

# Applying Structural Equation Modelling for Examining the Impact of Quality Dimensions in Improving the Adoption of Digital-Learning Platforms

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## Abstract

Although a number of studies have proved the significance of quality characteristics in improving Digital-learning platforms success, there is few research about the impact of quality dimensions in increasing system adoption and usage. As a result, our research investigated the impact of quality indicators such as Quality of Service, quality of learning content and information, and quality of system on Digital-learning platforms usability. Quality of Service, quality of learning content and information, and quality of system characteristics were determined to be the essential components impacting Digital-learning platforms adoption among learners. The study revealed that system quality was the most critical factor influencing the perceived ease of use and usefulness of Digital-learning platforms. Information quality also had a significant impact on both perceived ease of use and usefulness. Additionally, service quality affected these usability factors as well. The findings indicate that system quality significantly influenced usability factors, specifically perceived ease of use and perceived usefulness (H1:  $\beta = 0.321$ ; H2:  $\beta = 0.366$ ). Additionally, service quality is found to have a significant effect on both usability factors, ease of use and usefulness (H5:  $\beta = 0.371$ ; H6:  $\beta = 0.366$ ). Furthermore, the results are essential in determining the importance of those quality components that can be utilized by developers in institutions of higher education to enhance their Digital-learning platforms experiences.

**Keywords:** Structural Equation Modelling, Digital-Learning Platforms, Quality Dimensions, E-learning

## 1. Introduction

The increased popularity of digital learning technologies has encouraged more people to utilize Digital-learning platforms [1], [2], [3], [4]. Digital-learning platforms is defined as easy access to diverse educational opportunities that may be obtained via the use of cell phones, tablets, or tablet computers. Digital learning platforms are online tools, systems, or software that facilitate learning, teaching, and collaboration. They are designed to deliver educational content, track progress, and support the learning process for students, educators, and organizations. There are several common types of digital learning platforms such as Moodle, Canvas and Blackboard. Because of this, these technologies allow students to learn at any time by interacting and engaging with material on digital learning platforms [5], [6], [7], [8]. Due to the features of these technologies that use smart technology, such as accessibility, flexibility, mobility, and cost, many researchers have conducted additional studies on Digital-learning platforms implementation since Covid-19 [9], [10], [11], [12].

Recently, there is growing trend of use of digital learning universities over the world [13]. Most universities now has converted their learning systems towards online learning tools like m-learning due to the rapid development in the field of mobile technologies [14]. Digital learning can be defined as a platform on which learners can obtain the knowledge with the help of mobile devices. During Covid-19 period, digital learning was noticed as a powerful learning tool, to

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assist learners' continuous learning process in Jordan [15]. In addition, digital learning has become an important platform to develop and support distance learning for both teachers and students [16]. Several previous studies indicated that digital learning platform improved ability learning for students despite several advantages of mobile learning, after pandemic of Covid-19, several studies have recommended to shift from traditional learning method to digital learning to enhance the learning process to students [17]. According to [18], the use of mobile information system was very important for students to perform their learning activities through mobile applications. The rapid development of mobile technologies has affect in a positive way in several fields, including higher education [19]. Many learners are encouraged to use digital learning applications towards performing learning activities [19]. This leads for universities to meet the rapidly increasing demand through the development of appropriate digital learning platforms for both teachers and students [19].

In addition, universities' teachers also were increasingly used digital learning in teaching process in post Covid-19. This proves that digital learning platform has increased the usefulness and its importance in the learning process before and after Covid-19 pandemic, which forced many universities in Jordan to transform and use digital learning systems in the classrooms [20]. This indicates that several Jordanian universities used different online learning tools such as e-learning and digital learning as learning platforms [20]. Based on that, the adoption of digital learning is a challenge for Jordanian universities and teachers in Jordan [21].

The role of mobile technologies in learning and education is more critical today than ever before [22]. Mobile technologies and applications developments can potentially transform education towards virtual learning. These enhancements make learning processes more efficient and offer student-centered, personalized learning opportunities [23]. Furthermore, digital learning applications are essential to increase learning outcomes by providing students with content according to their learning needs. These applications allow learners to receive feedback anytime and continuously improve their learning processes. Digital learning applications also offer significant opportunities for sustainable education practices. Regarding the investigation of digital learning applications acceptance and usage, there have been several studies that have conducted in the literature [24], which aiming for understanding the key factors related to the usage digital learning applications, although the fact that the usage of digital learning applications before Covid-19 is very different than after the Covid-19 pandemic. Hence, most of studies now focus exclusively on this topic as well as the studies on digital learning applications usage after Covid-19 pandemic are still very limited [25].

