type of vocabulary and grammar exercises, worksheets, and reviews in the print format. In the fourth stage, participants in both groups filled out the surveys.

In the last stage, 30% ($n=23$) of them were randomly selected for the semi-structured interviews (the qualitative component of the study). The same teacher and the same resources (Clanfield et al., 2021 *Cambridge Evolve 2*; Davis & Rimmer, 2011 *Cambridge Active Grammar 1*; and Gairns et al., 2008 *Oxford Word Skills*) were used for teaching both groups. The rationale for using the same teacher, contents, contexts, and conditions was to ensure that some intervening variables did not affect the outcome of the study.

Instruments

Being a mixed methods research study, both quantitative and qualitative data were collected. The quantitative data were collected through three tools, namely Grammar and Vocabulary Test (GVT), Attitudes Towards e-Assessments (ATeA) survey, and Attitudes Towards Blackboard (ATB) survey. The qualitative data were collected via semi-structured interviews. The main reason for using both quantitative and qualitative data collection tools was to enhance the overall design of the study and to “boost the validity and dependability of the data” (Zohrabi, 2013, p. 2).

Grammar and Vocabulary Test (GVT)

This was a knowledge test taken as pre- and post-tests by all the participants. It consisted of 50 multiple-choice items with 25 grammar questions and 25 vocabulary questions. The questions were generated from Cambridge Test Generator Application for *Evolve 2*. Grammar topics covered included present simple, present continuous, subject and object pronouns, simple past, quantifiers, relative pronouns, comparative and superlative adjectives, as well as present perfect tense. As for vocabulary, the topics included personality adjectives, collocations with make and do, sports and exercising, opinions and feelings, money and shopping, naming and describing food, traveling and transportation, jobs, health problems, internet phrases, social media verbs, weather, landscapes, and cityscapes. The pre-test was conducted a week prior to the experiment, while the post-test was done in the last week of the experiment. The pre-test was paper-based, but the post-test was electronic for the experimental group and paper-based for the control group.

Attitudes Towards e-Assessments Survey (ATeAS)

This is a structured (or closed-ended) questionnaire originally compiled and used by Huda et al. (2020) to measure the e-assessment perspectives and attitudes of 200 randomly selected Bangladeshi undergraduate and post-graduate students. The original survey consisted of 27 statements on a 5-point Likert scale. The statements were related to 6 different sets of factors - affective factors (5 statements), validity (5 statements), practicality (5 statements), reliability (4 statements), security (3 statements), and teaching and learning (5 statements).

For the current study, only 14 statements from the original survey were taken and slightly modified to make them more suitable. Out of that, 5 items were related to the affective component, 2 items related to the issue of validity, 2 related to the issue of practicality, 3 items were related to reliability, and 2 items related to the issue of security of assessments. The statements were arranged on a five-point Likert-scale, ranging from 1 (Strongly Agree) to 5 (Strongly Disagree). Participants were required to express the extent to which they agreed or disagreed with each statement. They could also choose to be neutral if they had no opinions. The survey was translated to Arabic to help the participants have a better understanding of the statements. It took the participants approximately 10 minutes to complete the survey.

Attitudes Towards Blackboard Survey (ATBS)

This is a structured (or closed-ended) questionnaire originally compiled and used by AlTameemy et al. (2020) to explore the difficulties and opportunities of using Blackboard for taking assessments. The original survey had two parts. The first part included demographic information of the respondents including gender, age, ICT knowledge and skills, and frequency of using Blackboard for taking writing tests. The second part consisted of three sections. The first section consisted of 7 statements related to the students' beliefs towards using Blackboard in testing writing. The second section

consisted of 7 statements related to the students' perceptions about using Blackboard in testing writing. The third section consisted of 7 statements related to the difficulties of e-assessments.

