Revisiting User Satisfaction and Intention to Use: A Cross-Sectional Study of E-Learning During Lockdown

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Abstract: *Covid-19 related lockdowns forced students of higher education to receive education entirely online as a replacement for physical attendance in classrooms. This new situation caused students to discover the advantages and disadvantages of e-Learning and influenced their satisfaction and intention to use it. Consequently, this study revisits the intention to use and satisfaction-related theories based on pre-covid conditions. This revisit was necessary because the evidence suggests that students' new situation has changed some determinants related to their satisfaction and intention to use. This situation warranted the simultaneous consideration of many dimensions when measuring user satisfaction and intention to use during the lockdown. This cross-sectional study developed an integrated model to measure students' satisfaction and its impact on e-Learning intention to use. Structural equation modelling was used to conduct the empirical analysis. Nine hundred respondents from Malaysia and Saudi Arabia participated in this study. Students from Malaysia and Saudi Arabia showed marginal differences in their perceptions of e-Learning. The findings showed changes in students' perceptions towards satisfaction and intention to use e-Learning, which might be due to using e-Learning exclusively.*

Keywords: technology acceptance, intention to use, technology readiness, IS success model, e-Learning, covid-19 outbreak, Saudi Arabia, Malaysia, higher education

Introduction

The COVID-19 pandemic had caused a physical shutdown of higher education institutions globally. Consequently, the education process had shifted exclusively to online mode (Chang et al. 2021; Chaturvedi, Vishwakarma, and Singh 2021; Gupta et al. 2021; Jones et al. 2021; Khan et al. 2021). Although e-Learning systems have made considerable achievements in higher education institutions (Shahzad et al. 2020), they have been under-utilized as the key mode of teaching in blended learning strategies (Cho and Hong 2021; Hidalgo, Abril, and Parra 2020; Pal and Vanijja 2020; Pollock et al. 2020; Teele et al. 2021). Thus, the sudden shift to e-Learning systems as the only mode of education could have caused changes in students' approach to e-Learning (Cho and Hong 2021; Meulenbroeks 2020; Oyedotun 2020; Santiago et al. 2021) and consequently affected their satisfaction and intention to use e-Learning.

The use of lockdowns to stop the spread of COVID-19 has put a lot of pressure on e-Learning systems to serve students at the same time efficiently (Almetwazi et al. 2020). Moreover, students' preferences for face-to-face learning (Cho and Hong 2021; Ibrahim et al. 2021; Teele et al. 2021; Tuma et al. 2021) may make it challenging to satisfy them with the exclusive use of e-Learning (Pollock et al. 2020). The radical change to only using e-Learning could potentially cause unpredicted changes to current students' opinions (satisfaction, intention to use, acceptance) towards e-Learning (Haslam 2021; Muthuprasad et al. 2021). For instance,

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using e-Learning systems exclusively (no alternatives) during lockdown may dissatisfy them (Chakraborty et al. 2020; Chaturvedi, Vishwakarma, and Singh 2021; Haslam 2021). Therefore, it is essential to consider their readiness to use e-Learning (Chaturvedi, Vishwakarma, and Singh 2021; Haslam 2021; Oyedotun 2020; Nassr et al. 2020).

Little is known regarding the extent of the effects on university students who used e-Learning during the lockdown. More specifically, there is a lack of studies that measured user satisfaction (Mokhtar et al. 2020) or the intention to use technology in situations that disrupt education continuity (Shahzad et al. 2020).

Thus, the problem statement that concerns this study is: The current studies, while studying the impact of lockdown on the students' satisfaction and intention to use e-Learning, have focused on the explicit determinants such as communication infrastructure and the availability of educational materials online. Though this is critical to a certain point, there is a fact that the universities established e-Learning a long time ago, and the expected problems related to the explicit determinants have been discussed and almost settled, at least in countries with good communication infrastructure and internet penetration. Therefore, prior studies have concluded that university students could manage to access e-learning during lockdown with minimal physical issues to overcome. This has left room for investigating the impact of lockdown on students' satisfaction and intention to use. There is a lack of studies investigating the implicit impact of lockdown by a multidimensional set of factors while bringing in quantitative and empirical evidences that are statistically verified.

Thus, determining the factors that could improve university students' intention and satisfaction with e-Learning in exclusive use is critical in mitigating the potential negative impact on students' usage of e-Learning conveniently. It is necessary to study these factors, as lockdowns have left traces on students' perceptions of the exclusive use of e-Learning (Haslam 2021; Kaffenberger 2021; Singh et al. 2021). It is critical to find significant antecedents to learn from the current situation to effectively manage the education process in similar future situations (Haslam 2021; Kaffenberger 2021; Teele et al. 2021).

On the other hand, the cross-sectional studies that were found (Al-Ahmari et al. 2020; Al-Azzam, Elsalem, and Gombedza 2020; Alqudah et al. 2020; Alqurshi 2020; Chandra 2020; Dhahri et al. 2020; Pal and Vanijja 2020; 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) reveal information regarding students' satisfaction or/and intentions during COVID-19 lockdowns within the boundaries of one country. This is with the exception of Qazi et al. (2020), who conducted a cross-country study, but they only measured students' satisfaction via the accessibility of e-Learning systems. Thus, there is a need to know the influencing factors from several perspectives (personal, technological and easiness) on e-Learning to bring innovative solutions for current and future situations (Chang et al. 2021).

Although Chandra (2020); Ibrahim et al. (2021); Shahzad et al. (2020) considered the differences among groups of participants, they studied the differences between males and females within the same context of India, Saudi Arabia, and Malaysia, respectively. Cross-sectional studies were done by Al-Azzam, Elsalem, and Gombedza (2020); Alqudah et al. (2020); Alqurshi (2020); Sindiani et al. (2020), but they were cross-college in the same university, with the exceptions of Alqudah et al. (2020); Alqurshi (2020); Sukendro et al. (2020), which were cross-sectional among colleges: medical colleges in Jordan, Saudi Arabia, and a sports college in Indonesia, respectively. Meanwhile, the study of Alqurshi (2020) was more concerned with students' satisfaction, but the analysis was descriptive and did not assess the relationship among factors. Other cross-sectional studies by Dhahri et al. (2020); Elzainy, El Sadik, and Al Abdulmonem (2020); Tuma et al. (2021); Ulenaers et al. (2021) took place with medical students in Pakistan, Saudi Arabia, Iraq, and Belgium, respectively, regarding their experiences with online study during the lockdowns. Commonly, they reported that students' personal perspectives should be considered, which significantly impacted their satisfaction and intention to use e-Learning. However, these studies did not develop models that clearly

specified the role of each factor. Moreover, the above-mentioned cross-sectional studies might reveal fewer differences if they were conducted in two or three countries.

This study has the potential to contribute in terms of (1) developing an empirical and integrated model that may reveal the existence of several factors from different perspectives that are influencing students' satisfaction and intention to use; (2) being a cross-country study that may reveal differences in university students' perspectives while using e-Learning; (3) revealing students' intention to use and satisfaction while in an unfamiliar situation (lockdown); and (4) studying the variances in university students' satisfaction and intention to use while using several modes of e-Learning (synchronous, asynchronous, or both modes). The synchronous mode of e-Learning refers to real-time education such as using ZOOM, Microsoft Teams, Google Meet, or other platforms. While the asynchronous mode of e-Learning refers to traditional eLearning, where educational materials are uploaded, and students can access them anytime.

