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Explaining the Factors Affecting Students' Attitudes to Using Online Learning (Madrasati Platform) during COVID-19

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Abstract: This study aims to investigate students' perceptions about the Madrasati platform as well as to identify the crucial factors that could influence the adoption of the Madrasati platform. Online quantitative survey method was employed to collect the data. SEM modelling method was adopted to analyze the hypotheses in the research model. The findings of the study indicate system quality, service quality and content quality, technology infrastructure, awareness, university management support, security concerns and training have a primary role in increasing the usage of the Madrasati platform in Saudi Arabia. The findings indicate that all factors have a significant influence on Madrasati platform-adoption among students. This research contributes to the body of knowledge and Madrasati platform-adoption practices. Likewise, it may help facilitate and promote the usage of Madrasati platform among students in Saudi universities.

Keywords: e-learning; Madrasati platform; distance learning usage; COVID-19; KSA

1. Introduction

Recently, the development of mobile and wireless technologies have pushed learners to exploit their mobile devices to support their learning process [1]. There have been several opportunities to utilize new technologies including educational platforms for improving their academic performance during COVID-19 [2–4]. On the other hand, teachers are emphasizing the embedding of these new technologies within the academic curriculum to enhance learning interactions outside the classroom during COVID-19 [5–7]. However, this seems to be one of the main challenges that faced educational institutions during the lockdown at the time of the COVID-19 pandemic.

Educational platforms can be defined as the process by which learning can be strengthened via computers and mobile devices including smart phones, tablet computers and laptops [8,9]. These platforms have several benefits, such as the ability to access learning materials anywhere, flexibility, friendliness, interactivity and others [10–14]. Several studies have found that the usage of educational platforms have positive effect on improving the learning process and enhancing the academic performance among students [15–17].

The lockdown that was implemented as a result of the spread of COVID-19 affected schools, as it did all social activities, and these affects were combined with constraints on

people's mobility. Saudi Arabia has adopted a distance-learning platform by applying virtual classrooms to enable continuous learning progress in public schools and keep teachers and students safe from the spread of the disease. Therefore, the Ministry of Education (MOE) created a virtual platform called Madrasati (this can be translated as My school). Madrasati is a Learning Management System (LMS) that aims to enhance teaching and learning during the lockdown to avoid academic loss. The MOE introduced this platform as an official distance-learning channel for public schools and some private schools. The main objective of this platform, as mentioned in (MOE, 2021), is to deliver high-quality education through LMS platforms and to assist teachers in carrying out their lessons in a convenient and high-quality way. Madrasati started to present synchronous learning through virtual classes on Microsoft Teams, and asynchronous learning such as recorded classes and Ain channels that publish supported materials. It comprises many supporting tools that are utilized to bring the learning and teaching process for all primary education grades from 1st to 12th (MOE, 2021). The Madrasati platform's features can be summarized as follows:

- Provides virtual classrooms that allow students and their teachers to meet simultaneously according to managed schedules prepared by schools' administrations;
- Enables students to download lesson materials such as educational books, Power-Point presentations, videos and educational games that support student learning, as well as allowing them to upload homework and assignments, and perform quizzes and exams;
- Comprises many supported tools such as Microsoft teams, email services and some other communication channels that allow a convenient interaction amongst students, teachers and parents;
- Provides schools' leaders with professional tools to perform their management role and support the education process, as well as providing teachers with easy-to-use tools to prepare their lessons, question banks and exams;
- Comprises tools and supportive materials for students with disabilities (MOE, 2021).

According to (MOE, 2021), Madrasati serves 47 educational departments, 275 supervision offices, 25,000 public schools, 729 private schools, and more than 5 M students inside Saudi Arabia. Additionally, during 2020–2021, more than 90 M and 63 M virtual classes were conducted in the first and second semesters, respectively.

According to several studies [18–20], there are many aspects that could hinder the adoption of educational applications (such as the Madrasati platform) among learners and instructors, such as a lack of technology infrastructure, lack of awareness among users, poor internet connectivity and other issues [21]. For example, Almaiah et al., revealed that the main issues that affected students' usage of e-learning systems during the COVID-19 pandemic were a lack of technology, poor content quality, poor system quality, lack of student awareness towards the use of e-learning system. Therefore, this work aims to explore learners' perceptions on one of the e-learning system (Madrasati Platform) that have been developed by Ministry of Education in Saudi Arabia. In addition, this research attempts to understand the most important factors that encourage learners to adopt this platform. Based on above, this research seeks to answer these main questions:

(1).　What are the most important factors that encourage learners to adopt the Madrasati Platform in the KSA?
(2).　What are the students' perceptions of the Madrasati Platform as the primary distance-learning platform available in the KSA?

In the KSA, the Ministry of Education declared the lockdown of schools and universities and that the learning process would be moved from face-to-face to distance learning by using the Madrasati platform [3]. Today, educational platforms such as the Madrasati platform in the KSA are playing a key role in the continuity of learning process in primary education during the COVID-19 pandemic [22]. Before the spread of COVID-19, the percentage of the usage of e-learning systems among Saudi students was very low [23–25],

which represented a great challenge for the Ministry of Education, schools and universities in the KSA [26]. In fact, determining users' perceptions towards adopting and using the Madrasati platform is one of the important steps in order to build a successful educational platform [27]. By understanding students' perceptions about the Madrasati platform, this research will contribute by determining the most significant factors that could improve the exploitation of educational platforms among students; thus, it will help educational institutions to adopt these platforms in successful way. Very limited studies that have been conducted to address this issue in the KSA.

Therefore, this research seeks to address this issue by determining the key factors that influence students' usage of the Madrasati platform, as well as understanding their perceptions about the quality of the Madrasati platform in the KSA. The results of this research will provide important recommendations for the Ministry of Education, designers and developers about the main aspects that should be taken in the consideration for the successful usage of the Madrasti platform among students in the KSA.

2. Literature Review

2.1. Related Works

In the literature, several previous studies [28–30] have been focused on studying the adoption of educational platforms from different perspectives. The majority of these studies found that several factors, including quality factors (system quality, content quality and service quality), technological factors (internet connectivity, technology infrastructure and technical resources) and human factors (awareness, skills and training), played an important role in motivating students to use educational technologies [28–30]. For example, Almulhem [31] revealed that factors including quality of service, quality of system and top management support had a positive impact on intention to use educational technologies through perceived usefulness and ease. A study by Alamri and Almaiah [32] claimed that the adoption of an e-learning system was significantly influenced by the support of higher management, and this is considered one of the key factors for ensuring the successful adoption of educational platforms. The full support from high-level management will offer the necessary technological resources, financial support and professional technical staff in order to ensure the successful implantation of educational platforms. According to quality factors, previous studies found that quality factors have a direct, significant effect on perceived usefulness and ease of use. For example, Aldossry [33] found that perceived usefulness and perceived ease-of-use of learning management systems is significantly influenced by the system's quality. In addition, drawing from the ISS model, system's quality may affect actual use [34]. Therefore, we assume in this research that system quality may positively affect actual use by mediating perceived usefulness and perceived ease of use.

