

Perceptions of E-Assessment Among Saudi Arabian Students of Higher Education

Abdulmajid Alsaadoun
College of Education, Al Baha University, Saudi Arabia

Abstract

The aim of the current research paper is to examine Saudi Arabian university students' perceptions of electronic assessment (e-assessment) and what variables affected these perceptions. The study followed a descriptive design in which an online questionnaire instrument was used to collect data from the participants, 196 undergraduate students. The results show that most of the students have high positive perceptions of e-assessment. Furthermore, the results show that the participants' gender, level of study, major, and GPA may influence their perceptions of e-assessment. Based on the results, a set of recommendations is presented.

Keywords: Electronic assessment, Perceptions, Saudi Arabia, University students

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1. Introduction

Information and communication technologies (ICT) provided significant assistance to educators (Alruwais, Mills, & Wald, 2018). The implementation of ICT as a means of assessing students' learning is common in higher education settings, and educators should accept the changes associated with the emergence of new technologies and their applications in academic practice in order to keep pace with the times.

Even as new ways of educating students evolve, it is important to continue to systematically implement assessment. Various forms of assessment, including but not limited to multiple-choice questions, short and long essays, and multiple response questions, can be offered electronically.. E-assessments in the form of online tests are now springing up due to demand and global changes at higher education *institutions* caused by Covid 19 pandemic. However, learners' perceptions and acceptance of e-assessment have not been widely studied in developing countries (Adanır et al., 2020).

Many research studies propped the benefits of using e-assessment for students, teachers and educational institutions. Researchers argue that e-assessment helps students who live in remote regions to take the required exam in their homes. They also believe that e-assessment enables teachers to correct the exam and release students' grades in a short time. In this regard, e-assessment reduces the teacher's time and effort in assessing a large number of students. For this reason, many higher educational institutions developed accurate, secure and fast methods to reduce the cost of assessing students (Alruwais, Mills, & Wald, 2018).

Instructors need to understand their students' perspective when assessing their efforts, especially with the emergence of e-assessment. Understanding the students' perspective helps instructors to better perceive the situation and thereby help students overcome any obstacles that may come with this new tool. For instance, knowing the students' perceptions would not just solve institutional problems such as the desire for better academic outcomes or increased productivity, but would also be a more effective means to process understanding as well as to improve and develop the institutions' educational practice.

The role of educators in the use of e-assessment is very comprehensive. To generalize this role, instructors need to facilitate the activities that the students are required to do. This includes tracking and analyzing student performance and finding misconceptions in the students' learning (Gikandi, Morrow, & Davis, 2011). In these activities, better communication between students and educators and among students is needed. For example, educators are required to facilitate the chat rooms made available for an online learning scenario in order to ease communication within the student body (Alsadoon, 2017). It is also the educators' responsibility to learn how to grade group projects and how to engage with the students (Ridgway, McCusker, & Pead, 2004). Furthermore, educators need to adapt to this new form of assessment using the technology available to instructors and students. Being flexible and lenient in relation to assessment is one of the keys to success for educators to help the students (Fontanillas, Carbonell, & Catás, 2016). Training about how to integrate e-assessment in educators' educational practice should be available (Alruwais, Mills, & Wald, 2018).

Educators have both negative and positive perspectives of e-assessment (Yoestara et al., 2020). Previous studies showed that some educators have a negative view of e-assessment due to lack of electricity, poor internet connectivity, and insufficient training and skills with technology (Khadka et al., 2020). According to a study conducted by Khan and Khan (2019), positive consideration of e-assessment increases in both instructors and students when they undergo training on how to use e-assessments. Training programs implemented by governments to improve e-assessment design have the potential to solve obstacles faced by both educators and students.

One of the problems inherent to the educators' point of view is grading group work (Alruwais, Mills, & Wald, 2018). Instructors have deemed this difficult due to its technical side, but progress is being made. One solution is the Self Peer Assessment Resource Kit (SPARK), a web-based template that effectively grades group work. SPARK is designed for use in subjects that develop students' capacity to work within a team and to reflect on their teamwork skills. It includes two separate interfaces, one for instructors and one for students. The instructors' interface shows the sequence of processes needed to go through the assessment setting. The students' interface helps them understand the process and submit their assessments.

Technological innovations have affected every industry, and the education sector has not been left behind. For the last two decades, learning institutions worldwide have embraced online learning platforms that have made it possible for people to study from any place at any time and allowed students to partake in assessments when they fall due. Some notable innovations that have facilitated e-assessments include Google Forms, interactive apps, and the Blackboard platform. According to Joshi et al. (2020), the Blackboard platform was developed in 1997 to facilitate online learning. Its main objective was to be user-friendly and to allow instructors to share learning materials online with their students. Some of the notable benefits of the Blackboard e-assessment platform, according to Khan and Khan (2019), include its ease of availability, quick feedback, user tracking, and enhanced communication. Despite these benefits, the platform has its share of drawbacks. For instance, the functionality of some Blackboard features depends on the operating system used. The platform is costly due to its high demand. Additional costs relate to the need to use the Internet to access it. Some users also find that the platform is not user-friendly. Nonetheless, Blackboard's benefits outnumber its disadvantages.

However, some learning institutions opt to use Google Forms. Besides being free, Google Forms are user-friendly and easy to share (Jazil et al., 2020). They are suitable for simple quizzes, and they allow instructors to convey the results with ease. With increasing innovation, the number of e-assessment platforms continues to grow. Others include assessment systems for context-rich short-answer questions, clickers, remote assessment via video evaluation, objective structured video exams, and video-based communication assessment. The choice of an online platform depends on cost, support and other services, ease of authentication, and ease of installation.

Another notable platform that has increasingly been used by institutions to facilitate online learning is Microsoft Teams. Different scholars have explored the effectiveness of Microsoft Teams in online assessments. For instance, Torres-Madroñero et al. (2020) observed that it was appropriate for text-based learning and multiple text questions. In addition, when Wea and Dua Kuki (2021) explored the application of Microsoft Teams in online assessments and students' perceptions of it, they found that Microsoft Teams helped instructors evaluate learners' enthusiasm about learning. It also helped learners to share challenges with their instructors, contributing to positive perception of the platform. According to Peytcheva-Forsyth and Aleksieva (2021), Microsoft Teams made it easier for instructors to administer tests. In their view, students perceived this positively since it allowed them to continue with their studies during the COVID-19 pandemic.

The emergence of COVID-19 as a global pandemic has had a huge effect on all aspects of educational practice. One of these aspects is evaluating students' learning. E-assessment has become the major alternative to traditional assessment, and its use has become mandatory. However, use of this relatively new form of assessment must be accompanied by assessment of stakeholders' perceptions. Therefore, students' perceptions of the use of e-assessment should be examined. The current study aims to examine perceptions of e-assessment of students at a university in Saudi Arabia. In addition, the study aims to examine the effect of some variables on students' perceptions of e-assessment.