Literature Review

In the course of studying students' satisfaction and intention to use e-Learning during the lockdowns, many researchers focused on synchronous e-Learning systems. For example, Pal and Vanijja (2020) studied the usability of Microsoft Teams to measure students' intention to use e-Learning during the lockdowns. Almetwazi et al. (2020); Ibrahim et al. (2021); Naroo et al. (2020); Sindiani et al. (2020) studied students' experiences in Saudi Arabia and Jordan while using Zoom, Microsoft Teams, and other tools. Pollock et al. (2020) reported that synchronous e-Learning systems such as Zoom were well-received in medical education. Although students perceived synchronous e-Learning applications positively, they expressed preferences for blended learning as soon as they could do it safely (Almetwazi et al. 2020; Dhahri et al. 2020; Sindiani et al. 2020).

Many studies such as Alqudah et al. (2020); Alqurshi (2020); Azlan et al. (2020); Ibrahim et al. (2021); Selvanathan, Mohamed Hussin, and Nor Azazi (2020); Teele et al. (2021); Trung et al. (2020), reported on students' experiences with e-Learning systems during the COVID-19 pandemic. Yet, the researchers could barely find models measuring the changes in university students' satisfaction and intentions while using those systems during the pandemic. They covered many issues that were not confined to technical problems but included familiarity with them. For instance, Li and Lalani (2020) explained about Zoom experiences in radiology education during the lockdowns but barely mentioned the changes in the students' satisfaction and intention to use. Yang et al. (2021) pointed out that courses conducted via synchronous online education registered more participants but had low completion rates during the lockdowns, which may indicate dissatisfaction.

A few studies reported some additional issues. For instance, the studies of Azlan et al. (2020); Svoboda et al. (2021) identified sources of dissatisfaction by students that e-Learning (synchronous and asynchronous) cannot cover easily, such as practical aspects, where students face difficulty with understanding and running practical assignments. Similar issues were discussed by Jones et al. (2021); Kaul et al. (2020); Wise et al. (2020). On the other hand, Azlan et al. (2020); Ibrahim et al. (2021) concluded that university students showed satisfaction when some enhancements took place in e-Learning capabilities to facilitate the practical labs of their medical classes. For instance, the study of Belfi et al. (2021) used a limited sample (26 students) with a short e-Learning experiment (2-week long), which showed evidence that students showed satisfaction with improvements (i.e., introducing a virtual training lab) to e-Learning systems. The study of Dickinson and Gronseth (2020) revealed that current e-Learning platforms need to be reviewed to ensure they can fulfil the requirements of pure online education. Therefore, this cross-country study focuses on various factors influencing university students' satisfaction and intention to use e-Learning systems.

Study Context: 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); Ibrahim et al. (2021) reported the actions and procedures which Saudi Arabian universities took to continue the education process during the COVID-19 outbreak; which were similar to the procedures taken in Malaysia, as reported by Azlan et al. (2020); Kamaludin et al. (2020); Selvanathan, Mohamed Hussin, and Nor Azazi (2020); Shahzad et al. (2020); Sia and Adamu (2020). In contrast to other research that was focused on the status of the higher education processes in Saudi Arabia and Malaysia, Alqahtani and Rajkhan (2020); Shahzad et al. (2020) developed a list of critical success factors and a model describing students' perspectives on the system quality of e-Learning, respectively. The findings of Alqahtani and Rajkhan (2020); Shahzad et al. (2020) were mainly focused on the technical aspects (information, system, and service qualities) of satisfaction. Indeed, the majority of Saudi Arabian and Malaysian studies that were concerned with higher education e-Learning during the COVID-19 lockdown were found to emphasise the technical attributes (i.e., strong internet connection, clarity of audio and video of eLearning systems, etc.) that influence university students' satisfaction and intention to use. Yet, other factors related to students' personalities have been found to impact university students' intention to use e-learning Kamaludin et al. (2020). The lack of studies was found to be concerning in regards to creating an integrated model that may assist in predicting students' satisfaction and intention to use eLearning.

The two countries were selected as the context of this study for several factors. First, they were reachable by the author's team, who had similar eLearning experiences as the students during lockdown. Second, studies discussed above have shown quite similar features with Malaysia and Saudi Arabia.

Model Development

Few studies focused on the importance of reassessing students' satisfaction and intention to use while solely using e-Learning during lockdowns. Additionally, these few studies assessed them from singular perspectives. For example, Pal and Vanijja (2020) were concerned with usability, Al-Okaily et al. (2020) focused on students' acceptance, while Shahzad et al. (2020) were only interested in the quality of the e-Learning systems. A qualitative study (Rahiem 2021) showed students' personal experiences in overcoming stress due to the lockdowns; students' satisfaction and system qualities were among the themes extracted from students' input. This study argues that while using e-Learning solely to receive education, students may not only be concerned with the system's quality and usability, but may also need to acclimatise to this new situation. Therefore, it is expected to see some effects from the many dimensions on satisfaction and intention to use (Sindiani et al. 2020). Subaeki et al. (2019) considered that integrating other factors with the IS success model is encouraged as long as there is enough support from those theories. Furthermore, one information system model can complement other models to better understand the issue (Jewer, Compeau, and Besworth 2017). Hence, this study proposes a model that not only concerns system qualities (IS success model components of information, system, and service qualities) but also considers the personal perspective (Technology Readiness Index (TRI) of Parasuraman and Colby (2015)).

The theoretical framework (Figure 1) demonstrates the interrelationships between rather important variables in the study. According to Sekaran and Bougie (2010), after the theoretical framework has been developed, testable hypotheses can be formulated to examine whether the developed model is valid. The conceptual research model (Figure 1) makes use of the integration of two leading social cognitive theories, specifically, the Technology Acceptance Model (TAM), and Technology Readiness (TR), in addition to the IS success model. It is vital to develop a sequential and parsimonious conceptual framework and examine determinants of satisfaction and intention to use e-Learning in Saudi Arabia and Malaysia. Therefore, a

systematic approach of logical, sequential steps will give a comprehensive view of this intention. Next subsections present more justifications for including every component in the model.

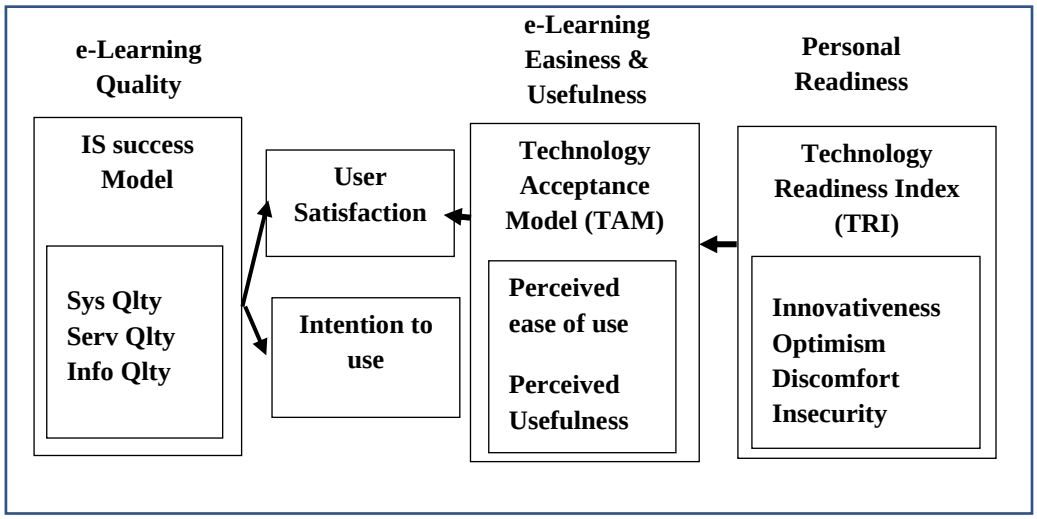

Figure 1: Conceptual Model
Note: Sys Qlty: System Quality, Serv Qlty: Service Quality, Info Qlty: Information Quality

The TAM model is widely used in education domain to explain students' acceptance of eLearning. For example, Pal and Vanijja (2020) integrated TAM and the System Usability Scale to measure the usability of Microsoft Teams from the students' perspectives during the COVID-19 lockdown. Al-Okaily et al. (2020) used TAM to measure students' intentions during the lockdowns. Shahzad et al. (2020) employed the IS success model to reassess students' satisfaction with e-Learning under the effects of the COVID-19 outbreak. Ibrahim et al. (2021) assessed individual factors (usefulness from TAM, facilitating condition from UTAUT2), with no specific relationship specified. Similarly, Qazi et al. (2020) empirically measured students' satisfaction. Due to the absence of TAM to explain the effects of personal factors of technology users (student) and technology features on intention to use or satisfaction, TAM has been integrated with several models.