According to previous studies [33–35], students' acceptance of mobile learning (which has been generally confirmed), is an essential step in order to guarantee the full usage of this system. To achieve this, the main aspects and factors affecting students' adoption of mobile learning application should be understood effectively [36]. In addition, students' needs and requirements should be determined by mobile-service providers and designers correctly from the beginning. To address this issue, several studies have been conducted.

For example, Almaiah [37] proposed a model to examine the students' adoption of mobile-learning applications in Jordan. The authors used the TAM model with adding quality factors, including quality of content design and quality of learning content, functionality, interface design and interactivity. The results indicated that quality factors have strong effect on students' adoption of mobile learning application. Almaiah et al., [38] extended the TAM model to identify the determinants that promoting the use of mobile-learning applications among students. Resistance to changes and attachment have been shown by empirical results to have an important influence on the behavior of mobile-learning applications. Almaiah and Alamri [39] proposed a structure for M-learning acknowledgment dependent on integrating the Technology Acceptance Model (TAM) with the refreshed

DeLone and McLean's model (DL&ML). The examination intended to research the impact of value components and individual variables on student's fulfillment and expectation to use the M-learning network. The outcomes presumed that quality components, identified alongside framework quality, data quality, and administration quality, are fundamental measurements for guaranteeing students' satisfaction and achieving the utilization of the M-learning framework. A study conducted by Almaiah [40] explores the key factors that affect students' acceptance of mobile learning. The study applied the Unified Theory of Acceptance and Use Technology (UTAUT) model and revealed that perceived data quality, similarity, trust, awareness, accessibility of assets, self-adequacy and security are the principal sparks of mobile-learning acceptance among students. In the same way, Almaiah [40] found that technology infrastructure and quality factors were the most significant factors for motivating students to accept and use an e-learning platform.

2.2. Overview of the Madrasati Platform as a Distance-Learning Tool

During COVID-19, many schools around the world started to use distance-learning platforms such as mobile-learning platforms, Blackboard and Madrasati [41]. For example, many public and private schools in Saudi Arabia have employed the Blackboard system and Madrasati platform to be distance learning tools as a result of the decision by the Saudi government to close all universities during the COVID-19 pandemic [42]. Madrasati is an online classroom that can be accessed using laptops and smartphones for instructors and their students to continue the learning process during the COVID-19 pandemic. The Madrasati platform enables instructors to upload all learning materials, activities, assignments and quizzes. On the other side, students can access the online classrooms and interact with instructors through the online class, download the learning materials and submit homework using the Madrasati platform. Madrasati is a distance-learning platform with many features that support the learning and teaching process for all education levels in universities. It also contributes towards achieving the lessons plans and educational goals of the curriculum [43–46]. Madrasati features a package of educational tools to support the teaching and learning process. It is a virtual classroom that enables learners and their teachers to meet simultaneously via virtual meetings or at any convenient time for them through recorded lessons [47–50]. In addition, the platform includes excellent features for ease communication between students and teachers such as email service, teams and a variety of channels for communication amongst students, teachers and parents [51].

3. The Proposed Model and Hypotheses

This study proposed a comprehensive model in order to address the above issues and research gaps. As shown in Figure 1, the proposed model of this study examines how quality, technology, security, awareness, training and management support factors that affect the adoption of the Madrasati platform among students in Saudi Arabia. These factors are considered as predictors of the adoption of several types of educational technologies according to previous studies [52–55].

3.1. System Quality, Service Quality and Content Quality Factors

In this study, quality factors include three main dimensions as determinants of Madrasati platform adoption during COVID-19, namely system quality, service quality and content quality. Decision makers in primary education consider these factors for successful adoption of the Madrasati platform. For students to be assured that the Madrasati platform can be used for learning at the primary education level, schools need to provide high-quality learning content, high-quality learning services and essential learning functions. According to previous studies [56–59], system quality, service quality and content quality are the most significant factors influencing educational technologies' adoption during COVID-19. In the information system quality factors context, the updated DeLone and McLean model, developed by DeLone and McLean, which focused on three main dimensions (namely: system quality, information quality, and service quality) is a useful tool. Each one of these

dimensions is divided into subdimensions such as the following: system quality (usability, functionality, interface design, accessibility, ease of use, interactivity); information quality (content adequacy, content usefulness, content design); and service quality (availability, personalization, reliability, trust, responsiveness). These quality factors became the indices to predict the success of many types of educational technologies. Based on that, this study proposes the following hypotheses:

Hypothesis 1 (H1). *System quality (SMQ) positively affects Madrasati platform adoption.*

Hypothesis 2 (H2). *Service quality (SVQ) positively affects Madrasati platform adoption.*

Hypothesis 3 (H3). *Content quality (COQ) positively affects Madrasati platform adoption.*
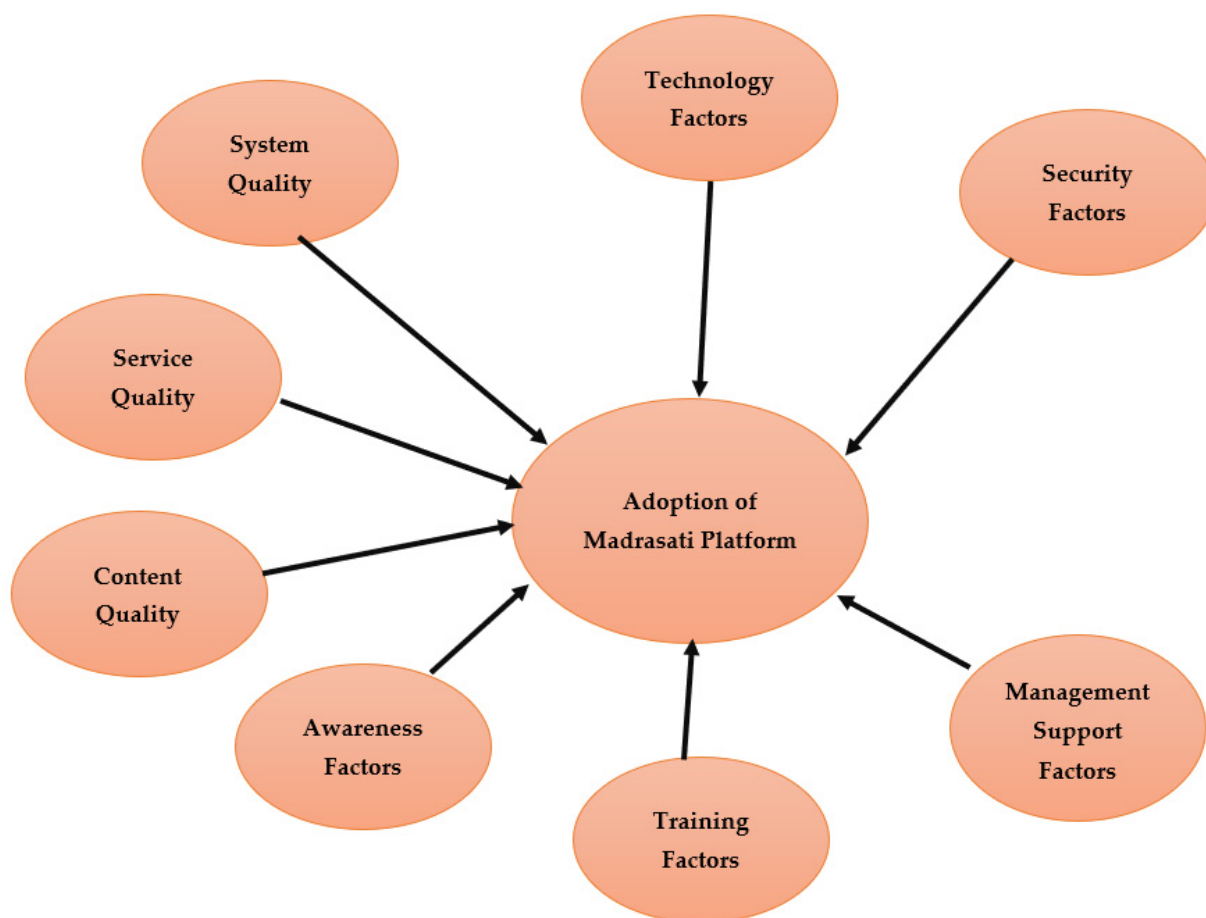