2. Literature Review

2.1 Students' Perceptions of E-assessment

Online tests, as one of the most common forms of e-assessment, have gained educators' attention. Educators, according to Ilgaz and Adanir (2020), consider online tests more reliable and efficient than the traditional pen and paper ones. However, according to Khan and Khan (2019), students do not appreciate the significance of e-assessments and prefer more traditional forms. Unlike the results of Khan and Khan (2019), however, some studies have shown that most students prefer e-assessments (Elmehdi & Ibrahim, 2019). Therefore, students' preference for online tests varies. For instance, some students prefer online assessments because of their personalized and prompt grading, but others may not appreciate timely grading, especially if they are poor performers (Khan & Khan, 2019).

While the principles of tests in an online environment are not significantly different from the traditional system (Alsadoon, 2017), a difference between online assessments and traditional assessments relates to the higher need for online learners to study independently and obtain learning materials and to take a more active role in their own assessment (Fontanillas, Carbonell, & Catásus, 2016). However, as Khan and Khan (2019) pointed out, online learners often fail to recognize this difference and the need for greater engagement on their part. As a result, they misinterpret online assessments as restrictive, resulting in lower grades. Khan and Khan (2019) further noted that students often perform poorly even when they are more involved. In their view,

students take traditional examinations more seriously than online assessments, which explains their higher performance on them.

Various challenges can arise in the attempts to successfully implement e-assessment, but there are also ways to meet those challenges. Although students are responsible for familiarizing themselves with the technological aspect of things so they can better participate in e-assessment (Alruwais, Mills, & Wald, 2018), there are also, in their perspective, security, validity, and fairness issues (Shraim, 2019). Some negative views on e-assessment are shared by both teachers and students, such as lack of internet access, lack of electricity, poor connectivity, and lack of training and skills with technology (Khadka et al., 2020). Technical challenges play a huge role in influencing a student's perception of e-assessment (Tahir et al., 2019), and students' comfort level when using computers has a significant and positive impact on the perception of e-assessments (Albanna & Abu-Safe, 2019).. A study by Khan and Khan (2019) showed that training on how to use e-assessments provided increased instructors and students' positive perspectives and feedback. Successful implementation of e-assessment also depends on the system being reliable, valid, secure, and flexible (Shraim, 2019). While most students have access to technology and the internet, there are still poor countries which lack electricity, have no access to the internet, and have a lack of technological resources which makes them unable to implement e-assessments (Osugi, 2012). Therefore, it is the responsibility of the government and educational institutions to initiate efforts to provide these services for their students (Alruwais, Mills, & Wald, 2018).

As multiple studies show, there are a wide range of student perceptions and attitudes towards e-assessment, ranging from highly positive to highly negative. In some cases, students may appreciate some aspects of e-assessment but not others. A sampling of research on this topic follows, moving from negative to positive findings.

Abu Alrob, Asad, and Abu Daqr (2019) performed a study that supported the quality of computerized tests and students' attitude towards the exams. Data were collected from 704 student respondents and faculty using questionnaires and interviews. The results of the computerized tests had negative implications on students' grades.

Elsalem et al. (2020) conducted a study that assessed student attitude toward computerized tests made necessary by the emergence of COVID-19. The participants of the study included 1,019 students. Twenty-nine questions prepared on Google Forms were given to the participants. The questions involved evaluating the demographics and behavioral changes of students with regards to online exams. The study results outlined the negative impacts of computer-based learning. In addition, high stress levels were identified from the data collected, since the students' environment did not encourage learning.

Elsalem, Al-Azzam, Jum'ah, and Obeidat (2021) undertook a study focused on evaluating students' experience in remote e-learning exams and how likely it was that cheating would occur at a university in the Arab world. The total number of students that voluntarily agreed to participate in the study was 730. The data collection methods comprised a survey with 16 questions that assessed the factors affecting students' preferences for computerized tests. The results indicated that few students in the medical program preferred e-assessment. The authors' recommendation was that different sets of exam questions should be given to different students to discourage exam dishonesty, which would reduce interaction during the exam.

A study by Dermo (2009) at the University of Bradford in England aimed at assessing the students' experience in e-assessment, the risks involved, and the benefits of the method. One hundred thirty undergraduates were selected to take part in the data collection. The online survey assessment provided to the students focused mainly on practical issues, reliability, security, validity, and affective factors that influence computerized learning methods. These methods are portrayed as reliable, valid, and secure in improving student performance. The data collected indicated that the students accepted the e-assessment, and there were positive feelings regarding the test. However, some students complained that doing exams on a computer increased their stress and anxiety levels. Therefore, effective management should be applied to ensure that all student needs will be met. The study also revealed that age and gender did not affect the learning outcome delivery of the e-assessment.

Sorensen (2013) focused on assessing the students' experience with computerized tests implemented as a learning method at the University College of London. One hundred students participated in the data collection; however, only 54 of the 100 finished the survey. The students undertook online survey tests to enhance the practicality of the computerized tests, and their attitude towards the survey showed that they preferred doing their exams online. Three tests were implemented; the first two were formative quizzes, and the final test was a summative assessment. The survey showed positive reviews from the students concerning the implementation of the e-assessment. The study denotes that computerized testing improves students' performance since it provides a significant focus on their weak coursework areas, allowing them to develop their skills.

Patronis, Ishtaiwa-Dweikat, Al Awad, and Aburezeq (2019) conducted a study that aimed at assessing a student's and an instructor's attitudes on the benefits and challenges of computerized tests at an United Arab Emirates (UAE) university. Two hundred six students and ten faculty members participated in the data collection.

Online questionnaires were administered to the students, and the faculty participated in a semi-structured interview. The findings indicated that the benefits of learning online included improvement in student performance and an increase in their motivation. Formative e-assessment also gives students feedback and allows for responses on the past questions reviewed; it is, therefore, a convenient method of administering exams. However, a student's lack of technical skills and experience can affect his or her achievement rate. The study shows that e-assessment requires overall preparation and arrangements to ensure that students and instructors are familiar with the assessment methods applied. Backup plans and exam confidentiality should be adhered to in educational institutions to ensure that the learning outcomes of the test are achieved.