To evaluate the Digital-learning platforms' usage in educational settings, several studies have been conducted. According to [25], Digital-learning platforms are unquestionably becoming global. The opportunity suggests that teachers and students will benefit from the use of a Digital-learning platforms. Digital-learning platforms is the process of learning that takes place on a mobile device, such as through applications [25]. Digital-learning platforms provide several advantages. The most important benefit of Digital-learning platforms is that it may take place anyplace/anytime and does not have to be limited to a particular location. It may assist students in enhancing their communication and technical skills and competence sets [26], [27], [28]. It can foster a feeling of cooperation and future learning outcomes [29], [30], [31], [32]. Finally, these applications enable pupils to self-regulate their learning while also allowing teachers to individualize instruction [32]. According to previous research, Digital-learning platforms has taken hold. Furthermore, Covid-19 has compelled numerous institutions to employ cutting-edge technology in order to improve teaching and learning, such as Digital-learning platforms and m-learning apps. Numerous institutions are now utilizing Digital-learning platforms apps to offer a variety of courses during Covid-19.

Recently, with the advent of Covid-19, one of the most essential things in education is how to adapt technology to help students and instructors learn more [33]. As a result, numerous institutions have utilized many online learning technologies like e-learning systems, blackboards, and Digital-learning platforms apps [34], [35], [36]. However, while mobile apps are increasingly used in schools, their usage among students is still in its early phases and there is few research regarding the uptake of digital learning technologies in educational settings [37]. Despite the fact that there have been a lot of research assessing the primary role of quality features in learning platforms such as smart learning systems and m-learning apps [38], [39] few studies have been done on how to use quality measurements to improve Digital-learning platforms usability. In conclusion, determining the crucial and finest quality measures for designers and developers is regarded as an essential phase in institution-for the usage of Digital-learning platforms successfully.

This will have a beneficial influence on learning via mobile applications' effectiveness. As a result, this research seeks to achieve the main objective:

*What are the primary quality dimensions that could lead to success the usage of Digital-learning platforms effectively?*

## 2. Related Works

Several researchers have begun to look at what the key elements are that improve and encourage Digital-learning platforms quality [15]. Several research in the information system area show that identifying quality characteristics is an primary stage in leading to the successful introduction of any new technology [16]. Another research verified the usefulness of quality variables in increasing users' usage of a variety of information systems [17]. This demonstrates that Digital-learning platforms require well-defined essential quality metrics [18]. The goals of Digital-learning platforms must also be clear from the start, as well as adequate quality standards. Although there have been numerous research papers providing some evidence of the significance of quality elements in improving Digital-learning platforms' success [19], there are few studies on how quality dimensions impact the usage of Digital-learning platforms [20]. Several researchers have shown the impact of quality dimensions on Digital-learning platforms usability. Also, many studies have suggested that quality indicators may assist in determining the major quality elements so that Digital-learning platforms apps are used effectively [21]. In light of this, several case studies have demonstrated that quality evaluations can help improve the quality of a variety of learning platforms, such as LMS, smart learning systems, and m-learning apps [22]. This issue has begun to be researched. A study [32] assessed the impact of various quality measures on student engagement in Digital-learning platforms using a quality model for Digital-learning platforms systems. According to the research, excellent standards like functionality, quality of service, quality of interface design and quality of learning content significantly increased student use of Digital-learning platforms. Similarly, a research [35] found that higher standards for app developers were linked to increased consumption. According to the findings, system quality, service quality, and information quality were all critical in improving Digital-learning platforms program success. According to [32], several key quality dimensions for Digital-learning platforms usability were identified by researchers like service quality, content, and usefulness. This research looks at which aspects of Digital-learning platforms quality may be improved from four vantage points: quality of information, system functionality, quality of service and quality of systems features. In contrast, [33] suggested that a student's desire to apply Digital-learning platforms is influenced by their perceived usefulness enjoyment of perceiving and ease of use.

Consequently, the adoption of digital learning platforms at the higher education level offers the potential to transform learning and education by enhancing teachers' digital pedagogical skills and providing students with more equitable and sustainable learning opportunities. This study aims to investigate the primary elements that influence students on using digital learning platforms in higher education.