In terms of the integration of TAM and the IS success model, this study found many studies that empirically proved the significance of this integration, such as Adeyemi and Issa (2020); Chen, Shu, and Lee (2019); Mardiana, Tjakraatmadja, and Aprianingsih (2015); Mohammadi (2015); Obaid (2020). Additionally, this study found significant evidences regarding personal dimension considerations in many studies, as seen in further sections. It could be said that this study is concerned with integrating three models to deliver a more comprehensive explanation. The integration of those three models serves to illustrate that user satisfaction could be influenced by various factors from several perspectives (qualities, easiness and personal readiness).

Technology Acceptance Model (TAM)

e-Learning technology has been used extensively to continue educational processes during the lockdowns. Consequently, user intention (Al-Okaily et al. 2020; Haslam 2021; Khan et al.

2021), ease of use, and technology usefulness (Sukendro et al. 2020; Khan et al. 2021; Al-Okaily et al. 2020) could be critical elements in students' intention to use, and satisfaction with e-Learning technology (Aguilera-Hermida 2020). TAM is one of the models exploited by the IS community for foreseeing the future use of technologies (Sukendro et al. 2020). It has been used to measure students' intention to use e-Learning during COVID-19 (Khan et al. 2021; Bui et al. 2020; Aguilera-Hermida 2020), which encouraged this study to use its main components. Perceived Usefulness (PU) and Perceived Ease of Use (PEOU) are the two core constructs of TAM, which are measured most of the time on a scale of 1 (strongly disagree) to 5 (strongly agree).

The overall intention to use for students was investigated qualitatively by Hussein et al. (2020); the students' answers showed a tendency to use e-Learning as a replacement for face-to-face education. Nevertheless, they found technical difficulties, which would require the inclusion of other measurements while measuring students' satisfaction. For example, Ibrahim et al. (2021) considered PU, yet, they employed nine indicators (PU is usually measured by 3–4 indicators) to report a moderate intention to use e-Learning in Saudi Arabia. In the context of Malaysia, Mokhtar et al. (2020) found PU significant for students' satisfaction with e-Learning during the lockdown. Sukendro et al. (2020) found that PU significantly explained the intention to use e-Learning during the COVID-19 lockdown. However, students investigated by Ali et al. (2021); Gupta et al. (2021) showed difficulty (dissatisfaction) with using e-Learning systems, which may bring attention to measuring PEOU in any proposed model. PU and PEOU were originally used to measure the likelihood of usage, not the actual use or post-use (Pal and Vanijja 2020; Sukendro et al. 2020). Therefore, this study did some reworking to the method to measure the intention to use, and then surveyed students after a period of using e-Learning systems during the lockdowns. However, TAM could not be used exclusively in situations where system qualities are critical, due to their impact (how fast/slow) on students' intention to use and satisfaction.

System Qualities (Information, Service, and System)

Although the DeLone & McLean Information System Success Model was established a long time ago, it has been revalidated in many fields recently (Adeyemi and Issa 2020; Obaid 2020; Subaeki et al. 2019; Yu and Qian 2018). The IS success model has been adopted entirely or partially, where some of its components are integrated with other models. For example, the studies of Rammutloa (2017); Shahzad et al. (2020) used almost all of the fundamental components of the model and found that information, system, and service qualities significantly influenced students' satisfaction with asynchronous e-Learning during lockdowns. According to Adeyemi and Issa (2020); Shahzad et al. (2020), information, service, and system qualities all significantly and positively influence user satisfaction. On the other hand, a study by Alqurshi (2020) reported that students were confused when delivering assignments and answering quizzes while using e-Learning systems. This may reveal difficulties within the information and service qualities.

This study preferred to use the integration model of the information success model, TRI, and TAM as it "is needed to provide proper antecedents for intention to use since TAM has a stronger theoretical background for predicting behavioural intention (BI)" (Mardiana, Tjakraatmadja, and Aprianingsih 2015, 172). Many studies have found this integration is related to e-Learning, such as Adeyemi and Issa (2020); Obaid (2020). Based on the research of Adeyemi and Issa (2020); Mokhtar et al. (2020); Obaid (2020); Shahzad et al. (2020); Yu and Qian (2018), the following hypotheses have been developed:

H1: system quality owns an effect on user satisfaction

H2: system quality owns an effect on intention to use

H3: service quality owns an effect on user satisfaction

H4: service quality owns an effect on intention to use

H5: information quality owns an effect on user satisfaction

H6: information quality owns an effect on intention to use

H7: user satisfaction owns an effect on intention to use

User Satisfaction

University students' satisfaction is being severely tested during the lockdowns (Alqudah et al. 2020; Elzainy, El Sadik, and Al Abdulmonem 2020; Haslam 2021; Mokhtar et al. 2020; Naroo et al. 2020; Qazi et al. 2020). On normal days, university students are satisfied with e-Learning systems, as revealed by a large sample of students (21608) (Zaheer et al. 2015). However, in days of crisis and exclusive use, Al-Ahmari et al. (2020); Almarzooq, Lopes, and Kochar (2020); Alqudah et al. (2020); Mokhtar et al. (2020); Qazi et al. (2020) recommended measuring students' satisfaction to understand the impact of the COVID-19 lockdowns. Mokhtar et al. (2020) measured the impact of PU, system quality, and course quality on university students' satisfaction. However, no underlying theories had been discussed, and no commonly used scale had been employed. Meena and Ganesan (2021); Qazi et al. (2020) found that students were satisfied when all resources to reach e-Learning are provided. Selvanathan, Mohamed Hussin, and Nor Azazi (2020) had not explicitly measured university students' satisfaction, yet, nine satisfaction-related indicators were found scattered in their factors (instructor, instruction, and interaction). Al-Ahmari et al. (2020); Alkhowailed et al. (2020) descriptively reported university students' satisfaction with e-Learning during the COVID-19 lockdowns. Alqudah et al. (2020); Chandra (2020) reported dissatisfaction with e-Learning, although the sample sizes were very limited, with 23 and 94 students, respectively. The satisfaction elements proposed and measured by Selvanathan, Mohamed Hussin, and Nor Azazi (2020) were descriptively analysed and showed average satisfaction toward e-Learning. Cho and Hong (2021); Elzainy, El Sadik, and Al Abdulmonem (2020) reported students' satisfaction with e-Learning systems, although they reported no direct satisfaction measurement items. Similarly, a study by Lapitan et al. (2021) reported students' satisfaction, yet, a specialised e-Learning module was used. This has increased the need for this study, as the previously reported studies gave different answers and employed less commonly used scales.