Atifnigar, Zaheer, Alokozay, and Takal (2020) studied the implications of alternative assessments for students, based on their perceptions and attitudes towards computerized tests. The formative tests created a loop that guides instructors to help students with weak areas of schoolwork, which has improved students' performance. Participants in the study numbered 2,807 and provided feedback on alternative assessments in their learning environment. The research methods comprised qualitative, mixed-method, and quantitative research designs. Data were collected from 117 publications in Google Scholar, Research Gate, Academia.edu, peer reviews, book chapters, theses and an electronic database to tabulate students' perceptions of alternative assessments. The studies were summarized and synthesized to evaluate the learners' experiences with new methods of learning. The findings indicate that student performance is likely to improve when different innovative education strategies are employed. An alternative assessment provides a feedback loop that helps tutors modify and monitor instruction that enhances the student's results.

Many studies showed that there was no significant differences between e-assessment and traditional tests (Da'asin, 2016; Yurdabakan & Uzunkavak, 2012). This coincides with studies conducted by Albanna and Abu-Safe (2019), who investigated students' attitudes toward computer-based and traditional paper and pencil testing. There was no significant difference in the perception of change in the type of assessment based on gender (Albanna & Abu-Safe, 2019).

While not all studies focus on the reasons for student perceptions of e-assessment, multiple studies do focus on the differences in the perceptions across the student population of e-assessment use based on various factors, such as gender, personal interests, individual characteristics, and technical factors. It is noteworthy that results are mixed when it comes to whether gender affects how a student perceives e-assessments (Kundu & Bej, 2021), as shown in the following studies.

Al-Khayat (2017) conducted a study aimed at examining students' and instructors' attitudes toward computerized tests in the business faculty at a university in Jordan. The participants included 338 students and five instructors. The study involved administering questionnaires to students and conducting interviews with instructors. The findings show that students and instructors have a positive attitude toward these types of tests, and their attitudes were affected by gender and GPA, favoring male students and high GPA students.

Perceptions of e-assessment vary from student to student, with the main factors being individual characteristics. The gender factor is significant. According to Bahar and Asil (2018), males perceive e-assessment differently than females, with males exhibiting a more positive attitude toward e-assessment (Bahar & Asil, 2018). According to a study by Adanir et al., (2020), female students tend to be more stressed than male students during e-assessments. Female students also were more concerned about the increased possibility of cheating in e-assessment situations compared to males (Adanir. et al., 2020). Overall males prefer e-assessment to females (Adanir et al., 2020).

While studies have different outlooks about the influence of gender on the perception of e-assessment, emphasizing one viewpoint over another is counterproductive. Studies may vary widely, but there are truths on all sides. If students are comfortable when using computers, it has a significant positive impact on their perception of e-assessments (Albanna & Abu-Safe, 2019).

2.2 Advantages of E-assessment

The main reason why universities have adopted e-assessment is to obtain an accurate and faster method of assessing students (Alruwais, Mills, & Wald, 2018). Compared to the traditional pen and paper approach of assessment, e-assessment is much more effective. For example The main reason why universities have adopted e-assessment is to obtain an accurate and faster method of assessing students (Alruwais, Mills, & Wald, 2018). Compared to the traditional pen and paper approach of assessment, e-assessment is much more effective. For instance, e-assessment is highly secure, customizable, accessible via technological devices and more reliable. Under varying circumstances, e-assessment can be helpful to students, educators, institutions, and overall educational aims (Alruwais, Mills, & Wald, 2018).

E-assessment is a new and improved means for students to take exams. In a study conducted by Al-Momani (2020), most students hoped to switch their traditional tests to e-assessment. In general, students appear to prefer it because they have more control, there are user-friendly interfaces, and tests can resemble games and recreational activities, which is very appealing to the younger generation (Ridgway, McCusker, & Pead, 2004).

E-assessments are fast and easy to use (Eljinini, Alsamarai, Hameed, & Amawi, 2012) and they provide immediate feedback, which can improve learning capabilities (Gilbert, Whitelock, & Gale, 2011). In a recent study done at Glamorgan University and Leeds Metropolitan University, e-assessments were deemed helpful in improving students' academic performance (Gilbert, Whitelock, & Gale, 2011). E-assessment specifically helps increase students' motivation for better academic performance (Gilbert, Whitelock, & Gale, 2011). E-assessment has been shown to increase students' motivation and enhance their performance (Marriott, 2009) and it provides immediate results to students in remote areas, bringing convenience to them and enabling them to focus on other academic pursuits (Ridgway, McCusker, & Pead, 2004). A study conducted by Amer (2020) found that e-assessment hinders cheating.

E-assessments are as advantageous for instructors as they are for students. Paper tests consume more of educators' time, keeping them from other important matters such as lesson planning. E-assessments save teachers' time and energy compared to traditional assessments (Gilbert, Whitelock, & Gale, 2011). E-assessment also improves the quality of instructors' feedback, according to Ridgway, McCusker, and Pead (2004). The e-assessment direct feedback system allows educators to easily find misconceptions about topics that are unclear to students, just in time before a final exam (Ellaway & Masters, 2008).

E-assessment solves the barriers that students may encounter during their studies and helps them achieve at high levels. These barriers usually include physical, cultural, mental and emotional elements that prevent students from achieving their goals. With the increasing number of students, there is a direct increase in demand for faster and more accurate assessment (Ridgway, McCusker, & Pead, 2004). Educators simply cannot keep up with the increasing demand. Therefore, finding a more efficient means of assessment is the best solution.

Huda, Kabir, and Slldlq (2020) conducted a study that evaluated the importance of e-assessment to students and the problems faced when institutions tried to adapt to the new learning method. The data collection involved 200 students from selected universities in Dhaka. Surveys comprised of 27 statements on a Likert scale were given to the participants. In addition, websites, research papers, and journals were used as methods of collecting secondary data. Findings from the study indicated that e-assessment had created learning opportunities in higher levels of education by adding value to students' conventional classroom-based learning.

A study by Walker, Topping, and Rodrigues (2008) portrays the benefits of e-assessments in increasing students' understanding of their coursework through achieving the desired level of performance at the University of Dundee in Scotland. Fifteen students participated in the study, which investigated their experiences and expectations during the e-assessment test. A screen-capture software tool recorded the students' interactions with the different questions in the test. The screen records were later employed in the semi-structured interviews, and the participants were asked to provide their views on the e-assessment. The feedback collected indicated that e-assessment had helped learners identify their weaknesses and strengths, which enabled them to concentrate where they needed to reinforce their learning.

According to Sobremisana and Aragon (2016), the objective of their study was to assess the significance of computer-based assessment and paper-based assessment by reflecting on the respondents' views in the learning environment. The 86 participants were students from Rizal Technological University in the Philippines. They were matched based on age, sex, assigned instructors, and time of class. The data collection methods involved questionnaires, the Physics Achievement Test, and an attitude survey. The gathered information portrayed the students' positive acceptance of computer-based assessment as due to it denoting highly accurate results. The students' attitude toward the computerized exams led the university to adopt the learning method. The students showed they were confident and less stressed when doing the exams. The students preferred computerized exams because they could easily get feedback from the tests, and the method increased their engagement levels.

