DO STUDENTS HAVE EQUAL PERCEPTIONS OF E-LEARNING DURING THE COVID-19 PANDEMIC? A CROSS-SECTIONAL STUDY INVESTIGATED THE DIFFERENCES IN STUDENTS' PERCEPTIONS TOWARDS THE DETERMINANTS THAT INFLUENCE SOLE E-LEARNING USE

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ABSTRACT

Lockdowns due to the COVID-19 pandemic have forced universities to migrate entirely to eLearning to deliver classes. Students have found themselves using either synchronous, asynchronous, or mixed mode learning methods based on their universities' preferences. Many studies that investigated difficulties during the lockdown have been mainly concerned about technical difficulties. The reports lacked the investigation of differences among students' groups, with a few exceptions that highlighted differences among male and female students. Moreover, existing studies were found to focus on singular dimensions (TAM, IS success model, etc.). This study perceives that students, based on the various groups they belong to, can show different levels of perceptions towards determinants that influence the usage of eLearning. This study investigated differences among students in terms of determinants from TRI, TAM, and IS success model. A total of 915 participants from Malaysia and Saudi Arabia reported their perceptions. The findings reported in this study showed significant differences among participants, in particular, among groups of gender, age, country, and eLearning mode. It is noticeable that participants who used

the asynchronous mode of eLearning gave more weight to information quality, system quality, service quality, perceived usefulness, perceived ease of use, innovation, optimism, satisfaction, and intention to use. Meanwhile, participants who used the synchronous mode experienced more discomfort. It could be said that the significant differences between the usage of synchronous and asynchronous modes should be considered for better quality of online learning.

The COVID-19 pandemic has driven universities and students to use eLearning as a medium of education (Chang et al., 2021; Chaturvedi et al., 2021; Gupta et al., 2021; Jones et al., 2021; Khan et al., 2021; Muthuprasad et al., 2021; Santiago et al., 2021; Singh et al., 2021; Svoboda et al., 2021; Tuma et al., 2021; Ulenaers et al., 2021). The quick shift to eLearning may cause variation in students' perceptions (Cho & Hong, 2021; Santiago et al., 2021). For instance, students may experience a change of mood towards eLearning (Chaturvedi et al., 2021; Haslam, 2021). During the pre-pandemic period, students were used to going to campuses and physically interacting with lecturers and classmates. Therefore, the readiness to use eLearning exclusively may influence their perceptions towards eLearning (Chaturvedi et al., 2021; Haslam, 2021; R. Nassr et al., 2020; Oyedotun, 2020).

Students do not share the same reaction in the sole use of eLearning (Chaturvedi et al., 2021; Haslam, 2021; Oyedotun, 2020; Pollock et al., 2020). The robust models (discussed later) measuring students' perceptions may witness changes due to lockdowns. More specifically, lockdowns could have effects on students' perceptions towards eLearning use. However, there is a lack of studies that measure differences in terms of satisfaction (Mokhtar et al., 2020) and/or intention to use technology. Many antecedents have been determined that negatively or positively influence students' perceptions, yet there is a need to understand if there are differences in students' perceptions. Dondorf et al. (2016) showed that students' performance in face-to-face environment was better than in eLearning. However, face-to-face learning is currently postponed indefinitely. Then, there is the possibility to find differences among students towards the quality, usefulness, and readiness to use eLearning. Thus, knowing the differences may help play a part in determining considerations in developing eLearning systems. It is necessary to study the differences in students' perceptions on various related factors, as lockdowns have impacted them (Haslam, 2021; Kaffenberger, 2021; Singh et al., 2021). It is critical to measure differences in students' perceptions to learn from the current situation, for effective management of education processes in future similar situations (Haslam, 2021; Hussein et al., 2020; Kaffenberger, 2021; Teele et al., 2021).

Finally, a number of cross-sectional studies (Al-Ahmari et al., 2020; Al-Azzam et al., 2020; Alqudah et al., 2020; Alqurshi, 2020; Chandra, 2020; Dhahri, Arain, Memon, Rao, & Mian, 2020; Pal & Vanijja, 2020; J. Qazi et al., 2020; Shahzad et al., 2020; Sindiani et al., 2020; Singh et al., 2021; Sukendro et al., 2020; Tuma et al., 2021; Ulenaers et al., 2021) have shown differences only in terms of models. They have not adopted the cross-country model, with the exception of J. Qazi et al. (2020). A cross-country study may reveal differences globally regarding students' perceptions during the COVID-19 lockdown.

The literature reviewed in this study have brought interesting findings in terms of the challenges encountered and proposed several solutions to overcome those challenges. Yet, this study has found a room for contributions. This study has the potential to contribute in terms of the following:

(1) Finding empirical evidence regarding differences in students' perceptions while using eLearning during the COVID-19 pandemic. This study investigated students in terms of gender, age, and eLearning mode.

(2) Adopting a cross-country study that may reveal differences in students' perspectives globally.

(3) Revealing differences in students' intention

to use and satisfaction while in unfamiliar situations (lockdown).

LITERATURE REVIEW

COVID-19 has forced universities to shut down to avoid its spread (Chang et al., 2021; Shahzad et al., 2020; Sindiani et al., 2020). The switch to exclusive online mode has brought the attention to eLearning systems (Aguilera-Hermida, 2020; Dickinson & Gronseth, 2020; Oyedotun, 2020; Pal & Vanijja, 2020; Selvanathan et al., 2020; Sindiani et al., 2020). This enforcement to use eLearning as the sole medium has pushed students to familiarize themselves with its features, which may affect their satisfaction and intention (Aguilera-Hermida, 2020). Lockdowns due to the pandemic have influenced students' study habits (Chang et al., 2021; Oyedotun, 2020; Trung et al., 2020) and may possibly change their perspectives of eLearning systems (Aguilera-Hermida, 2020; Oyedotun, 2020; Sia & Adamu, 2020).

In the course of researching students' experience with eLearning during lockdown, many research have focused on synchronous eLearning, which is live broadcasting of classes. For example, Pal and Vanijja (2020) studied the usability of Microsoft Teams to measure students' intention to use while studying in lockdown. Almetwazi, Alzoman, Al-Massarani, and Alshamsan (2020), Ibrahim, Al Raddadi, et al. (2021), Naroo, Morgan, Shinde, and Ewbank (2020), and Sindiani et al. (2020) examined students' experiences in Saudi Arabia and Jordan while using Zoom, Microsoft Teams, and other tools. Meanwhile, Almarzooq, Lopes, and Kochar (2020) explained how Microsoft Teams could be used effectively to deliver lessons during lockdown. Similarly, Pollock et al. (2020) reported that synchronous eLearning systems such as Zoom were received well in medical education. However, the above-mentioned studies did not investigate the differences in students' perceptions towards factors influencing eLearning's intention to use and satisfaction.

ELEARNING SYSTEMS

Many studies such as Alqudah et al. (2020), Alqurshi (2020), Azlan et al. (2020), Bui, Luong, Nguyen, Nguyen, and Ngo (2020), Chertoff et al. (2020), Dhahri et al. (2020), Gomez, Azadi, and Magid (2020), Ibrahim, Al Raddadi , et al. (2021), R. Nassr, Mohammad et al. (2020), Selvanathan et

al. (2020), Teele et al. (2021), Trung et al. (2020), and Tuma et al. (2021) reported the experiences of students with eLearning systems. However, they barely measured differences in students' perceptions toward satisfaction, intention to use, and other factors related to eLearning. They covered many issues not confined to technical problems solely, such as familiarity aspects, particularly synchronous eLearning tools such as Microsoft Teams and Zoom, which were explicitly mentioned in Lapitan, Tiangco, Sumalinog, Sabarillo, and Diaz (2021), Qiu, Li, and Li (2020), and Teele et al. (2021). Li et al. (2020) extensively explained successful Zoom experiences in radiology education during lockdown, but barely mentioned students' perspectives. Almetwazi et al. (2020), Jones et al. (2021), Kaul et al. (2020), and Svoboda et al. (2021) considered feedback from a fewer number of students while discussing challenges in using eLearning but missed discussing the differences in students' perceptions. Azlan et al. (2020), Belfi, Dean, Bartolotta, Shih, and Min (2021), and Ibrahim, Al Raddadi, et al. (2021) considered students' perceptions where they showed positive engagement with eLearning during lockdown. However, the study of Belfi et al. (2021) used a sample that was too limited (26 students) with a short eLearning experiment (2-week long). Therefore, this cross-country study focuses on differences in students' perceptions while using various online learning systems.

MALAYSIA AND SAUDI ARABIA

The studies of Al-Ahmari et al. (2020), Ali et al. (2021), Alkhowailed et al. (2020), Almetwazi et al. (2020), Alqahtani and Rajkhan (2020), Elzainy, El Sadik, and Al Abdulmonem (2020), and Ibrahim, Al Raddadi, et al. (2021) reported the actions and procedures taken by Saudi universities to continue the education process during COVID-19 outbreak, which are similar to procedures and actions taken in Malaysia, as reported by Azlan et al. (2020), Kamaludin et al. (2020), R. Nassr, Mohammad et al. (2020), Selvanathan et al. (2020), Shahzad et al. (2020), and Sia and Adamu (2020). In contrast to other research that were focused on the status of the learning processes in Saudi Arabia and Malaysia, Alqahtani and Rajkhan (2020), and Shahzad et al. (2020) developed a list of critical success factors and models describing students' perspectives on the system's quality of eLearning, respectively.

The majority of studies within the context of Saudi Arabia and Malaysia that were concerned with eLearning during the COVID-19 lockdown were found to considerably emphasize technical readiness (strong internet connection, clarity of audio and video of eLearning systems, etc.). However, Alqahtani and Rajkhan (2020) found that readiness of students and lecturers is critical in terms of training, management support, and awareness, to benefit from eLearning as an innovative solution.

Another concern is mental health, which was the concern of Kamaludin et al. (2020), where they found students leaning towards acceptance and mental disengagement over adaptive coping. A lack of studies was found concerning various dimensions measuring students' satisfaction and intention to use eLearning within at least, the context of Saudi Arabia and Malaysia during the discontinuation of learning processes, such as in the current COVID-19 lockdown. The above-mentioned studies barely touched upon the differences in students' perceptions in terms of gender, age, and/or their eLearning mode (synchronous, asynchronous, or both). The context of this study (Malaysia and Saudi Arabia) was selected due to many similarities found among them, as previously discussed. Moreover, universities within the context of this study were reachable by authors.