### 2.1. Quality Dimensions

Quality dimensions may play a crucial role in mitigating potential barriers to digital learning applications. In environments where there is scepticism or resistance towards digital learning tools, technological efforts alone may not suffice to overcome these barriers. However, when quality of digital learning system is high, students are more receptive to educational initiatives, training programmes, and change management strategies aimed at fostering digital learning adoption. This proactive approach can help alleviate concerns, build confidence, and empower stakeholders to leverage digital learning technologies effectively in service delivery. This part covers the pertinent research on how quality criteria influence information system usability. Quality variables including quality of system, quality of information, and quality of service can impact significantly on students' intention to utilize according to [5]. Furthermore, quality measures have a significant and beneficial influence on behavioral intention to utilize. Several studies have also shown that quality of system, quality of information, and quality of service had significant measures in adopting digital technologies for learning [10]. The studies' findings suggested that these quality characteristics have a significant and beneficial influence on behavioral intention. [19] carried out a study to evaluate the impact of quality variables on learning management system acceptance in Malaysia. The study findings suggested that a learning management system's overall quality, information quality, and service quality had an immediate impact on the desire to use it. System quality, according to [20], was "significantly" associated with behavioral intent in a study of 300

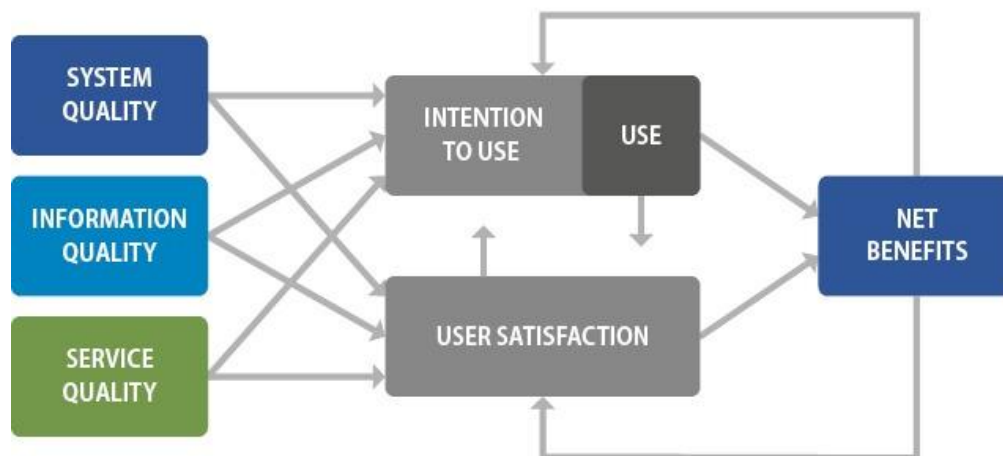
Americans. According to [21], in their research on determining the factors influencing consumers' intentions to utilize mobile banking, informational quality and service quality had a significant and positive effect on behavioral intention, whereas system quality had no impact. According to the results of a research published by [22], quality of system, quality of information, and quality of service had a strong impact on actual use of e-learning in Iran.

This study will evaluate the impact of quality criteria on two usability factors: (i) perceived usefulness and (ii) perceived ease of use as measured by a user survey. Several empirical studies have confirmed the link between quality variables and perceived usefulness, as well as perceived ease of use [15]. Previous research has shown that quality metrics were key drivers of system usability, significantly and positively influencing these perceptions. [36] Studied how quality metrics effect on usability dimensions to encourage students' use of educational and learning system. Their findings demonstrated that higher quality standards improved both usability factors in the e-learning environment. Similarly, [37] identified the influence of three types of quality assessments on usability dimensions in the usage of websites. [38] Pinpointed three critical quality variables for the efficiency of digital learning platforms: service quality, content, and functionality. Their research also examined student motivation and provided recommendations to enhance digital learning platform quality based on quality metrics. [39] Explored the impact of quality factors on Taiwan's intention to use e-learning systems, finding that information quality, particularly content quality, significantly influenced on usability dimensions. Design quality, however, only affected perceived ease of use, with no impact on usefulness. Additionally, service quality was found to significantly affect both perceived ease of use and usefulness. Regarding system quality, elements like functionality, interactivity, response time, and interface design had a notable effect on usability dimensions, with the exception of response time, which had an insignificant impact on ease of use. However, in the Digital-learning platforms environment, little research has been conducted on quality variables' influence on usability dimensions, even though quality elements are primary drivers throughout the adoption process.