2.3 Disadvantages of E-assessment

With advantages also come disadvantages, but they are solvable problems. Disadvantages of e-assessment mainly include lack of experience with computers, unavailability of a computer and/or the Internet, poor technical infrastructure, difficulty scoring and correcting questions, difficulty assessing group projects, and unfamiliarity with technology on the part of some instructors (Alruwais, Mills, & Wald, 2018).

There are no unsolvable problems when it comes to e-assessment. The lack of computer experience can be solved by requiring training at the beginning to familiarize students with e-assessment (Osugi, 2012). The second problem is accessibility. This can be solved by the Ministry of Education or a similar entity providing schools with fully equipped labs (Alruwais, Mills, & Wald, 2018). Third, the problem with technical infrastructure has been especially acute in poorer countries (Osugi, 2012). To solve this problem, the government should provide equipment to set and run e-assessment programs (Alruwais, Mills, & Wald, 2018). Fourth is the difficulty of scoring and correcting questions. This solution involves two factors -- the computer system and human checking. Mitchell, Williamson, and Broomhead (2003) suggest that well-defined answers to short questions would shorten the instructors' time for checking e-assessment results. The fifth problem, difficulty of assessing group projects, can be solved by using the Self Peer Assessment Resource Kit (SPARK), which is designed to effectively

evaluate group work (Ridgway, McCusker, & Pead, 2004). The sixth and final problem with e-assessment comes from instructors who are unfamiliar with technology. The solution to this problem is simply to require instructors to have training (Alruwais, Mills, & Wald, 2018).

Bashit Alshaaer, Alhendawi, and Lassoud (2021) aimed at examining the barriers hindering online learning. The participants included 552 professors and 900 students from universities in various Arab countries. Questionnaires with open-ended questions were used to collect feedback from the participants. The results showed that poorly trained students and professors are likely to face difficulties when undertaking computerized tests. Obviously, electronic skills require adequate technological training.

Jabsheh (2020) focused on the significance of computer-based exams on student performance at the Palestine Technical University. The participants were comprised of students who did not achieve the passing level of 50% out of 100%. The data were collected by using the LMS Moodle to measure student success in English courses. The data indicated that taking English exams online may affect the performance levels of individuals with low working memory. In addition, students were likely to take more time reading passages and questions on screens than with pen and paper exams, which led to low scores, since it affected the time required to finish the test. The study shows that the questions in an online learning environment have certain constraints that limit a student's ability to interpret them. There is little flexibility in the open-ended quizzes, so students' answers can be marked unfairly. The study also reveals that males performed better than females in computerized tests; however, high levels of performance are achieved by both genders in paper-based exams.

This literature review has analyzed what other scholars say about online tests. It mainly considered students' perceptions about e-assessments from the accounts of different scholars. Though some students do not appreciate the significance of e-assessments, the research articles considered students as the critical stakeholders of e-assessment. Their primary responsibility when taking e-assessments was to individually make the effort to understand the materials in their current course requirements before handling exams. Students were also obligated to familiarize themselves with various technologies to make it easier to use the online platforms. If they did that, they could eliminate most of the challenges relating to successful implementation of e-assessments.

Past researchers isolated some challenges universal to students across the globe whether they possessed the required technological skills or not. The research included security, validity, and fairness concerns. Some students and instructors were concerned about additional challenges like poor Internet access, lack of electricity, poor connectivity, and lack of technology training and skills. While these were understandable challenges, research revealed that they caused some students and instructors to have negative perceptions of online tests. Some researchers perceive online tests as a great way to curb exam dishonesty, while others argue that such environments do not encourage learning.

This literature review has explored the benefits and limitations of e-assessments. Some notable benefits include accuracy of assessing students, greater control, user-friendly interfaces, and the resemblance of the tests to games and recreational activities. Limitations include the lack of experience with computers, availability of a computer and the Internet, poor technical infrastructure, and the difficulty of assessing group projects. After the emergence of the COVID-19 pandemic, most learning institutions embraced e-assessments, replacing the traditional mode of testing. Past research revealed that stakeholder engagement preceded the implementation of this new form of assessment to promote acceptability. However, the recent implementation of e-assessment platforms due to the COVID-19 pandemic was not preceded by stakeholder engagement. For instance, in Saudi Arabia, the platform was introduced on 24 October 2020 with little stakeholder engagement (AlTameemy, Alrefae, & Alalwi, 2020) and students and instructors alike developed positive and negative perceptions of e-assessments. The current study seeks to examine undergraduate students' perceptions of e-assessment to ascertain whether they were positive or negative. The research further investigates the factors that contributed to these perceptions.

3. Methodology

3.1 Research Design

The research design used in the current study is quantitative research. Information about students' perceptions of e-assessment at Al-Baha University was gathered via an online survey with the following response options: strongly agree, agree, neutral, disagree, and strongly disagree. The sample size was 196 students, with years at college ranging between one and six.

3.2 Research Questions

The current study aims to answer the following two questions:

First research question:

What are the students' perceptions of advantages and disadvantages of the use of e-assessment?

Second research question:

Is there a significant difference among students in their perceptions of advantages and disadvantages of the use

of e-assessment due to gender, level of study, major, or GPA?

4. Findings / Results

4.1 Descriptive Statistics

Frequencies and percentages were calculated for gender, academic level, major, and GPA. Slightly more females ($n = 100$, 51%) than males participated in the study. In regards to academic levels of study, the largest group of students were in their first year ($n = 73$, 37%). More of the participants were enrolled in the sciences ($n = 148$, 76%) than in the humanities. The most frequently observed category of GPA was Excellent ($n = 104$, 53%). Frequencies and percentages are presented in Table 1.

4.2 Reliability of the Tool Used

A Cronbach's alpha coefficient was calculated for the advantages scale, which consisted of 14 items, and the disadvantages scale, which consisted of eight items. The Cronbach's alpha coefficient was evaluated using the guidelines suggested by George and Mallery (2018) in which $> .9$ excellent, $> .8$ good, $> .7$ acceptable, $> .6$ questionable, $> .5$ poor, and $\leq .4$ unacceptable. The items for advantages had a Cronbach's alpha coefficient of 0.94, indicating excellent reliability. The items for disadvantages had a Cronbach's alpha coefficient of 0.83, indicating good reliability. Table 2 presents the results of the reliability analysis.