Figure 1. The Proposed Model for examining the Adoption of Madrasati Platform.

3.2. Technology Factor

In the context of this study, technology infrastructure (TI) refers to the combination of hardware, software communication networks and software applications that should be offered by schools that enable students to access the Madrasati platform. Providing adequate technology infrastructure is necessary for introducing new technology such as the Madrasati platform. Otherwise, insufficient resources of information technology and infrastructure will impede the acceptance and usage any new technology [60]. Previous studies [61] indicated that information technology infrastructure is one of the necessary components of Madrasati platform adoption. As a result, IT infrastructure in the schools of Saudi Arabia requires extensive analysis. Based on the above discussion, this study proposes:

Hypothesis 4 (H4). *Technology infrastructure (TI) positively affects Madrasati platform adoption.*

3.3. Security Factor

Several previous studies [62] have determined security concerns as a significant barrier to the adoption of educational technologies and e-learning. Furthermore, they are acknowledged as a significant impediment to students and schools adopting Madrasati. As a result, security concerns must be addressed in order to ensure the success of the adoption of Madrasati among students. Almaiah [63] confirmed that addressing security concerns is a big challenge in order to successfully adopt any new educational technologies during COVID-19. Based on this, this study proposes the following:

Hypothesis 5 (H5). *Security Concerns (SC) negatively affect Madrasati platform adoption.*

3.4. Awareness Factor

Learners' awareness about new technology such as Madrasati is still limited [64]. Therefore, universities should increase the awareness among their students those who lack adequate and essential technical information. According to [65], the awareness factor had a strong impact on e-learning adoption among users. Moreover, several researchers have indicated that one of the main issues that should be addressed in order to increase the involvement and use of educational technologies is inadequate awareness of the technology's existence [66]. This study proposed that awareness is crucial in adopting Madrasati platform. As a result, the following hypothesis was proposed:

Hypothesis 6 (H6). *Awareness (AW) positively affects Madrasati platform adoption.*

3.5. Training Factor

In the context of our study, awareness factor is defined activities conducted by schools to improve and develop their students' skills for the usage of Madrasati, as well as to employ IT experts who can help improve Madrasati implementation. All students are expected to undergo training on e-learning systems in order to be prepared to adapt to changing conditions such as those caused by the COVID-19 pandemic. Therefore, training students in new technologies is one of the significant factors that could lead to success in the adoption of the Madrasati platform during COVID-19. Based on the above, we formulated the following hypothesis in our proposed model:

Hypothesis 7 (H7). *Training (TI) positively affects Madrasati platform adoption.*

3.6. Management Support Factor

According to [11], support from the level of university management is associated with their willingness to provide all necessary resources to ensure the development success of educational technologies such as Madrasati. In other words, the positive attitude of higher management towards the Madrasati platform project is a real indicator of schools in supporting Madrasati platform adoption. Previous studies [11] confirmed that university management support is vital to the development of e-learning system adoption, which reflects positively on students' actual use and acceptance of e-learning. Based on that, this study proposes the following:

Hypothesis 8 (H8). *Management support (MS) positively affects Madrasati platform adoption.*

4. Methodology

In this paper, we need to answer the following two questions:

(1). What are the most important factors that encourage learners to adopt the Madrasati platform in the KSA?

To answer this, we used the SEM method in order to analyze the hypothesized relationships in the proposed model for this study. In the context of educational technologies' adoption, several previous studies used the SEM method for examining students' adoption [61]. These studies indicated that the SEM method is capable of discovering relations among variables effectively. In addition, it is an advantageous data-analysis method and can test the structural model in technology acceptance models [62]. Based on this, we used the SEM method to test the hypotheses in the proposed model for our study.

Regarding the second the question of this research:

(2). What are the students' perceptions of the Madrasati platform as a primary distance-learning platform available in the KSA?

In this research, to test and analyze the descriptive data of the proposed model in order to identify the students' perceptions of the Madrasati platform as a primary distance-learning platform, SPSS software (Version 23.0) was used.

4.1. Data Collection and Participants

This study is based on an empirical examination of Saudi schools that are engaged in Madrasati platform adoption. In this work, an online quantitative survey method was employed to collect the data. Online simple random sampling was used to select study participants and collect data. The study population comprised 3.3 million students at Saudi Arabian schools that are enrolled in the Madrasati platform. Online random sampling was employed to target 3000 students from the 1st level to the 12th in the schools. This technique was used to mitigate against bias. The online survey was conducted between September and November of 2021. An online survey with the link was sent to the participants' twitter accounts.

4.2. Research Measurements

To ensure the items in the online questionnaire were measured in a valid and reliable manner, validated scales from prior studies were used for all constructs in our study. For instance, the items for system quality, service quality, content quality and technology infrastructure constructs are adopted from [3–5], items for university management support and training from [7–9], items for awareness from a study conducted by [10]. Items for security concerns from [12]. Finally, the adoption of the Madrasati platform is measured using items from [13]. All variables were quantified using a scale with poles ranging from strongly disagree (1) to strongly agree (5).

To ensure the questionnaire items were valid and clear, we sent the questionnaire to seven experts who have experience in the e-learning field in order to check the appropriateness and clarity of all questions and of each item for each construct. Based on the expert feedback, we corrected all comments and then we resent the questions to them again. The experts indicated that all items were clear and appropriate for each construct.

5. Data Analysis and Results

5.1. Reliability Analysis

In this study, reliability analysis was conducted using Cronbach's alpha on the data collected as step of measuring the internal consistency of each construct. Table 1 presents the values of Cronbach's alpha for all constructs. The results indicated that all values were higher than 0.70, which is acceptable according to [63]. This means that the reliability values for all constructs were accepted for further analysis.

