Challenges of Deploying Online Exams

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Abstract: This study explores the experience of transferring exams from a conventional learning environment to an online format by Technical and Vocational Training Corporation (TVTC) as a response to COVID-19 pandemic. A particular interest of this study was in the challenges facing the administrators at TVTC. A phenomenological approach was employed to analyze data collected from the administrators responsible for the online exams at ten different educational institutions affiliated with TVTC. Findings indicate several challenges to implementing online exams. A robust technologies infrastructure and developing technical skills for instructors and students can help overcome many of these challenges. However, further research to investigate effective strategies for online exams is needed.

Keywords: *Online exams, COVID-19 pandemic, Technical and Vocational Training Corporation.*

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Introduction

Assessment is an essential part of the educational cycle. During the COVID-19 pandemic educational institutions elected to assess how students learn through online exams. The Technical and Vocational Training Corporation (TVTC) also experienced the online exams during the same period. TVTC has over 100 institutions with programs for many different majors. These institutions are widely distributed throughout Saudi Arabia. This study aims to investigate the challenges faced by TVTC instructors during the COVID-19 pandemic when distance learning was offered and the exams were done online.

With the adoption of distance learning it was important to study the design and delivery of that learning. Student assessment is an area that deserves attention. Distance and online learning will become significant learning formats in Saudi Arabia in all educational and training sectors. It is important to identify the challenges educators face when implementing online learning and online exams and to highlight effective practices they have applied to overcome these challenges. Identifying suitable and effective assessment approaches and distinguishing between barriers to and facilitators of their operation helps in implementing (Beebe, Vonderwell, & Boboc, 2010), planning to use them effectively (Ilgaz, & Adanır, 2020), developing empirical strategies (Kearns, 2012) and facilitating development of a framework for assessing online practices and online exams.

With consideration of the growth of online learning and distance learning, this research provides significant input to understanding the best approaches and practices for conducting online exams and adds to the knowledge for continued research for effective use of online exams. Education institutions are currently adapting new technologies in online exams (Ilgaz, & Adanır, 2020) that have potential for learning. Application of efficient and effective assessment is still difficult (Xiong, & Suen, 2018) and less research is being done about incorporating different forms of assessment into an online learning environment (Beebe, et al., 2010). As online exams are growing, there are still much to be exposed about them (Bohmer, Feldman & Ibsen 2018). This research was guided by the question: What challenges face instructors at TVTC when conducting online exams?

Literature Review

Assessment, the collecting and analyzing data to reflect a learner's performance (Ilgaz & Adanır, 2020), is an integral part of the learning

process. Exams are the most common assessment methods in traditional learning environments. Most studies agree that electronic assessment or e-assessment means that all evaluation procedures, from designing, conducting, responding to questions, and grading to giving feedback, are carried out electronically using information technology (Alruwais, Wills, & Wald, 2018). Online assessment or online exams, on the other hand, refers to assessment or exams that require the internet which means it can be conducted at a physical distance disconnect between instructors and their students.

Exams remain the most common approach to assessing students and assigning grades but different ways to conduct these exams have been developed (Prisacari & Danielson, 2017). For example, students have taken exams through testing platforms or learning management systems (Prisacari & Danielson, 2017). Such exams are used increasingly to evaluate students' learning (Ilgaz, & Adanır, 2020) and will become even more common with the spread of online learning which will, in turn, raise several challenges to student assessment (Boitshwarelo, Reedy & Billany 2017).

E-exams provide many advantages in both online and traditional learning environments, making them a preferred method of assessment (Ilgaz, & Adanır, 2020). E-exams help educators save time and effort in developing and grading them (Ridgway, McCusker & Pead, 2004). They also enhance monitoring students' progress and performance by making analysis across assessments (Alruwais, Wills, & Wald, 2018).