4.3 First Research Question

To answer the first research question, "What are the students' perceptions of advantages and disadvantages of the use of e-assessment?", frequencies, percentages, mean, and standard deviation were calculated. Summary statistics can be found in Table 3.

According to Table 3 for the advantages scale, 41.6% of respondents strongly agreed with the use of e-assessment as a measuring tool. Also, 43.9% of them strongly agreed that they felt more focused during e-assessment as compared to traditional testing. Interestingly, only 33.5% of respondents strongly preferred e-assessment because they felt that it encourages memorization, but 72.9% either agreed or strongly agreed that if they could choose, they would prefer e-assessments over traditional ones. Further, 75.8% of them agreed that they liked taking e-assessment. Another advantage noted by 68.7% of respondents was that e-assessment can provide immediate feedback. Additional analysis demonstrated that (a) about 64.1 % of participants understand faster what is required for e-assessment; (b) 70% of them consider e-assessment comprehensive to the taught material; (c) 54.3% of respondents find e-assessments fairer than traditional ones; (d) 60.7% of them reported not feeling embarrassed when making mistakes while taking e-assessments (as compared to traditional ones); (e) 68.2% agreed that e-assessment reduces the fear factor; (f) 73.4% agreed that the evaluation process is devoid of nepotism during e-assessment; (g) 57.8% feel the questions from e-assessment are clearer than the traditional testing method; and (h) 72.9% and 75.8% of participants responded that they would choose e-assessment over traditional tests and that they liked the use of e-assessment, respectively.

The descriptive analysis of the advantages scale was conducted on a 5-point Likert scale, and the scoring for each question was as follows: (1) strongly agree; (2) agree; (3) neutral; (4) strongly disagree; (5) disagree. The majority of score means were around 3-4, while the scores of only four questions averaged above 4. These questions were (a) "I think the evaluation process is devoid of nepotism in e-assessment"; (b) "I see that e-assessment enables me to change my answer easily"; (c) "If I have a choice, I will choose e-assessment instead of traditional ones"; and (d) "I like the use of e-assessment". Overall, this indicates that respondents tended to agree with the stances that depicted possible advantages of e-assessment.

Unlike Table 3, which shows the advantages of e-assessment, Table 4 presents possible disadvantageous situations to which respondents could be exposed during e-assessment. Interestingly, a majority of respondents either disagreed or disagreed strongly with the negative stances. For example, 71.7% of respondents disagreed that they felt uncomfortable with their computer capabilities when taking an e-assessment. One disadvantageous point participants agreed with more consistently was the idea that e-assessment limits the use of drawings, images, and shapes. About 54.3% of participants agreed that the restrictions on drawings and image use are two e-assessment limitations. About 45.1% of respondents disagreed that they felt confused while taking e-assessment, whereas 41.6% agreed that they did feel confused. Another interesting point is that 67.7% of participants did not find the display of questions on a computer or phone screen to be distracting. Additional analysis demonstrated that (a) 53.1% did not feel fatigued during the introduction of e-assessment; (b) 45.1% did not feel anxious while answering e-assessment questions; and (c) that 61.8% of participants could properly read the instruction of e-assessment before they started answering.

This scale was also measured on a 5-point Likert scale, following the same scoring method used for the advantages scale. The average in most categories fell between 2-3, meaning that participants tended to slightly disagree with the negative situations. The only disadvantage about which participants mostly agreed was that e-assessment limits the use of drawings, images, and shapes, as mentioned above. Overall, participants seemed to

find e-assessment more advantageous than traditional testing.

4.4 Second Research Question

To answer the second research question, "Is there a significant difference among students in their perceptions of advantages and disadvantages of the use of e-assessment due to gender, level of study, major, and GPA?", a multivariate analysis of variance (MANOVA) was conducted to assess if there were significant differences in the linear combination of advantages and disadvantages between the levels of gender, academic level, major, and GPA.

No significant effects were found for gender, academic level, major, and GPA. The main effect for gender was not significant, $F(2, 185)= 2.13, p=.122$, $\eta^2=0.02$, suggesting the linear combination of advantages and disadvantages was similar for each gender. The main effect for academic level was not significant, $F(10, 372) = 1.56, p = .116$, $\eta^2=0.04$, suggesting the linear combination of advantages and disadvantages was similar for each academic level. The main effect for major was not significant, $F(2, 185)=1.14, p=323$, $\eta^2=0.01$, suggesting the linear combination of advantages and disadvantages was similar for each level of major. The main effect for GPA was not significant, $F(4, 372)=2.00, p = .094$, $\eta^2=0.02$, suggesting the linear combination of advantages and disadvantages was similar for each level of GPA. The MANOVA results are presented in Table 5.

5. Discussion

The present study brings to light insights about e-assessment as compared to traditional types of assessment. According to the descriptive analyses, the majority of respondents agreed that e-assessment offers more advantages than disadvantages. Such findings have enormous applicability, considering the current crisis of the COVID-19 pandemic that the world is facing, which has forced many educational institutions to adopt e-assessment.

It can be generalized that the male population spends more time on computers (Link and Marz, 2006). It therefore makes sense that initially they would perceive e-assessment more positively than do females. However, this may not continue to be true, as the popularity of recreational computer use by females rises.

The applied 5-point Likert advantage scale described possible advantages that e-assessment could offer. Respondents mostly agreed that this emerging method of testing (a) could provide faster feedback; (b) is comprehensive of the teaching material; and (c) reduces the fear factor. Approximately 72.9% of participants preferred e-assessment to traditional ones. The mean was 3.82, which indicates students have a positive perception. The increasing demand for faster and more accurate ways of evaluating student performance has been debated since 2004 (Ridgway, McCusker, & Pead, 2004). Such need is reported not only by educators, but it has also shown to be appreciated by students from previous studies (Ellaway & Masters, 2008; Khan & Khan, 2019). In this context, our results also reflect students' preference over the traditional testing forms. Our data corroborate what is presented in the literature. The results of the study showed no statistical differences in students' perceptions of e-assessment according to the variables of gender, GPA, or academic level.

This finding may be due to the fact that male and female students alike have become aware that the transition to e-learning is becoming an urgent necessity through the rapid developments of technology and the information explosion. In addition, e-learning, whether in normal times or in difficult times in which diseases and epidemics spread, has become an integral part of the educational material in the classroom. This result can also be attributed to the fact that during the COVID-19 pandemic, all of the study participants were exposed to the same conditions used in e-learning and its tools at the university. This may have led to variables such as gender, GPA, and academic level having no statistical significance on their perceptions towards e-assessment.

The heterogeneity and congruence among many studies regarding perceptions are attributable only to a type of acquired motivation or to a type of social behavior motivation (Samara & Adaili, 2008). Students' perceptions can be influenced by such factors as their e-learning teachers and teaching methods; curricula, some of which are related to the learner himself or herself; and the educational environment in which the learner lives.