## 2.2. Theoretical Model

Usability is one of the main obstacles to success of adopting Digital-learning platforms [3]. Many researchers have proposed models and frameworks for capturing the reasons why people use, accept, and adopt Digital-learning platforms. They applied several technology adoptions theories to determine the significant determinants of Digital-learning platforms usage. One of these models known as DeLone and McLean model, which is developed by DeLone and McLean [17]. This model is one of the most powerful models utilized in prior research. Many previous works have indicated that is model is considered one of the effective models for evaluating the impact of quality indicators on educational technology usage [12], [13], [14], [15]. Another studies confirmed that this model is the best fit for assessing the impact of quality assessments on Digital-learning platforms success as opposed to other models such as TAM and UTAUT. For example, TAM model examines the technology usage intention through two key factors: perceived usefulness and perceived ease of use, both of which impact an individual's intention to use the technology. UTAUT provides a model for predicting users' acceptance and intention to use new technology. TRA model confirms that individual behavior is driven by behavioral intention, which is influenced by attitudes and subjective norms.

Thus, in our study aims to use the DeLone and McLean model in order to establish a new framework that include the primary quality dimensions for improving Digital-learning platforms' usability. This model incorporates three important quality indicators: quality of information, quality of service, and quality of system. Based on previous research, these quality metrics could have a significant impact in encouraging users to utilize Digital-learning platforms systems. Quality standards have been shown in several studies to play a significant role in encouraging the adoption of multiple types of learning platforms [16], [17], [18], [19]. Another critical point should be mentioned, Digital-learning platforms systems with high quality features produce increased usage, higher user satisfaction, and greater user acceptance [10], [11], [12]. More specifically, the effectiveness of a new information system is closely related to users' engagement with it. As a result, the three quality criteria have an important role in information system use as noted by numerous authorities [22], [23], [24]. Based on the preceding analysis, a study by DeLone and McLean discovered that these three DeLone and McLean model quality parameters will serve as a starting point for our proposed research methodology. This study will describe in the sections below the quality buildings of the DeLone and McLean model based on their standards as shown in figure 1.



**Figure 1.** The DeLone and Mclean Model

Quality of system characteristics is considered the primary dimension of the DeLone and McLean's model. It is referred as "excellent-features and characteristics that should be implemented in new application including quality metrics"[10]. System quality is determined by a number of many measures like navigability, function, availability, and flexibility [14]. According to DeLone and McLean [17], selecting and using the system quality indicators based on the type of information system. Therefore, educational systems have most commonly used functionality, availability, accessibility and adaptability as system quality measurements [22]. System quality has been researched to be one of the most important measurements in determining whether or not students adopt educational platforms. Quality of system, for example, the study discovered that the quality of a system is an important indicator in promoting real usage of Digital-learning platforms through usability criteria such as ease of use and usefulness. Based on the foregoing discussion, this study constructed our proposed research model upon the foundation of system quality measurement, thus:

*H1: Quality of system characteristics have significant effect on the ease of use of digital learning platform.*

*H2: Quality of system characteristics have significant effect on the perceived usefulness of digital learning platform.*

The information or content quality of the DeLone and McLean model's second dimension is the data or content quality. This aspect pertains to the system's design, format, and accuracy level of information [17]. Among the many quality measures, the concept of information quality is defined by numerous sub-measurements, including accuracy, relevance, efficiency, and completeness of content [12]. According to previous studies, information quality is one of the most important predictors that have encouraged pupils to use educational platforms. Regarding quality of information, [2] found that the quality of information is a major usability problem in pushing kids to utilize Digital-learning platforms. According to [17], the quality of data has the greatest influence on perceived usefulness and ease of use. Based on the aforementioned debate, this study developed a model based on the idea of information quality measurement according to the hypotheses below.

*H3: Quality of learning content and information have significant effect on the ease of use of digital learning platform.*

*H4: Quality of learning content and information have significant effect on the usefulness of digital learning platform.*

The service quality is the third aspect of the DeLone and McLean model's quality measurement. In the educational technology context, common sub-measurements of service quality include trust, responsiveness, and customization [15]. Several studies have found that service quality is one of the most important predictors in encouraging students to use educational platforms. Providing high-quality service is essential for encouraging Digital-learning platforms usage, according to [2]. [17] Discovered that the quality of service was the most significant predictor of perceived usefulness and perceived ease of use. Practically, service quality is defined as the degree to which a company satisfies its clients' demands in order to deliver quality services [17]. The service quality measurement was used as a basis for building our proposed research model because of the aforementioned discussion.