E-exams provide students with immediate feedback (Alruwais et al, 2018; Ridgway et al., 2004), increase flexibility for students in remote areas or with disabilities (Cramp, Medlin, Lake, & Sharp, 2019), and offer better control over when and where to take the exams (Ridgway et al., 2004). Moreover, technology enables implementation of adaptive testing which refers to the ability to adjust the difficulty of a test based on students' responses to provide accurate results of their performance (Ridgway et al., 2004)

For universities, e-exams help to decrease costs (Alruwais, et al., 2018; Boitshwarelo, Reedy & Billany 2017) because large numbers of students can take e-exams and have their grades issued promptly and accurately (Ridgway et al., 2004). Additionally, e-exams help to reduce cheating by checking the identification of examinees and providing different questions in a different order for each student (Peterson, 2013).

With all the above-mentioned advantages of e-exams, their use does not adversely affect students' performance. Several studies examined the effect of e-exams on learners' performance comparing to e-exams to

traditional exams and concluded that the medium of the exams does not affect performance (Kemp & Grieve, 2014; Karay et al., 2015). Moreover, Some studies found that students prefer e-assessment (Alruwais, et al., 2018). However, other studies reveal concerns about some challenges that can occur when implementing e-exams.

Some challenges are technological since a robust technical infrastructure is an important element to implementation of e-exams such as is a potential for technical problems to occur during taking the exam (Ilgaz & Adanır, 2020). Slow network speed, Internet connectivity problems, or poor technical infrastructure development (Kearns, 2012; Osuji, 2012; Davis, Rand & Seay. 2016; Ilgaz & Adanır, 2020). Students, instructors and administrators might be unfamiliar with the technology in general or with the specific system used to provide their e-exams (Osuji, 2012; Ilgaz & Adanır, 2020). Unreliable devices students use when taking the e-exams, power-cuts, non- responsive devices (Ilgaz & Adanır, 2020) or old hardware and software (Davis et al. ,2016) can cause problems and unreliable test results. The potential for technical system problems and unfamiliarity with e-exams can be stressful (Wibowo et al. 2016) and cause anxiety (Cramp et al., 2019). However, over time the familiarity will reduce the students' stress levels (Davis et al., 2016; Cramp et al. 2016).

Physical distance between instructors and their students also cause such issues as the academic integrity, validity, reliability, and security of e-exams (Kearns, 2012; Ilgaz & Adanır, 2020; Xiong, & Suen, 2018; Bohmer, et al., 2018). Xiong and Suen (2018) discussed the issue of cheating in an online setting which is considered easier than in a traditional learning setting. Newton (2015) pointed out that there were paid services that helped online students earn good grades by doing their work for them. The proctoring services that promote online testing security by using a webcam for identity authentication charge fees that can run to hundreds of dollars depending on the security level and the length of the test (Xiong, & Suen, 2018).

Another challenge in e-exams is that the instructors usually are not expert at developing online tests (Xiong, & Suen, 2018) and need training to be confident about using e-exams (Alruwais, et al., 2018). I Instructors need support both during development of e-exams and while the tests are being conducted (Frankl & Bitter, 2012). I Implementing e-exams increases instructors' workload (Kearns, 2012; Bohmer et al., 2018). It requires effort to set up the exams (Davis et al. 2016), especially when creating a questions bank. Another challenge mentioned in literature was the system's inadequacy for recording mathematical calculations (Laine et al. 2016) Moreover, learning management system (LMS) provides several kinds of questions such

as multiple-choice that are useful only for lower-order thinking skills such as remembering definitions (Alruwais, et al., 2018)

Research Design

This research follows the ethnography design of qualitative research which studies the shared pattern of phenomenological research in which the researcher describes a phenomenon as seen by the participants who experience it (Creswell & Creswell, 2018).