For the current study, only 6 statements were selected from the original survey. Out of that, 3 were related to students' beliefs about Blackboard, 2 related to the effectiveness of Blackboard as a testing tool, and 1 statement was related to the difficulty of using Blackboard. The selected items were slightly modified to make them suitable and relevant to the goals and objectives of this study. The statements were arranged on a five-point Likert-scale, ranging from 1 (Strongly Agree) to 5 (Strongly Disagree). Participants were required to express the extent to which they agreed or disagreed with each statement. They could also choose to be neutral if they wished. This survey was also translated to Arabic to help the participants have a better understanding of the statements. It took the participants approximately 5 minutes to complete the survey.

Semi-structured Interview

In this study, data from the interview were used to triangulate the quantitative findings and answer the mixed methods research question. During the face-to-face interviews, participants were asked to clarify or expand their answers by giving examples or evidence to ensure the data collected were as valid as possible. Likewise, to guarantee that the respondents properly understood the questions and that they were not incapacitated by a linguistic barrier, the interviews were conducted in Arabic. For the sake of anonymity, a coding system was used to refer to the respondents.

The interview consisted of 7 questions related to the students' beliefs about e-assessments in general, their perceptions about using Blackboard for testing in particular, and their rationale for preferring e-tests to PBTs or vice versa. During the interview, the respondents gave more in-depth information about their perceptions and attitudes. These data helped in triangulating the findings from the test and the surveys.

Validity, Reliability, and Piloting of the Research Instruments

The data collection tools used in this study were validated and piloted before being used for the main study. They were presented to a panel of experts to establish their validity. The feedback given by the experts was incorporated in finalizing the tools. Similarly, the experts checked the interview questions for credibility and dependability.

The tools were also pilot-tested prior to the main study. Both ATeA and ATB surveys were piloted on a group of 30 Saudi prep year EFL students who did not participate in the main study. Using the SPSS, the Cronbach's Alpha internal consistency reliability of .82 (for ATeA) and .73 (for ATB) were found. As can be seen in Table 1, the alphas in the main study rose to .85 and .88 respectively and these, according to Binnahedh (2022), were acceptable reliability measures.

Table 1. *Alpha Reliability of Pilot and Main Study*

Instrument	No. of Pilot Study Items	of No. of Main Study Items	Cronbach's Alpha	
			Pilot Study (n = 30)	Main Study (n = 72)
Attitude Towards e-Assessment Survey	14	14	.82	.85
Attitudes Towards Blackboard Survey	6	6	.73	.88

DATA ANALYSIS AND RESULTS

Results

Being a mixed methods research study, both quantitative and qualitative data were collected and analyzed. The quantitative data were collected via a test and surveys and analyzed using descriptive and inferential statistics. The qualitative data were collected via semi-structured interviews and thematically analyzed.

Results of Research Question 1

To answer RQ1, a hypothesis that, *EFL learners who used e-assessments will have higher academic achievements in a grammar and vocabulary test than those who used paper-based assessments*, was formed. The data used for testing this hypothesis were collected through the GVT conducted as a pre- and post-test. Data from the test were subjected to independent and paired samples *t*-tests.

To find out if there were pre-existing differences between the groups in their grammar and vocabulary skills prior to the treatment, an independent samples *t*-test was conducted. Assumptions of normality and homogeneity of variances were tested and satisfied. Having met those assumptions, the test was carried out and its result revealed no statistically significant pre-existing differences between the two groups, $t(74) = 1.389$, $p = .169$, as can be seen in Table 2. Even though descriptive statistics showed that the mean of the experimental group was almost 2.3 points higher than that of the control group, the difference could be attributed to chance, as it was not statistically significant. Looking at the standard deviations, it was clear that although they were not exactly equal, they were close enough to assume equal variances. Based on this finding, the null hypothesis was accepted and it was concluded that the two groups were academically homogeneous.