Intention to Use

Intention is the main dependent variable recognised in the studies based on TAM, measuring the likelihood that an individual will utilise any information system (Khan et al. 2021; Obaid 2020). In many cases, students reported their intention to continue using e-Learning once students' requirements had been implemented (McRoy et al. 2020; Khan et al. 2021; Obaid 2020). The impact of the lockdowns on intention to use may exceed e-Learning. It was reported by Mok et al. (2021) that university students, at least those in China and Hong Kong, may lose the intention to pursue higher education due to the complexities caused by the outbreak. Therefore, this study used intention to use as the main dependent variable in the proposed model.

Technology Readiness Index (TRI)

University students found themselves in an unfamiliar situation when their homes, regarded as a place of relaxation, instead became a place to study (Jena 2020; OECD 2020; Oyedotun 2020). Therefore, university students might express discomfort and unreadiness in this situation (Srivastava et al. 2021; Ulenaers et al. 2021). Gomez, Azadi, and Magid (2020) reported that

university students were more comfortable when new courses were intentionally developed to overcome isolation. This shows that an appreciation for students' situations increases their satisfaction and intention to use e-Learning during the lockdowns. The personal aspects needed for education solutions during the lockdowns have been emphasised in Christopher, de Tantillo, and Watson (2020). The findings of Christopher, de Tantillo, and Watson (2020) showed that technology solutions are not the only factor to grab university students' attention and satisfy them with e-Learning services, but the personal aspects of students should be considered too. Similarly, the critical success factors listed by Alqahtani and Rajkhan (2020) emphasised the personal readiness of students for e-Learning, regardless of the sophistication of the e-Learning systems used. Khan et al. (2021) also emphasised the need to consider students' personal readiness for e-Learning.

The OECD (2020) report, while analysing university students' intentions toward e-Learning, emphasised students' innovation, optimism, and satisfaction to maintain a good level of intention to use e-Learning during the lockdowns. Therefore, this study adopted the Technology Readiness Index by Parasuraman and Colby (2015), as it is broadly used to measure users' personal readiness, which is an important consideration (Haslam 2021; Ulenaers et al. 2021). Furthermore, TRI is used in emerging situations that may enforce the use of new technology (Bessadok, Lassaad, and Almotairi 2018; Larasati, Widyawan, and Santosa 2017). Regarding the elements of TRI (innovativeness, optimism, discomfort, and insecurity), Sindiani et al. (2020) reported that university students in Jordan showed some discomfort and insecurity while using Zoom due to the reports regarding its security breaches. However, Hasan and Khan (2020) reported that fewer students considered security issues related to e-Learning. Haider and Al-Salman (2020) reported discomfort among university students after using e-Learning exclusively. Oyedotun (2020); Ulenaers et al. (2021) also discovered significant insecurity among students while using e-Learning systems during the lockdowns. Meanwhile, Sindiani et al. (2020); Srivastava et al. (2021) reported that university students were displeased with their online experiences. Similar results were found by Dhahri et al. (2020); Oyedotun (2020) during the lockdowns. In a similar context, Tuma et al. (2021) suggested that more efforts need to be made to increase students' satisfaction and intention to use e-Learning and overcome their hesitation to consider it as the only education channel. However, Singh et al. (2021); Azlan et al. (2020) concluded that students perceive e-Learning as an opportunity for innovation, and they are optimistic about using it. Considerations for the personal readiness of university students while studying students' satisfaction and intentions during lockdown was emphasised by Haider and Al-Salman (2020); Azlan et al. (2020); Kaul et al. (2020); Oyedotun (2020); Srivastava et al. (2021).

The TRI and TAM integration could be employed to analyse the constructs and adoption of innovative technology (Endratno 2012; Hallikainen and Laukkanen 2016; Larasati, Widyawan, and Santosa 2017). The Acceptance Model (TRAM) integrates TRI's common personality factors with TAM's specific factor system (Buyle et al. 2018). This clarifies how the integrated perspective of the two theories can explain users' intention to use and the way people use innovative technology. In such a combination, TRI personality dimensions would act as an antecedent to TAM. Considering personal factors such as innovativeness, optimism, discomfort, and insecurity, it is essential to propose a model that measures students' satisfaction and intention to use.

Thus, the following hypotheses have been developed:

H8: innovativeness owns an effect on perceived ease of use

H9: innovativeness owns an effect on perceived usefulness

H10: optimism owns an effect on perceived ease of use

H11: optimism owns an effect on perceived usefulness

H12: insecurity owns an effect on perceived ease of use

H13: insecurity owns an effect on perceived usefulness

H14: discomfort owns an effect on perceived ease of use

H15: discomfort owns an effect on perceived usefulness

H16: perceived ease of use owns an effect on intention to use

H17: perceived ease of use owns an effect on user satisfaction

H18: perceived usefulness owns an effect on intention to use

H19: perceived usefulness owns an effect on user satisfaction

Figure 2 shows the proposed model.

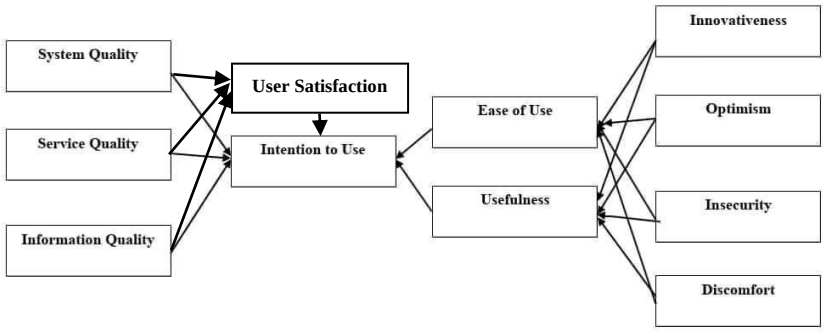

Figure 2: The Proposed Model

Methodology

This study was conducted using quantitative means, in particular causal-comparative (J. Hair et al. 2019) as the purpose is to validate the proposed relationships between factors affecting e-Learning students' intention to use and satisfaction with e-Learning during the COVID-19 outbreak. This is due to the fact that the most solid type of theoretical inference a researcher can draw from is a causal inference (J. Hair et al. 2019, 615). Accordingly, a hypothesised cause-and-effect relationship had been built (Figure 2, H1~H19). The above-mentioned hypotheses were constructed from the proposed model (Figure 2). The hypotheses were proposed to identify antecedents of satisfaction and intention to use e-Learning.

Instrument development

The instrument used was adapted from instruments validated in previous quantitative studies of a similar nature (Al-Okaily et al. 2020; Khan et al. 2021; Mohammadi 2015). The questionnaire was adopted with some adaptations and rewording. All indicators used a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree), which is commonly used in prior studies. The questionnaire items on information quality, service quality, system quality, and satisfaction were borrowed from Mohammadi (2015). Perceived ease of use, intention to use, and perceived usefulness were adopted from Al-Okaily et al. (2020); Khan et al. (2021). Finally, the TRI factors' indicators were borrowed from Parasuraman and Colby (2015) (see appendix A).

Data Collection and Procedure

The target population for this study was university students from Saudi Arabia and Malaysia who had experienced e-Learning during the lockdowns. As this study was aimed at the general population of students, the technique of "non-probability sampling" was applied with the use of "convenience sampling" (Hui 2017). The online survey was disseminated via two stages. First, emails were sent to a group of lecturers who conducted online courses in Malaysia (IIUM, UniKL) and Saudi Arabia (Imam Abdul Rahman Bin Faisal University, King Saud University). Those lecturers were asked to distribute the survey amongst their students. Lecturers used their eLearning systems to post the link of the online survey and asked the students to participate voluntarily after the administrators were contacted for permission. Before answering the questions, they were given a brief description of the purpose of the study and time estimated to finish all questions. The online survey was conducted from 4th January 2021 to 1st February 2021. In terms of analysis, Least Squares-Structural Equation Modelling (PLS-SEM) has been used in numerous areas, including education (Hair et al. 2017), and was employed in this study for data analysis. Nine hundred fifteen respondents (408 from Malaysia and 507 from Saudi Arabia) had successfully and completely answered the questions. The sample sizes from Saudi Arabia and Malaysia were enough, according to Sekaran and Bougie (2010).