Research Context

The study was conducted during the second semester of the 2020 academic year when the COVID-19 virus pandemic led educational institutes to shift to distance learning and conduct exams online. TVTC used the LMS for delivering education as well as for assessing students' learning via e-exam tools. Final exams which weigh from 10 to 20% of the overall grades of students were conducted on distance

Instructors developed question banks for the courses they taught. The kinds of questions used varied, based on the course content. The exam schedule was arranged and managed by the e-training center, a central administrative body tasked to manage the e-training and issues related to it. The schedules were announced to the students via LMS and emailed to them. During the exam time, each student logged into LMS and took the e-exams from his or her home. Technical support was provided during the exam via IT center in TVTC.

Target and Sample

The target population was administered at TCTV. Our approach was to purposefully select a group of individuals. Such an approach would help the researcher understand the challenges of deploying online exams and answers since they are in the position of being e-exam administrators. After obtaining IRB approval, the researcher sent emails to 25 supervisors of e-exams administration in 16 different branches of TVTC in cities throughout Saudi Arabia. The emails included information about the researcher and the goal of the study. The targeted individuals were asked for their agreement to voluntarily participate in the study and to provide their phone numbers to arrange where interviews could take place. Seven declined to participate, eight did not reply, and only 10 were willing to participate. Thus, ten administrators participated in the semi-structured interviews.

Data Collection

Data were collected through 30-minute interviews conducted with supervisors of e-exams administration to ask the research subjects about the challenges they faced and what they considered effective or helpful to solve and overcome challenges in the area of online assessment. Notes were taken during the interviews.

Data Analysis

After finishing the interviews, the researcher processed and organized the collected data following the steps suggested by Creswell and Creswell (2018). First, the data were organized and prepared for analysis which involved transcribing the interviews. Second, the data were read to provide a general sense of the information and an opportunity to reflect on its overall meaning and the general ideas expressed by participants. Third, coding all data was begun by bracketing chunks and assigning a word to represent each category. Those categories were labelled with terms based on the language of the participants. The researcher used both approaches of coding: developing codes based on emerging information collected from participants and using predetermined codes and fitting data to them. The following categories, most of which were mentioned in the literature as challenges facing deploying online exams, were developed: Server Overload, Devices Compatibility, Credibility, Poor Internet, Financial ability, Communication, Stress, Students poor technical skills, Instructors poor technical skills, Workload, Cannot asses high-order thinking skills, Not accurate assessment, Cannot assess practical skills, and Hard to write Mathematical formulas. Data coding was done by hand. Fourth, the description and themes were generated, using coding (thematic analysis). In this step, the researcher merged related categories four themes: technical, student, instructor, and educational. Table 1 shows the themes, codes, and sample quotations of participants.

Results and Discussion

Four themes of challenges emerged, related to technical, student, instructor, and educational issues.

Technical challenges. Not surprisingly, many of the challenges identified by participants arose from the technical part. The overloading of the server by the large number of students doing the e-exams at the same time was the most difficult problem. All participants agreed that the greatest challenge was the server overload which caused a variety of problems during the exam.

Several administrators talked about the special attention needed during the exam time that they needed to pay for students' requests to get back in again after the system forced them to logout or deleted their attempts. These problems occurred either by the system overload or because of the time determinants that some instructors used as a way of reducing the chance for cheating. The overload server problem also caused the system to delay in response to students' action. For example, it took a long time to sign in to the exam or for students to send their responses. That delay was counted against the exam time for students. The administrators responded to this challenge by running some e-exams on other platforms. These technical challenges were mentioned in the literature even in recent studies (Ilgaz & Adanır, 2020; Davis et al., 2016; Kearns, 2012; Osuji, 2012). The educational inductions need to develop a strong intrastation for e-learning with all its elements.