Table 2. Results of the Independent Samples *t*-test on the Pre-Test

Source of Variance	Group	N	Mean	SD	t	df	Sig.(2 tailed)
Pre-Test Scores	Experimental	42	28.90	7.397	1.389	74	.169
	Control	34	26.61	6.804			

Secondly, the pre- and post-test scores of the participants within each group needed to be matched to see if there were gains or losses in the aftermath of the treatment. Therefore, a paired samples *t*-test was done for each group. For the experimental group, the results revealed a statistically significant difference between their pre- and post-test scores, $t(41) = -4.920$, $p = .001$, as shown in Table 3. The post-test mean was 7.6 points higher than that of the pre-test. The standard deviations revealed a slightly higher variability in the pre-test scores. As for the control group, there was no statistically significant difference between the pre- and post-test scores, $t(33) = .569$, $p = .573$. The 0.7 points difference could not have been real, as it was not statistically significant. In summary, the paired samples *t*-tests showed that, while the experimental group gained 7.6 and had statistically significant difference between the pre- and post-tests, the control group gained only 0.7 points and had a statistically insignificant difference.

Table 3. Paired Samples Test on Pre- and Post-tests

Group	Source of Variance	Mean	SD	t	df	Sig. (2-tailed)
Experimental Group	Pre_Test	28.9	7.397	-4.920	41	.001
	Post_Test	36.54	6.981			
Control Group	Pre_Test	25.91	6.832	.569	33	.573
	Post_Test	26.61	6.804			

Having established that the two groups were almost similar prior to the experiment, another independent samples *t*-test was run to compare their mean scores in the post-test. The result showed that the experimental group had a statistically significantly higher post-test mean than the control group, $t(74) = 6.235$, $p = .001$, as shown in Table 4. Since the significance value (.001) was lower than the critical value (.05), the null hypothesis was rejected and it was concluded that there were some differences between the two groups. The experimental group participants outperformed those in the control group by almost 10 points, indicating that the e-assessment intervention has had a positive effect on their academic achievements. Specifically, this shows that taking assessments on Blackboard did help the participants improve their scores.

Table 4. Results of the Independent Samples *t*-test on the Post-test

Group	Source of Variance	Mean	SD	t	df	Sig. (2-tailed)
Experimental Group	Post_Test	36.54	6.981	6.235	74	.001
Control Group		26.61	6.804			

Results of Research Question 2

The data to answer RQ2 were collected through the e-assessment survey. Descriptive statistics were used to answer this question. To compute the results, ‘strongly agree’ and ‘agree’ percentages were combined to represent the degree of agreement, while ‘strongly disagree’ and ‘disagree’ were combined to represent the degree of disagreement.

As shown in Table 5, 79% of the participants in the experimental group said they did not feel comfortable taking PBTs. Only 10% of them felt comfortable with it and 12% had neutral opinions. To reiterate this, 96% of them rejected the idea that e-assessments were not suitable for them and 64% of them claimed that they were more comfortable taking online tests than PBTs. Likewise, 84% of them preferred online assessments; 58% believed that online assessments were more reliable than PBTs; and 72% of them said that PBTs were not as secure as online assessments. Problems often associated with online assessments were downplayed by the participants. For example, only 7% of them agreed that e-assessments were stressful and only 12% believed that they could adversely affect their concentration. Likewise, only 17% of them said technical problems might hinder their performance in e-assessments. On the other hand, 79% of participants agreed that online assessments were fairer and more objective than PBTs and 66% of them agreed that teachers were likely to make mistakes in marking PBTs.