FACTORS INFLUENCING STUDENTS' PERCEPTIONS TO USE ELEARNING

eLearning has witnessed an increase in usage by students during lockdown in comparison to the days before (Aguilera-Hermida, 2020; Ibrahim, Al Raddadi, et al., 2021). Nevertheless, only a few studies have focused on the differences in students' perceptions particularly in satisfaction and intention to use while solely using eLearning during lockdown. Moreover, eLearning was reassessed from a singular perspective. For example, Pal and Vanijja (2020) were concerned with the usability, Al-Okaily, Alqudah, Matar, Lutfi, and Taamneh (2020) were focused on students' acceptance, while Shahzad et al. (2020) were concerned only about the quality of eLearning systems (i.e., information, system, and service). A qualitative study (Rahiem, 2021) showed students' personal experiences in overcoming stress due to lockdown, students' satisfaction, and system qualities as among the themes extracted from students' inputs, yet the

differences among them were not discussed. This study argues that while using eLearning solely to receive education, students may act differently depending on their age, gender, eLearning mode, or possibly country, due to variations in the lockdowns imposed. Measuring the differences helps in assisting the students to cope with eLearning use during lockdown. Therefore, some differences are expected in students' assessment of the dimensions involved in measuring satisfaction with an intention to use eLearning (Sindiani et al., 2020). The dimensions discussed in this study were selected from various related theories. Assessing more dimensions can reveal more information about the satisfaction and intention to use eLearning (Jewer, Compeau, & Besworth, 2017; Subaeki, Rahman, Putra, & Alam, 2019). Hence, this study assessed the differences in students' perceptions in terms of components of the IS success model (information, system, and service) and personal perspective (Technology readiness index (TRI) of Parasuraman and Colby (2015)), in addition to TAM components such as perceived usefulness and perceived ease of use.

Although many research studied students' satisfaction under lockdown (Mokhtar et al., 2020), discussions regarding the differences in students' perceptions are scarce. For instance, Pal and Vanijja (2020) integrated TAM and Usability with Microsoft Teams from students' perspectives during the COVID-19 lockdown. Hundreds of students were surveyed by Pal and Vanijja (2020); yet, they did not consider assessing differences among students' gender, age, and other similar areas. Al-Okaily et al. (2020) used TAM to measure students' intentions while in lockdown. Shahzad et al. (2020) employed the IS success model to reassess students' satisfaction with eLearning (asynchronous mode only) under the effects of the COVID-19 outbreak. Ibrahim, Al Raddadi, et al. (2021) assessed usefulness (from TAM) and facilitating conditions (from UTAUT2); however, differences among students were not analyzed. An exception was found in the work of J. Qazi et al. (2020) where students with more resources were found to be more satisfied than students with less resources.

Adeyemi and Issa (2020), Chen, Shu, and Lee (2019), Mardiana, Tjakraatmadja, and Aprianingsih (2015), Mohammadi (2015), and Obaid (2020) used TAM and the IS success model in measuring

students' satisfaction, but they did not report differences in students' feedback. Apart from assessing differences using TAM and IS success model, this study included personal factors of the Technology Readiness Index, due to significant evidence found in several studies regarding personal dimensions (insecurity, discomfort, innovation, and optimism) while investigating students' experiences with eLearning during the lockdown.

In terms of cross-study, many studies reported differences among gender groups. For instance, Chandra (2020), Ibrahim, Al Raddadi, et al. (2021), and Shahzad et al. (2020) studied the differences between males and females within the contexts of India, Saudi Arabia, and Malaysia, respectively. Moreover, cross-sectional studies were done by Al-Azzam et al. (2020), Alqudah et al. (2020), Alqurshi (2020), and Sindiani et al. (2020), but they were cross-college in the same university with the exceptions of Alqudah et al. (2020), Alqurshi (2020), and Sukendro et al. (2020), which were cross-sectional among medical colleges in Jordan, Saudi Arabia, and a sport college in Indonesia, respectively. Some studies (Al-Azzam et al., 2020; Alqudah et al., 2020; Sindiani et al., 2020) focused on the experience of students towards new situations and their capabilities to cope, while the study of Alqurshi (2020) focused more on students' satisfaction. Other cross-sectional studies by Dhahri et al. (2020), Elzainy et al. (2020), Tuma et al. (2021), and Ulenaers et al. (2021) took place with medical students in Pakistan, Saudi Arabia, Iraq, and Belgium, respectively, regarding their experience with online classes during lockdown. These studies commonly reported that students' personal perspectives should be considered, which significantly impact their satisfaction. The above-mentioned cross-sectional studies might reveal fewer differences in comparison if they were conducted in two or three countries. Moreover, those studies did not examine differences in students' perceptions in terms of age, country, and eLearning mode, except for gender.

TECHNOLOGY ACCEPTANCE MODEL (TAM)

Researchers who assessed students' perceptions during lockdowns used factors such as user intention (Al-Okaily et al., 2020; Haslam, 2021; Khan et al., 2021), ease of use, and technology usefulness (Al-Okaily et al., 2020; Khan et al., 2021; Sukendro

et al., 2020). The TAM was utilized to measure intention to use eLearning among students during the COVID-19 outbreak (Aguilera-Hermida, 2020; Al-Okaily et al., 2020; Bui et al., 2020; Khan et al., 2021; Pal & Vanijja, 2020; Sukendro et al., 2020), particularly Perceived Ease of Use (PEOU) and Perceived Usefulness (PU). Ibrahim, Al Raddadi, et al. (2021) considered PU to report moderate intention to use eLearning in Saudi Arabia. In the context of Malaysia, Mokhtar et al. (2020) found PU to be as significant for students' satisfaction with eLearning during lockdown. Meanwhile, Sukendro et al. (2020) found that PU significantly explained the intention to use eLearning during COVID-19 lockdown. On the other hand, DeLone & McLean Information System Success Model has been validated in many fields in recent years (Adeyemi & Issa, 2020; Mardiana et al., 2015; Obaid, 2020; Ojo, 2017; Rammutloa, 2017; Subaeki et al., 2019; Yu & Qian, 2018). The studies of Rammutloa (2017) and Shahzad et al. (2020) used information, system, and service qualities to find significant influence on students' satisfaction with the asynchronous eLearning mode during lockdown.

This study investigated differences in students' perceptions, particularly using factors of TRI, IS model, and TAM, as they have been used extensively in the domain of eLearning (Adeyemi & Issa, 2020; Mardiana et al., 2015; Mohammadi, 2015; Mokhtar et al., 2020; Obaid, 2020; Ojo, 2017; Rammutloa, 2017; Shahzad et al., 2020). Additionally, students' satisfaction is under critical test during lockdown (Alqudah et al., 2020; Elzainy et al., 2020; Haslam, 2021; Mokhtar et al., 2020; Naroo et al., 2020; J. Qazi et al., 2020). In normal days, students are satisfied with eLearning systems (Zaheer, Gondal, & Qadri, 2015). In cases of days of crisis, Al-Ahmari et al. (2020), Almarzooq et al. (2020), Alqudah et al. (2020), Mokhtar et al. (2020), and A. Qazi et al. (2020) recommended to measure students' satisfaction to understand the consequences of COVID-19 lockdown on their satisfaction and intention to use. However, this has yet to be conducted, which may underestimate students who show dissatisfaction.

Mokhtar et al. (2020) measured the influence of PU, system quality, and course quality on students' satisfaction. A. Qazi et al. (2020) found that students were satisfied when all resources to reach eLearning were provided. Similarly, when quality

(content, instructor, technology, assessment) and flexibility were provided, students showed satisfaction with eLearning during lockdown (Meena & Ganesan, 2021). Selvanathan et al. (2020) had not explicitly measured students' satisfaction; however, nine satisfaction-related indicators (questions) were found in their factors (instructor, instruction, and interaction). Al-Ahmari et al. (2020) and Alkhowailed et al. (2020) descriptively reported students' satisfaction with eLearning during lockdown. Alqudah et al. (2020) and Chandra (2020) reported dissatisfaction with eLearning. Sreehari (2020) revealed that students' dissatisfaction was due to less engagement. Cho and Hong (2021), and Elzainy et al. (2020) reported students' satisfaction with the current implementation of eLearning systems. This increased the motivation to measure differences in students' satisfaction.

The intention to use is the focal construct recognized in TAM-based studies (Khan et al., 2021; Obaid, 2020). In many cases, students reported their intention to continue using eLearning when some considerations on students' requirements had taken place (Khan et al., 2021; McRoy et al., 2020; Obaid, 2020). However, findings on measurement of differences in students' intention are scarce.

The last group of factors investigated in this study was related to a personal aspect, as students have found themselves in an unfamiliar situation where their homes, regarded as a relaxation place, have become a place to study (Azlan et al., 2020; Jena, 2020; OECD, 2020; Oyedotun, 2020). Therefore, students may express discomfort and unreadiness with this situation (Aguilera-Hermida, 2020; Dhahri et al., 2020; Kapasia et al., 2020; Oyedotun, 2020; Srivastava et al., 2021; Ulenaers et al., 2021). It was noticed that students' attitudes and personal aspects were largely considered in the report of OECD (2020). Gomez et al. (2020) reported that students were more comfortable when new courses were intentionally developed to overcome isolation; however, differences in students' perceptions were not investigated. Christopher, de Tantillo, and Watson (2020) extensively emphasized personal aspects for any adopted solution for education during lockdown. Christopher et al. (2020) recommended that a college employ narrative pedagogy to engage students and understand personal challenges while studying during lockdown. This is in contrast to the findings of Chick et al. (2020) and Dhawan (2020), who discovered many education continuity challenges, technological, and strategic solutions. Yet, their proposals (Chick et al., 2020; Dhawan, 2020) lacked the consideration of the personal or psychological aspects of students. The critical success factors' list by Alqahtani and Rajkhan (2020) emphasized the readiness of students and lecturers for eLearning, regardless of the sophistication of the eLearning systems used. Khan et al. (2021) also focused on consideration of students' perceptions for eLearning and their readiness for it. However, the above-mentioned studies did not investigate the differences among students towards their experience with eLearning, which is an important consideration for the usage of any eLearning system.