When TVTC institutions elected to use e-exams because of the COVID-19 pandemic, administrators used Blackboard, the evaluation tool available to them in their learning management system. However, Blackboard is not a platform especially designed for evaluating students' learning and not is adequate to run a secure exam and ensure academic integrity. This raised challenge to credibility. For example, Blackboard does not provide means to lock the browser feature or enable video cams for proctoring students. Some participants expressed concern about being unable to accurately assess their students' learning by the e-exams. They cited a potential for students to cheat either by letting someone else take their exam or by discussing their answers with friends. One instructor stated, "The biggest hurdle: credibility: ensuring identity of the examinee". This challenge was and still is a concern for educators in several studies (Bohmer, et al. 2018; Ilgaz & Adanır, 2020; Kearns, 2012; Xiong, & Suen, 2018)

Device compatibility was another challenge. Some students used their smart mobiles to take the e-exams, which caused the questions to appear to have been changed, affecting their responses to these questions. Instructors responded to this challenge by adding more instructions to the exam such as the number of questions. However, system that are designed for evaluating students include different methods of proctoring students and ensuring their credibility and compatibility with mobiles and tablets.

TVTC is spread over a large area of Saudi Arabia and has many branches that reach into the suburbs. Such areas faced problems of poor internet service which is only available in some places. Some students do not have internet service in their homes and had to go other places such as

libraries, coffee shops, or friends' homes to take the exams. For those students, administrators had to make sure that their e-exam sessions were not held during the curfew.

Student-related challenges. Other participants commented on difficulty conducting e-exams because of the financial ability of students. Some students did not have their own devices so were unable to log in at the exam time. Some share devices with other family members who might also need them to do their work or exams. One participant said, "Some of our students do not own internet service or smart devices due to their poor financial situation and do not have the capability of reaching the online exams." Administrators responded to this challenge by conducting the exams in more than one session.

Students' poor technical skills posed another challenge. Participants said that this lack affected students' use of the LMS which, in turn, affected their performance on the e-exams. The instructors added, "Students did not have enough training to use LMS." For students who experienced the e-exams for the first time the first day was the most difficult. The administrator advised the instructors in their institutions to conduct pilot e-exams and let the students practice doing exams with no grades so they could ask for support before taking the real exam. The situation improved on following days because the students were used to the system and were careful about the time restrictions of the exams. Students also became familiar with the information technology support process which turned out to be less stressful for them. Speaking about the needs for internet, instructors from suburbs observed that communicating with some students by internet or even by phone communication was difficult.

Two participants mentioned that e-exams were stressful for students and increased their concerns. Students become concerned that their attempts did not submit well or technical problems would prevent them from completing the e-exams. This challenge will fade over time as students become familiar with using LMS and other systems in their learning and evaluating (Cramp et al. 2016; Davis et al., 2016; Wibowo et al. 2016). Poor technical skills and the stress students face when using e-exams can be overcome by the training students.

Instructor-related challenges. Another difficulty arose about the workload for instructors. They had to develop more multiple questions in different formats for each learning objective to create a question bank to reduce the possibility of cheating. This required extra effort, especially with the type of questions available in the LMS. Another task which increased their workload was manually transferring the students' grades to the students' grades center

system because there was no connection between that system and the LMS used in TVTC. Training instructors on the use of any and all systems implemented in their educational institutions is essential.

Poor technical skills among instructors was another problem. Before the COVID-19 pandemic, most instructors at TVTC did not use LMS and those who did use it did not use the evaluation tool. They have no experience in developing the exam, or making it available for students among other problems. The administrators dealt with the problem by conducting online training webinars and creating video instructions to be available for instructors at any time. They also designated some IT support providers to provide support on developing e-exams and extending their time. The need to train instructors to use e-exams was cited in the literature (Alruwais, et al., 2018). As well as their need for support (Frankl & Bitter, 2012), increasing instructors' workload for developing e-exams also was cited (Kearns, 2012). However, this difficulty decreases over time as instructors gain familiarity with the systems and questions created.