Data Analysis

The respondents' demographic data is displayed in Table 1 and reveals that male respondents represent 69.2%, while female respondents are 30.8%. Respondents were mostly aged 18–24 years (73.4%) which is commonly the age range of university students. Respondents from Malaysia and Saudi Arabia make up 44.6% and 55.4% of the sample, respectively. In terms of the e-Learning mode used, respondents reported using asynchronous mode (university e-Learning) (51.5%), synchronous mode (21.7%), and both modes (26.8%).

Table 1: Demographic 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%)

The Measurement Model

A reliability analysis measures the consistency between indicators (in the same construct using Cronbach's Alpha). Hair et al. (2017) state that ideally a value > 0.7 is required for it to be classified as highly reliable, and values between 0.6 and 0.7 are deemed to be acceptable. As presented in Table 2, the values of Cronbach's alpha and the composite reliability of the ten constructs ranged from 0.86 to 0.91 and 0.90 to 94 respectively, which are above the recommended acceptable values of 0.70 (Nunnally and Bernstein 1994). Furthermore, this study assessed the convergent validity of the constructs using the "Average Variance Extracted (AVE)". Table 2 shows that for all constructs, the AVE values are higher than 0.5, which can be deduced to provide sufficient convergent validity (Yoo and Alavi 2001). This excludes the insecurity construct, which was deleted, as its values (CR, AVE, and factor loadings of three of its items) are below the threshold values. This study also assessed the discriminant validity. The results support the discriminant criteria set for all constructs. The values of the diagonal values in the matrix are higher than the off-diagonal values in the corresponding columns and rows (Table 2).

As shown in Table 3, the loadings of all 38 indicators are noteworthy, as all of them are above 0.70. The indicators' loading on their constructs are higher than their cross-loadings on all the other constructs. Consequently, discriminant validity was validated (loadings and cross-loadings meet the criteria).

Table 2**:** Mean, standard deviation (SD), CR and AVE, and correlations between variables

Latent variable	M	SD	Alpha	CR	AVE	1	2	3	4	5	6	7	8	9	10
1. INFOQ	4.04	.79	0.91	0.93	0.79	**0.89**									
2. SERVQ	3.80	.88	0.87	0.91	0.72	0.73	**0.85**								
3. SYSQ	3.98	.80	0.88	0.91	0.73	0.77	0.68	**0.85**							
4. PEOU	3.97	.82	0.87	0.91	0.73	0.69	0.72	0.69	**0.85**						
5. PU	4.08	.82	0.88	0.91	0.73	0.70	0.70	0.67	0.78	**0.85**					
6. INNOV	3.85	.79	0.86	0.90	0.70	0.55	0.56	0.54	0.63	0.64	**0.84**				
7. OPT	3.88	.88	0.87	0.90	0.71	0.56	0.60	0.54	0.67	0.69	0.68	**0.84**			
8. DIS	2.94	1.1	0.91	0.93	0.78	-0.13	-0.10	-0.11	-0.08	-0.12	0.05	-0.08	**0.88**		
9. USERSATS	3.87	1.0	0.91	0.94	0.85	0.70	0.79	0.65	0.74	0.72	0.55	0.65	-0.14	**0.92**	
10. INTENTION	3.99	.86	0.87	0.92	0.79	0.63	0.67	0.59	0.76	0.74	0.63	0.67	-0.09	0.68	**0.89**

Note: 1. INFOQ: Information Quality; 2. SERVQ: Service Quality; 3. SYSQ: System Quality; 4. PEOU: Perceived Ease of Use; 5. PU: Perceived Usefulness; 6. INNOV: Innovation; 7. OPT: Optimism; 8. DIS: Discomfort; 9. USERSATS:

User Satisfaction; 10. INTENTION: Intention to use.
The principal diagonal of the inter-correlation matrix signifies AVE per construct

Table 3: Loadings and cross-loadings of the model

	DIS	INNOV	INTENTION	OPT	PEOU	PU	INFOQ	SERVQ	SYSQ	USERSATS
DIS1	**0.91**	0.032	-0.099	-0.124	-0.09	-0.144	-0.143	-0.1	-0.107	-0.156
DIS2	**0.896**	0.062	-0.083	-0.052	-0.07	-0.094	-0.119	-0.12	-0.109	-0.147
DIS3	**0.9**	0.026	-0.087	-0.073	-0.09	-0.107	-0.109	-0.08	-0.094	-0.103
DIS4	**0.828**	0.083	-0.055	-0.016	-0.03	-0.065	-0.086	-0.08	-0.069	-0.092
INNOV1	0.136	**0.787**	0.51	0.506	0.514	0.522	0.435	0.459	0.433	0.43
INNOV2	0.035	**0.847**	0.557	0.631	0.539	0.535	0.482	0.481	0.487	0.485
INNOV3	0.033	**0.863**	0.515	0.575	0.543	0.548	0.46	0.477	0.465	0.469
INNOV4	-0.03	**0.859**	0.542	0.595	0.518	0.548	0.49	0.478	0.458	0.487
INTENTION1	-0.106	0.59	**0.904**	0.644	0.731	0.698	0.618	0.663	0.575	0.693
INTENTION2	-0.093	0.575	**0.893**	0.616	0.669	0.661	0.529	0.557	0.504	0.585
INTENTION3	-0.054	0.525	**0.881**	0.54	0.646	0.622	0.544	0.568	0.517	0.549
OPT1	-0.1	0.598	0.623	**0.838**	0.619	0.589	0.488	0.565	0.476	0.623
OPT2	-0.044	0.51	0.476	**0.77**	0.468	0.542	0.412	0.407	0.407	0.409
OPT3	-0.077	0.601	0.573	**0.896**	0.581	0.62	0.513	0.528	0.507	0.574
OPT4	-0.066	0.609	0.597	**0.872**	0.593	0.581	0.48	0.526	0.46	0.585
PEOU1	-0.002	0.507	0.599	0.504	**0.812**	0.625	0.554	0.559	0.577	0.552
PEOU2	-0.055	0.563	0.645	0.565	**0.851**	0.692	0.617	0.626	0.613	0.632
PEOU3	-0.119	0.546	0.707	0.637	**0.888**	0.663	0.59	0.639	0.549	0.681
PEOU4	-0.106	0.542	0.669	0.588	**0.874**	0.696	0.623	0.66	0.633	0.673
PU1	-0.119	0.574	0.656	0.637	0.696	**0.873**	0.63	0.631	0.61	0.644
PU2	-0.105	0.545	0.606	0.572	0.638	**0.853**	0.57	0.553	0.542	0.583
PU3	-0.091	0.544	0.645	0.566	0.664	**0.875**	0.621	0.592	0.593	0.598
PU4	-0.109	0.533	0.633	0.591	0.677	**0.828**	0.59	0.623	0.567	0.66
infoQ1	-0.124	0.49	0.534	0.482	0.617	0.613	**0.894**	0.628	0.704	0.606
infoQ2	-0.13	0.486	0.569	0.497	0.621	0.64	**0.907**	0.673	0.711	0.636
infoQ3	-0.104	0.498	0.559	0.513	0.624	0.639	**0.883**	0.686	0.69	0.641
infoQ4	-0.121	0.508	0.593	0.508	0.616	0.616	**0.88**	0.626	0.665	0.629