Table 5. *Frequency Distribution for Experimental Group's Attitudes towards e-Assessments*

Statements	SA		A		N		D		SD	
	F	%	F	%	F	%	F	%	F	%
I feel more comfortable taking assessment on a paper than online.	2	5%	2	5%	5	12%	18	43%	15	36%
Using a computer adds to the stress of the assessment.	1	2%	2	5%	1	2%	18	43%	20	48%
Online assessments are not suitable for me.	1	2%	1	2%	0	0%	20	48%	20	48%
I feel more comfortable taking assessment online than on a paper.	5	12%	22	52%	3	7%	1	2%	1	2%
It is hard for me to concentrate when taking online exams.	3	7%	2	5%	15	36%	12	29%	10	24%
I feel that online exams are unfair because they do not only test my knowledge, but my IT skills as well.	2	5%	3	7%	20	48%	7	17%	10	24%
It is easier to guess answers in an online assessments.	1	2%	4	10%	22	52%	5	12%	10	24%
Online assessments are better and easier to do because pens and papers are not needed.	20	48%	15	36%	0	0%	4	10%	3	7%
I don't like taking online assessments because of technical problems.	20	48%	10	24%	5	12%	5	12%	2	5%
The results of online assessments are more accurate and reliable because computers don't make mistakes and you can get results instantly.	15	36%	22	52%	1	2%	2	5%	2	5%
Paper-based assessments are fairer than online assessments.	3	7%	3	7%	3	7%	18	43%	15	36%
It is easier to cheat in a paper-based assessment than in an online assessment.	20	48%	16	38%	5	12%	1	2%	0	0%
Paper-based assessments are less secure than online assessments.	15	36%	15	36%	10	24%	1	2%	0	0%

Teachers might make mistakes in marking paper-based assessments. 22 52% 6 14% 10 24% 2 5% 2 5%

Table 6. *Frequency Distribution for Control Group's Attitudes towards e-Assessments*

Statements	SA		A		N		D		SD	
	F	%	F	%	F	%	F	%	F	%
I feel more comfortable taking assessment on a paper than online.	20	59%	13	38%	0	0%	1	3%	0	0%
Using a computer adds to the stress of the assessment.	15	44%	15	44%	1	3%	2	6%	1	3%
Online assessments are not suitable for me.	11	32%	20	59%	1	3%	1	3%	1	3%
I feel more comfortable taking assessment online than on a paper.	1	3%	1	3%	2	6%	10	29%	20	59%
It is hard for me to concentrate when taking online exams.	14	41%	10	29%	0	0%	6	18%	4	12%
I feel that online exams are unfair because they do not only test my knowledge, but my IT skills as well.	18	53%	12	35%	2	6%	5	15%	5	15%
It is easier to guess answers in an online assessments.	16	47%	14	41%	0	0%	2	6%	2	6%
Online assessments are better and easier to do because pens and papers are not needed.	1	3%	3	9%	0	0%	20	59%	10	29%
I don't like taking online assessments because of technical problems.	22	65%	10	29%	0	0%	14	3%	1	3%
The results of online assessments are more accurate and reliable because computers don't make mistakes and you can get results instantly.	3	9%	3	9%	2	6%	16	47%	10	29%
Paper-based assessments are fairer than online assessments.	19	56%	14	41%	0	0%	1	3%	0	0%

It is easier to cheat in a paper-based assessment than in an online assessment.	0	0%	2	6%	7	21%	15	44%	10	29%
Paper-based assessments are less secure than online assessments.	2	6%	2	6%	0	0%	10	29%	20	59%
Teachers might make mistakes in marking paper-based assessments.	2	6%	3	9%	3	9%	$\frac{16}{2}$	47%	10	29%

As shown in Table 6, 97% of the participants in the control group reported that they felt more comfortable taking PBTs than e-assessments. Only 3% of them were more comfortable with online assessments. To reiterate this, 91% of them accepted the idea that online assessments were not suitable for them and 88% of them claimed that they were more comfortable with PBTs. Likewise, 88% participants reported their preference for PBTs and between 76% and 88% agreed that online assessments were less reliable and less secure than PBTs. Similarly, 73% of them dismissed the claim that PBTs were more susceptible to cheating and 76% disagreed that teachers were likely to make mistakes in marking them. Most of the control group participants reported that online assessments were stressful (88%), hard to concentrate in them (70%), test both knowledge and IT skills (88%), and are prone to technical problems (94%). Overall, findings from the surveys showed that while the experimental group participants had favorable attitudes towards e-assessments, those in the control group exhibited negative attitudes towards them.

