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PREPAREDNESS OF INSTITUTIONS OF HIGHER EDUCATION FOR ASSESSMENT IN VIRTUAL LEARNING ENVIRONMENTS DURING THE COVID-19 LOCKDOWN: EVIDENCE OF BONA FIDE CHALLENGES AND PRAGMATIC SOLUTIONS

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ABSTRACT

Aim/Purpose	This study investigates the perceptions of faculty members at Prince Sattam bin Abdulaziz University, Saudi Arabia, towards preparedness of institutions of higher education (IHE) for assessment in virtual learning environments (VLEs) during the COVID-19 lockdown. In addition, the study explores evidence of bona fide challenges that impede the implementation of assessment in VLE for both formative and summative purposes, and it attempts to propose some pragmatic solutions.
Background	Assessment of student performance is an essential aspect of teaching and learning. However, substantial challenges exist in assessing student learning in VLEs.
Methodology	Data on faculty's perceptions were collected using an e-survey. Ninety-six faculty members took part in this study.
Contribution	This paper contributes to COVID-19 research by investigating preparedness of IHE for assessment in VLEs from faculty members' perceptions. This practical research explores deleterious challenges that impede the implementation of assessment in VLE for both formative and summative purposes, and it proposes

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	effective solutions to prevent future challenges. These solutions can be used by IHE to improve the quality of assessment in VLEs.
Findings	The findings revealed that IHE were not fully prepared to provide a proper assessment in a VLE during the lockdown, nor did they have clear mechanisms for online assessment. The findings also showed that faculty members were not convinced that e-assessment could adequately assess all intended learning outcomes. They were convinced that most students cheated in a way or another. Additionally, faculty had other concerns about (1) the absence of advanced systems to prevent academic dishonesty; (2) insufficient qualifications of some faculty in e-assessment because most of them have never done it before, and e-assessment has never been mandated by the university before the pandemic; and (3) insufficient attention paid to formative assessment.
Recommendations for Practitioners	It is recommended that decision makers help faculty members improve by continuous training on developing e-assessment tests for both formative and summative assessments. Decision makers should also ensure the inclusion of technology-based invigilation software to preclude cheating, make pedagogical and technical expertise available, and reconsider e-assessment mechanisms. Faculty members are recommended to attend training sessions if they do not master the basic skills of e-assessment and should devise a variety of innovative e-assessments for formative and summative purposes.
Recommendations for Researchers	More similar work is needed to provide more solutions to the challenges identified in this paper regarding the e-assessment in response to the COVID-19 pandemic.
Impact on Society	The study suggests introducing technology-based solutions to ensure e-assessment security, or holding tests in locations where they can be invigilated whilst rules of social distancing can still be applied.
Future Research	Future research could suggest processes and mechanisms to help faculty develop assessment in VLEs more effectively.
Keywords	assessment in VLEs, COVID-19, e-assessment, lockdown, online assessment

INTRODUCTION

At the time of writing this research study, the Coronavirus disease 2019 (COVID-19) pandemic has been striking hard and crippling life in many ways all over the globe. The first case was reported on December 8, 2019 in Wuhan Province, China (Jan, 2020). “Just in a span of few months it clutched the world in its claws” (Choudhury et al., 2020, p. 248). Since March 2020, the World Health Organization (WHO) has declared COVID-19 a global pandemic affecting public health. As of August 2020, COVID-19 is rapidly spreading in more than 200 countries, infecting over 21 million people globally, killing more than 761K so far, with the disease continuing to spread, causing panic as well as social and economic disruption.

The unexpected outbreak of the COVID-19 pandemic across the world has forced Saudi Arabia like many other countries to respond swiftly by taking a number of precautionary procedures. One of these procedures included the closure of all educational institutions, and shifting from traditional in-class education to online education where students study from home, in an attempt to mitigate socializing and so to curb the spread of the pandemic. In Saudi Arabia, the rapid transition to the virtual world started on March 8, 2020, in the eighth week of the second semester of 2020, following direc-

tions from the government meant to ensure nonstop teaching and learning. The Ministry of Education has activated online educational portals and urged all educational institutions nationwide to launch whatever digital platforms they have at their disposal in order to eliminate the chances of shutting down the current semester and make sure education goes on uninterrupted. Platforms such as ZOOM, Blackboard, iEN TV Network, iEN National Education Portal, and Future Gate have become familiar names among educators. During the lockdown, such technologies are supposed to be useful in bolstering VLEs and alleviating the effects of the lockdown on education in general (Javaid et al., 2020).

In compliance with the guidelines set out by the Ministry of Education for universities regarding the arrangements for tests and assessments during the lockdown, institutions of Higher Education (IHE) in Saudi Arabia have adopted the continuous e-assessment policy for the remaining internal assessments, in addition to final exams for the second semester of 2020, using e-assessment methods as an alternative to traditional assessments depending on the nature of the courses and disciplines. Universities also provided virtual workshops for faculty and students to prepare them for the transition to online learning, and they conducted pilot tests to ensure that students were ready for the assessment in a virtual environment.

As a result of the continued suspension of traditional classroom study until the date of the final exams at universities, a number of assessment methods were recommended by the Ministry of Education: (a) formative assessment during the virtual learning process; (b) final electronic tests via Blackboard; (c) various short MCQs (multiple-choice questions); (d) open-book tests; (e) oral tests through e-learning platforms; (f) PowerPoint presentations; (g) student participation during virtual classes; (h) homework assignments; (i) discussions; and (j) e-portfolios. Among the several alternatives recommended by the Ministry of Education, Prince Sattam bin Abdulaziz University, from which the participants of this study were selected, has mandated that faculty members conduct the final exams virtually via Blackboard and not in a face-to-face environment.