*H5: Quality of Service have significant effect on the ease of use of digital learning platform.*

*H6: Quality of Service have significant effect on the usefulness of digital learning platform.*

The quality dimensions in the above sections are regarded as critical factors for many types of information systems [10]. Quality measurements from the DeLone and McLean model have previously been used in studies to investigate the impact of system, service and information quality on students' use of learning platforms. They discovered that the DeLone and McLean model is the best one to assess the influence of quality criteria on Digital-learning platforms success. The need for quality assurance, development, and improvement of learning platforms has grown more important in recent years [37], [38], [39]. In these new technologies, using high-quality metrics to improve the usability of educational platforms has become a must [14]. The success of any Information Security/Information Technology (IS/IT) may be measured by the IS's quality features [17]. Finally, any high-quality measurement system will result in more consumers utilizing it and feeling satisfied. As a result, the following three quality criteria from DeLone and McLean's model could be key drivers for improving the usefulness of Digital-learning platforms among students.

*H7: PEU has strong impact on the usefulness of digital learning platform.*

*H8: PEU has strong impact on the intention to use digital learning platform.*

*H9: PU has strong impact on the intention to use digital learning platform.*

*H10: INU has strong impact on the actual use of digital learning platform.*

### 3. Methodology

#### 3.1. Data Collection

The study employed a quantitative research design to gather the data from participants from three different universities. The target participants included both undergraduate and postgraduate students from college of Information Technology with totaling 907 students. This large sample size was chosen to ensure that the findings would be accurate and can be generalized. According to the results of G\*Power analysis, the sample size in this study was acceptable with  $d = .04$ . [38] Confirmed that a large number of sample size significantly enhances the precision of the dimension's estimation. table 1 represents the demographic analysis. The study's demographic data revealed that 55.6% of participants were male, while 44.4% were female. Regarding age distribution, 44.4% were between 18-20 years old, 33.6% were between 21–25 years, and 22.1% were above 25 years old. Additionally, 77.2% were undergraduate students, while 22.8% were postgraduate. Regarding mobile owners, 71.6% were had Android, while 28.4% were had iPhone. Finally, experience levels of digital learning showed that 100% of participants had experience in using digital learning platforms.

**Table 1.** Analysis of Demographic Information

Information		Sample	(%)
Gender	Male	504	55.6%
	Female	403	44.4%
Age	18–20	402	44.4%
	21–25	305	33.6%
	Over 25	200	22.1%
Level	Undergraduate	701	77.2%
	Postgraduate	206	22.8%
Mobile Owner	Android	650	71.6%
	iPhone	257	28.4%
Prior experience with Digital-learning platforms App	Yes	907	100%
	No	0	0.0%

#### 3.2. Measurement of the Model

This research constructed the aspects in the questionnaire from previously tested measures and modified them to be appropriate for Digital-learning platforms. For example, data from a study by [12] were used to assess three quality

dimensions. The two constructs of TAM model including PUS and EUS were adapted from study [13]. Also, INU items were taken from research by [14]. The difficulties began when the tasks were evaluated since there were four or five items in each category. The researchers assigned a Likert scale of five points to each question. The online survey contains the final online survey, which was used in our research model. This study designed the questionnaire in English and had it translated into Arabic by a professional translator after conducting previous studies. The authors emailed five Digital-learning platforms specialists and asked them to review the questionnaire items for clarity and appropriateness. All scholars have mentioned that all questions are clear and fit with context of Digital-learning platforms.

## 4. Data Analysis and Results

### 4.1. Reliability Analysis

To assess the quality of measurements model in terms of reliability, this study used the Cronbach's alpha. The literature suggested that the ideal value for Cronbach's alpha must be above 0.70. In this research findings, all items loadings exceeded this threshold (0.70), indicating solid internal consistency across variables. Table 2 summarizes the Cronbach's alpha findings.

### 4.2. Validity Analysis

Regarding to convergent validity assessment for the measurements model, the findings indicated that the average variance extracted (AVE) was above 0.50 as shown in table 2, which considered sufficient to establish convergent validity for all constructs in the proposed model. In addition, discriminant validity was also assessed. One widely used method for this assessment is the Fornell–Larcker criterion, which compares the square root of the AVE with the correlations between factors in the model [39]. The analysis showed that discriminant validity was met for all constructs, as the square root of the AVE as shown in table 3 was higher than the corresponding correlation coefficients.