OECD (2020) emphasized student's innovation, optimism, and satisfaction as important factors that would help to maintain good intentions to use eLearning during lockdown. However, the report was qualitatively written, and no specific scale was used to measure factors such as innovation, optimism, and satisfaction. Therefore, this study measured differences among students in terms of TRI by Parasuraman and Colby (2015), as it is broadly known to measure users' personal perspectives (Haslam, 2021; Ulenaers et al., 2021). Furthermore, TRI is used in emerging situations that may enforce the use of new technology (or at least not familiar prior to that) (Bessadok, Lassaad, & Almotairi, 2018; Hallikainen & Laukkanen, 2016; Larasati, Widyawan, & Santosa, 2017). Sindiani et al. (2020) reported that students in Jordan showed some discomfort and insecurity while using Zoom. Haider and Al-Salman (2020) measured students' discomfort while using eLearning, which was high due to its exclusive use. Oyedotun (2020) and Ulenaers et al. (2021) also discovered significant insecurities among students while using eLearning systems during lockdown. Meanwhile, Sindiani et al. (2020) and Srivastava et al. (2021) stated that students were displeased with their online experience. Similar results were found while studying psychological statuses of medical students in Pakistan (Dhahri et al., 2020) and developing countries in general (Oyedotun, 2020) during lockdown. In a similar context, Tuma et al. (2021) suggested that more efforts need to be taken to convince students to engage with eLearning and overcome their hesitation to consider it as the only

education channel. However, Azlan et al. (2020) and Singh et al. (2021) concluded that students perceive eLearning as an opportunity for innovation and they feel optimistic to use it. Considerations on personal perspectives while examining students' satisfaction and intention during lockdown were emphasized by Haider and Al-Salman (2020), Kaul et al. (2020), Oyedotun (2020), and Srivastava et al. (2021). Although Azlan et al. (2020) did not explicitly use readiness factors (insecurity, discomfort, optimism, and innovativeness), they looked to questions answered by students involving similar aspects (Azlan et al., 2020, p. 19).

METHOD

Based on previous research, this study built a survey. All indicators used a 5-point Likert scale. The questionnaire items of satisfaction, service, system, and information were adopted from Mohammadi (2015). Perceived usefulness, intention to use, and perceived ease of use were adopted from Al-Okaily et al. (2020) and Khan et al. (2021). Finally, the TRI factors' indicators were borrowed from Parasuraman & Colby (2015).

The target population for this study was students from Malaysia and Saudi Arabia who had experienced eLearning during lockdown. As this study was aimed at the general population of students, the non-probability sampling technique was applied (Hui, 2017). The sample was selected using a convenience sampling method from university students. A group of lecturers in targeted universities were asked to share the survey link via eLearning systems. As the link was only available within the eLearning system, this ensures that the students were active, registered in the course, and using an eLearning system for education. The survey link was included in the universities' eLearning systems, particularly in IIUM, UniKL, and UPM in Malaysia, and Imam Abdul Rahman Bin Faisal University, King Abdulaziz University, and King Saud University in Saudi Arabia. The online survey duration was from 4th January 2021 to 1st February 2021. The questionnaires were distributed using Google Forms. SPSS has been used in numerous areas including education (Hair et al., 2017), and was also employed in this study for data analysis.

DATA ANALYSIS

The respondents' information listed in Table 1 shows that male respondents are the majority (69.2%), aged 18–24 years (73.4%). Respondents from Malaysia and Saudi Arabia are 44.6% and 55.4%, respectively. In terms of the eLearning mode used, respondents reported using asynchronous mode (university eLearning) (51.5%), synchronous mode (21.7%), and both modes (26.8%).

Table 1 *Demographic information of the respondents (N = 915)*

Gender:	Male: 633 (69.2%) Female: 282 (30.8%)	**Age**: 18-24: 672 (73.4%) 25+: 243 (26.6%)
Country:	Malaysian: 408 (44.6%) Saudi: 507 (55.4%)	**eLearning**: Asynchronous (university eLearning): 471 (51.5%) Synchronous: 199 (21.7%) Synchronous & Asynchronous: 245 (26.8%)

Table 2 presents the students' average answers for factors used in this study. The range of averages is 2.94–4.08. A *t*-test was used to find differences in students' perceptions in terms of gender, age, and country. The results (summarized in Table 3) have shown differences in perceptions between Malaysian and Saudi students. In terms of information quality, this study found that respondents from Saudi Arabia statistically and significantly appreciated information quality in their eLearning ($M = 4.2$, $SD = 0.76$) as compared to Malaysian respondents ($M = 3.8$, $SD = 0.77$) with t(913) = -8.66, p = 0.000. Similarly, for system quality, respondents from Saudi Arabia statistically and significantly appreciated system quality in their eLearning ($M = 4.15$, $SD = 0.80$) as compared to Malaysian respondents ($M = 3.77$, $SD = 0.76$) with t(913) = -7.33, p = 0.000. Additionally, in terms of service quality, respondents from Saudi Arabia statistically and significantly appreciated service quality in their eLearning ($M = 3.94$, $SD = 0.88$) as compared to Malaysian respondents ($M = 3.16$, $SD = 0.84$) with t(913) = -5.84, p = 0.000. The fourth and fifth differences were related to perceived usefulness and perceived ease of use. This study found that respondents from Saudi Arabia statistically and significantly appreciated perceived usefulness ($M = 4.26$, $SD = 0.79$) while using eLearning, as compared to Malaysian respondents ($M = 3.86$, $SD = 0.80$) with t(913) = -7.57, p = 0.000. Additionally, respondents from Saudi Arabia also statistically and significantly appreciated perceived ease of use ($M = 4.14$, $SD = .77$) as compared to Malaysian respondents ($M = 3.77$, $SD = .85$) with $t(913) = -6.9$, $p = 0.000$.

The sixth, seventh, and eighth differences were related to discomfort, optimism, and innovation among Saudi and Malaysian respondents. This study found that Saudi respondents statistically and significantly experienced less discomfort (M = 2.85, SD = 1.24) compared to Malaysian respondents (M = 3.05, SD = 1.003) with t(913) = 2.66, p = 0.009. Saudi respondents statistically and significantly experienced more optimism (M = 4.09, SD = .85) and innovation (M = 4.04, SD = .73) as compared to Malaysian respondents, who experienced less optimism (M = 3.62, SD = .85) and less innovation (M = 3.61, SD = .79), with t(913) = -8.26, p = 0.000, and t(913) = -8.46, p = 0.000, respectively. Finally, in terms of satisfaction and intention to use, this study found that Saudi respondents statistically and significantly were more satisfied (M = 4.08, SD = 0.96) and had more intention to use eLearning (M = 4.16, SD = .84) compared to Malaysian respondents, who were less satisfied (M = 3.5, SD = 1.00) and had less intention to use eLearning (M = 3.77, SD = .85), with t(913) = -7.50, p = 0.000, and t(913) = -6.8, p = 0.000, respectively. Both Saudi and Malaysian participants showed no difference in terms of insecurity.

A t-test was also used to assess the differences among males and females. The results have shown differences in perceptions between male and female students. In terms of information quality, this study found that male respondents statistically and significantly appreciated more information quality while using eLearning (M = 4.14, SD = 0.75) compared to female respondents (M = 3.8, SD = 0.82), with t(913) = 6.03, p = 0.000. Similarly, in terms of system quality, male respondents statistically and significantly appreciated system quality more while using eLearning (M = 4.06, SD = 0.78) compared to female respondents (M = 3.79, SD = 0.82), with t(913) = 4.74, p = 0.000. As for service quality, this study found that male respondents statistically and significantly appreciated service quality more while using eLearning (M = 3.87, SD = 0.87) compared to female respondents (M = 3.61, SD = 0.86), with t(913) = 4.13, p = 0.000. The fourth and fifth differences were related to perceived usefulness and perceived ease of use. This study found that male respondents statistically and significantly appreciated more perceived usefulness (M = 4.19, SD = 0.77) compared to female respondents (M = 3.84, SD = 0.88), with t(913) = 6.11, p = 0.000. This study also found that male respondents statistically and significantly appreciated more perceived ease of use (M = 4.07, SD = .79) while using eLearning compared to female respondents (M = 3.75, SD = .86), with t(913) = 5.39, p = 0.000.

The sixth and seventh differences between male and female respondents were optimism and innovation. This study found that male respondents statistically and significantly showed more optimism (M = 4.07, SD = .84) compared to female respondents (M = 3.57, SD = .90), with t(913) = 7.29, p = 0.000. Additionally, male respondents saw themselves as more innovated with eLearning (M = 3.97, SD = .75) compared to female respondents (M = 3.57, SD = .81), with t(913) = 7.20, p = 0.000. In terms of satisfaction and intention to use, male respondents statistically and significantly were more satisfied (M = 3.96, SD = 0.99) and had more intention to use eLearning (M = 4.11, SD = .84) compared to female respondents who were less satisfied (M = 3.64, SD = 1.01) and had less intention to use eLearning (M = 3.7, SD = .87), with t(913) = 4.46, p = 0.000, and t(913) = 6.28, p = 0.000, respectively. Both male and female participants showed no difference in terms of insecurity and discomfort.

A t-test was also used to assess the differences among age groups: 18–24 years and 25+ years. The results have shown differences in perceptions between 18–24 group and 25+ group. For information quality, this study found that respondents of age group 25+ statistically and significantly gave more appreciation towards information quality in their eLearning (M = 4.22, SD = 0.68) compared to respondents from age group 18–24 (M = 3.97, SD = 0.81), with t(913) = -4.38, p = 0.000. Similarly, in terms of system quality, respondents from age group 25+ statistically and significantly gave more appreciation for system quality in eLearning (M = 4.16, SD = 0.73) compared to respondents of age group 18–24 (M = 3.91, SD = 0.82), with t(913) = -4.08, p = 0.000. As for service quality, there was no difference found between the two age groups. The third and fourth differences were related to perceived usefulness and perceived ease of use. This study found that respondents from age group 25+ statistically and significantly saw perceived usefulness (M = 4.27, SD = 0.70) and perceived ease of use (M = 4.10, SD = .78) as important in eLearning, compared to respondents of 18–24 age

group, who saw perceived usefulness (M = 4.01, SD = 0.85) and ease of use (M = 3.93, SD = .84) as less important with t(913) = -4.23, p = 0.000, and t(913) = -2.80, p = 0.005, respectively.