Table 1. Reliability and convergent validity analysis.

Constructs	Cronbach's Alpha	(AVE > 0.5)
Seytem quality	0.843	0.887
Service quality	0.887	0.891
Content quality	0.914	0.921
Technology infrastructure	0.801	0.812
Security concern	0.774	0.789
University management support	0.831	0.854
Training	0.845	0.821
Awareness	0.834	0.864

5.2. Convergent and Discriminant Validity Analysis

To conduct the validity analysis, convergent and discriminant validity analyses were performed. First, convergent validity analysis was conducted by applying the average variance extracted (AVE). Table 1 shows the findings of the AVE analysis, which indicates that all values were higher than (>0.5); this means that these values were acceptable according to [64]. Based on that, all values of AVE for all constructs were correct for the next step of analysis.

Second, discriminant validity analysis was performed by applying the square root of AVE values for all variables. Based on the results in Table 2, AVE values were greater than threshold of correlation values between two variables, which indicates that these values were acceptable as mentioned by [65].

Table 2. Discriminant validity analysis.

	SMQ	SVQ	COQ	ITF	SC	AW	TI	MS
SMQ	**0.944**							
SVQ	0.797	**0.941**						
COQ	0.630	0.758	**0.965**					
ITF	0.646	0.684	0.545	**0.970**				
SC	0.759	0.769	0.563	0.689	**0.967**			
AW	0.769	0.792	0.643	0.707	0.790	**0.924**		
TI	0.530	0.623	0.506	0.643	0.527	0.614	**0.954**	
MS	0.738	0.657	0.514	0.584	0.621	0.717	0.525	**0.910**

5.3. Structural Model Analysis

This study aimed to answer the first research question as mentioned in the introduction section;

(1).   What factors influence students' use of the Madrasati platform in the KSA?

To achieve this objective, we used the SEM method in order to analyze the hypothesized relationships in the proposed model for this study. The results of the SEM analysis indicated that all hypotheses in the proposed model were supported, as presented in Table 3.

Table 3. Results of structural equation modelling analysis.

Hypotheses	Impact	β	SE	*t*-Value	Results
H1	Positive (+)	0.331	0.054	4.730	Supported
H2	Positive (+)	0.317	0.042	4.137	Supported
H3	Positive (+)	0.347	0.075	1.331	Supported
H4	Positive (+)	0.322	0.044	3.471	Supported
H5	Negative (−)	0.301	0.091	3.114	Supported
H6	Positive (+)	0.312	0.06687	5.108	Supported
H7	Positive (+)	0.306	0.06671	5.104	Supported
H8	Positive (+)	0.302	0.06665	5.101	Supported

The results indicated that system quality (SMQ), has a significantly positive effect on the adoption of the Madrasati platform (H1: β-value = 0.331, $p < 0.001$). Service quality (SVQ) has a significant and positive influence on the adoption of the Madrasati platform (H2: β-value = 0.317, $p < 0.001$). Content quality factor (COQ) has a significantly positive effect on the adoption of Madrasati (H3: β-value = 0.347, $p < 0.001$). With these results supporting hypotheses H1, H2 and H3. The findings revealed that (ITF) technology infrastructure factor influenced the adoption of Madrasati positively (β-value = 0.322, $p < 0.001$), with this result supporting hypothesis H4. Our findings indicated that security concerns had a negative influence on the adoption of Madrasati (β-value = −0.301, $p < 0.001$), with this result supporting hypothesis H5. The results also indicated that awareness had significant influence on the adoption of Madrasati (β-value = −0.312, $p < 0.001$), Thus, the results indicated that the hypotheses H6 was supported. The findings revealed that (TI) training factor influenced the adoption of the Madrasati platform positively (β-value = 0.306, $p < 0.001$), with this result supporting hypothesis H7. Finally, the findings also indicated that the factor of management support (MS) had significant influence on the adoption of the Madrasati platform (β-value = 0.302, $p < 0.001$); this result means that H8 accepted.

5.4. Descriptive Data Analysis

Regarding the second the question of this research:

(2).　What are the students' perceptions of the Madrasati platform as a primary distance-learning platform available in the KSA?

In this research, to test and analyze the descriptive data of the proposed model in order to identify the students' perceptions of Madrasati as a primary distance-learning platform, the SPSS software (Version 23.0) was used. The results of the descriptive analysis are discussed below.

As shown in Figure 2, the descriptive analysis results related to students' perceptions of the quality of content of Madrasati indicated that 92% of students confirmed that they can find the learning content for their courses in an easy and quick manner. In addition, the results indicated that majority of students (95%) found that Madrasati has supported various activities of learning content such as course content, assignments, quizzes and discussion forums. The results also indicated a high percentage of students (93%) who found that learning content produced through Madrasati is updated continuously. Finally, 95% of students were satisfied with the Madrasati platform in terms of learning content quality. These results indicate that content quality is the one of the most crucial factors contributing the students' usage of Madrasati during the COVID-19 pandemic in the KSA.
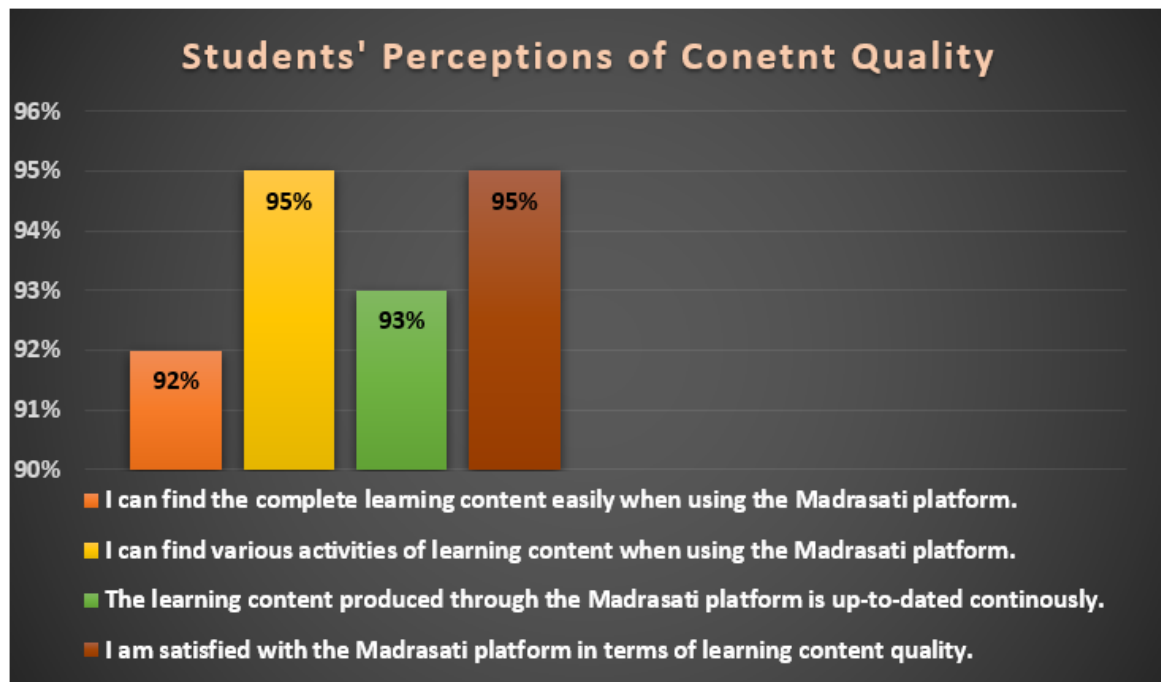
Figure 2. Students' perceptions of CQ of the Madrasati platform.