Results of Research Question 3

The data to answer RQ3 were collected through the Blackboard attitudes survey. Descriptive statistics were used to answer this research question. To compute the results, 'strongly agree' and 'agree' percentages were combined to represent the degree of agreement and 'strongly disagree' and 'disagree' were combined to represent the degree of disagreement.

Table 7. Frequency Distribution for Experimental Group's Attitudes towards Blackboard

Statements	SA		A		N		D		SD	
	F	%	F	%	F	%	F	%	F	%
The tests used in Blackboard are clear to understand.	18	43%	20	48%	2	5%	1	2%	1	2%
Doing tests through Blackboard is time-consuming.	10	24%	4	10%	3	7%	15	36%	10	24%
Using Blackboard increases my study productivity.	22	52%	8	19%	9	21%	1	2%	2	5%

I find it easy to use Blackboard for my assessments.	18	43%	15	36%	6	14%	2	5%	1	2%
Using Blackboard to take assessments affects my grades negatively.	2	5%	1	2%	13	31%	15	36%	11	26%
The instructions provided on Blackboard are difficult to follow.	3	7%	2	5%	27	64%	6	14%	4	10%

Table 7 displays the findings related with the attitudes of the experimental participants towards using Blackboard as a testing tool. Up to 91% of them expressed positive attitudes towards it; 79% agreed it was easy to use; and 71% of them believed that it increased their productivity. Only 34% complained that Blackboard assessments were time-consuming and 7% believed that taking tests on Blackboard negatively affected their grades.

Table 8. Frequency Distribution for Control Group's Attitudes towards Blackboard

Statements	SA		A		N		D		SD	
	F	%	F	%	F	%	F	%	F	%
The tests used in Blackboard are clear to understand.	1	3%	6	18%	1	3%	20	59%	6	8%
Doing tests through Blackboard is time-consuming.	12	35%	18	53%	0	0%	2	6%	2	6%
Using Blackboard increases my study productivity.	2	6%	1	3%	1	3%	12	35%	18	53%
I find it easy to use Blackboard for my assessments.	6	18%	2	6%	0	0%	12	35%	14	41%
Using Blackboard to take assessments affects my grades negatively.	20	59%	11	32%	0	0%	1	3%	2	6%
The instructions provided on Blackboard are difficult to follow.	16	18%	15	44%	0	0%	3	9%	0	0%

Table 8 displays the attitudes of the control group participants towards using Blackboard as a testing tool. 67% of them expressed negative attitudes towards it; 76% said it was not easy to use; and 91% believed it was incapable of increasing their productivity. Also, 88% participants said that Blackboard assessments were time-consuming and 91% of them agreed that the instructions on Blackboard were hard to follow. Overall, the findings from this survey reveal that the perceptions of the experimental group participants towards using Blackboard was positive, while the control group participants had negative attitudes towards it.

Results of Research Question 4

The interviews were conducted on 23 randomly selected participants from both groups. The findings were thematically analyzed and discussed. To analyze the interview data, they were transformed through “the process of quantizing” or quantification so that they could be processed statistically (Caracelli & Greene 1993; Dörnyei, 2007). Quantification is used in research studies to increase reliability and decrease bias (Yildirim & Simsek, 2011; Sandelowski et al., 2009). Five themes were identified, namely ‘*technical issues related to e-assessment,*’ ‘*need for ICT knowledge,*’ ‘*eLearning stress and anxiety,*’ ‘*lack of human support,*’ and ‘*Blackboard as an assessment tool.*’