The fifth, sixth, and seventh differences between age groups were found in terms of discomfort, optimism, and innovation. This study found that respondents of age group 18–24 statistically and significantly experienced more discomfort with eLearning (M = 3.0, SD = 1.12) compared to respondents from age group 25+ (M = 2.78, SD = 1.19) with t(913) = 2.5, p = 0.013. In contrast, respondents from age group 25+ showed more optimism (M = 4.12, SD = 0.81) compared to respondents from age group 18–24 (M = 3.80, SD = .89) with t(913) = -4.83, p = 0.000. Additionally, respondents from age group 25+ saw themselves as more innovated with eLearning (M = 4.01, SD = .75) compared to respondents from age group 18–24 (M = 3.79, SD = .79), with t(913) = -3.83, p = 0.000. Finally, in terms of satisfaction and intention to use, respondents from age group 25+ statistically and significantly were more satisfied (M = 4.02, SD = 0.99) and had more intention to use eLearning (M = 4.19, SD = .80) compared to respondents from age group 18–24, who were less satisfied (M = 3.92, SD = .87) and had less intention (M = 3.81, SD = 1.01), with t(913) = -2.87, p = 0.004, and t(913) = -4.24, p = 0.000 respectively. Both age groups showed no difference in terms of insecurity.

Meanwhile, a one-way ANOVA was used to detect differences among students who used different modes of eLearning. In this study, three modes of eLearning had been used by respondents while in lockdown: synchronous, asynchronous, and mixed. There was a statistically significant difference in terms of discomfort between groups as demonstrated by one-way ANOVA (F(2,912) = 6.78, p = .001). A Tukey post hoc test showed a statistical and significant difference between students using synchronous and asynchronous modes of eLearning. Students who used synchronous mode experienced more discomfort (M = 3.19, SD = 0.95) compared to students who used asynchronous mode (M = 2.83, SD = 1.25). The second difference was found in terms of optimism, as shown by one-way ANOVA test (F(2, 912) = 43.99, p = 0.001). A Tukey post hoc test showed a statistical and significant difference between students using synchronous and asynchronous modes of eLearning.

Students using synchronous mode showed less optimism (M = 3.52, SD = 0.92) compared to students using asynchronous mode (M = 4.13, SD = 0.817). Meanwhile, students using asynchronous mode showed more optimism (M = 4.13, SD = 0.817) compared to students who used mixed mode (M = 3.7, SD = 0.84).

The third difference was innovation (F(2, 912) = 26.33, p = 0.000). A Tukey post hoc test showed that there was a statistical and significant difference between students using synchronous and asynchronous modes of eLearning. Students using asynchronous mode believed that they can be more innovative (M = 4.02, SD = 0.76) compared to students who used synchronous mode (M = 3.58, SD = 0.815) or mixed mode (M = 3.73, SD = 0.74). The fourth difference found was information quality as revealed by one-way ANOVA test (F(2,912) = 40.56, p = 0.000). A Tukey post hoc test showed a statistical and significant difference between students using synchronous, asynchronous, and mixed modes of eLearning. Students who used asynchronous mode (M = 4.22, SD = 0.74) saw information quality as important, followed by students who used mixed mode (M = 4.00, SD = 0.69), and finally synchronous mode (M = 3.64, SD = 0.87). The fifth difference found was system quality as explained by one-way ANOVA test (F(2,912) = 30.41, p = 0.000). A Tukey post hoc test showed that there was a statistical and significant difference between students using synchronous, asynchronous, and mixed modes of eLearning. Again, students who used asynchronous mode (M = 4.14, SD = 0.84) saw system quality as important compared to students who used mixed mode (M = 3.97, SD = 0.70) and synchronous mode (M = 3.62, SD = 0.83). The sixth difference was service quality as revealed by one-way ANOVA test (F(2,912) = 16.97, p = 0.000). A Tukey post hoc test showed a statistical and significant difference between students using synchronous, asynchronous, and mixed modes of eLearning. Students who used synchronous mode (M = 3.49, SD = 0.89) saw service quality as less important compared to those who used asynchronous mode (M = 3.92, SD = 0.89) and mixed mode (M = 3.80, SD = 0.78).

The seventh difference found was perceived usefulness as revealed by one-way ANOVA (F(2,912) = 28.62, p = 0.000). A Tukey post hoc test showed that there was a statistical and significant

difference between students using synchronous, asynchronous, and mixed modes of eLearning. Students who used asynchronous mode ($M = 4.26$, $SD = 0.76$) saw perceived usefulness as important compared to students who used mixed mode ($M = 3.99$, $SD = 0.77$) and synchronous mode ($M = 3.77$, $SD = 0.91$). The eighth difference found was perceived ease of use ($F(2,912) = 21.9$, $p = 0.000$). A Tukey post hoc test showed that there was a statistical and significant difference between students using synchronous, asynchronous, and mixed modes of eLearning. Students who used mixed mode ($M = 4.11$, $SD = 0.79$) perceived ease of use as important compared to students who used asynchronous mode ($M = 3.96$, $SD = 0.75$) or synchronous mode ($M = 3.66$, $SD = 0.90$). The ninth difference found by ANOVA test was satisfaction ($F(2,912) = 30.40$, $p = 0.000$). A Tukey post hoc test showed that there was a statistical and significant difference between students using synchronous, asynchronous, and mixed modes of eLearning. Students who used asynchronous mode ($M = 4.08$, $SD = 0.96$) were more satisfied with their mode of eLearning compared to students who used mixed mode ($M = 3.78$, $SD = 0.92$) and synchronous mode ($M = 3.45$, $SD = 1.09$). Finally, the tenth difference found was intention ($F(2,912) = 32.81$, $p = 0.000$). A Tukey post hoc test showed a statistical and significant difference between students who used synchronous, asynchronous, and mixed modes of eLearning. Students who used asynchronous mode ($M = 4.18$, $SD = 0.80$) showed more intention to use eLearning compared to students who used mixed mode ($M = 3.91$, $SD = 0.82$) or synchronous mode ($M = 3.62$, $SD = 0.92$).

CHAPTER ONE STUDENTS' IMPORTANCE-PERFORMANCE MAP ANALYSIS (IPMA)

This study ran importance-performance matrix analysis (IPMA) as a post-hoc procedure in PLS using intention to use eLearning and satisfaction as the outcome constructs. The IPMA estimates the total effects that represent the predecessor constructs' importance in shaping the target constructs (intention to use eLearning and satisfaction), while their average latent variable scores represent their performance, and the computation of the index values (performance scores) were accomplished by rescaling the latent constructs scores to a range of 100 (highest performance) down to 0

Table 2 Mean, Standard Deviation and Reliability Values for Respondents' Answers

Factors	M	SD	Reliability (Cronbach's Alpha)
Information Quality	4.04	.79	.91
System Quality	3.98	.81	.88
Service Quality	3.80	.88	.87
Satisfaction	3.86	1.01	0.91
Perceived Usefulness	4.08	.82	0.88
Perceived Ease of Use	3.98	.82	0.88
Intention	3.99	.87	0.87
Insecurity	3.59	.90	0.75
Discomfort	2.94	1.15	0.91
Optimism	3.89	.89	0.87
Innovation	3.85	.79	0.86

(lowest performance) (Hair et al., 2017). According to Ringle & Sarstedt, (2016)drawing on the IPMA module implemented in the SmartPLS 3 software, illustrates the results generation and interpretation. Design/methodology/approach The explications first address the principles of the IPMA and introduce a systematic procedure for its use, followed by a detailed discussion of each step. Finally, a case study on the use of technology shows how to apply the IPMA in empirical PLS-SEM studies. Findings The IPMA gives researchers the opportunity to enrich their PLS-SEM analysis and, thereby, gain additional results and findings. More specifically, instead of only analyzing the path coefficients (i.e. the importance dimension IPMA enriches the results instead of only analyzing the path coefficients (i.e. the importance dimension). It also takes into consideration the average value of the latent constructs and their indicators (i.e. performance dimension). Figures 1 and 2 show the findings of importance (total effects) and performance (index values) used for the IPMA.

As shown in Figure 1, this study plotted the total effects scores and index values out on a priority map. It can be observed that service quality (SERVQ) is a very important factor in determining the satisfaction with eLearning due to its relatively higher importance values compared to other constructs in the proposed model. Perceived ease of use (PEOU) is the second most important factor in determining the satisfaction with

Table 3 *Differences Among Respondent Groups in Terms of eLearning Use*

Group	Factor	Test	Result	Group	Factor	Test	Results
Country	Information quality	t-test	Saudi respondents concerned IQ, system quality and service quality more.	Gender	Information quality	t-test	Male respondents appreciate more information quality.
	System quality				System quality		Male respondents appreciate system quality.
	Service quality				Service quality		Male respondents appreciate service quality.
	Perceived Usefulness and Perceived Ease of Use		Perceived usefulness and perceived ease of use were seen as important in the eyes of Saudi respondents.		Perceived Usefulness and Perceived Ease of Use		Male respondents appreciate more perceived usefulness and perceived ease of use.
	Discomfort, Optimism and Innovation		Saudi respondents were concerned less about discomfort and more about optimism and innovation.		Intention to use and Satisfaction		Male respondents are more optimism and see themselves innovated.
	Satisfaction and Intention to use		Respondents from Saudi Arabia were statistically and significantly more satisfied and have had more intention to use eLearning.		Satisfaction and Intention to use		Male respondents are more satisfied and have more intention to use.
Age	Information quality	t-test	Age group of 25+ gives more appreciation for information quality.	eLearning modes	Discomfort and optimism	One-way ANOVA	Students who used synchronous mode experienced more discomfort and less optimism. Students who used asynchronous are more optimistic compared to students who used mixed mode.
	System quality		Age group of 25+ gives more appreciation for system quality.		Innovation		Students who used asynchronous mode believe that they can be more innovative compared to students who used synchronous mode or mixed mode.
	Perceived Usefulness and Perceived Ease of Use		Age group of 25+ see perceived usefulness and perceived ease of use as important.		Information quality		Students who used asynchronous mode see information quality as more important, followed by students who used mixed mode, and finally students who used synchronous mode.
	Discomfort, Optimism and Innovation		Age group of 18-24 experience more discomfort. Age group of 25+ showed more optimism. Age group of 25+ see themselves as more innovated with eLearning.		System quality		Students who used asynchronous mode see system quality as more important compared to students who used mixed mode or synchronized mode.
	Satisfaction and Intention to use		Age group 25+ are more satisfied and have more intention.		Service quality, Perceived Usefulness Perceived Ease of Use Satisfaction		Students who used synchronous mode see service quality as less important. Students who used asynchronous mode see perceived usefulness as important. Students who used mixed mode see perceived ease of use as more important compared to other students. Students who used asynchronous mode are more satisfied compared to other students. Students who used asynchronous mode showed more intention compared to other students.

e-Learning. Regarding the other antecedent factors, the important factors are perceived usefulness (PU) and optimism (OPT), while the weak factors are discomfort (DIS), system quality (SYSQ), and insecurity.