According to Figure 3, which presents the results of the students' perceptions of the system quality of Madrasati. The results indicated that most students (82%) were satisfied with the Madrasati platform in terms of its functionalities, such as easy and relatively sufficient options that meet the requirements of the students. In addition, the results indicated that the majority of students (87%) found that the Madrasati platform is compatible with different platforms such as Android and IOS. The results also indicated that 92% of students can use the Madrasati platform anywhere and anytime because the online lectures were recorded. Finally, 90% of students confirmed that Madrasati allows to them to interact with teachers with easily and simple manner.
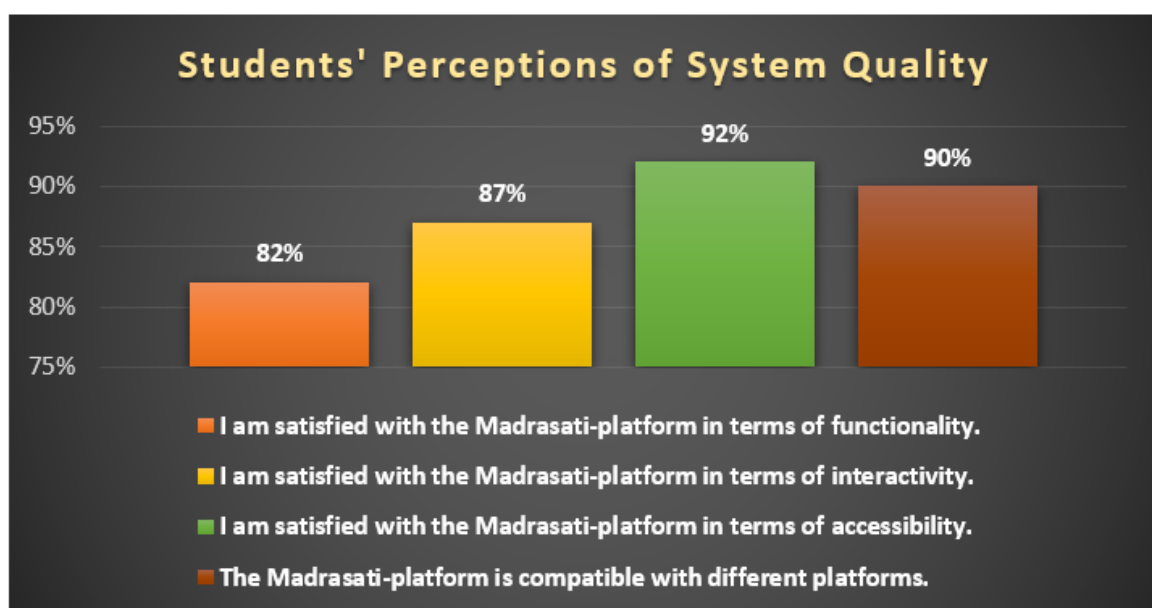

Figure 3. Students' perceptions of SQ of the Madrasati platform.

Figure 4, presents the results of the students' perceptions on the service quality of the Madrasati platform. The results indicated that most of the students (91%) can easily navigate between Madrasati platform tasks. In addition, the results indicated that the majority of students (95%) found that the Madrasati platform gives them alerts/notifications when the teacher adds any new learning content or activities. The results also indicated that 93% of students confirmed that this platform is easily accessible for both students and instructors. A total of 95% of students confirmed that Madrasati contains sufficient features for them to conduct the learning process from their home. Overall, the majority of students were satisfied with the Madrasati platform learning services, with 96% agreeing.
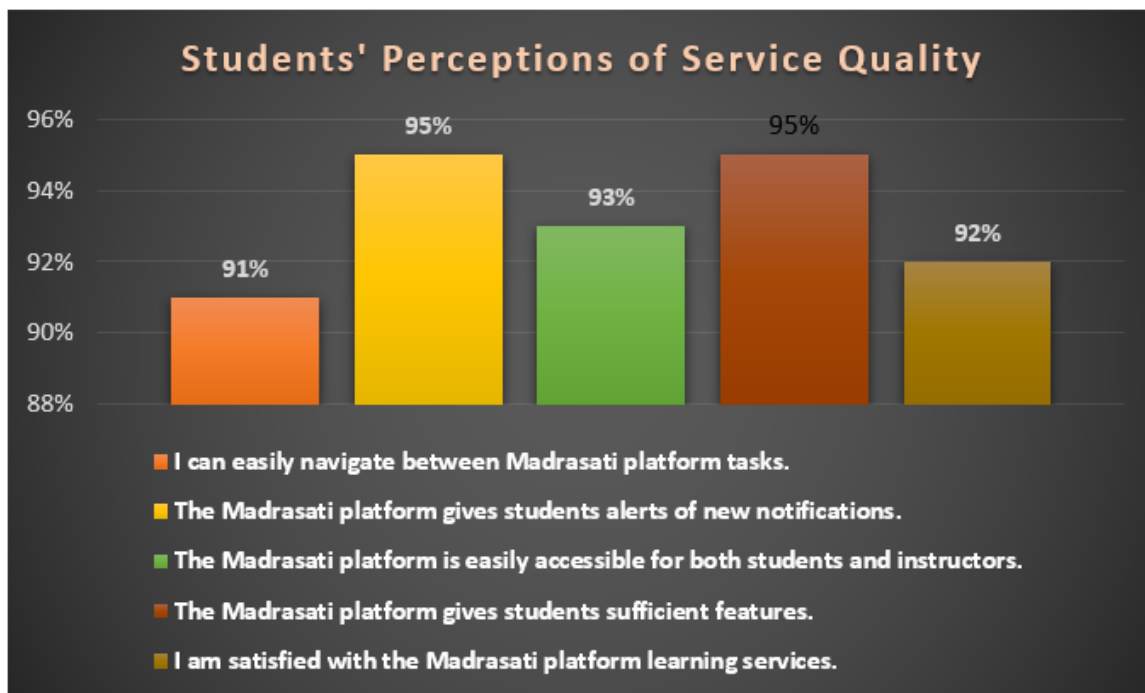

Figure 4. Students' perceptions of SEQ of the Madrasati platform.

6. Discussion

The results indicated that the TAM model is constructed of four external factors, namely IT infrastructure, university management support, university culture, awareness, ease-of-use and perceived usefulness, all of which have a primary role in increasing the acceptance of mobile learning in Saudi universities. The findings indicated that all factors have a significant influence on mobile learning acceptance among students.