On April 3, 2020, the Ministry of Education made a number of recommendations to address the lockdown challenges, including the mechanisms for the final assessment in universities. These included granting special permission to all students to withdraw from a course or multiple courses if they wished to. This special permission was held effective until the last day before the final exams. The withdrawal was not to be included in the student's transcript and would not entail any academic penalty. Thus, students would have sufficient time to review their academic status and take the right decision in this regard. Another policy was to increase the grades assigned to the internal assessment for all courses (to become 80% of the total grade, with only 20% for the final assessment/summative assessment, viz-à-viz the traditional 50-50 distribution of marks). The third policy was to activate the feature of analyzing the student's grades for previous semesters electronically, and to use this feature to make sure that a student's GPA is not affected adversely by grades obtained in the current 'exceptional' semester. One possible sub-policy in this regard was also the proposal to change the course result from the 'grading system' to the 'pass-fail system' so that a course result would have no effect on the student's GPA.

RESEARCH BACKGROUND

Despite the considerable efforts to provide education opportunities and viable alternatives within VLEs, a challenge facing faculty members loomed throughout. This challenge was how to assess students' performance in this new-fangled virtual environment. The assessment of student learning is a domain of emphasis that merits special priority (Kearns, 2012). It is known that "classroom assessment is a process in which teachers and students gather evidence of student learning through several assessment practices" (Vlachou, 2018, p. 2). This process requires validity and reliability procedures that are actually achieved in the direct classroom learning context, but might raise concerns in online-only assessment (Hopfenbeck, 2018). Among these concerns is the likelihood that students may receive assistance from their family and/or friends, or that they may turn to the textbook or a website

to obtain answers to test questions. Here, it is necessary to clarify what we mean by assessment, its types and objectives.

Most educators agree that there are two main types of assessment criteria, among others, namely formative assessment and summative assessment (Ayachi-Ghanouchi et al., 2013). Formative assessment occurs continuously during the educational process (Wuttke et al., 2015). It provides systematic continuous feedback at all stages of the educational situation (Lozano & Segura, 2016), as it shows the strengths and weaknesses in order to adjust what is necessary in a formative and continuous way (Ertle et al., 2016). It can be carried out at any time after teaching a specific unit or part of the course in the form of practice quizzes (Wilson et al., 2011), verbal responses (Ruiz-Primo & Furtak, 2007), exercises (Koh, 2010) or discussions. Formative assessment aims to (a) check the short-term goals (Dolin et al., 2018); (b) diagnose what students have learned and what they have failed to achieve (Heritage, 2007); (c) help students to develop their performance throughout the learning process (Alshenqeeti, 2020); (d) enable teachers to reconsider their teaching (Hasim & Barnard, 2018), and (e) raise students' motivation for learning (Leenknecht et al., 2020).

Summative assessment “occurs at the end of the learning process” (Faulconer et al., 2019, p. 1), “resulting in a ranking, a mark, a grade or a degree” (Jones, 1996, p. 134). Students are exposed to a set of exams through which it can be determined to what extent they have met performance expectations (Sarkany & Deitte, 2017). Summative assessment aims to (a) provide long-term feedback (Chapman et al., 2013); (b) give students grades that explain their achievement of goals (Sangwin, 2017); (c) make decisions, grant certificates, and impose an academic penalty (Rolfe & McPherson, 1995); and (d) enable educational institutions to make judgments about students' performance (Das et al., 2017).

In this era of the COVID-19 outbreak, IHE are replacing traditional assessment with e-assessment tools, and this is something unconventional for both professors and students, which will presumably translate into tougher assessment challenges than usual (Burgess & Sievertsen, 2020). Burke and Dempsey (2020) propose that during the COVID-19 lockdown, “distance learning is a poor substitute for real interaction” and that classroom observations are the more successful form of formative assessment (p. 37). Not surprisingly, most challenges associated with e-assessment have emerged because of the absence of direct face-to-face contact that is possible in a physical location (Kearns, 2012). Some issues cited in the literature on assessment in VLE include the following: (a) inability of educators to prevent cheating and plagiarism (Xiong & Suen, 2018); (b) concerns about the ability to verify user identity (Baró et al., 2020); (c) concerns about the reliability and validity of e-assessments (Akimov & Malin, 2020); (d) limitations on the types of e-assessment questions, as they are mainly based on multiple-choice, true/false, matching, and gap filling (Marriott, 2009); (e) concerns about academic integrity (Kearns, 2012); (f) concerns about invigilation of e-tests (Khan & Jawaid, 2020); (g) inability of technologies to deal with qualitative responses without human intervention (Nickels, 2013); and (h) issues related to faculty members' time management and training (Hettiarachchi et al., 2016).

The transition “towards institution-wide adoption of online assessment is attracting considerable attention among higher education institutions” (Mayhew, 2018, p. 1). Crisp et al. (2011) posit, however, that despite the availability of a plethora of online tools and applications, many educators question the efficacy of e-assessment as a direct replacement for traditional classroom assessment systems. Xiong and Suen (2018) suggest moving only the teaching and learning to the online realm, but keeping the face-to-face traditional assessment as is to guarantee security. Khan and Jawaid (2020) state that COVID-19 forced a transformation from traditional face-to-face learning to e-learning, and that this transformation “will bring long-lasting effects on teaching and learning, assessment procedures and methods” (p. 3). Sabzwari (2020) stresses that face-to-face assessment should be implemented “to ensure integrity and security of assessment,” so institutions should “consider creating larger venues that allow physical distancing or plan a greater number of venues to achieve the same goal” (p. 3).