Education-related challenges. A recurring theme among administrators who participated in this study was the educational challenges. Some instructors do not believe that e-exams adequately reflect students' real learning. For example, the instructors were concerned about whether e-exams could adequately assess high order cognitive skills of the students. Some of them believed it was hard to assess some learning objectives they set for their students by multiple choice or true/false questions. Also, they could not assess students 'practical skills, which students may need to demonstrate mastery various practical skills to pass. Most TVTC instructors had to waive this part but a few asked their students to record videos demonstrating mastery of these skills. One administrator mentioned that some instructors complained that it was difficult to write mathematical formulas and algebraic equations using the available tools. These challenges were cited in the literature (Alruwais, et al., 2018; Laine et al. 2016) however, there are many e-assessment methods that support the use of different kinds of questions as well as the mathematical formulas.

Table 1. Themes, codes, and sample quotations of participants

sample quotations of participants	codes	themes
Frequent Interruptions and logged out by the LMS system, with difficulty returning to it due to overload	Server Overload	Technical
We had to perform electronic tests on alternative platforms due to the overload on Blackboard	Server Overload	
Some students logged in through their mobiles, which led	Devices	

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to some exam questions being dropped	Compatibility	
The biggest hurdle was credibility: ensuring identity of the examinee,	Credibility	
verifying students were doing the test themselves and	Credibility	
unsure if students' claims of communication problems were honest		
LMS does not provide help in securing the e-exam such as locking the browser	Credibility	
Some students have very poor internet service	Poor Internet	Students
Most students do not have private computers	Financial ability	
Some of students do not own internet service or tablets due to financial constraints	Financial ability	
Some students do not own smart devices to reach the online exams	Financial ability	
Difficulty in communicating with students from villages there is no internet or even phone communication.	Communication	
Stress and concerns of some students while taking the e-exams	Stress	
The weak technical skills of some students	Students poor technical skills	
Students had not had enough training to use LMS	Students poor technical skills	
Some instructors lack technical skills	Instructors poor technical skills	Instructors
The need to develop multiple questions for e-exams (question bank) causing excess work for instructors	Workload	
Blackboard has no connection with the Rayat platform (the system responsible for students' grades)	Workload	
Electronic questions do not assess all cognitive levels of learning.	Cannot asses high-order thinking skills.	Education
Online exams do not accurately reflect the students' performance or learning	Not accurate assessment	
It is hard to assess practical skills via online exams	Cannot assess practical skills	
Instructors find it hard to write mathematical formulas, algebraic equations and functions in tests	Hard to write Mathematical formulas,	

Conclusion

This research was conducted during the COVID-19 pandemic to spotlight the challenges faced by educational institutions while conducting online exams. The hardest challenges were related to technical issues and the most-mentioned ones were related to overload of the servers. At that time institutions had no other choice but e-exams to assess students. The

technical infrastructure was not strong enough to run the online exams for large numbers of students and large numbers of courses which was the case in TVTC. At the same time, there was not enough time to develop a robust technical infrastructure. However, the administrators practiced some techniques to reduce the overload at LMS. For example, they distributed the exam sessions all day long and also held some sessions in the evening.

Another challenge arose regarding the use of technology – student and instructor unfamiliarity with LMS, especially with the e-exams. The administrators dealt with this challenge by increasing technical support for both groups and in a variety of forms such as instruction videos, infographic and sound forms. The work hours of live support were extended and pilot e-exams were developed on which students could practice.

Another challenge related to the instructors and students was the lack technical skills which reflected students' performance on the e-exams and instructors' development of the e-exams. This challenge can be overcome by training instructors and students and increasing their technical skills so they become familiar with technology. This can solve the stressful experience of e-exams.

Challenges related to educational issues such as assessing high-order cognitive levels of learning and practical skills were found. With the development of e-assessment technics and systems such challenges will fade. There are a number of advance evaluating systems that overcome all challenges found in this study. To conclude, with the spread of online or e-learning, educational institutions should develop a robust technical infrastructure and increase their instructors' and students' technical skills. These two elements facilitate and smooth implementation of online learning including online exams and reduce the obstacles that can make e-exam a difficult experience.

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