Nevertheless, the performance of these significant factors (Service Quality and Perceived Ease of Use) lagged behind other antecedents' factors (Perceived Usefulness and Information Quality). According to Hair et al., (2017), the goal of IPMA is to identify predecessors that have a relatively high importance for the target construct (i.e., those that have a strong total effect) but also a relatively low performance (i.e., low average latent variable scores). The aspects underlying these constructs represent potential areas of improvement that may receive high attention. Although variables such as system quality scored relatively high in performance, it has small relevance in influence satisfaction with eLearning. In summary, in order to improve the satisfaction with eLearning, the managerial activities should focus on enhancing the performance of service quality, perceived ease of use, perceived usefulness, and optimism.
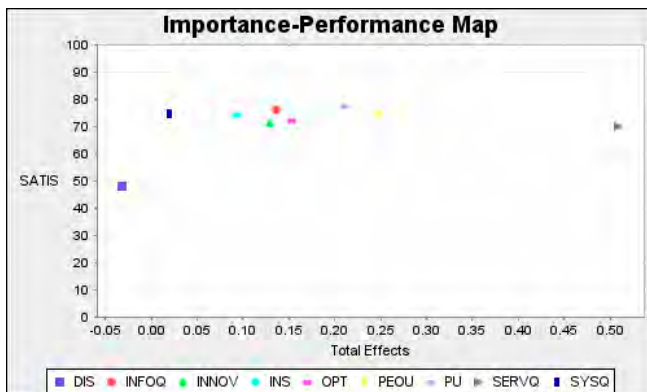

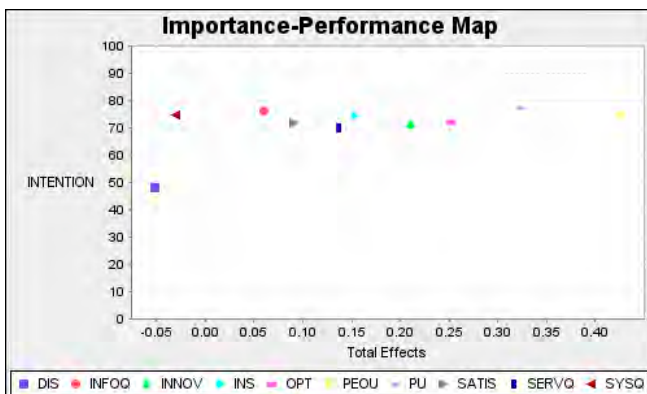Figure 1 IPMA (Priority Map) for Satisfaction with eLearning

Key: OPT: optimism; INNOV: innovativeness; INS: insecurity; DIS: discomfort; PEOU: perceived ease of use; PU: perceived usefulness; SYSQ: system quality; INFOQ: information Quality; SERVQ: service quality.

On the other hand, the situation with intention to use is different, if compared to satisfaction. In Figure 2, the most important factors are PEOU, PU, OPT and INNOV; meanwhile, less important factors that score high performance are SYSQ and INFOQ. Then, it could be said that managerial action should be towards enhancing the performance of PEOU, PU and OPT.

As such, to improve students' intention to use and satisfaction with eLearning, the managerial action should be targeting service quality, perceived ease of use, perceived usefulness, and optimism. The results have not shown significant differences among students regardless of their groups (gender, age, or country). This may reveal that students do consider usefulness, ease of use, and service quality as most important factors to be considered in future similar events.

DISCUSSION

The COVID-19 pandemic has forced students to study online, which may have effects on their perceptions towards online learning. Understanding differences in students' perceptions may help universities in putting more emphasis on those differences. This study considered differences in terms of gender, age, country, and eLearning mode. The findings have shown that among various student groups, they showed an almost similar perception towards insecurity. This might be interpreted as students having surpassed the consideration of using eLearning as an issue.

In terms of IS model factors, participants from Saudi Arabia gave more weight to information quality, system quality, and service quality, compared to participants from Malaysia. Similarly, Saudi participants gave more weight to perceived usefulness and perceived ease of use. The possible interpretation is that participants from Malaysia may see those qualities as normal and expected features of eLearning and as such, these may impress them less during lockdown. Moreover, it is noticeable that the majority of the Malaysian participants were involved in synchronous and mixed modes, while the majority of Saudi participants

were involved in the asynchronous mode. This might indicate that the asynchronous mode (most of the time, it is used by the university's eLearning portal) is more complicated and involves many aspects related to online learning compared to synchronous mode. The synchronous mode is used considerably in live broadcasting of classes and most of the time, it cannot entirely replace the asynchronous mode.

In terms of personal factors, Malaysians showed more discomfort towards using eLearning during lockdown compared to Saudi participants. This might be interpreted as Malaysians being less happy to study from home compared to Saudi participants. Another possible interpretation is that, as long as the majority of Malaysians use synchronous mode of eLearning, it enforces them to be online (and possibly open their webcams) during the live broadcasting of classes. This is not the case with the asynchronous mode of eLearning, which was used by the majority of the Saudi participants. Similarly, participants from Saudi Arabia showed more positivity towards innovation and optimism. This is expected as people who demonstrate less discomfort may show more innovation and optimism.

Finally, participants from Saudi Arabia showed more satisfaction and intention to use eLearning as compared to Malaysian participants. This is in correlation with the above results. Overall, the possible comments towards differences among participants from Saudi Arabia and Malaysia are that participants who use synchronous or mixed mode are less excited towards the quality of eLearning, ease of use, and usefulness. Moreover, they show more discomfort, which contradicts those using the asynchronous mode of eLearning. The distinctive feature of the synchronous mode, which is live and utilizes real time meetings, may force students to be ready as in physical classes. This is difficult to do in comfortable spaces (their houses). In contrast, students using asynchronous mode have more freedom regarding the time to log in and study.

Regarding the gender differences, male participants put more weight on information quality, system quality, service quality, perceived usefulness, and perceived ease of use compared to female respondents. The findings are quite similar to differences between Malaysia and Saudi Arabia in terms of information quality, system quality, service quality, perceived usefulness, and perceived ease of use. The common factor between country and gender groups is that the majority of the participants reported using asynchronous mode, which gave more appreciation towards quality factors (information, system, service), ease, and usefulness. On the other hand, male and female participants showed insignificant differences in terms of discomfort and insecurity, and showed significant differences in terms of innovation, optimism, satisfaction, and intention to use. Male participants put more emphasis on values of innovation, optimism, satisfaction, and intention to use compared to female participants. The possible interpretation is similar to the above-mentioned arguments, where participants who used the asynchronous mode gave more emphasis on quality, ease of use, usefulness, innovation, satisfaction, and intention.

Other differences among participants were related to age groups. Participants from the age group of 25+ gave more weight to information quality, system quality, perceived usefulness, and perceived ease of use, compared to those in the age group of 18–24. Similar to the above argument, participants from the age group of 25+ were found to use asynchronous mode more than synchronous. Moreover, participants from the age group of 18–24 showed more discomfort compared to participants from the age group of 25+. In contrast, participants from the age group of 25+ put more emphasis on innovation, optimism, satisfaction, and intention, compared to participants from younger age group (18–24). This is the third confirmation that those who used asynchronous mode of eLearning showed more positivity towards eLearning during lockdown.

The final differences were found among eLearning mode groups. As expected, based on the results reported above, participants using the synchronous mode showed more discomfort than those using other modes. Furthermore, participants using the asynchronous mode gave more weight to optimism, innovation, information quality, system quality, service quality, satisfaction, intention to use, and perceived usefulness compared to other groups. Meanwhile, participants using mixed mode gave more weight to perceived ease of use compared to other groups. It could be noted that participants using the asynchronous mode were more positive

towards factors related to eLearning use, except perceived ease of use, which was appreciated more by participants who used mixed mode.

This study assessed students' satisfaction and found various levels of satisfaction. The lowest mean value was recorded with participants who used the synchronous mode (M = 3.45). This may support findings reported by Alqudah et al. (2020) and Chandra (2020) in terms of dissatisfaction with synchronous mode of eLearning, as participants who used the asynchronous mode showed more satisfaction (M = 4.08). This study may also support the findings of Cho and Hong (2021), and Elzainy et al. (2020), regarding satisfaction with asynchronous and mixed modes.

The findings of this study are in line with those of Haider and Al-Salman (2020), Sindiani et al. (2020), and Srivastava et al. (2021) in terms of discomfort with eLearning. However, this study found that the discomfort was more among students who used the synchronous mode of eLearning. On the other hand, this study did not find significant values indicating insecurity among participants. Therefore, the findings here contradict those of Oyedotun (2020) and Ulenaers et al. (2021) in terms of insecurity. According to Parasuraman and Colby (2015), insecurity occurs when students feel that eLearning impacts their life negatively. It is difficult to state the same of eLearning as students are already familiar with it before the pandemic. Finally, the findings of this study are in line with Azlan et al. (2020) and Singh et al. (2021) in terms of students' perceptions of innovation and optimism. Yet, this study found that innovation and optimism were more significant in students using asynchronous mode.

The findings of this study have confirmed the conclusions of Aguilera-Hermida (2020), Haslam (2021), Kaffenberger (2021), Nassr et al. (2020), and Singh et al. (2021), that the COVID-19 pandemic has impacted students' perceptions towards eLearning. Specifically, this study reported empirical evidence in terms of the existence of differences among students' groups (gender, age, country, and eLearning mode). This study sets itself apart from other cross-sectional studies (Al-Ahmari et al., 2020; Al-Azzam et al., 2020; Alqudah et al., 2020; Alqurshi, 2020; Chandra, 2020; Dhahri et al., 2020; Pal & Vanijja, 2020; J. Qazi et al., 2020; Shahzad et al., 2020; Sindiani et al., 2020; Singh et al., 2021; Sukendro et al., 2020; Tuma et al., 2021; Ulenaers et al., 2021) by considering differences in terms of country. Furthermore, this study considered various measurements that are widely reported to influence students' satisfaction and intention to use such as factors of IS model, TAM, and TRI.