As a consequence of the COVID-19 lockdowns, faculty members have been facing the challenges of preparedness for the transition from face-to-face to online tutoring (Kebritchi et al., 2017; Phillip & Cain, 2015). The current study will focus on the challenges encountered by IHE during the preparation and implementation of both formative and summative assessments. The study also puts forward effective solutions to prevent future deleterious challenges and to ensure the effectiveness of e-assessments (see Table 1). Specifically, this study investigates the perceptions of faculty members at Prince Sattam bin Abdulaziz University towards preparedness of IHE for assessment in VLEs during the COVID-19 lockdown. In addition, the study explores evidence of bona fide challenges that impede the implementation of assessment in VLE for both formative and summative purposes, and it attempts to propose some pragmatic solutions. In light of these objectives, this study was guided by the following research questions:

RQ1: What are the perceptions of faculty members towards preparedness of IHE for assessment in VLEs during the COVID-19 lockdown?

RQ2: What are faculty members' perceived challenges of implementing assessment in VLE courses in response to the COVID-19 lockdown?

Several studies have started to investigate the impact of COVID-19 on teaching and learning since the pandemic erupted, but there has been little research on the preparedness of IHE for assessment in VLEs, as well as on the challenges encountered by faculty members as they try to carry out e-assessment. The gains and losses in introducing assessment in VLEs are worthy of careful consideration and meticulous study. In addition, faculty members' perception would be an important input for professors and universities globally in running online assessment, as this would help keep online assessment of students' performance identical to, and as fair as, the traditional (face-to-face) assessment. According to Haleem et al. (2020), there are many areas of research required in response to COVID-19, including online education from home and the miscellany of challenges that have heretofore been largely unknown to a good many educators.

STRUCTURE OF THE STUDY

This study investigates the perceptions of faculty members at Prince Sattam bin Abdulaziz University towards preparedness of IHE for assessment in VLEs during the COVID-19 lockdown. The study is divided into six sections. The preceding section, section one, presented the introduction, a selective review of research relevant to the study, and the description of the problem. Section two introduces the research method used including the participants, the instrument and its validity and reliability, data collection, and data analysis. Section three presents the statistical findings of the survey. Section four provides a discussion on the findings and proposes some pragmatic solutions. Finally, section five presents the limitations and provides suggestions for future research, and section six presents the conclusion.

METHOD

PARTICIPANTS

Faculty members from Prince Sattam bin Abdulaziz University, Saudi Arabia, took part in this study. The URL to the e-survey (see Appendix) was sent to a total of 1793 faculty via the Deanship of IT and Distance Learning to ensure that all faculty members had equal opportunities to respond to the survey. 96 faculty responded. Data was collected by the end of the final exams from 10 to 30 May, 2020. The demographic information was not collected for the participants in this study because the participants were believed to be fairly comparable in that they all were affiliated with the same university and also because the main aim of the study was only to collect data about preparedness of IHE during the COVID-19 lockdown. The sample was purposefully chosen from Prince Sattam bin Ab-

Abdulaziz University based on factors including faculty willingness to participate in this study, the university having opted for the final e-assessment via Blackboard among several alternatives recommended by the Ministry of Education, and the researchers' ease of access during the lockdown to the participants, who were professors at the same university as the researchers.

INSTRUMENT

To build the survey, the researchers carried out a considerable review of relevant research studies that focused on assessment in VLEs, as well as on online education during the COVID-19 pandemic. The researchers' own experience was also a significant source of information for building the survey. The researchers produced the e-survey utilizing the free online tool 'Google Forms'. The e-survey was specifically targeted to collect data on faculty's perceptions about their own preparedness and the preparedness of IHE for assessment in a VLE during the COVID-19 lockdown, in addition to challenges of giving assessment in VLEs for both formative and summative purposes. This survey was split into two sections. The first section contained 20 closed-response items focused on four categories: (1) preparedness of IHE for online assessment, (2) preparedness of faculty members for online assessment, (3) threats to validity and reliability and assessment methods, and (4) technical challenges. The second section contained an open-ended question intended to draw out from respondents any other challenges or suggestions that were not listed in the closed-response section. The respondents were instructed to read the items and then, in all conscience and good faith, select the choice that precisely reflected their perceptions, on a five-level Likert-scale, with answers varying from strongly agree (5) to strongly disagree (1).

VALIDITY AND RELIABILITY

Validity of the survey was assessed by a panel of English language experts who were asked to review its items. The experts were requested to give their feedback for the purpose of improving the survey. They independently evaluated the survey for clarity, appropriateness and suitability for use in the current study. To achieve maximum face validity and ensure reliability, a pilot test was conducted on a group of faculty volunteers ($n = 13$) who were not included in the actual study. The goal was to probe the suitability of the survey and to ascertain if further modifications would be necessary before the implementation of the main study. As per the respondents, the phrasings of two statements had to be clarified further, and a final, modified survey was thus produced. The internal reliability of the survey items was proven using Cronbach's alpha (.863). The value indicated a relatively high degree of reliability.

DATA COLLECTION

Prior to the commencement of the study, the researchers obtained ethics approval from the research ethics boards at Prince Sattam bin Abdulaziz University. Upon the approvals, the Deanship of IT and Distance Learning sent emails enclosing the electronic link of the e-survey to all faculty members via the university email. It was explained to the respondents that their contribution to the survey would be anonymous and confidential. No missing data was reported in the completed surveys: the electronic feature (Required) did not permit the participants to skip an item. Accordingly, all items had to be answered for the respondent to be able to submit the survey, thus eliminating the chance of 'missing data' due to participants' item skipping.