Table 9 presents the thematic analyses of the interview responses of the experimental group respondents. 92% of them were in favor of using Blackboard for taking assessments. Only 17% of them complained about the technical issues associated with e-assessments and the need for students to have some basic ICT knowledge to take e-assessments. Moreover, only 33% felt that lack of human support system in e-assessments could pose problems for test takers. Regarding stress and anxiety, although 25% of them confessed to feeling stressed and anxious during e-assessments, majority of them downplayed it. In particular, Participant 7 said that, “*Stress and anxiety are not only felt in e-assessments. Students get stressed and anxious whether they are taking assessments online or paper-based.*”

Table 9. *Frequency Distribution for Experimental Group’s Interview Responses*

Themes	Frequency	Percentage
Technical problems	2	17%
Need for ICT knowledge	2	17%
eLearning stress and anxiety	3	25%
Lack of human support	4	33%
Blackboard as a good tool for assessments	11	92%

Table 10 presents a thematic analysis of the interview responses of the control group respondents. Up to 82% of them said they preferred taking PBTs to avoid technical issues often associated with e-assessments. Also, 92% of them complained that they felt more anxious and nervous when taking e-assessments. For example, Participant 1 said that, “*Personally, although I have good ICT skills, I get very nervous during e-assessments and this affects my scores negatively. For example, all my scores during the Covid-19 online classes were terrible.*” Likewise, 73% of the participants revealed that e-assessments were not as fair as PBTs because they test both knowledge acquisition and ICT skills. In addition, 64% complained of lack of human support when taking e-assessments. Regarding the use of Blackboard for assessments, 82% of the participants expressed negative experiences about it and only 18% supported it.

Table 10. *Frequency Distribution for Control Group’s Interview Responses*

Themes	Frequency	Percentage
Technical problems	9	82%
Need for ICT knowledge	8	73%
eLearning stress and anxiety	9	82%
Lack of human support	7	64%
Blackboard as a good tool for assessments	2	18%

Overall, the experimental group participants exhibited positive dispositions towards e-assessments and the Blackboard, which triangulates the findings from their surveys. Conversely, the control group participants exhibited negative dispositions about e-assessments and Blackboard, which also triangulates the findings from their surveys. In a nutshell, the fact that the experimental group participants expressed more favourable writing attitudes than those in the control group agrees with the quantitative finding and, therefore, answers the mixed methods research question, which asks if the interview data complemented and expanded the quantitative findings.

DISCUSSION OF FINDINGS

Discussion of Research Question 1

The finding of the first research question showed that the experimental group participants outperformed those in the control group in the post-test by almost 10 points, and the difference was statistically significant, $t(74) = 6.235, p = .001$. Although some researchers argue that other reasons, such as guessing (Stanković & Tatar, 2018) or cheating and plagiarism (Kocdar et al., 2018), sometimes account for the superior performance of e-test takers, research has revealed that students generally show better academic performance on digital platforms than on traditional ones (Paudel, 2021; Shehzadi et al., 2020).

This result parallels other studies that found that students tend to perform better in e-assessments than in PBTs. These studies include Akram et al. (2021), Ali and Dmour (2021), Mahmoudi-Dehaki et al. (2021), Paudel (2021), Shehzadi et al. (2020), Kademi (2022), and Kusada et al. (2023). Most of these studies have found that digital technology plays a critical role in meeting the needs of learners, making the learning process more exciting, keeping learners motivated, enhancing their academic performance, and improving teachers’ pedagogical competencies (Akram et al., 2021). However, there are some counter-findings in the literature. For example, Azmi and Khoshaim (2021) found a statistically significant difference between auto-graded and manually graded exams in favour of manual grading, thus underscoring the importance of traditional testing and grading methods.