This study considered various modes of eLearning, age, gender, and country to find differences in students' perceptions, distinguishing it from the work of Pal and Vanijja (2020) that mainly concerned Microsoft Teams (synchronous mode) and one dimension of factors (usability) as well as considering no differences among the groups. This study also differentiated itself from the work of Al-Okaily et al. (2020) by considering several dimensions. Moreover, the cross-sectional study by Al-Okaily et al. (2020) surveyed Jordanian students; however, they did not consider variances among the students. The cross-sectional study by Shahzad et al. (2020) covered differences between male and female students and used only IS success model factors. In contrast, this study extended the investigation to differences among groups (gender, age, country, and eLearning mode), which revealed more results and more differences.

This study provided more details regarding differences among students from different countries, in contrast to the cross-country work of J. Qazi et al. (2020), which was mainly focused on accessibility to resources. This study extended the factors from TAM and IS success model, used by Adeyemi and Issa (2020), Chen et al. (2019), Mardiana et al. (2015), Mohammadi (2015), and Obaid (2020), and added TRI factors. The findings showed significant differences among groups in terms of those factors. Studies (Aguilera-Hermida, 2020; Al-Okaily et al., 2020; Bui et al., 2020; Ibrahim, Al Raddadi, et al., 2021; Khan et al., 2021; Pal & Vanijja, 2020; Sukendro et al., 2020) that concerned perceived usefulness and perceived ease of use of eLearning during the COVID-19 pandemic have confirmed the significance of those two factors in eLearning. This study went deeper and reported significant differences among students regarding those two factors, particularly between those using asynchronous, synchronous, and mixed modes. Students who used asynchronous or mixed models were more concerned towards perceived usefulness and perceived ease of use, compared to those who used synchronous modes. Furthermore, this study

confirmed the significance of information quality, system quality, and service quality reported in Adeyemi and Issa (2020), Mardiana et al. (2015), Mohammadi (2015), Mokhtar et al. (2020), Obaid (2020), Ojo (2017), Rammutloa (2017), and Shahzad et al. (2020), as well as reporting the differences among groups of age, gender, country, and eLearning mode.

IPMA showed an agreement among students in terms of the emphasis on certain factors (usefulness, ease of use, and service quality) in order to increase their satisfaction and intention to use eLearning during future lockdowns.

Finally, in terms of limitations, this study only considered gender, age, country (Malaysia and Saudi Arabia), and eLearning mode to assess differences among students. It could not encompass all possible groups. This study assessed differences among students in Saudi Arabia and Malaysia. Generalization of results should consider variances among students in other countries. Therefore, it is recommended to select the appropriate variables that fit the context of the study. Another limitation is related to factors used in this study, where it focused on factors from TRI, TAM, and IS success model. Those are commonly used for eLearning; however, other factors could also be assessed to determine differences.

CONCLUSION

The differences among country and gender groups showed that students who use asynchronous mode of eLearning tend to emphasize importance of information quality, system quality, service quality, perceived usefulness, and perceived ease of use, as compared to students who use synchronous or mixed mode. This might be due to the fact that asynchronous eLearning is more complicated, and students may spend more time uploading, downloading, collaborating, discussing, and answering, which would make them value the qualities (information, system and service) and ease of use. Moreover, the only factor found to have insignificant role in differences among groups is insecurity. This may indicate that students have less concerns towards any negative aspect of eLearning use. Discomfort exists among students, but is more prevalent among students using the synchronous mode. Therefore, universities may need to focus on resolving reasons behind that, particularly for the synchronous mode.

References

Adeyemi, I., O, & Issa, A., O. (2020). Integration of information system success model (ISSM) and technology acceptance model (TAM): Proposing students' satisfaction with university web portal model. *Record and Library Journal, 6*(1), 69-79.

Aguilera-Hermida, P., A. (2020). College students' use and acceptance of emergency online learning due to COVID-19. *International Journal of Educational Research Open, 1,* 100011. doi:https://doi.org/10.1016/j.ijedro.2020.100011

Al-Ahmari, A. N., Ajlan, A. M., Bajunaid, K., Alotaibi, N. M., Al-Habib, H., Sabbagh, A. J, Al-Habib, A. F., & Baeesa, S. S. (2020). Perception of Neurosurgery Residents and Attendings on Online Webinars During COVID-19 Pandemic and Implications on Future Education. *World Neurosurgery.* doi:https://doi.org/10.1016/j.wneu.2020.11.015

Al-Azzam, N., Elsalem, L., & Gombedza, F. (2020). A cross-sectional study to determine factors affecting dental and medical students' preference for virtual learning during the COVID-19 outbreak. *Heliyon, 6,* e05704. doi:https://doi.org/10.1016/j.heliyon.2020.e05704

Al-Okaily, M., Alqudah, H., Matar, A., Lutfi, A., & Taamneh, A. (2020). Dataset on the acceptance of e-learning system among universities students' under the COVID-19 pandemic conditions. *Data in Brief, 32,* 106176. doi:https://doi.org/10.1016/j.dib.2020.106176

Ali, M., Allihyani, M., Abdulaziz, A., Alansari, S., Faqeh, S., Kurdi, A., & Alhajjaji, A. (2021). What just happened? Impact of on-campus activities suspension on pharmacy education during COVID-19 lockdown – A students' perspective. *Saudi Pharmaceutical Journal, 29,* 59–66. doi:https://doi.org/10.1016/j.jsps.2020.12.008

Alkhowailed, M., S, Rasheed, Z., Shariq, A., Elzainy, A., El Sadik, A., Alkhamiss, A., Alsolai, A. M., Alduraibi, S. K., Alduraibi, A., Alamro, A., Alhomaidan, H. T., & Al Abdulmonem, W. (2020). Digitalization plan in medical education during COVID-19 lockdown. *Informatics in Medicine Unlocked, 20,* 100432. doi:https://doi.org/10.1016/j.imu.2020.100432

Almarzooq, Z., Lopes, M., & Kochar, A. (2020). Virtual learning during the COVID-19 pandemic a disruptive technology in graduate medical education. *Journal of the American college of Cardiology, 75*(20), 2635-2638. doi:https://doi.org/10.1016/j.jacc.2020.04.015

Almetwazi, M., Alzoman, N., Al-Massarani, S., & Alshamsan, A. (2020). COVID-19 impact on pharmacy education in Saudi Arabia: Challenges and opportunities. *Saudi Pharmaceutical Journal, 28,* 1431–1434. doi:https://doi.org/10.1016/j.jsps.2020.09.008

Alqahtani, A., Y, & Rajkhan, A., A. (2020). E-Learning critical success factors during the COVID-19 pandemic: A comprehensive analysis of E-Learning managerial perspectives. *Education Sciences.* doi:10.3390/educsci10090216

Alqudah, N., M, Jammal, H., M, Saleh, O., Khader, Y., Obeidat, N., & Alqudah, J. (2020). Perception and experience of academic Jordanian ophthalmologists with E-Learning for undergraduate course during the COVID-19 pandemic. *Annals of Medicine and Surgery, 59,* 44–47. doi:https://doi.org/10.1016/j.amsu.2020.09.014

Alqurshi, A. (2020). Investigating the impact of COVID-19 lockdown on pharmaceutical education in Saudi Arabia – A call for a remote teaching contingency strategy. *Saudi Pharmaceutical Journal, 28,* 1075–1083. doi:https://doi.org/10.1016/j.jsps.2020.07.008

Amir, L., R, Maharani, D. A., Wimardhani, Y., Septorini, Julia, V., Sulijaya, B., & Puspitawati, R. (2020). Student perspective of classroom and distance learning during COVID-19 pandemic in the undergraduate dental study program Universitas Indonesia. *BMC Medical Education, 20*(392). doi:https://doi.org/10.1186/s12909-020-02312-0

Azlan, C. A., Hsiu Ding Wong, Tan, L. K., AD Huri, M. S. N., Ung, N., Min, Pallath, V., Phoay Lay Tan, C., Yeong C. H., Ng, H., Kwan. (2020). Teaching and learning of postgraduate medical physics using Internet-based e-learning during the COVID-19 pandemic – A case study from Malaysia. *Physica Medica.* doi:https://doi.org/10.1016/j.ejmp.2020.10.002

Belfi, L., M, Dean, K., E, Bartolotta, R., J, Shih, G., & Min, R., J. (2021). Medical student education in the time of COVID-19: A virtual solution to the introductory radiology elective. *Clinical Imaging, 75,* 67–74. doi:https://doi.org/10.1016/j.clinimag.2021.01.013

Bessadok, A., Lassaad, S., & Almotairi, K., Hatem, A. (2018). Internet of Things Users Classification According to Their Technology Readiness Index. *International Journal of Internet of Things, 7*(2), 37-44. doi:10.5923/j.ijit.20180702.03

Bui, T.-H., Luong, D.-H., Nguyen, X.-A., Nguyen, H.-L., & Ngo, T.-T. (2020). mpact of female students' perceptions on behavioral intention to use video conferencing tools in COVID-19: Data of Vietnam. *Data in Brief, 32,* 106142. doi:https://doi.org/10.1016/j.dib.2020.106142

Chakraborty, P., Mittal, P., Gupta, M., Sheel, Yadav, S., & Arora, A. (2020). Opinion of students on online education during the COVID-19 pandemic. *Human Behavior and Emerging Technologies.* doi:https://doi.org/10.1002/hbe2.240

Chandra, Y. (2020). Online education during COVID-19: perception of academic stress and emotional intelligence coping strategies among college students. *Asian Education and*

Development Studies. doi:10.1108/AEDS-05-2020-0097

Chang, T.-Y., Hong, G., Paganelli, C., Phantumvanit, P., Chang, W.-J., Shieh, Y.-S., & Hsu, M.-L. (2021). Innovation of dental education during COVID-19 pandemic. *Journal of Dental Sciences*(16), 15-20. doi:https://doi.org/10.1016/j.jds.2020.07.011

Chaturvedi, K., Vishwakarma, D., Kumar, & Singh, N. (2021). COVID-19 and its impact on education, social life and mental health of students: A survey. *Children and Youth Services Review, 121*(105866). doi:https://doi.org/10.1016/j.childyouth.2020.105866

Chen, J., K, C, Shu, K.-C., & Lee, H., H, Y. (2019). *Examining E-Learning Systems Success Continuance Intention User by Integrating TAM and DMIS Model.* Paper presented at the 2019 Portland International Conference on Management of Engineering and Technology (PICMET), Portland, OR, USA,.