DATA ANALYSIS

The collected data were coded and analyzed using the "IBM SPSS Statistics 26." Descriptive statistics, namely means (M), standard deviations (SD) and percentages, were used to report a statistical summary of results. Responses were generated as continuous (interval) variables due to the Likert-type scale of five possible alternatives spanning from strongly disagree (1) to strongly agree (5) having equal-appearing intervals.

FINDINGS

The findings from the statistical analysis are grouped into four categories: (1) preparedness of IHE for online assessment, (2) preparedness of faculty members for online assessment, (3) threats to validity and reliability and assessment methods, and (4) technical challenges. Categories 1 and 2 present the findings for RQ1, and categories 3 and 4 answer RQ2. It is important to note that the categories may overlap to some degree, but they provide a convenient way to classify the findings.

The first question in this study was to identify the perceptions of faculty members towards preparedness of IHE for assessment in VLEs during the COVID-19 lockdown. With regard to preparedness of IHE, 62.5% of faculty thought that universities were not ready for online assessment due to the abrupt and rapid transition to e-learning ($M = 3.54$, $SD = 1.313$). The result also revealed that 75% of faculty agreed that IHE vacillated as they sought to choose the appropriate assessment method after the abrupt suspension of face-to-face classes ($M = 3.95$, $SD = 1.16$). In addition, most faculty (89.6%) agreed that IHE held several training workshops on remote assessment preparation in response to the lockdown ($M = 4.14$, $SD = .820$). Also, a clear majority of faculty (79.8%) agreed that reducing the amount of marks allocated to the online final assessment/summative assessment was a sagacious tactic because it minimized the impact of the poor validity of e-assessment ($M = 3.85$, $SD = 1.123$).

Regarding the preparedness of faculty members, among the total number of respondents 25% strongly agreed and 41.7% agreed that not all faculty members had sufficient experience in preparing online assessment ($M = 3.62$, $SD = 1.172$). Results further showed that 31.3% strongly agreed and 27.1% agreed that preparing remote assessment tests takes a lot of time and effort ($M = 3.54$, $SD = 1.313$). Additionally, according to 72.9% of the participants, neither the faculty nor the academic programmes were able to assess the students accurately and fairly ($M = 3.77$, $SD = 1.051$).

The second question in this study was to determine the faculty members' perceived challenges of implementing e-assessment for online courses. Regarding the threats to validity and reliability and assessment methods, 75% of the participants confirmed that most students cheated in a way or another in their online tests ($M = 4.12$, $SD = 1.135$). Furthermore, a clear majority of faculty (87.5%) thought that a great portion of students gained higher scores in their courses due to e-assessment than they would have in the traditional classroom ($M = 4.43$, $SD = .96$). Moreover, 66.7% of the respondents believed that there was no way to prevent students from cheating in online tests ($M = 3.85$, $SD = 1.196$), and most faculty members (81.3%) accepted that in online learning the summative assessment requires more stringent procedure than does the formative assessment ($M = 3.91$, $SD = .735$).

In this study, 83.4% of the respondents disagreed with the statement that the students' performance in online assessment is identical to their performance in the traditional (face-to-face) assessment ($M = 1.91$, $SD = 1.082$). Beyond that, according to 81.3% of the participants, the majority of the final exam questions were based on the type of objective test questions such as multiple-choice questions, fill in the blanks, true/false, and match the items. ($M = 3.81$, $SD = 1.136$).

This paper also reported on the perceived technical challenges that faculty members faced. The results revealed that half the participants agreed that Blackboard does not support all types of test questions ($M = 3.12$, $SD = 1.275$). There are technical problems with the Blackboard software when preparing assessment questions, such as the answering options and the auto spell-checker ($M = 3.52$, $SD = 1.005$), and there was too much online traffic on the university's server especially during final exams, which impeded the speed of browsing and saving answers ($M = 3.41$, $SD = 1.120$).

Moreover, a significant proportion of faculty (64.6%) reported that the online assessment did not deliver 'a level playing field' to all students in terms of internet access, internet speed and various technical conditions ($M = 3.66$, $SD = 1.236$). Also, 62.5% agreed that at the outset of each electronic test a great deal of time was wasted in pre-test procedures such as communicating with students, making sure they were ready, giving them instructions, repeating the instructions again and again in a way

that confused the testing process ($M = 3.5$, $SD = 1.142$). However, only 18.8% agreed that the Blackboard interface does not provide comfortable experience for students taking exams, or that it is not user-friendly ($M = 2.89$, $SD = .876$). Similarly, only 39.6% of the respondents agreed that sometimes Blackboard behaved erratically. For example, it sometimes left the test open for some students but closed for others even when test time was up ($M = 3.02$, $SD = 1.095$).

DISCUSSION

PREPAREDNESS OF IHE FOR ONLINE ASSESSMENT

The results demonstrate that IHE were not fully prepared to provide a proper assessment in a VLE during the COVID-19 lockdown. IHE were short of clear mechanisms for online assessment, and this was evidenced by the vacillation of universities as they sought to choose the appropriate assessment method for their students in response to the abrupt suspension of face-to-face classes. In the open-ended question, one of the respondents complained about the university was late in issuing decisions on assessment and tests. Another respondent mentioned that the only challenge was the constant non-clear instruction-giving and the constant communication of reluctant solutions. Universities that deliver traditional education are likely to lack the requirements for fair assessment in a VLE, which detracts from the reliability, validity, academic integrity and security of their assessment (Oncu & Cakir, 2011).