Similarly, the applied 5-point Likert disadvantage scale described possible disadvantages of e-assessment. Respondents disagreed with many of the situations described, except that e-assessment indeed limits the use of drawing, images, and shapes. Interestingly, although some may think the display of questions on a computer or phone screen is distracting, approximately 68% of participants disagreed. In line with the fact that respondents agreed that e-assessment reduces the fear factor, 45.1% of them also said that they did not feel anxious while answering the e-assessment questions. This latter finding could reflect the impact the environment, including classrooms, could have on some students, as e-assessment usually allows them to be tested in a more friendly space.

Some of the disadvantages reported in the literature did not reflect the present study's findings. The study sample reported disagreement with feeling confused by the technology used for e-assessment, which goes against what the literature states (Alruwais, Mills, & Wald, 2018). This could partially be due to the types of exams different student samples had to take.

Furthermore, the lack of accessibility for participants in earlier studies may not reflect the current participants' reality. Such limitation should be solved as it is the duty of the Saudi Ministry of Education to provide the population with fully equipped laboratories with internet access (Alruwais, Mills, & Wald, 2018). Problems related to group work, as reported by Alruwais, Mills, and Wald (2018) can be easily solved by using online platforms such as Microsoft Teams or SPARK (Alruwais, Mills, & Wald, 2018).

E-assessment has advantages both for students and for educators. However, its implementation has to be conducted carefully, since the system may not fit every educational field (i.e., arts). Problems related to internet accessibility and technology literacy are easily solvable, as every educational institution should provide fully equipped labs. Although this might be a limitation for developing countries, developed countries should at least encourage the use of these technologies, as this seems to be a worldwide trend. Despite some reports demonstrating that e-assessment may improve students' academic performance by improving their learning capabilities, studies are needed to quantitatively evaluate whether students actually learned significantly more (Gilbert, Whitelock, & Gale, 2011).

6. Conclusion

To conclude, most of the students in this study had positive perceptions toward using e-assessment as a measuring tool of their learning. They reported increased focus on their e-assessment compared to traditional tests. They stated that they had fun while answering quiz questions in the e-assessment format. They believe that e-assessment has more comprehensive teaching material than traditional tests. Thus, e-assessment seems more fair than traditional assessment. They also felt that e-assessment provided them with a more comfortable and quiet testing environment and included fewer spelling errors. According to the research participants, e-assessment enables them to easily and quickly change their answers on tests. Finally, e-assessment has proved to be the most appropriate measuring instrument during emergencies such as pandemics.

6.1 Recommendations

Any study, by its very nature, is limited and opens up space for future researchers to expand on what was learned, and this study is no exception. More replicated studies are needed to reaffirm and further validate the findings of this study as well as previous studies with undergraduate and graduate students in different universities, particularly those enrolled at universities that use learning management systems other than Blackboard. In addition, while this study focused on exploring students' perceptions toward e-assessment at the university level, there is also room for further research focusing on investigating students' perceptions at different levels, such as beginner and intermediate learners.

References

- Abu Alrob, M., Asad, N., & Abu Daqar, M. (2019). Attitudes toward and implications of the computer-based exams at Arab American University of Palestine. *Journal of Education and Learning*, 8(1), 196-205.
- Adanir, G. A., Ismailova, R., Omuraliev, A., & Muhametjanova, G. (2020). Learners' perception of online exams: A comparative study in Turkey and Kyrgyzstan. *International Review of Research in Open and Distance Learning*, 21(3). <https://doi.org/10.19173/irrod.v21i3.4679>
- Albanna, N., & Abu-Safe, H. (2019). Investigating students' attitudes toward computer-based and traditional paper-pencil testing. *Proceedings of ICERI 2019*. Seville, Spain.
- Al-Khayat, M. (2017). Students' and instructors' attitudes toward computerized tests in business faculty at the main campus of Al-Blaqa Applied University. *An-Najah University Journal for Research*, 31(11), 6.
- Al-Momani, M. M. (2020). The effectiveness of students' attitude towards the use of e-exams at Zarqa University. *GAI International Academic Conference*, 1(1), 31.
- Alruwais, N., Wills, G., & Wald, M. (2018). Advantages and challenges of using e-assessment. *International Journal of Information and Education Technology*, 8(1), 34-37.
- Alsadoon, H. (2017). Students' perceptions of e-assessment at Saudi Electronic University. *Turkish Online Journal of Educational Technology-TOJET*, 16(1), 147-153.
- AlTameemy, F. A., Alrefae, Y., & Alalwi, F. S. (2020). Using Blackboard as a tool of e-assessment in testing writing skill in Saudi Arabia. *Asian ESP*, 16(6.2), 183-202.
- Amer, M. E. M. (2020). Effectiveness of using electronic exams in assessment in Saudi universities: Empirical study. *International Journal of Educational Technology and Learning*, 8(2), 61-69.
- Atifnigar, H., Zaheer, Z. R., Alokozay, W., & Takal, G. M. (2020). Students' perception of alternative assessment: A systematic literature review. *International Journal of Linguistics, Literature and Translation*, 3(4), 228-240.
- Bahar, M., & Asil, M. (2018). Attitude towards e-assessment: Influence of gender, computer usage, and level of education. *Open Learning: The Journal of Open, Distance, and e-Learning*, 33(3), 221-237.
- Bashitashaaer, R., Alhendawi, M., & Lassoued, Z. (2021). Obstacle comparisons to achieving distance learning