servQ1	-0.03	0.432	0.529	0.42	0.575	0.548	0.549	**0.829**	0.534	0.597
servQ2	-0.09	0.486	0.521	0.484	0.625	0.585	0.593	**0.857**	0.593	0.625
servQ3	-0.148	0.499	0.62	0.564	0.66	0.639	0.698	**0.869**	0.649	0.738
servQ4	-0.086	0.494	0.595	0.564	0.605	0.602	0.637	**0.844**	0.549	0.737
sysQ1	-0.047	0.493	0.542	0.471	0.599	0.578	0.623	0.545	**0.849**	0.552
sysQ2	-0.14	0.472	0.495	0.451	0.586	0.572	0.672	0.578	**0.873**	0.536
sysQ3	-0.1	0.485	0.53	0.509	0.626	0.603	0.682	0.611	**0.871**	0.593
sysQ4	-0.093	0.428	0.476	0.446	0.552	0.558	0.685	0.614	**0.83**	0.571
usersatis1	-0.12	0.502	0.628	0.579	0.688	0.68	0.64	0.721	0.612	**0.917**
usersatis2	-0.135	0.523	0.634	0.604	0.688	0.642	0.635	0.749	0.589	**0.929**
usersatis3	-0.148	0.521	0.64	0.628	0.684	0.689	0.68	0.746	0.623	**0.927**

Note: 1. INFOQ: Information Quality; 2. SERVQ: Service Quality; 3. SYSQ: System Quality; 4. PEOU: Perceived Ease of Use; 5. PU: Perceived Usefulness; 6. INNOV: Innovation; 7. OPT: Optimism; 8. DIS: Discomfort; 9. USERSATS: User Satisfaction; 10. INTENTION: Intention to use

The Structural Model

Figure 3 displays the validated structural model, with variances explained (R2 value) and the values of path coefficients presented. The path coefficients (β values) reveal the quality of the relationships between the constructs (Chin 1998) and the t-values, which indicates the significance of the relationship. The R^2 value designates the ratio of variance which was foreseen in the model. All path coefficients (β values) were positive except the paths: discomfort→perceived usefulness, discomfort→perceived ease of use, system quality→intention to use. Table 4 presents the hypotheses results. In contrast to the original hypotheses, insecurity was excluded from the model due to the low values of its indicators and composite reliability.

Table 4: The results of research hypotheses

Hypothesis	Effect	β value	S.E	T-values	Conclusion
H1	SYSQ -> USERSATS	0.016	0.035	0.458	Not Supported
H2	SYSQ -> INTENTION	-0.03	0.037	0.812	Not Supported
H3	SERVQ -> USERSATS	0.443	0.045	10.00***	Supported
H4	SERVQ -> INTENTION	0.093	0.044	2.102*	Supported
H5	INFOQ -> USERSATS	0.106	0.041	2.6**	Supported
H6	INFOQ -> INTENTION	0.043	0.043	1.005	Not Supported
H7	USERSATS -> INTENTION	0.106	0.045	2.316*	Supported
H8	INNOV -> PEOU	0.331	0.043	7.7***	Supported
H9	INNOV -> PU	0.336	0.043	7.86***	Supported

H10	OPT -> PEOU	0.439	0.042	10.453***	Supported
H11	OPT -> PU	0.451	0.042	10.83***	Supported
H14	DIS -> PEOU	-0.065	0.024	2.729**	Supported
H15	DIS -> PU	-0.102	0.023	4.431***	Supported
H16	PEOU -> INTENTION	0.386	0.044	8.731***	Supported
H17	PEOU -> USERSATS	0.202	0.048	4.175***	Supported
H18	PU -> INTENTION	0.288	0.046	6.338***	Supported
H19	PU -> USERSATS	0.171	0.048	3.536***	Supported

Note: INFOQ: Information Quality; SERVQ: Service Quality; SYSQ: System Quality; PEOU: Perceived Ease of Use; PU: Perceived Usefulness; INNOV: Innovation; OPT: Optimism; DIS: Discomfort; USERSATS: User Satisfaction; INTENTION: Intention to use

Coefficient of Determination: R^2 Value

R^2 specifies the variance quantity of the dependent construct which is triggered by the independent constructs. The large R^2 value indicates the high predictive power of the structural model. It is essential to certify that R^2 must be sufficiently high for the model to achieve the lowest and most acceptable level of explanatory power (Urbach and Ahlemann 2010). Table 5 reveals the results of R^2 from the assessment model, signifying that all the values of R^2 are sufficient for the model to reach the level of acceptance of explanatory power. Note that the variances explained in the endogenous constructs, which are user satisfaction, intention to use, perceived ease of use, and perceived usefulness were 0.674 (67%), 0.653 (65%), 0.51 (51%), and 0.54 (%54), respectively.

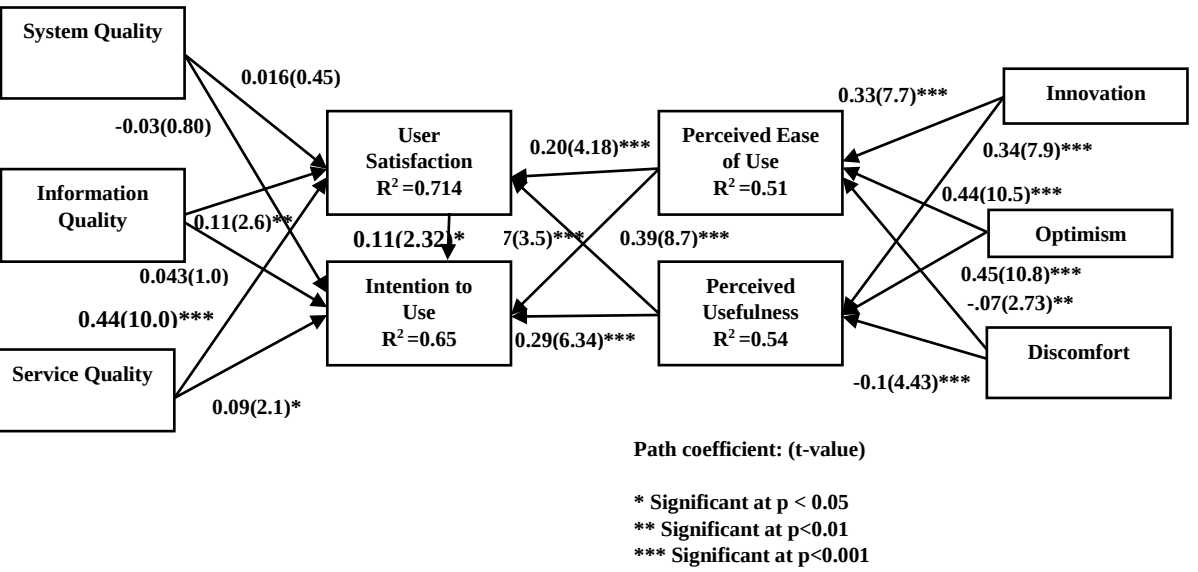

Figure 3: The Structural Model

Table 5: Coefficient of Determination Result R^2

exogenous construct	endogenous construct	R^2	Cohen (1988b)	Chin (1998)	Hair et al., (2013)
SYSQ, INFOQ, SERVQ, PEOU, PU	USERSATS	0.714	Substantial	Substantial	Moderate
SYSQ, INFOQ, SERVQ, USERSATS	INTENTION	0.653	Substantial	Substantial	Moderate
INNOV, OPT, DIS	PEOU	0.51	Substantial	Moderate	Moderate
INNOV, OPT, DIS	PU	0.54	Substantial	Moderate	Moderate

Note: INFOQ: Information Quality; SERVQ: Service Quality; SYSQ: System Quality; PEOU: Perceived Ease of Use; PU: Perceived Usefulness; INNOV: Innovation; OPT: Optimism; DIS: Discomfort; USERSATS: User Satisfaction; INTENTION: Intention to use

Effect Size f^2

This study also calculated the effect size (f^2) to specify whether an exogenous construct has a weak, moderate, or substantial effect on an endogenous construct (Gefen, Rigdon, and Straub 2011). Cohen (1988) suggested a guideline to measure the magnitude values of f^2, which are 0.02 (small effect), 0.15 (medium effect), and 0.35 (large effect). Table 6 shows the results of f^2.