PREPAREDNESS OF FACULTY MEMBERS FOR ONLINE ASSESSMENT

In terms of faculty members' preparedness, most faculty members agreed that IHE have held several training workshops on remote teaching and testing in response to the COVID-19 lockdown. Unfortunately, the aim of these workshops was only to show how to develop summative assessments on Blackboard without linking them with the achievement of the course outcomes. It is essential for IHE at the end of the online semester "to assess students' academic performance, [and] to analyse the students' learning outcomes" (Thuy, 2019, p. 241). Indeed, it is not enough for universities to announce statistics on the number of students who have passed the courses as an indicator of the success of assessment in VLEs. According to Xiong and Suen (2018), in VLEs faculty members are facing new challenges on how to develop e-assessment to satisfy different learners' needs. In the open-ended question, one of the respondents commented on assessment training:

Shortage of detailed guidance material from the university (video, files), as the university considered its training workshops sufficient. Those training workshops were mostly a waste of time, and the substance was shallow.

As said above, only summative assessments were considered in the training on assessment. IHE stumbled as they tried to include training on formative assessment in their workshops. This could be because technology-based assessment is too focused on summative assessment, according to research results (Heinrich, 2006), or because formative assessment is not used to compute students' final results and grades (Ullah et al., 2012). This finding contradicts Thuy (2019), who states that assisted technologies at Hanoi Open University can be applied to develop only formative exams because the University has not built an online system for summative examinations, so summative assessment is administered under the control of the university at the end of the semester. The argument proposed by Thuy (2019) is that assisted technologies have just been utilized in online assessments, and professors at Hanoi Open University have not had professional training to implement summative e-assessments.

Many of the respondents indicated that not all faculty members had sufficient experience in preparing material for online assessment despite a good deal of virtual training during the lockdown. A participant expressed his annoyance because the e-learning team at the university was very late in spread-

ing awareness of using Blackboard effectively, especially for assessment. Another respondent opposed that, however, by confirming that the department where he works did their best in preparing and guiding the staff to set exams. In the open-ended question, a respondent commented that virtual exams were not an appropriate alternative to conventional tests:

The idea of having students perform virtual exams may be effective right now during the lockdown but I do not think that currently it is a better alternative to traditional methods in the long run. At the heart of any university is care for their students and for the education imparted.

THREATS TO VALIDITY AND RELIABILITY AND ASSESSMENT METHODS

Despite the reduction of the number of marks allocated to the summative assessment for the purpose of minimizing the impact of the poor validity of e-assessment, more than two-thirds of the participants believed that neither the faculty nor the academic programmes were able to 'e-assess' the students accurately and fairly. There were several mishaps that could trigger this inaccuracy. For example, most of the respondents confirmed that most students cheated in a way or another and gained higher scores in their courses this semester than they would have in the traditional classroom. A variety of techniques need to be employed when assessment is provided in a VLE, to ensure assessment security and validity such as learner identification and technical requirements (Tereseviciene et al., 2020). However, a large portion of faculty believed that there was no way to prevent students from cheating in online tests. If cheating becomes rife, the marketplace may, as a result, develop a new, negative stance towards students graduating from IHE when there is a clear incompatibility between a student's GPA and his/her expected level of performance. Undoubtedly, credibility of some universities will suffer in the marketplace.

An analysis of students' grades conducted by the researchers confirms that the assessments may not accurately measure the true performance of students. The researchers analyzed the students' average scores on the tests before the COVID-19 lockdown and after for several courses. It turned out that the average of scores in the tests after the closure was much higher than before. This comparison might not be completely accurate because the increase could be attributed to experiences gained, but yet it might be an indicator of unreliability of e-assessment. Also, since students were allowed more than one test attempt, there was a suspicious discrepancy between the attempts. This may indicate that the students were receiving help from others. Figure 1 shows the attempts of three students who were recorded by Blackboard. Students A and B attempted the test three times, student C two times. For each student, the attempt that appears on top in the figure was his first attempt, and the one below it was his second, and so on. Figure 1 shows the significant discrepancies between attempts for each student, which casts doubt on the reliability of this e-test.