Our findings indicated that system quality, service quality and content quality had a positive influence on the adoption of the Madrasati platform in Saudi Arabia. This implies that an incorrect identification of the suitable quality requirements could impede the adoption and implementation of the Madrasati platform. This study found that quality factors had a positive impact on students' willingness to adopt Madrasati. The main reason for this result is the quality of learning content and quality of design content are considered as critical factors that motivate learners to use Madrasati. Based on the findings, quality factors could play a crucial role on how schools adopt the Madrasati platform. Previous studies found system quality, service quality and content quality are predictive of technology adoption, including e-learning systems adoption [64–66].

Based on these results, the technology infrastructure factor influenced the adoption of the Madrasati platform positively. This is because IT infrastructure enables students to access information, increases the utility of learning activities, increases the interactivity with instructors and improves the learning and teaching process efficiency. On the other hand, the IT infrastructure in Saudi Arabia is very strong, with high internet penetration and high

usage among students. Based on these findings, the current study concluded that with providing high specification of IT infrastructure would lead to the greater adoption of the Madrasati platform among students. This finding is consistent with prior studies [11,66].

Our findings indicated that security concerns had a negative influence on the adoption of the Madrasati platform. Previous studies have claimed that the security dimension has negative effect on educational technologies' adoption, owing to the numerous security threats in the e-learning websites. In Saudi Arabia, the number of security attacks have increased in recent years. In this case, the privacy of students' information could be compromised. As a result, security concerns are still a key challenge for adopting educational technologies such as Madrasati.

Furthermore, our findings indicated that there is a significant and positive correlation between awareness and adoption of the Madrasati platform. The study found that majority of Saudian students are unfamiliar with the adoption of the Madrasati platform and how to use it. This study found that when the percentage of awareness among students of how to use Madrasati is very low, their acceptance of the adoption of the Madrasati platform decreases. This result is consistent with prior research [11,66].

In addition, the findings indicated that the factor of university management support had a significant influence on the actual use of mobile learning among students in Saudi universities. In other words, universities should prioritize upper management support when deciding to implement new technologies such as mobile learning systems to ensure the development process of the mobile learning system is successful from the first step to the last. University management support includes top managers' pledges and commitments to embrace mobile learning systems, provide the necessary resources, financial supports and ensure to offer high-quality systems to ensure effective student usage of the mobile learning system. Saudi universities a have high level of management capabilities that could help in implementing mobile learning systems successfully. Our findings are consistent with prior studies [11,66]. The current study concluded that university management support is one of the most significant factors influencing the acceptance of mobile learning among students in Saudi universities.

Research Contributions

This study work provides several theoretical and practical contributions. First, this research contributes to the body of knowledge on educational technologies adoption during COVID-19 by providing a comprehensive model that captures the most significant determinants of Madrasati platform adoption among Saudi public schools. Second, this study clarifies that important factors, namely system quality, service quality and content quality, technology infrastructure, awareness, university management support, security concerns and training played a key role in increasing the usage of the Madrasati platform during the COVID-19-pandemic, ensuring the continuity of the learning process by using this distance-learning tool. Third, the findings of this study can help Saudi schools in better understanding the process of Madrasati platform project implementation. The schools should consider important factors related to schools in order to improve the usage of Madrasati. Finally, the study's findings will benefit decision makers, designers and developers in schools to ensure that students participate actively in using the Madrasati platform during the COVID-19 pandemic.

7. Conclusions, Limitations and Future Work

This study aimed explain the main determinants of Madrasati platform adoption in Saudi Arabia. The SEM method was used to test the hypotheses in the proposed model. PLS-SEM were used to analyze the data. The findings indicated that system quality, service quality and content quality, technology infrastructure, awareness, university management support, security concerns and training had primary roles in increasing the usage of the Madrasati platform in Saudi Arabia. The findings indicated that all factors had a significant influence on Madrasati platform adoption among students. This research contributes to the

body of knowledge and Madrasati adoption practices. Likewise, it may help facilitate and promote the usage of the Madrasati platform among students in Saudi universities.

Despite this work's interesting contributions, several limitations should be covered in the future work. Firstly, further investigation into the drivers of Madrasati platform acceptance among students is needed. Second, future work could explore the teachers' perceptions and their need to adopt the Madrasati platform. Finally, there is a need to investigate other important factors related to usability factors and their effect on students' acceptance of the Madrasati platform.

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References

1. Almaiah, M.A. Acceptance and usage of a mobile information system services in University of Jordan. *Educ. Inf. Technol.* **2018**, *23*, 1873–1895. [CrossRef]
2. Almaiah, M.A.; Alamri, M.M.; Al-Rahmi, W. Applying the UTAUT model to explain the students' acceptance of mobile learning system in higher education. *IEEE Access* **2019**, *7*, 174673–174686. [CrossRef]
3. Almaiah, M.A.; Jalil, M.M.A.; Man, M. Empirical investigation to explore factors that achieve high quality of mobile learning system based on students' perspectives. *Eng. Sci. Technol. Int. J.* **2016**, *19*, 1314–1320. [CrossRef]
4. Aburub, F.; Alnawas, I. A new integrated model to explore factors that influence adoption of mobile learning in higher education: An empirical investigation. *Educ. Inf. Technol.* **2019**, *24*, 2145–2158. [CrossRef]
5. Al-Adwan, A.S.; Albelbisi, N.A.; Hujran, O.; Al-Rahmi, W.M.; Alkhalifah, A. Developing a Holistic Success Model for Sustainable E-Learning: A Structural Equation Modeling Approach. *Sustainability* **2021**, *13*, 9453. [CrossRef]
6. Pimmer, C.; Mateescu, M.; Gröhbiel, U. Mobile and ubiquitous learning in higher education settings. A systematic review of empirical studies. *Comput. Hum. Behav.* **2016**, *63*, 490–501. [CrossRef]
7. Shawai, Y.G.; Almaiah, M.A. Malay language mobile learning system (MLMLS) using NFC technology. *Int. J. Educ. Manag. Eng.* **2018**, *8*, 1. [CrossRef]
8. Almaiah, M.A.; Al-Khasawneh, A.; Althunibat, A.; Almomani, O. Exploring the main determinants of mobile learning application usage during COVID-19 pandemic in Jordanian universities. In *Emerging Technologies during the Era of COVID-19 Pandemic*; Springer: Cham, Switzerland, 2021; pp. 275–290.
9. Almaiah, M.A.; Alyoussef, I.Y. Analysis of the effect of course design, course content support, course assessment and in-structor characteristics on the actual use of E-learning system. *IEEE Access* **2019**, *7*, 171907–171922. [CrossRef]
10. Alamri, M.M.; Almaiah, M.A.; Al-Rahmi, W.M. The role of compatibility and task-technology fit (TTF): On social networking applications (SNAs) usage as sustainability in higher education. *IEEE Access* **2020**, *8*, 161668–1616681. [CrossRef]
11. Almaiah, M.A.; Hajjej, F.; Lutfi, A.; Al-Khasawneh, A.; Alkhdour, T.; Almomani, O.; Shehab, R. A Conceptual Framework for Determining Quality Requirements for Mobile Learning Applications Using Delphi Method. *Electronics* **2022**, *11*, 788. [CrossRef]
12. Al Amri, M.M.; Almaiah, M.A. The Use of Mobile Gamification Technology for Sustainability Learning in Saudi Higher Education. *Int. J.* **2020**, *9*, 8236–8244.
13. Almaiah, M.A.; Alamri, M.M.; Al-Rahmi, W.M. Analysis the effect of different factors on the development of Mobile learning applications at different stages of usage. *IEEE Access* **2019**, *8*, 16139–16154. [CrossRef]

14. Almaiah, M.A.; Almulhem, A. A conceptual framework for determining the success factors of e-learning system implemen-tation using Delphi technique. *J. Theor. Appl. Inf. Technol.* **2018**, *96*, 5962–5976.