Discussion of Research Question 2

The findings of the second research question showed that while the participants in the experimental group had favourable attitudes towards e-assessments, those in the control group exhibited negative attitudes. This is not an unusual finding because, according to Huda et al. (2020), many students exhibit mixed reactions towards e-assessments. Consequently, it is normal for some participants to feel comfortable and perform better on e-tests, while others feel more comfortable and do better on PBTs (Stanković & Tatar, 2018). This finding is in congruence with other studies. For example, Kundu and Bej (2021) found that students’ overall perception of e-assessments was moderately high. Similarly, Tashkandi (2021) revealed that Saudi students had favourable attitudes

towards e-learning and felt somewhat comfortable with it. Other studies, such as those by Alsadoon (2017), Ayyoub and Jabali (2021), Binnahedh (2022), Patel et al. (2023), and Kusada et al. (2023), also found that students had a high level of perceptions towards e-tests.

Discussion of Research Question 3

The findings of the third research question showed that the attitudes of the experimental group participants towards using Blackboard were positive, while those of the control group participants were negative, thus revealing mixed reactions. This is also not an unexpected finding because technology-competent students usually prefer e-learning, while those with poor IT skills or technology anxiety often prefer other traditional methods of assessment. This finding is in harmony with those of Alhumsy and Alshaye (2021) and ALTameemy et al. (2020), who found that the majority of Saudi EFL students showed interest in using Blackboard for testing and had positive attitudes towards using e-assessments in testing the English language. Moreover, AlShaikh (2020) and Kademi (2022) have found that digital natives prefer using technology because it suits their way of learning. However, Alqurashi's (2005) study did not find any significant differences between students who used Blackboard and those who did not.

Discussion of Research Question 4

The findings of the fourth research question showed that the experimental group participants exhibited positive dispositions towards e-assessments and the use of Blackboard for assessments, which triangulates the findings from the surveys. Conversely, the control group participants exhibited negative dispositions towards e-assessments and the use of Blackboard for assessments, which also triangulates the findings from the surveys.

CONCLUSION

This study examined the impact of e-assessments on the academic achievements of Saudi EFL learners. It also investigated their attitudes towards e-assessments and using Blackboard for testing. The study used a sequential explanatory mixed-methods research design and collected quantitative data through a knowledge test and two surveys and qualitative data via semi-structured interviews. The participants were divided into the experimental group and the control group. Descriptive and inferential statistics, as well as thematic analysis, were used to analyse the data.

From the study, the following findings were drawn: First, the experimental group had a statistically significantly higher mean score in the post-test than the control group. Second, participants in the experimental group had more favourable attitudes towards e-assessments than the control group participants. Third, the attitudes of the experimental group participants towards using Blackboard were more positive than those of the control group participants. Fourth, the qualitative findings corroborated the quantitative ones. Based on the results of this study, it could be concluded that taking assessments via Blackboard improved the academic achievements of EFL learners. This is a very interesting finding, as it reveals that to effectively teach 21st century learners, it is almost inevitable to use some forms of technology.

However, the study had some limitations pertaining to its modest sample size, research tools, and research design. First, due to limited time and resources, a small sample size ($n = 72$) was used. This sample constituted only 24% of the population of Saudi EFL students at JELPYI during the 2022–2023 academic session. A further research study with a higher number of participants would provide more reliable and representative findings. The second limitation relates to the duration of the study. The

data were collected in one semester only. A further study, which would collect longitudinal data, is likely to give a more accurate assessment of the situation. The third limitation relates to the source of the data. This study collected data from students only. A future study that collects data from both students and teachers is likely to yield more robust findings and a better understanding of the situation.

IMPLICATIONS AND RECOMMENDATIONS

The findings of this study are significant in a number of ways. First, theoretically, it has contributed to the body of literature in the field of e-assessments and the debate between computer-based tests (CBTs) and paper-based tests (PBTs). It has also been demonstrated that electronic assessments help in improving academic achievements and enhancing attitudes towards e-learning in general and e-assessments in particular.

The following recommendations are made for educational policymakers and teachers. First, educational administrators should make provision for using technology in the classroom due to its immense pedagogical benefits. Second, teachers should utilise available technologies in their teaching to meet the expectations of their digital native students.

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