Table 6: Effect Size f^2

Exogenous construct	endogenous construct INTENTION	endogenous construct PEOU	endogenous construct PU	endogenous construct USERSATS
USERSATS	0.009			
DIS		0.008	0.022	
INFOQ	0.002			0.012
INNOV		0.115	0.127	
OPT		0.201	0.226	
PEOU	0.127			0.044
PU	0.076			0.034
SERVQ	0.007			0.447
SYSQ	0.001			0.00

Note: INFOQ: Information Quality; SERVQ: Service Quality; SYSQ: System Quality; PEOU: Perceived Ease of Use; PU: Perceived Usefulness

Predictive Relevance (Blindfolding) Q2

This study assessed the predictive-relevance power of the proposed model. As endorsed by Hair et al. (2017), the blindfolding procedure was employed on the endogenous constructs with a reflective measurement. Table 7 reveals that the Q^2 values (all of them) ranged from 0.37 to 0.604, signifying that the proposed model has an acceptable predictive relevance. For the Q^2 values, Hair et al. (2017) advised 0.02 (to be small), 0.15 (to be medium), and 0.35 (to be large), as relative measures of predictive relevance. The results of this study revealed that all constructs (exogenous) have a large predictive relevance.

Table 7 Predictive Relevance (Blindfolding) Q^2

endogenous construct	Q^2
INTENTION	0.512
PEOU	0.37
PU	0.392
USERSATS	0.604

Note: PEOU: Perceived Ease of Use; PU: Perceived Usefulness; USERSATS: User Satisfaction; INTENTION: Intention to use

Eventually, the standardised root mean square residual of the proposed model (SRMR = 0.042) was lower than 0.08. Thus, we can surmise that the data fit the model well.

Multi-Group Analysis (MGA)

This section examines the differences among students from Saudi Arabia and Malaysia based on the relationships of the proposed model. Several approaches for multi-group analysis have been found (Hair et al. 2017). This study followed the approach of PLS-MGA proposed by Henseler, Ringle, and Sinkovics (2009). According to Hair et al. (2017), PLS-MGA (analysing the differences between two or more groups of relationships) is a nonparametric multi-group analysis approach that builds on bootstrapping results.

This study used PLS-MGA to compare all the direct hypotheses proposed in the research model among the two groups (students from Saudi Arabia and students from Malaysia) and their respective eLearning modes (asynchronous, synchronous, and mixed). The PLS-MGA results between Malaysian and Saudi Arabian students indicate differences in terms of discomfort and user satisfaction.

Saudi students' estimation of the impact of discomfort on perceived usefulness was more significant than Malaysians'. Furthermore, Saudi students' estimation for the impact of user satisfaction on intention to use was more significant than Malaysians'. PLS-MGA revealed that students who mainly used asynchronous and synchronous methods concurrently during lockdown emphasised the service quality impact on their intention to use more than students who exclusively used either an asynchronous or a synchronous mode. The second difference among students based on their e-Learning mode was related to the impact of information quality on user satisfaction. Students who used both an asynchronous and a synchronous mode perceived information quality as influencing their satisfaction more, as compared to students who used either an asynchronous or a synchronous method exclusively. The last difference was found in terms of discomfort. Students who used an asynchronous mode exclusively saw

discomfort as a significant influence on perceived usefulness, in contrast to students who used a synchronous mode exclusively or those who used both modes.

DISCUSSION

This study, in contrast to most studies investigated in the literature review section, focuses on students' satisfaction and intention to use e-Learning specifically from a multi-dimensional perspective. Furthermore, this study has differentiated itself from other studies by employing several dimensions that proved themselves in IS, such as TAM, TRI, and the IS success model, in order to provide a broader look into user satisfaction and intention to use e-Learning. In contrast to many cross-sectional studies reported in the literature review, this study conducted a cross-sectional study in terms of countries.

The study findings have provided empirical evidence regarding the existence of multi-dimensional interpretations of user satisfaction and intention to use e-Learning. This study found empirical evidence that the IS success model, when integrated with TAM and TRI, provides a considerable explanation for the variances in user satisfaction and intention to use (see Tables 5 and 6). This indicates that e-Learning's intention to use and user satisfaction can be interpreted by involving many dimensions.

System quality's relationship with user satisfaction and intention to use was insignificant. Similarly, information quality's relationship with intention to use was insignificant. The association between system quality and information quality from one side and intention to use from another side was insignificant in this study. This finding contrasts with those of many studies within the context of e-Learning. It was difficult to interpret the insignificance of relationships in this study. An interpretation is that students are probably quite familiar with e-Learning from normal days; hence system and information qualities could not become distinctive during its exclusive use. This probably means that students are more concerned about other personal factors or even other contexts. On the other hand, information and service qualities were found to be significant in their relationships with user satisfaction. System quality's insignificant relationship with user satisfaction in this study contradicts other studies concerning the IS success model. This means that studying using only e-Learning puts pressure on students and drives them to be concerned with dimensions other than e-Learning's technical qualities. A compiled interpretation could be that students are satisfied with the qualities of e-Learning, yet, those qualities are not the sole drivers for their intention to use it during the COVID-19 outbreak.

To understand the above-mentioned argument, the model was tested to find differences between students in Saudi Arabia and Malaysia in terms of satisfaction and intention to use e-Learning. The findings showed insignificant and marginal differences between the two groups, indicating that changes in satisfaction and intention to use were not characterised in a specific group but in all of them. Therefore, user satisfaction and intention to use e-Learning have been influenced during the COVID-19 outbreak, and the role of qualities has been reduced for the sake of other factors.

Another change in satisfaction and intention to use was found with TRI. In this study, insecurity had been deleted due to the very low factor loadings of its indicators. This was interpreted to mean that those students were less afraid of using e-Learning during the COVID-19 outbreak. This is probably due to familiarity with e-Learning when it is used together with face-to-face learning. In contrast, the other three factors of TRI of innovativeness, optimism, and discomfort were significant in this study. This showed that students may find employing e-Learning during lockdowns as innovative, and they are likely to be optimistic about its use. Finally, students reported discomfort with e-Learning systems. Students in Saudi Arabia showed that discomfort

influenced the perceived usefulness, which is not the case with students in Malaysia. Discomfort might be gradually reduced as students keep using e-Learning, which was probably the case for students in Malaysia. This means that Saudi students' discomfort was higher than Malaysians when using e-Learning exclusively. Furthermore, Saudi students had a significant estimation of the relationship between user satisfaction and intention to use, which contrasts with Malaysians' estimation of the same relationship. Saudi students' estimation of the relationship between user satisfaction and intention to use is in line with results reported in many studies related to user satisfaction and intention to use. The interpretation should be focused on Malaysian students' estimation of the relationship between user satisfaction and intention to use, which was insignificant. Malaysian students also reported dissatisfaction in a qualitative study (Nassr et al. 2020), which is supported by this study's empirical evidence.