15. Almaiah, M.A.; Nasereddin, Y. Factors influencing the adoption of e-government services among Jordanian citizens. *Electron. Gov. Int. J.* **2020**, *16*, 236–259.

16. Alghazi, S.S.; Kamsin, A.; Almaiah, M.A.; Wong, S.Y.; Shuib, L. For Sustainable Application of Mobile Learning: An Extend-ed UTAUT Model to Examine the Effect of Technical Factors on the Usage of Mobile Devices as a Learning Tool. *Sustainability* **2021**, *13*, 1856. [CrossRef]

17. Almaiah, M.; Al-Khasawneh, A.; Althunibat, A.; Khawatreh, S. Mobile government adoption model based on combining GAM and UTAUT to explain factors according to adoption of mobile government services. *Int. Assoc. Online Eng.* **2020**, *14*, 199–225. [CrossRef]

18. Almaiah, M.A.; Al-Zahrani, A.; Almomani, O.; Alhwaitat, A.K. Classification of Cyber Security Threats on Mobile Devices and Applications. In *Artificial Intelligence and Blockchain for Future Cybersecurity Applications*; Springer: Cham, Germany, 2021; pp. 107–123.

19. Alrawad, M.; Lutfi, A.; Alyatama, S.; Elshaer, I.A.; Almaiah, M.A. Perception of Occupational and Environmental Risks and Hazards among Mineworkers: A Psychometric Paradigm Approach. *Int. J. Environ. Res. Public Health* **2022**, *19*, 3371. [CrossRef]

20. Bubukayr, M.A.; Almaiah, M.A. Cybersecurity concerns in smart-phones and applications: A survey. In Proceedings of the 2021 International Conference on Information Technology (ICIT), Amman, Jordan, 14–15 July 2021; pp. 725–731.

21. Alksasbeh, M.; Abuhelaleh, M.; Almaiah, M. Towards a model of quality features for mobile social networks apps in learning environments: An extended information system success model. *Int. Assoc. Online Eng.* **2019**, *13*, 75–93. [CrossRef]

22. Almaiah, M.A.; Al-Khasawneh, A.; Althunibat, A. Exploring the critical challenges and factors influencing the E-learning system usage during COVID-19 pandemic. *Educ. Inf. Technol.* **2020**, *25*, 5261–5280. [CrossRef]

23. Al-Emran, M.; Mezhuyev, V.; Kamaludin, A. Technology Acceptance Model in M-learning context: A systematic review. *Comput. Educ.* **2018**, *125*, 389–412. [CrossRef]

24. Almaiah, M.A.; Jalil, M.A.; Man, M. Extending the TAM to examine the effects of quality features on mobile learning ac-ceptance. *J. Comput. Educ.* **2016**, *3*, 453–485. [CrossRef]

25. Salloum, S.A.; Alhamad, A.Q.; Al-Emran, M.; Monem, A.A.; Shaalan, K. Exploring students' acceptance of e-learning through the development of a comprehensive technology acceptance model. *IEEE Access* **2019**, *7*, 128445–128462. [CrossRef]

26. Mulhem, A.A.; Almaiah, M.A. A Conceptual Model to Investigate the Role of Mobile Game Applications in Education during the COVID-19 Pandemic. *Electronics* **2021**, *10*, 2106. [CrossRef]

27. Al Amri, M.; Almaiah, M.A. Sustainability Model for Predicting Smart Education Technology Adoption Based on Student Perspectives. *Int. J. Adv. Soft Comput. Its Appl.* **2021**, *13*, 60–77.

28. Althunibat, A.; Altarawneh, F.; Dawood, R.; Almaiah, M.A. Propose a New Quality Model for M-Learning Application in Light of COVID-19. *Mob. Inf. Syst.* **2022**, *2022*, 3174692. [CrossRef]

29. Davis, F.D. Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Q.* **1989**, *13*, 319–340. [CrossRef]

30. Almaiah, M.A.; Alismaiel, O.A. Examination of factors influencing the use of mobile learning system: An empirical study. *Educ. Inf. Technol.* **2019**, *24*, 885–909. [CrossRef]

31. Al Mulhem, A. Exploring the Key Factors in the Use of an E-Learning System among Students at King Faisal University, Saudi Arabia. *Int. Assoc. Online Eng.* **2020**, *14*, 19–37. [CrossRef]

32. Alamri, M.M.; Almaiah, M.A.; Al-Rahmi, W.M. Social media applications affecting Students' academic performance: A model developed for sustainability in higher education. *Sustainability* **2020**, *12*, 6471. [CrossRef]

33. Aldossry, B. Evaluating the madrasati platform for the virtual classroom in Saudi arabian education during the time of COVID-19 Pandemic. *Eur. J. Open Educ. E-Learn. Stud.* **2021**, *6*, 23–25. [CrossRef]

34. Madrasati. Ministry of Education, Kingdom of Saudi Arabia. 2021. Available online: https://backtoschool.sa/ (accessed on 19 June 2021).

35. Khalife, W. The effectiveness of using active learning based on distance learning on improving academic achievement and developing the trend towards distance learning for the learning technologies course for mathematics education students. *Sci. J. Phys. Educ. Sports Sci.* **2019**, *87*, 321–334.

36. Khanfar, A.R. Distance-learning entrepreneurship education in the time of corona virus—COVID-19 challenges & solution. *J. Entrep. Educ.* **2020**, *23*, 1–17.

37. MOE. Ministry of Education, Kingdom of Saudi Arabia. 2020. Available online: https://www.moe.gov.sa/ar/mediacenter/MOEnews/Pages/MR2-2020-453.aspx (accessed on 21 June 2021).

38. Almaiah, M.A.; Jalil, M.A.; Man, M. Preliminary study for exploring the major problems and activities of mobile learning syst m: A case study of Jordan. *J. Theor. Appl. Inf. Technol.* **2016**, *93*, 580–594.

39. Almaiah, M.A.; Alamri, M.M. Proposing a new technical quality requirements for mobile learning applications. *J. Theor. Appl. Inf. Technol.* **2018**, *96*, 6955–6968.