- and applying electronic exams during COVID-19 pandemic. *Symmetry*, 13(1), 99.
- Da'asin, K. A. (2016). Attitude of Ash-Shobak University college students to e-exam for intermediate university degree in Jordan. *Journal of Education and Practice*, 7(9), 10-17.
- Dermo, J. (2009). E-assessment and the student learning experience: A survey of student perceptions of e-assessment. *British Journal of Educational Technology*, 40(2), 203-214.
- Eljinini, M. A. H., Alsamarai, S., Hameed, S., & Amawi, A. (2012). The impact of e-assessments system on the success of the implementation process. *International Journal of Modern Education and Computer Science*, 4(11), 76.
- Ellaway, R., & Masters, K. (2008). AMEE Guide 32: E-learning in medical education Part 1: Learning, teaching, and assessment. *Medical Teacher*, 30(5), 455-473.
- Elmehdi, H. M., & Ibrahim, A. M. (2019). Online summative assessment and its impact on students' academic performance, perception, and attitude towards online exams: University of Sharjah study case. In M. Mateev & P. Poutziouris (Eds.), *Creative business and social innovations for a sustainable future* (pp. 211-218). Springer.
- Elsalem, L., Al-Azzam, N., Jum'ah, A., & Obeidat, N. (2021). Remote e-exams during Covid-19 pandemic: A cross-sectional study of students' preferences and academic dishonesty in faculties of medical sciences. *Annals of Medicine and Surgery*, 62, 326-333.
- Elsalem, L., Al-Azzam, N., Jum'ah, A., Obeidat, N., Sindiani, A., & Kheirallah, K. (2020). Stress and behavioral changes with remote e-exams during the Covid-19 pandemic: A cross sectional study among undergraduates of medical sciences. *Annals of Medicine and Surgery*, 60, 271-279. EPrints.
- Fontanillas, T. R., Carbonell, M. R., & Catás, M. G. (2016). E-assessment process: Giving a voice to online learners. *International Journal of Educational Technology in Higher Education*, 13(1), 20.
- George, D., & Mallory, P. (2018). *IBM SPSS statistics 25 step by step*. Routledge. doi:10.4324/9781351033909
- Gikandi, J. W., Morrow, D., & Davis, N. E. (2011). Online formative assessment in higher education: A review of the literature. *Computers & Education*, 57(4), 2333-2351.
- Gilbert, L., Whitelock, D., & Gale, V. (2011). *Synthesis report on assessment and feedback with technology enhancement*. University of Southampton School of Electronics and Computer Science / The Higher Education Academy.
<http://eprints.soton.ac.uk/273221/1/Synthesis%2520report%2520on%2520assessment%2520and%2520feedback%2520Final%2520Report%2520July%25202011.pdf>
- Huda, K., & Slldlq, T. (2020). E-assessment in higher education: Students' perspective. *International Journal of Education and Development Using Information and Communication Technology*, 16(2), 250-258.
- Ilgaz, H., & Adanir, G. A. (2020). Providing online exams for online learners: Does it really matter for them? *Education and Information Technologies*, 25(2), 1255-1269.
- Intellectus Statistics [Online computer software]. (2021). Intellectus Statistics. <https://analyze.intellectusstatistics.com/>
- Jabsheh, A.-A.-H. M. (2020). The usability outlook of computer-based exams as a means of assessment and examination: A case study of Palestine Technical University. *International Journal of Linguistics, Literature and Translation*, 3(3), 154-159.
- Jazil, S., Manggiasih, L. A., Firdaus, K., Chayani, P. M., & NelyRahmatika, S. H. (2020). Students' attitudes towards the use of Google Forms as an online grammar assessment tool. *Proceedings of the International Conference on English Language Teaching (ICONELT 2019)*, 1(1), 1-7. <https://doi.org/10.2991/assehr.k.200427.033>
- Joshi, A., Virk, A., Saiyad, S., Mahajan, R., & Singh, T. (2020). Online assessment: Concept and applications. *Journal of Research in Medical Education & Ethics*, 10(2), 78-89. <https://doi.org/10.5958/2231-6728.2020.00015.3>
- Khadka, B. K., Rokaya, B. B., Roka, J., & Bhatta, P. D. (2020). Perceptions, issues, and challenges towards online and alternative examinations system: A case of Mid-Western University. *International Journal of Innovative Science and Research Technology*, 5(11), 105-114
- Khan, S., & Khan, R. A. (2019). Online assessments: Exploring perspectives of university students. *Education and Information Technologies*, 24(1), 661-677.
- Kundu, A., & Bej, T. (2021). Experiencing e-assessment during COVID-19: An analysis of Indian students' perception. *Higher Education Evaluation and Development*, 15(2), 114-134. <https://doi.org/10.1108/HEED-03-2021-0032>
- Link, T. M., & Marz, R. (2006). Computer literacy and attitudes towards e-learning among first year medical students. *BMC Med Educ*, 6(34), doi:10.1186/1472-6920-6-34
- Marriott, P. (2009). Students' evaluation of the use of online summative assessment on an undergraduate financial accounting module. *British Journal of Educational Technology*, 40(2), 237-254.
- Mitchell, T., Aldridge, N., Williamson, W. M., & Broomhead, P. (2003). *Computer-based testing of medical*

- knowledge. 7th International CAA Conference, Loughborough, UK.
<http://www.caaconference.com/pastConferences/2003/proceedings/index.asp>
- Osuji, U. S. (2012). The use of e-assessments in the Nigerian higher education system. *Turkish Online Journal of Distance Education*, 13(4), 140-152.
- Patronis, M., Ishtaiwa-Dweikat, F. F., Al Awad, M., & Aburezeq, I. (2019). Attitudes and perceptions towards summative e-assessment for free-text responses: A case study of a UAE university. *International Journal of Information and Communication Technology Education (IJICTE)*, 15(1), 13-28.
- Peytcheva-Forsyth, R., & Aleksieva, L. (2021). Forced introduction of e-assessment during COVID-19 pandemic: How did the students feel about that? (Sofia University case). *Thermophysical Basis of Energy Technologies (Tbet 2020)*, 1(1), 1-12. <https://doi.org/10.1063/5.0041862>
- Ridgway, J, McCusker, S., & Pead, D (2004). *Literature review of e-assessment* (Report 10). NESTA Futurelab Series.
- Rockman, I. F. (2002). The importance of assessment. *Reference Services Review*, 30(3), 181-182. <https://doi.org.sdl.idm.oclc.org/10.1108/00907320210435455>
- Samara NA, Abdel AS. Concepts and Terminology in Educational Sciences, 1, Dar Al Masirah for Publishing and Distribution, Amman, Jordan. 2008; 6.
- Shraim, K. (2019). Online examination practices in higher education institutions: Learners' perspectives. *Turkish Online Journal of Distance Education*, 20(4), 185-196.
- Sobremsiana, V., & Aragon, R. (2016). Computer-based assessment: Its effects on students' performance and attitude. *Research Journal of Science and IT Management*, 5(9),
- Sorensen, E. (2013). Implementation and student perceptions of e-assessment in a chemical engineering module. *European Journal of Engineering Education*, 38(2), 172-185.
- Tahir, B. Z. W. F. A., & Sani, M. B. (2019). Students' perception of computer-based approach to examining undergraduate accounting courses at the University of Maiduguri, Nigeria. 11(8)
- Torres-Madroñero, E. M., Torres-Madroñero, M. C., & Ruiz Botero, L. D. (2020). Challenges and possibilities of ICT-mediated assessment in virtual teaching and learning processes. *Future Internet*, 12(12), 1-20. <https://doi.org/10.3390/fi12120232>
- Walker, D., Topping, K., & Rodrigues, S. (2008). Student reflections on formative e-assessment: Expectations and perceptions. *Learning, Media, and Technology*, 33(3), 221-234.
- Wea, K. N., & Dua Kuki, A. (2021). Students' perceptions of using Microsoft teams application in online learning during the covid-19 pandemic. *Journal of Physics: Conference Series*, 1842(1), 1-8. <https://doi.org/10.1088/1742-6596/1842/1/012016>
- Westfall, P. H., & Henning, K. S. S. (2013). *Texts in statistical science: Understanding advanced statistical methods*. Taylor & Francis.
- Yoeстара, M., Putri, Z., Keumala, M., & Idami, Z. (2020). Pre-service English teachers' perception towards online assessment method. *International Journal of Language and Religion Education*, 2(1), 1-10.
- Yurdabakan, I., & Uzunkavak, C. (2012). Primary school students' attitudes towards computer-based testing and assessment in Turkey. *Turkish Online Journal of Distance Education*, 13(3), 177-188.