Other differences were found among students who used different e-Learning modes. Students who used both asynchronous and synchronous e-Learning methods considered service quality significant in their intention to use, in contrast to those using one mode only. This could indicate that while students use various e-Learning systems, they may appreciate service quality more in comparison to those using one mode all the time. Service quality was found to be insignificant among those using one mode. The possible interpretation for this could be that they may be familiar with the service quality from blended learning on normal days. Thus, during the COVID-19 outbreak, the priority shifted to personal or environmental matters. Similarly, students with both asynchronous and synchronous modes found information quality influenced their satisfaction, in contrast to students' perception of information quality on their satisfaction. Probably, the lockdowns had changed their measurements of satisfaction and intention to use, yet, students using both modes appreciated the quality of information. This indicates that the perceptions toward the IS success model components: information quality, system quality, and service quality, had been changed within this study. This is probably due to the sudden shift to e-Learning exclusively. This increases the importance of other factors not investigated in this study, such as personal factors (discomfort, innovation, optimism), and social or environmental factors.

The TRI-related findings in this study have confirmed the conclusions of prior studies empirically (most of them qualitatively reported their findings). This indicates that TRI is significant and should be included in models that measure users' satisfaction and intention to use, as it represents users' personal standpoint toward technology, regardless of its features.

This study has confirmed the predictions raised in Aguilera-Hermida (2020); Haslam (2021); Kaffenberger (2021); Singh et al. (2021), where lockdowns caused changes in students' satisfaction and intention to use. However, not all components of the IS success model have positive and significant relationships with satisfaction and intention to use. This study has confirmed the claims raised in Amir et al. (2020); Chakraborty et al. (2020); Chandra (2020); Cho and Hong (2021); Haslam (2021); Hussein et al. (2020); Meulenbroeks (2020); Muthuprasad et al. (2021); Oyedotun (2020); Pollock et al. (2020); Qazi et al. (2020) and Santiago et al. (2021) regarding the possibility of changes in students' satisfaction/intention to use/acceptance toward e-Learning due to the sudden shift to e-Learning. The changes found in this study were in components of the IS success model and TRI.

The findings of this study revealed that students paid more attention to other aspects, such as personal readiness, rather than technical aspects (system quality, service quality, information quality). Therefore, this has confirmed the prediction of Chakraborty et al. (2020) regarding the existence of aspects other than technical ones. Finally, the findings of this study have supported the claims raised in Aguilera-Hermida (2020); Haslam (2021); Hussein et al. (2020); Kaffenberger (2021); Teele et al. (2021) in terms of knowing the effective factors for e-Learning during disruptions such as COVID-19 outbreak may help in managing education

continuity in similar future situations. The findings of this study are worth to be noticed and considered by lecturers and education administrators. Lecturers and education administrators should pay more attention to students' preparedness for sole use of eLearning in terms of awareness and training. eLearning has been established a long time ago and almost all possible technical issues have been resolved. Education administrators need to ensure students are personally ready to accept and use eLearning as they do face-to-face learning, at least temporarily. Moreover, lecturers should be aware that students' personality online is different from their real-life personality as being physically isolated in unsuitable environment (home) could impose stress, discomfort, unreadiness, and unresponsiveness.

CONCLUSION

This study, and the extensive literature covering students' experiences during lockdowns, have discovered traces of changes in students' satisfaction and intention to use. Consequently, this study has proposed an integrated model to understand changes in satisfaction and intention to use, in terms of the influencing factors. The findings have confirmed the existence of changes in factors influencing students' satisfaction and intention to use, particularly factors related to service, information, and system qualities, which had either been reduced or become insignificant. Similarly, this study spotted changes in students' personal readiness. Insecurity had been removed from the model. Furthermore, the element of discomfort was found to be significant, and this was probably due to the exclusive use of e-Learning.

This study extended the cross-sectional method to cover differences among students from different countries with the proposed model, which was missing in many prior studies. The findings showed differences among students from different countries, yet they were marginal. Finally, lecturers and education administrators could learn from the findings of this study that technical preparedness significantly contributes in students' readiness to engage and use eLearning as they have done in face-to-face mode. Therefore, training students and conducting awareness campaigns to be ready to accept and use eLearning exclusively will probably convince students to use it during crises such as COVID-19.

Regardless of the contributions of this study, limitations still exist. First, the results of this study can be generalised with caution, as this study only collected data from Malaysia and Saudi Arabia. To confirm the findings of this study, it is recommended to conduct cross-sectional studies with other countries. Second, the proposed model mainly is concerned with the IS models. Hence, it is possible that other factors related to society and the environment may contribute to explaining user satisfaction and intention to use. Thus, it is recommended to investigate the influences of other dimensions (society, environment, and others) on students' satisfaction and intention to use. Third, no specific characteristics were specified in this study regarding the respondents other than that they were using e-Learning during the lockdowns. Therefore, it is recommended to consider specific groups of students in future research.

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Appendix A: Items of survey

Construct	Code	Question
Service Quality	servQ1	E-learning provides a proper online assistance and explanation
	servQ2	E-learning department staff responds in a cooperative manner
	servQ3	E-learning provides me with the opportunity of reflecting views
	servQ4	E-learning provides me with courses management
Information quality	infoQ1	E-learning provides information that is relevant to my needs
	infoQ2	E-learning provides comprehensive information
	infoQ3	E-learning provides me with organized content and information
	infoQ4	E-learning provides up to date content and information
System Quality	sysQ1	E-learning optimizes response time
	sysQ2	E-learning is reliable
	sysQ3	E-learning is secure

	sysQ4	E-learning is user friendly
User satisfaction	usersatis1	E-learning is enjoyable
	usersatis2	I am pleased enough with e-learning system
	usersatis3	E-learning satisfies my educational needs
Intention to use	INTENTION1	I intend to use e-learning to assist my learning.
	INTENTION2	I intend to use e-learning to get updated my subject knowledge with the latest amendments.
	INTENTION3	I intend to use e-learning as an autonomous (free) learning tool
Perceived Ease of Use (PEU)	PEOU1	I believe e-learning platforms are user friendly.
	PEOU2	It would be easy for me to find necessary information when using an e-learning platform
	PEOU3	I believe that using e-learning service can simplify the-learning process
	PEOU4	The set-up of the e-learning service is compatible with the way I learn
Perceived usefulness	PU1	Studying through e-learning mode provides the flexibility to the study at the time convenient to the learner.
	PU2	E-learning can enable people to study irrespective of where they are located in the world.
	PU3	There are technologies available to enable one to take tests and submit assignments electronically
	PU4	There are electronic tools available to enable interactive communication between instructor and student without meeting face-to-face.
Insecurity	INS1	I am too dependent on technology to do things for them
	INS2	Too much technology distracts me to a point that is harmful
	INS3	Technology lowers the quality of relationships by reducing personal interaction
	INS4	I do not feel confident doing business with a place that can only be reached online

Discomfort	DIS1	When I get technical support from a provider of a high-tech product or service, I sometimes feel as if I am being taken advantage of by someone who knows more than I do
	DIS2	Technical support lines are not helpful because they don't explain things in terms I understand
	DIS3	Sometimes, I think that technology systems are not designed for use by ordinary people
	DIS4	There is no such thing as a manual for a high-tech product or service that's written in plain language
Innovativeness	INNOV1	Other people come to me for advice on new technologies
	INNOV2	In general, I am among the first in my circle of friends to acquire new technology when it appears
	INNOV3	I can usually figure out new high-tech products and services without help from others
	INNOV4	I keep up with the latest technological developments in my areas of interest
Optimism	OPT1	New technologies contribute to a better quality of life
	OPT2	Technology gives me more freedom of mobility
	OPT3	Technology gives people more control over their daily lives
	OPT4	Technology makes me more productive in my personal life