Chertoff, J., Zarzour, J., Morgan, D., Lewis, P., Canon, C., & Harvey, J. (2020). The Early Influence and Effects of the COVID-19 Pandemic on Resident Education and Adaptations. *Journal of the American College of Radiology.* doi:https://doi.org/10.1016/j.jacr.2020.07.022

Chick, R., Connor, Clifton, G., Travis, Peace, K., Propper, B., Hale, D., Alseidi, A., & Vreeland, T. (2020). Using Technology to Maintain the Education of Residents During the COVID-19 Pandemic. *Journal of Surgical Education*, 729-732. doi:https://doi.org/10.1016/j.jsurg.2020.03.018

Cho, M.-J., & Hong, J., Pio. (2021). The emergence of virtual education during the COVID-19 pandemic: The past, present, and future of the plastic surgery education. *Journal of Plastic, Reconstructive & Aesthetic Surgery.* doi:https://doi.org/10.1016/j.bjps.2020.12.099

Christopher, R., de Tantillo, L., & Watson, J. (2020). Academic caring pedagogy, presence, and Communitas in nursing education during the COVID-19 pandemic. *Nurs Outlook, 00*(00), 1-8. doi:https://doi.org/10.1016/j.outlook.2020.08.006

Dhahri, A., Abbas, Arain, S., Yousuf, Memon, A., Majeed, Rao, A., & Mian, M., Amer. (2020). The psychological impact of COVID-19 on medical education of final year students in Pakistan: A cross-sectional study. *Annals of Medicine and Surgery, 60*, 445–450. doi:https://doi.org/10.1016/j.amsu.2020.11.025

Dhawan, S. (2020). Online Learning: A Panacea in the Time of COVID-19 Crisis. *Journal of Educational Technology Systems, 49*(1), 5-22. doi:10.1177/0047239520934018

Dickinson, K., & Gronseth, S. (2020). Application of Universal Design for Learning (UDL) Principles to Surgical Education During the COVID-19 Pandemic. *Journal of Surgical Education*, 1-5. doi:https://doi.org/10.1016/j.jsurg.2020.06.005

Dondorf, T., Breuer, R., & Nacken, H. (2016). *Classroom vs, E-Learning: A case study on the performance of students in different learning Scenarios.* Paper presented at the Conference: International Conference on Education and New Learning Technologies (EDULEARN), Barcelona, Spain.

Elzainy, A., El Sadik, A., & Al Abdulmonem, W. (2020). Experience of e-learning and online assessment during the COVID-19 pandemic at the College of Medicine, Qassim University. *Journal of Taibah University Medical Sciences, 15*(6), 456-462. doi:https://doi.org/10.1016/j.jtumed.2020.09.005

Gomez, E., Azadi, J., & Magid, D. (2020). Innovation Born in Isolation: Rapid Transformation of an In-Person Medical Student Radiology Elective to a Remote Learning Experience During the COVID-19 Pandemic. *Academic Radiology.* doi:https://doi.org/10.1016/j.acra.2020.06.001

Gupta, S., Dabas, A., Swarnim, S., & Mishra, D. (2021). Medical education during COVID-19 associated lockdown: Faculty and students' perspective. *Medical journal Armed Forces India, 77*, S79-S84. doi:https://doi.org/10.1016/j.mjafi.2020.12.008

Haider, A., S, & Al-Salman, S. (2020). Dataset of Jordanian university students' psychological health impacted by using e-learning tools during COVID-19. *Data in Brief, 32*, 106104. doi:https://doi.org/10.1016/j.dib.2020.106104

Hair, Hult, Ringle, & Sarstedt. (2017). *A primer on partial least squares structural equation modeling (PLS-SEM) (2nd ed.).* Thousand Oaks: Sage.

Hallikainen, H., & Laukkanen, T. (2016). *How technology readiness explains acceptance and satisfaction of digital services in b2b healthcare sector?* Paper presented at the PACIS 2016 Proceedings.

Haslam, M., B. (2021). What might COVID-19 have taught us about the delivery of Nurse Education, in a post-COVID-19 world? *Nurse Education Today, 97*, 104707. doi:https://doi.org/10.1016/j.nedt.2020.104707

Hui, T., Xue. (2017). The Effect of Source Credibility on Consumers' Purchase Intention in Malaysia Online Community. *Journal of Arts & Social Sciences, 1*(1), 12–20.

Hussein, E., Daoud, S., Alrabaiah, H., & Badawi, R. (2020). Exploring undergraduate students' attitudes towards emergency online learning during COVID-19: A case from the UAE. *Children and Youth Services Review, 119*, 105699. doi:https://doi.org/10.1016/j.childyouth.2020.105699

Ibrahim, N., Khamis, Al Raddadi, R., AlDarmasi, M., Al Ghamdi, A., Gaddoury, M., AlBar, H., M, & Ramadan, I., Kamal. (2021). Medical students' acceptance and perceptions of e-learning during the Covid-19 closure time in King Abdulaziz University, Jeddah. *Journal of Infection and Public Health*(14), 17–23. doi:https://doi.org/10.1016/j.jiph.2020.11.007

Ibrahim, N., Khamis, Al Raddadi , R., AlDarmasi, M., Al Ghamdi, A., Gaddoury, M., AlBar, H, M, & Ramadan, I., Kamal. (2021). Medical students' acceptance and perceptions of e-learning during the Covid-19 closure time in King Abdulaziz University, Jeddah. *Journal of Infection and Public Health*(14), 17–23. doi:https://doi.org/10.1016/j.jiph.2020.11.007

Jena, P., Kumar. (2020). Online Learning during Lockdonw period for COVID-19 in India. *International Journal of Multidisciplinary Education Research, 9*(5(8)), 82-92.

Jewer, J., Compeau, D., R, & Besworth, M., D. (2017). *Understanding IS Adoption and Success: Integration of IS Success and Technology Adoption Research*. Paper presented at the Twenty-third Americas Conference on Information Systems, Boston, Boston, USA.

Jones, V, A, Clark, K., A, Puyana, C., & Tsoukas, M. (2021). Rescuing medical education in times of COVID-19. *Clinics in Dermatology*. doi:https://doi.org/10.1016/j.clindermatol.2020.12.010

Kaffenberger, M. (2021). Modelling the long-run learning impact of the Covid-19 learning shock: Actions to (more than) mitigate loss. *International Journal of Educational Development, 81*, 102326. doi:https://doi.org/10.1016/j.ijedudev.2020.102326

Kamaludin, K., Chinna, K., Sundarasen, S., Khoshaim, H., Bakr, Nurunnabi, M., Baloch, G., Muhammad, . . . Abid Hossain, S., Far. (2020). Coping with COVID-19 and movement control order (MCO): experiences of university students in Malaysia. *Heliyon, 6*(e05339). doi:https://doi.org/10.1016/j.heliyon.2020.e05339

Kapasia, N., Paul, P., Roy, A., Saha, J., Zaveri, A., Mallick, R., . . . Chouhan, P. (2020). Impact of lockdown on learning status of undergraduate and postgraduate students during COVID-19 pandemic in West Bengal, India. *Children and Youth Services Review*. doi:https://doi.org/10.1016/j.childyouth.2020.105194

Kaul, V., de Moraes, A., Gallo, Khateeb, D., Greenstein, Y., Winter, G., Chae, J., . . . Dangayach, N., S. (2020). Medical Education During the COVID-19 Pandemic. *Chest*. doi:https://doi.org/10.1016/j.chest.2020.12.026

Khan, M., Arshad, Vivek, Nabi, M., Kamalun, Khojah, M., & Tahir, M. (2021). Students' Perception towards E-Learning during COVID-19 Pandemic in India: An Empirical Study. *Sustainability, 13*(57). doi:https://dx.doi.org/10.3390/su13010057

Lapitan, L., DS, Tiangco, C., E, Sumalinog, D., Angela, G, Sabarillo, N., S, & Diaz , J., Mark. (2021). An effective blended online teaching and learning strategy during the COVID-19 pandemic. *Education for Chemical Engineers, 35*, 116–131. doi:https://doi.org/10.1016/j.ece.2021.01.012

Larasati, N., Widyawan, & Santosa, P. (2017). Technology readiness and technology acceptance model in new technology implementation process in low technology SMEs. *International Journal of Innovation, Management and Technology, 8*(2), 113-117.

Li, Rajamohan, A., Acharya, P., Liu, C.-S., Patel, V., Go, J., . . . Acharya, J. (2020). Virtual read-out: Radiology education for the 21st century during the COVID-19 pandemic. *Academic Radiology, 27*(6), 872-881. doi:https://doi.org/10.1016/j.acra.2020.04.028

Mardiana, S., Tjakraatmadja, J., H, & Aprianingsih, A. (2015). DeLone–McLean information system success model revisited: The separation of intention to use-Use and the integration of technology acceptance models. *International Journal of Economics and Financial Issues, 5*, 172-182.

McRoy, C., Patel, L., Gaddam, D., Sivacharan, Rothenberg, S., Herring, A., Hamm, J., . . . Awan, O. (2020). Radiology education in the time of COVID-19: A novel distance learning workstation experience for residents. *Education*. doi:https://doi.org/10.1016/j.acra.2020.08.001

Meena, R., & Ganesan, P. (2021). Learner's satisfaction on online education during Covid-19 lockdown period. *UGC Care Group-1 Journal*.

Meulenbroeks, R. (2020). Suddenly fully online: A case study of a blended university course moving online during the Covid-19 pandemic. *Heliyon, 6*(e05728). doi:https://doi.org/10.1016/j.heliyon.2020.e05728

Mishra, L., Gupta, T., & Shree, A. (2020). Online teaching-learning in higher education during lockdown period of COVID-19 pandemic. *International Journal of Educational Research Open, 1*, 100012. doi:https://doi.org/10.1016/j.ijedro.2020.100012

Mohammadi, H. (2015). Factors affecting the e-learning outcomes: An integration of TAM and IS success model. *Telematics and Informatics, 32*, 701–719.