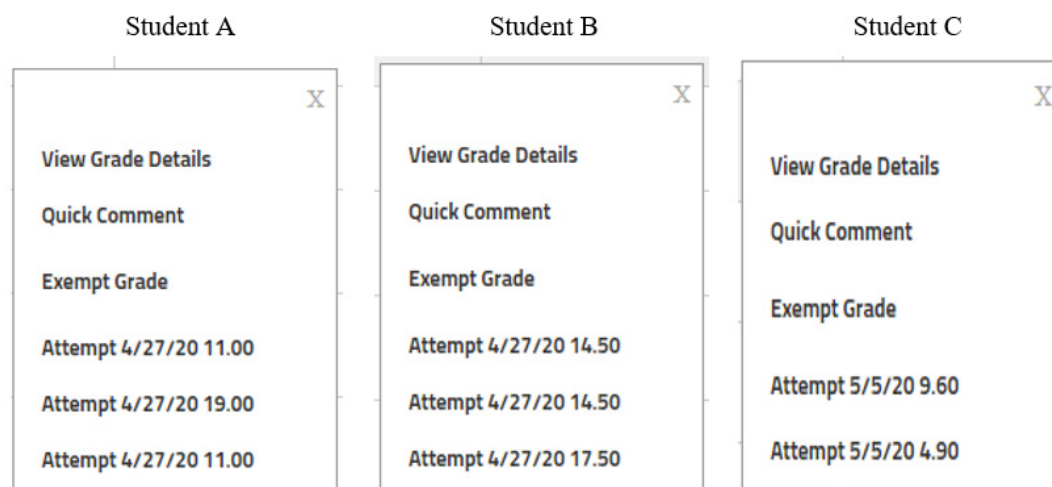


Figure 1. Test attempts by three students recorded by Blackboard

Curtailed academic dishonesty such as cheating and plagiarism and verification of student's identity are real challenges that arose in VLEs during COVID-19. Previous research has shown that one of the most serious challenges of assessment in a VLE is the potential for cheating and plagiarism (Mellar et al., 2018; Nickels, 2013). Due to the abrupt and rapid transition to e-learning under the COVID-19 pandemic, most universities utilized only basic security measures and did not use advanced systems (Hernández et al., 2008). Several studies insist that summative assessment requires more stringent procedure than the formative assessment (Andreatta & Gruppen, 2009). Formative assessment is commonly performed without invigilation, because it primarily assists in supporting the teaching and learning process (Xiong & Suen, 2018). When considering credits or degrees, a particular form of invigilated assessment is required to secure the validity of assessment results (Xiong & Suen, 2018). Regarding plagiarism, at Prince Sattam bin Abdulaziz University faculty members did not subject assignments of students to plagiarism detection software (iThenticate) because they were not allowed to use iThenticate more than 20 times per year, so faculty members used it sparingly and only for their own research.

The majority of the assessment tests (81.3% agreed) was based on the type of objective test questions such as multiple-choice questions, fill in the blanks, true/false, and match the items. These types of questions are "generally easier to grade both by automatic and human means" (Hettiarachchi et al., 2016, p. 50). Some faculty members take advantage of the automatic grading feature to avoid test questions that require manual grading and so to reduce their marking workload (Nickels, 2013). However, these types of assessment questions are generally suitable to assess knowledge at the lower-order level of Bloom's taxonomy (Hettiarachchi et al., 2016; Khan & Jawaid, 2020). A great body of research insists that it is difficult to develop higher-order cognitive skills (i.e., synthesis, analysis and evaluation) from multiple-choice questions (Bloor et al., 2014) or "questions which only need a simple yes or no response" (Bearn et al., 2002, p. 163).

TECHNICAL CHALLENGES

With regard to technical challenges, several studies confirm that using technology is not without technical limitations (Al Meajel & Sharadgah, 2018; Brown & Dinicola, 2020). A set of challenges was listed in the results of this study, and the participants were divided between agreeing and disagreeing about the existence of these challenges. For example, some professors agreed that preparing remote assessment tests takes a lot of time and effort. Dean (2003, p. 896) states that Blackboard "assessment development involves a multi-step exacting and often frustrating procedure." On the other hand, Yao (2020) points out that computer-based assessment, compared with paper-based assessment, "is less time-consuming, easier and quicker to be administered and scored" (p. 124). The respondents commented on such technical limitations. One respondent wrote:

During exams students' excuses about the Internet; headphones and speakers sometimes did not work correctly; students who preferred using Blackboard on their mobiles confronted more problems such as that they couldn't see the slides shared by the teacher, and sometimes they cannot take the exam via mobile phones.

Another participant added:

Many individual online struggles exist during exams. Most of them were primarily due to the lack of technical knowledge and not necessarily a design issue.

The automatic grading of students' answers does not always match the human grading. There are unexpected answers from students that the automatic grading system regards as incorrect while they are correct if graded manually. The following excerpt is a case in point, where the student corrected the mistakes in all phrases but in the second and third phrases added the word 'pictures' although it did not need correction. Blackboard marked those two answers wrong, so those answers had to be re-marked manually:

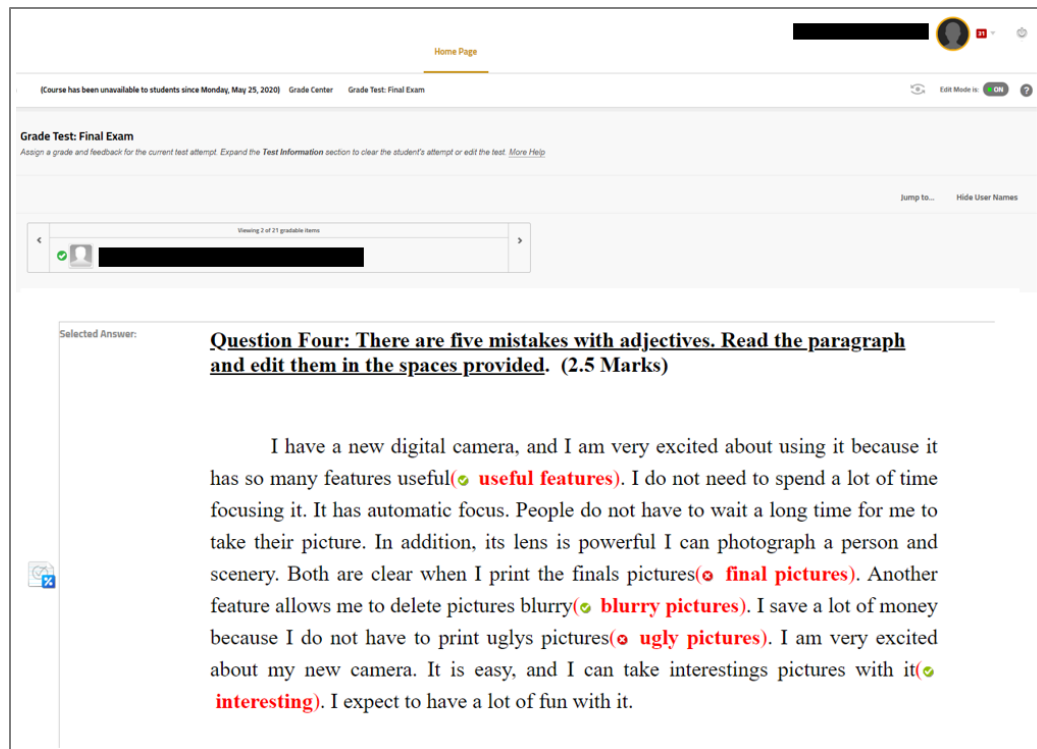


Figure 2. Blackboard excerpt from automatic grading of a student's answer

In addition to all the above-mentioned challenges, online assessment did not deliver 'a level playing field' to all students in terms of internet access, internet speed and various technical conditions. In this study, most faculty members disagreed with the notion that the students' performance in online assessment was identical to their performance in the traditional assessment. Azzahra (2020) found that the unprecedented disruption of the traditional face-to-face teaching and learning has put students from poor families in rural areas in trouble. Azzahra added that COVID-19 presented tertiary education with assessment challenges "brought about by the inequality in accessing technology infrastructure" (p. 2). The sudden transition to VLEs means that some students may not be technically ready for online learning and assessment (Longhurst et al., 2020). A respondent explained that Blackboard sessions and assessments were impossible to hold initially. We believe that was due to the busy traffic at similar class times.

SOLUTIONS

This paper has shed light on a whole host of e-assessment challenges triggered by the COVID-19 lockdown. This conundrum becomes all the more genuine if the lockdown continues for additional semesters. In light of this, immediate action needs to be taken to ensure that IHE are delivering good education and implementing proper e-assessment methods (see Table 1).

Table 1. Challenges encountered by faculty and suggested solutions

Challenge	Solution(s)
Preparedness of IHE	<ul style="list-style-type: none"> • It is important for universities to make an emergency plan for any unexpected future closures, so that clear mechanisms for online assessment are ready for implementation. • IHE should ensure that students' performance in online assessment is identical to their performance in the traditional (face-to-face) assessment.

Challenge	Solution(s)
<p>Preparedness of Faculty members <i>(Preparation of faculty members is intertwined with all the solutions, as faculty members and students are the main beneficiaries of the proposed solutions.)</i></p>	<ul style="list-style-type: none"> • Sufficient continuous training on developing e-assessment tests for both formative and summative assessments is need. • Faculty members should be provided with virtual proctoring software to secure online assessments.
<p>Cheating</p>	<ul style="list-style-type: none"> • To preclude cheating, it is recommended that IHE use technology-based invigilation software that blocks browsing, prevents access to other applications on the device being used to access the test, and takes photos of the student during the test (Khan & Jawaid, 2020). • Universities may use biometrics such as facial/voice recognition (Tereseviciene et al., 2020). • Universities may create an individual exam for each student (Palloff & Pratt, 2008). • Universities may hold tests at invigilated locations where principles of social distancing recommended by WHO can still be applied.
<p>Plagiarism</p>	<ul style="list-style-type: none"> • To prevent plagiarism, the researchers suggest expanding the use of the iThenticate software, so that the faculty members can use it freely. • It is also preferable to make iThenticate available for students too, so that it is not meant to be utilized as a “plagiarism detection tool” to penalize students but as a “learning tool used to support students” (Mahabeer & Pirtheepal, 2019, p. 3).
<p>Summative assessment requires more stringent procedure than the formative assessment.</p>	<ul style="list-style-type: none"> • The reliability and validity for both formative and summative assessments are required at the same level of accuracy as they are necessary to reach educational goals and objectives. • The suggested solutions mentioned above to prevent cheating and plagiarism should be employed for both types of assessment methods.
<p>Aberrances in the automatic grading system</p>	<ul style="list-style-type: none"> • Faculty members should not trust the automatic grading system. They should review the students’ answers manually before approving the final grades.
<p>Online traffic on the University’s server</p>	<ul style="list-style-type: none"> • Online tests should have their own server so that the online traffic is catered for with sufficient bandwidth. • Distribute the university exams over multiple time slots to avoid running too many exams at the same time.
<p>The majority of the final exam questions were based on the type of objective test questions.</p>	<ul style="list-style-type: none"> • Universities should provide workshops on objective and subjective assessment methods of outcomes. This will guarantee a complete assessment of both lower and higher-order cognitive skills. • A specialized e-assessment committee should be set up in each academic program to evaluate e-assessments and provide assistance.

LIMITATIONS AND FUTURE RESEARCH

There exist two limitations in this study, which suggest directions for further research. First, this study only explores the perceptions of faculty members. The perceptions of students are as yet to be explored in future research, and the findings compared. Second, the sample was drawn from Prince Sattam bin Abdulaziz University. However, bearing in mind that the implementation of the summative assessment via the VLE was made mandatory in all Saudi universities, as was the case in most universities around the world, this would increase the generalizability of the findings of the current research. Restrictions on mobility because of the COVID-19 lockdown limited the researchers' opportunities to generalize their results to a wider population. Future research could be conducted on a larger scale that includes faculty from different universities to reinforce the generalizability of the findings. In addition, future research could suggest processes and mechanisms to help faculty develop assessment in VLEs more effectively. More similar work is needed to provide more solutions to the challenges identified in this paper regarding the e-assessment in response to the COVID-19 pandemic.