Table 1. Frequency Table for Nominal Variables

No	Variable	n	%	Cumulative %
1.	Gender			
	Male	96	48.98	48.98
	Female	100	51.02	100.00
2.	Academic Level			
	First	73	37.24	37.24
	Second	47	23.98	61.22
	Third	27	13.78	75.00
	Fourth	27	13.78	100.00
	Fifth	6	3.06	86.22
3.	Major			
	Humanities	48	24.49	24.49
	Sciences	148	75.51	100.00
4.	GPA			
	Excellent	104	53.06	53.06
	Very Good	62	31.63	84.69
	Good	30	15.31	100.00

Due to rounding errors, percentages may not equal 100%.

Table 2. Reliability Table for Advantages and Disadvantages

Scale	No. of Items	α	Lower Bound	Upper Bound
Advantages	14	0.94	0.94	0.95
Disadvantages	8	0.83	0.80	0.86

The lower and upper bounds of Cronbach's α were calculated using a 95% confidence interval.

Table 3. Summary Statistics Table for the Advantages Scale

	Variable	SA	A	N	D	SD	M	Sd	SE _M
1.	I support the use of e-assessment as a measuring tool	72 41.6%	50 28.9%	22 12.7%	10 5.8%	19 11%	3.82	1.33	0.09
2.	E-assessment makes me more focused than traditional tests do	76 43.9%	29 16.8%	27 15.6%	22 12.7%	19 11%	3.70	1.43	0.10
3.	I see that e-assessment provides me with immediate feedback	71 41%	48 27.7%	30 17.3%	14 8.1%	10 5.8%	3.90	1.22	0.09
4.	I can understand what is required from e-assessment questions faster and easier	63 36.4%	48 27.7%	27 15.6%	21 12.1%	14 8.1%	3.70	1.32	0.09
5.	I think that e-assessments are comprehensive to the teaching material	84 48.6%	37 21.4%	15 8.7%	15 8.7%	22 12.7%	3.92	1.27	0.09
6.	I think e-assessments are fairer than traditional ones	63 36.4%	31 17.9%	35 20.2%	20 11.6%	24 13.9%	3.52	1.43	0.10
7.	I do not feel embarrassed when making mistakes while taking e-assessments compared to traditional ones	69 39.9%	36 20.8%	28 16.2%	18 10.4%	22 12.7%	3.65	1.40	0.10
8.	I see that e-assessments reduce the fear factor when I take the test	73 42.2%	45 26%	23 13.3%	15 8.7%	17 9.8	3.82	1.33	0.09
9.	I think the evaluation process is devoid of nepotism in e-assessment	79 45.7%	47 27.7%	29 16.8	10 5.8%	8 4.6%	4.03	1.13	0.08
10.	I see that e-assessment enables me to change my answer easily	86 49.7%	52 30.1%	16 9.2%	9 5.2%	10 5.8%	4.14	1.17	0.08
11.	I prefer to deal with e-assessments because they encourage me to memorize	58 33.5%	39 22.5%	35 20.2%	21 12.1%	20 11.6%	3.57	1.37	0.10
12.	I feel that the questions in e-assessment are clearer than on traditional tests	68 39.3%	32 18.5%	30 17.3%	25 14.5%	18 10.4%	3.61	1.41	0.10
13.	If I have a choice, I will choose e-assessment instead of traditional ones	106 61.3%	20 11.6%	16 9.2%	4 2.3%	27 15.6%	4.03	1.47	0.11
14.	I like to use e-assessment	106 61.3%	25 14.5%	16 9.2%	8 4.6%	18 10.4%	4.14	1.33	0.10
Mean							3.82		

Table 4. Summary Statistics Table for the Disadvantages Scale

	Variable	<i>SA</i>	<i>A</i>	<i>N</i>	<i>D</i>	<i>SD</i>	<i>M</i>	<i>Sd</i>	<i>SE_M</i>
1.	I feel confused while taking e-assessment	37 21.4%	35 20.2%	23 13.3%	45 26%	33 19.1%	2.98	1.47	0.11
2.	I think the e-assessment makes me nervous	36 20.8%	22 12.7%	20 11.6%	51 29.5%	44 25.4%	2.74	1.50	0.11
3.	I think the way questions are displayed on a computer or phone screen is distracting	16 9.2%	20 11.6%	20 11.6%	52 30.1%	65 37.6%	2.23	1.31	0.09
4.	I feel visual fatigue during the introduction of e-assessment	33 19.1%	24 13.9%	24 13.9%	39 22.5%	53 30.6%	2.73	1.52	0.11
5.	I feel anxious while answering e-assessment questions	34 19.7%	3 1.7%	43 24.9%	45 26%	33 19.1%	2.92	1.39	0.10
6.	I feel uncomfortable with my computer capabilities when taking the e-assessment	13 7.5%	17 9.8%	19 11%	55 31.8%	69 39.9%	2.16	1.28	0.09
7.	E-assessment limits the use of drawings, images and shapes	55 31.8%	39 22.5%	30 17.3%	25 14.5%	24 13.9%	3.44	1.44	0.10
8.	I cannot properly read the instructions for e-assessment before I start answering	21 12.1%	21 12.1%	24 13.9%	58 33.5%	49 28.3%	2.56	1.38	0.10
	Mean						2.72	0.95	

'-' indicates the statistic is undefined due to constant data or an insufficient sample size.

Table 5. MANOVA Results for Advantages and Disadvantages by Gender, Academic Level, Major, and GPA

Variable	Pillai	F	df	Residual df	P	η_p^2
Gender	0.02	2.13	2	185	.122	0.02
Academic level	0.08	1.56	10	372	.116	0.04
Major	0.01	1.14	2	185	.323	0.01
GPA	0.04	2.00	4	372	.094	0.02