Mokhtar, M. I., Mohd Yuki, M. H., Mohd Yusuf, N. A., Mat Yusof, N. S., & Omar, M. S. (2020). Students' satisfaction towards e-Learning system: A case study of Politeknik Tuanku Syed Sirajuddin. *International Journal of Advanced Research in Education and Society, 2*(4), 42-51.

Muthuprasad, T., Aiswarya, S., Aditya, K., S, & Jha, G., K. (2021). Students' perception and preference for online education in India during COVID -19 pandemic. *Social Sciences & Humanities Open, 3*(100101). doi:https://doi.org/10.1016/j.ssaho.2020.100101

Naroo, S., A, Morgan, P., B, Shinde, L., & Ewbank, A. (2020). The Impact of COVID-19 on global contact lens education. *Journal of Optometry*. doi:https://doi.org/10.1016/j.optom.2020.11.002

Nassr, R. M., Aborujilah, A., Aldossary, D., A, & Aldossary, A., A. (2020). Understanding education difficulty during COVID-19 lockdown: Reports on Malaysian university

students' experience. IEEE Access, 8(2020), 186939-186950. doi:10.1109/ACCESS.2020.3029967

Nassr, R. M., Saleh, A., Hadi, Dao, H., & Saadat, M. N. (2019). Emotion-aware educational system: The lecturers and students perspectives in Malaysia. In I. R. Lee S., Choo H. (Ed.), Proceedings of the 13th International Conference on Ubiquitous Information Management and Communication (IMCOM) 2019. IMCOM 2019. Advances in Intelligent Systems and Computing (Vol. 935). Cham: Springer.

Nassr, R., Mohammd, Aldossary, A., A, & Nasir, H. (2021). Students' intention to use emotion-aware virtual learning environment: Does a lecturer's interaction make a difference? Malaysian Journal of Learning and Instruction, 18(1), 183-218.

Obaid, T. (2020). Factors driving E-learning adoption In palestine: An integration of technology acceptance model and IS success model. SSRN Electronic Journal. doi:http://dx.doi.org/10.2139/ssrn.3686490

OECD. (2020). Strengthening online learning when schools are closed: The role of families and teachers in supporting students during the COVID-19 crisis. Retrieved from https://www.oecd.org/coronavirus/policy-responses/strengthening-online-learning-when-schools-are-closed-the-role-of-families-and-teachers-in-supporting-students-during-the-covid-19-crisis-c4ecba6c/

Ojo, A., I. (2017). Validation of the DeLone and McLean information systems success model. Healthcare Information Research, 23(1), 60-66.

Oyediran, W., Oyeleke, Omoare, A., Motunrayo, Owoyemi, M., Adebusola, Adejobi, A., Olatoke, & Fasasi, R., Bolanle. (2020). Prospects and limitations of e-learning application in private tertiary institutions amidst COVID-19 lockdown in Nigeria. Heliyon, 6, e05457. doi:https://doi.org/10.1016/j.heliyon.2020.e05457

Oyedotun, T., Deborah. (2020). Sudden change of pedagogy in education driven by COVID-19: Perspectives and evaluation from a developing country. Research in Globalization, 2, 100029. doi:https://doi.org/10.1016/j.resglo.2020.100029

Pal, D., & Vanijja, V. (2020). Perceived usability evaluation of icrosoft Teams as an online learning platform during COVID-19 using System Usability Scale and Technology Acceptance Model in India. Children and Youth Services Review. doi:https://doi.org/10.1016/j.childyouth.2020.105535

Parasuraman, A., & Colby, C. (2015). An updated and streamlined Technology Readiness Index: TRI 2.0. Journal of Service Research, 18(1), 59-74. doi:10.1177/1094670514539730

Pollock, S., E, Nathan, N., R, Nassim, J., S, Kourosh, A., Shadi, Mariwalla, K., & Tsao, S., S. (2020). The show must go on: Dermatologic procedural education in the era of COVID-19. International Journal of Women's Dermatology. doi:https://doi.org/10.1016/j.ijwd.2020.11.002

Qazi, A., Naseer, K., Qazi, J., AlSalman, H., Naseem, U., Yang, S., . . . Gumaei, A. (2020). The early influence and effects of the Coronavirus Disease 2019 (COVID-19) pandemic on Resident Education and Adaptations. Child Youth Serv Rev. doi:10.1016/j.childyouth.2020.105582

Qazi, J., Naseer, K., Qazi, A., AlSalman, H., Naseem, U., Yang, S., . . . Gumaei, A. (2020). Evolution to online education around the globe during a SARS-CoV-2 Coronavirus (COVID-19) Pandemic: Do develop and underdeveloped cope alike? Children and Youth Services Review. doi:https://doi.org/10.1016/j.childyouth.2020.105582

Qiu, H., Li, Q., & Li, C. (2020). How technology facilitates tourism education in COVID-19: Case study of Nankai University. Journal of Hospitality, Leisure, Sport & Tourism Education. doi:https://doi.org/10.1016/j.jhlste.2020.100288

Rahiem, M., D, H. (2021). Remaining motivated despite the limitations: University students' learning propensity during the COVID-19 pandemic. Children and Youth Services Review, 120(105802). doi:https://doi.org/10.1016/j.childyouth.2020.105802

Rammutloa, M. W. (2017). Application of the Delone and Mclean's Model to assess the effectiveness of Interanet in an Open Distance Learning Library. (Master's Thesis Stellenbosch University).

Santiago, I.-P., Ángel, H.-G., Julián, C.-P., & Prieto, J., Luis. (2021). Emergency Remote Teaching and Students' Academic Performance in Higher Education during the COVID-19 Pandemic: A Case Study. Computers in Human Behavior. doi:https://doi.org/10.1016/j.chb.2021.106713

Selvanathan, M., Mohamed Hussin, N. A., & Nor Azazi, N. A. (2020). Students learning experiences during COVID-19: Work from home period in Malaysian higher learning institutions. Teaching Public Administration. doi:10.1177/0144739420977900

Shahzad, A., Hassan, R., Aremu, A., Yusuff, Hussain, A., & Lodhi, R. N. (2020). Effects of COVID-19 in E-learning on higher education institution students: The group comparison between male and female. Quality & Quantity. doi:https://doi.org/10.1007/s11135-020-01028-z

Sia, J., Kee-Ming & Adamu, A., Abbas. (2020). Facing the unknown: Pandemic and higher education in Malaysia. Asian Education and Development Studies, 10(2), 263-275. doi:10.1108/AEDS-05-2020-0114

Sindiani, A., Mahmoud, Obeidat, N., Alshdaifat, E., Elsalem, L., Alwani, M., M, Rawashdeh, H., . . . Tawalbeh, L., Issa. (2020). Distance education during the COVID-19 outbreak: A cross-

sectional study among medical students in North of Jordan. Annals of Medicine and Surgery, 59, 186–194. doi:https://doi.org/10.1016/j.amsu.2020.09.036

Singh, H., Kumar, Joshi, A., Malepati, R., N, Najeeb, S., Balakrishna, P., Pannerselvam, N., Kumar, . . . Ganne, P. (2021). A survey of E-learning methods in nursing and medical education during COVID-19 pandemic in India. *Nurse Education Today, 99*, 104796. doi:https://doi.org/10.1016/j.nedt.2021.104796

Sreehari, P. (2020). Online learning during the Covid-19 lockdown: Learners' perceptions. *Journal of Critical Reviews, 7*(19), 300-307.

Srivastava, S., Jacob, J., Charles, A., S, Daniel, P., Mathew, J., K, Shanthi, P., . . . Rabi, S. (2021). Emergency remote learning in anatomy during the COVID-19 pandemic: A study evaluating academic factors contributing to anxiety among first year medical students. *Medical journal Armed Forces India, 77*, S90-S98. doi:https://doi.org/10.1016/j.mjafi.2020.12.012

Subaeki, B., Rahman, A., A, Putra, S., J, & Alam, C., N. (2019). Success model for measuring information system implementation: Literature review. *Journal of Physics: Conference Series* (1402), 077015. doi:10.1088/1742-6596/1402/7/077015

Sukendro, S., Habibi, A., Khaeruddin, K., Indrayana, B., Syahruddin, S., Makadada, F., Alfrets, & Hakim, H. (2020). Using an extended Technology Acceptance Model to understand students' use of e-learning during Covid-19: Indonesian sport science education context. *Heliyon, 6*, e05410. doi:https://doi.org/10.1016/j.heliyon.2020.e05410

Svoboda, S., A, Swigert, A., Nielson, C., B, & Motaparthi, K. (2021). Inspired by COVID-19 isolation: Evolving educational techniques in dermatology residency programs. *Clinics in Dermatology*. doi:https://doi.org/10.1016/j.clindermatol.2020.12.021

Teele, V., A, Sindelar, A., Brown, D., Kane, D., A, Thatte, N., Williams, R., J, . . . Wolbrink, T., A. (2021). Online education in a hurry: Delivering pediatric graduate medical education during COVID-19. *Progress in Pediatric Cardiology, 60*, 101320. doi:https://doi.org/10.1016/j.ppedcard.2020.101320

Trung, T., Hoang, A.-D., Nguyen, T., Tien, Dinh, V.-H., Nguyen, Y.-C., & Pham, H.-H. (2020). Dataset of Vietnamese student's learning habits during COVID-19. *Data in Brief*, 1-7. doi:https://doi.org/10.1016/j.dib.2020.105682

Tuma, F., Nassar, A., K, Kamel, M., K, Knowlton, L., M, & Jawad, N., Kadhim. (2021). Students and faculty perception of distance medical education outcomes in resource-constrained system during COVID-19 pandemic. A cross-sectional study. *Annals of Medicine and Surgery, 62*, 377–382. doi:https://doi.org/10.1016/j.amsu.2021.01.073

Ulenaers, D., Grosemans, J., Schrooten, W., & Bergs, J. (2021). Clinical placement experience of nursing students during the COVID-19 pandemic: A cross-sectional study. *Nurse Education Today, 99*, 104746. doi:https://doi.org/10.1016/j.nedt.2021.104746

Yu, P., & Qian, S. (2018). Developing a theoretical model and questionnaire survey instrument to measure the success of electronic health records in residential aged care. *PLoS One, 13*(1), e0190749. doi:https://doi.org/10.1371/journal.pone.0190749

Zaheer, M., Gondal, U. H., & Qadri, M., Majeed. (2015). *E-Learning and Student Satisfaction*. Paper presented at the 29th Annual Conference of the Asian Association of Open Universities: New frontiers in ODL.