CONCLUSIONS

It goes without saying that this year presented an unprecedented challenge to education due to the abrupt transition from offline to online teaching and assessment as a result of the COVID-19 pandemic. The extent of confusion that ensued, both for students and their families, has been considerable. It is quite understandable that students were not all 'in the same league' in terms of Internet access and various technical conditions, which may affect the validity and reliability of the online assessments. IHE were not ready for this sudden pandemic and therefore were largely unable to implement the assessment process properly. Faculty members could prepare e-assessment tasks, but they were not able to fully trust the students' performance, because students were not always interacting with the e-learning process as it was hoped. Therefore, the priority now is to prepare students for the new concept of assessment in a VLE, and to develop a new generation of students who will be able to recognize their own learning needs and responsibilities.

The Covid-19 pandemic has disrupted the traditional education system and has triggered an immediate need to implement alternative assessment methods. This change in assessment in a VLE requires IHE to review their current assessment policies in order to learn from the mistakes made during the spread of this pandemic. They should analyse the strengths and weaknesses of their first e-assessment experience and endeavor to improve the quality of assessment in VLEs. Assessment in a VLE requires universities to develop an e-assessment system based on meticulous planning to ensure that e-assessment is honest, valid and reliable.

Based on the perception of faculty members, it is clear that faculty have genuine concerns about a range of challenges for higher education assessment in VLEs. They worry about the absence of advanced systems that can provide e-assessment security. They are also concerned about cheating and plagiarism. They are not convinced that e-assessment can adequately assess all intended learning outcomes. They have concerns about insufficient qualifications of some faculty and the need to get more training on developing e-assessment tests. They further believe that the pandemic posed new challenges to many students because of the implementation of new online assessment modalities.

To sum up, the present assessment systems in VLEs do not prepare IHE or faculty to assess the students accurately and fairly. In order for assessment in VLEs to take a worthy place, the challenges mentioned in this study need to be addressed.

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APPENDIX: COPY OF E-SURVEY

Preparedness of Institutions of Higher Education for Assessment in Virtual Learning Environments during the COVID-19 Lockdown: Evidence of bona fide Challenges and Pragmatic Solutions

Dear faculty member,

Thank you for agreeing to take part in this important questionnaire investigating preparedness of institutions of higher education for assessment in virtual learning environments during the COVID-19 Lockdown. This questionnaire will only take about five minutes to complete. Be assured that all answers you provide will be kept in the strictest confidentiality. All responses will be compiled together and analyzed as a group.

Thank You,

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Section A

Please read the following closed-response statements, then indicate the extent to which you agree or disagree with each statement.

NO	Statement	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
1	Universities were not ready for online assessment due to the abrupt and rapid transition to e-learning under the COVID-19 pandemic.					
2	The university vacillated as it sought to choose the appropriate assessment method for its students after the abrupt suspension of face-to-face classes.					
3	I think most students cheated in a way or another in their online tests.					
4	I think a large portion of students gained higher scores in their courses this semester due to online assessment than they would have in the traditional classroom.					
5	There was no guaranteed mechanism to prevent students from cheating in online tests.					
6	I think that reducing the amount of marks allocated to the online final assessment was a sagacious tactic because it minimized the impact of the poor validity of online assessment.					
7	Not all faculty members had sufficient experience in preparing online assessment.					

NO	Statement	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
8	The university held several training workshops on remote assessment preparation in response to the COVID-19 lockdown.					
9	Preparing remote assessment tests takes a lot of time and effort.					
10	Neither the faculty nor the academic programmes were able to assess the students accurately and fairly.					
11	Blackboard does not support all types of test questions.					
12	There are technical problems with the Blackboard software when preparing assessment questions, such as the test page view, the answering options, the auto spell-checker, and others.					
13	The Blackboard interface does not provide comfortable experience for students taking exams, and in general it is not user-friendly.					
14	There was too much online traffic on the university's server especially during final exams, which impeded the speed of browsing and saving answers.					
15	I believe that in online learning the summative assessment (such as the final exam) requires more stringent procedure than the formative assessment (such as homework and presentations).					
16	The students' performance in online assessment is identical to their performance in the traditional (face-to-face) assessment.					
17	The online assessment did not deliver 'a level playing field' to all students in terms of internet access, internet speed and various technical conditions, which affected the reliability and validity of the assessment.					
18	At the outset of each electronic test, a great deal of time was wasted in pre-test procedures such as communicating with students, making sure they were ready, giving them instructions, repeating the instructions again and again in a way that confused the testing process.					
19	Sometimes Blackboard behaved so erratically that I was muddled and unsure what to do. For example, in some tests it scored some students' answers and overlooked others for no explicit reasons, or it sometimes left the test open for some students but closed for others even when test time was up.					
20	The majority of the final exam questions were based on the type of objective test questions such as multiple-choice questions, fill in the blanks, true/false, match the items, etc.					

Section B
Open-ended Question

If you have encountered other e-assessment challenges that are not listed above, please describe them here:

Thank you for your time.

BIOGRAPHIES



Talha A. Sharadgah has a PhD in Curricula and Teaching Methods from Amman Arab University, Jordan (2013). Currently, he is an assistant professor in the English Department at Prince Sattam bin Abdulaziz University in Saudi Arabia. His areas of research interest are focused on educational assessment and technology integration in education. ORCID: <https://orcid.org/0000-0001-6338-9605>



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