40. Almaiah, M.A. Thematic analysis for classifying the main challenges and factors influencing the successful implementation of e-learning system using Nvivo. *Int. J. Adv. Trends Comput. Sci. Eng.* **2020**, *9*, 142–152. [CrossRef]

41. Lutfi, A.; Alsyouf, A.; Almaiah, M.A.; Alrawad, M.; Abdo, A.A.; Al-Khasawneh, A.L.; Ibrahim, N.; Saad, M. Factors Influencing the Adoption of Big Data Analytics in the Digital Transformation Era: Case Study of Jordanian SMEs. *Sustainability* **2022**, *3*, 1802. [CrossRef]

42. Kemp, A.; Palmer, E.; Strelan, P. A taxonomy of factors affecting attitudes towards educational technologies for use with technology acceptance models. *Br. J. Educ. Technol.* **2019**, *50*, 2394–2413. [CrossRef]

43. Venkatesh, V.; Thong, J.Y.; Xu, X. Consumer acceptance and use of information technology: Extending the unified theory of acceptance and use of technology. *MIS Q.* **2012**, *36*, 157–178. [CrossRef]

44. Ahmad, N.; Feroz, I.; Anjum, A. Usability Analysis of Educational Information Systems from Student's Perspective. In Proceedings of the 2020 International Conference on Big Data in Management, Manchester, UK, 15 May 2020; pp. 130–135.

45. Alqahtani, A.Y.; Rajkhan, A.A. E-learning critical success factors during the COVID-19 pandemic: A comprehensive analysis of e-learning managerial perspectives. *Educ. Sci.* **2020**, *10*, 216. [CrossRef]

46. Sargent, K.; Hyland, P.; Sawang, S. Factors influencing the adoption of information technology in a construction business. *Australas. J. Constr. Econ. Build.* **2012**, *12*, 72–86. [CrossRef]

47. Ergüzen, A.; Erdal, E.; Ünver, M.; Özcan, A. Improving Technological Infrastructure of Distance Education through Trustworthy Platform-Independent Virtual Software Application Pools. *Appl. Sci.* **2021**, *11*, 1214. [CrossRef]

48. Al-Shihi, H.; Sharma, S.K.; Sarrab, M. Neural network approach to predict mobile learning acceptance. *Educ. Inf. Technol.* **2018**, *23*, 1805–1824. [CrossRef]

49. Alshurideh, M.; Al Kurdi, B.; Salloum, S.A.; Arpaci, I.; Al-Emran, M. Predicting the actual use of m-learning systems: A comparative approach using PLS-SEM and machine learning algorithms. *Interact. Learn. Environ.* **2020**, *21*, 1–5. [CrossRef]

50. Chong, A.Y. A two-staged SEM-neural network approach for understanding and predicting the determinants of m-commerce adoption. *Expert Syst. Appl.* **2013**, *40*, 1240–1247. [CrossRef]

51. Iacobucci, D. Everything you always wanted to know about SEM (structural equations modeling) but were afraid to ask. *J. Consum. Psychol.* **2009**, *19*, 673–680. [CrossRef]

52. Hew, T.S.; Leong, L.Y.; Ooi, K.B.; Chong, A.Y. Predicting drivers of mobile entertainment adoption: A two-stage SEM-artificialneural-network analysis. *J. Comput. Inf. Syst.* **2016**, *56*, 352–370. [CrossRef]

53. Asadi, S.; Abdullah, R.; Safaei, M.; Nazir, S. An integrated SEM-Neural Network approach for predicting determinants of adoption of wearable healthcare devices. *Mob. Inf. Syst.* **2019**, *2019*, 8026042. [CrossRef]

54. Sharma, S.K. Integrating cognitive antecedents into TAM to explain mobile banking behavioral intention: A SEM-neural network modeling. *Inf. Syst. Front.* **2019**, *21*, 815–827. [CrossRef]

55. Chiang, W.Y.; Zhang, D.; Zhou, L. Predicting and explaining patronage behavior toward web and traditional stores using neural networks: A comparative analysis with logistic regression. *Decis. Support Syst.* **2006**, *41*, 514–531. [CrossRef]

56. Joseph, H.; Rolph, F.; Anderson, E.; Babin, B.J.; Black, W.C. *Multivariate Data Analysis: A Global Perspective*; Pearson: London, UK, 2010; Volume 7.

57. Chan, F.T.; Chong, A.Y. A SEM–neural network approach for understanding determinants of inter organizational system standard adoption and performances. *Decis. Support Syst.* **2012**, *54*, 621–630. [CrossRef]

58. Leong, L.Y.; Hew, T.S.; Tan, G.W.; Ooi, K.B. Predicting the determinants of the NFC-enabled mobile credit card acceptance: A neural networks approach. *Expert Syst. Appl.* **2013**, *40*, 5604–5620. [CrossRef]

59. Zabukovšek, S.S.; Kalinic, Z.; Bobek, S.; Tominc, P. SEM–ANN based research of factors' impact on extended use of ERP systems. *Cent. Eur. J. Oper. Res.* **2019**, *27*, 703–735. [CrossRef]

60. Graham, C.R.; Woodfield, W.; Harrison, J.B. A framework for institutional adoption and implementation of blended learning in higher education. *Internet High. Educ.* **2013**, *18*, 4–14. [CrossRef]

61. Alkarney, W.; Albraithen, M. Are critical success factors always valid for any case? A contextual perspective. *IEEE Access* **2018**, *6*, 63496–63512. [CrossRef]

62. Althunibat, A.; Almaiah, M.A.; Altarawneh, F. Examining the Factors Influencing the Mobile Learning Applications Usage in Higher Education during the COVID-19 Pandemic. *Electronics* **2021**, *10*, 2676. [CrossRef]

63. Almaiah, M.A.; Al-Khasawneh, A. Investigating the main determinants of mobile cloud computing adoption in university campus. *Educ. Inf. Technol.* **2020**, *25*, 3087–3107. [CrossRef]

64. Althunibat, A.; Binsawad, M.; Almaiah, M.A.; Almomani, O.; Alsaaidah, A.; Al-Rahmi, W.; Seliaman, M.E. Sustainable applications of smart-government services: A model to understand smart-government adoption. *Sustainability* **2021**, *13*, 3028. [CrossRef]

65. Almaiah, M.A.; Almomani, O.; Al-Khasawneh, A.; Althunibat, A. Predicting the Acceptance of Mobile Learning Applications during COVID-19 Using Machine Learning Prediction Algorithms. In *Emerging Technologies during the Era of COVID-19 Pandemic*; Springer: Cham, Switzerland, 2021; pp. 319–332.

66. Almaiah, M.A.; Al-lozi, E.M.; Al-Khasawneh, A.; Shishakly, R.; Nachouki, M. Factors Affecting Students' Acceptance of Mobile Learning Application in Higher Education during COVID-19 Using ANN-SEM Modelling Technique. *Electronics* **2021**, *10*, 3121. [CrossRef]