**Table 2.** Cronbach's alpha findings.

Constructs	Cronbach's alpha	(AVE>0.5)
SYQ	0.85	0.820
IYQ	0.79	0.884
SIQ	0.82	0.721
PEU	0.90	0.851
PU	0.89	0.807
INU	0.95	0.854
AU	0.92	0.858

**Table 3.** Discriminant validity analysis.

	SYQ	IYQ	SIQ	EUS	PUS	IUS	AU
SYQ	0.917						
IYQ	0.788	0.981					
SIQ	0.621	0.744	0.866				
PEU	0.620	0.632	0.522	0.879			
PU	0.755	0.741	0.555	0.678	0.917		
INU	0.750	0.788	0.635	0.710	0.780	0.845	
AU	0.520	0.615	0.512	0.622	0.530	0.620	0.980

### 4.3. Correlation Analysis

This study employed a correlation analysis to evaluate the connection between two concepts as per our hypotheses. Linear regression is the most common type of correlation testing. This test measures the linear connection between variables. The Pearson coefficient, which ranges from -1 to +1 and proves that the hypothesis is correct according to

[38], has a minimum value of (0.05). In this section presents the evaluation of ten hypotheses with correlation analysis in our study. The first hypothesis (H1) predicted that quality of system could have a strong influence on digital learning users' perceptions of ease of use. The correlation coefficient is 0.781, according to [table 4](#), which indicates that the value of this statistic is significant. This suggests that the two variables are tightly linked. As a result, the hypothesis is confirmed.

**Table 4.** Findings of Analysis of Correlation for Hypothesis (H1)

		System Quality	Perceived Ease of Use
System Quality	Pearson Correlation	1	0.781**
	Sig. (2-tailed)		0.000
	N	450	450
Perceived Ease of Use	Pearson Correlation	0.781**	1
	Sig. (2-tailed)	0.000	
	N	450	450

The second hypothesis (H2) suggested that system quality would have a strong impact on the usefulness of digital learning. [Table 5](#) shows a correlation coefficient of 0.752, indicating a significant relationship between the two variables. Therefore, this hypothesis is confirmed.

**Table 5.** Findings of Analysis of Correlation for Hypothesis (H2)

		System Quality	Perceived Usefulness
System Quality	Pearson Correlation	1	0.752**
	Sig. (2-tailed)		0.000
	N	450	450
Perceived Usefulness	Pearson Correlation	0.752**	1
	Sig. (2-tailed)	0.000	
	N	0450	450

The third hypothesis (H3) proposed that enhanced information quality would have a significant positive impact on the ease of use of digital learning. The Pearson correlation coefficient analysis in [table 6](#) shows a correlation coefficient of .697, indicating a strong relationship between these two constructs. Therefore, hypothesis three is confirmed.

**Table 6.** Findings of Analysis of Correlation for Hypothesis (H3)

		Information Quality	Perceived Ease of Use
Information Quality	Pearson Correlation	1	0.697**
	Sig. (2-tailed)		0.000
	N	450	450
Perceived Ease of Use	Pearson Correlation	0.697**	1
	Sig. (2-tailed)	0.000	
	N	450	450

The fourth hypothesis (H4) predicted that the quality of information would have a significant positive influence on digital learning usefulness. In [table 7](#), the study found that the Pearson correlation coefficient value is .710. This indicates a high level of correlation between the two concepts. As a result, hypothesis four is confirmed.

**Table 7.** Findings of Analysis of Correlation for Hypothesis (H4)

		Information Quality	Perceived Usefulness
Information Quality	Pearson Correlation	1	0.710**
	Sig. (2-tailed)		0.000



	N	450	450
	Pearson Correlation	0.710**	1
Perceived Usefulness	Sig. (2-tailed)	0.000	
	N	450	450

H5 was the fifth hypothesis (that service quality would have an important impact on users' perceptions of digital learning 's ease of use). The correlation coefficient in [table 8](#) was calculated to be .657. This suggests that there is a significant connection between the two variables. As a result, this hypothesis can be accepted.

**Table 8.** Findings of Analysis of Correlation for Hypothesis (H5)

		Service Quality	Perceived Ease of Use
	Pearson Correlation	1	0.657**
Service Quality	Sig. (2-tailed)		0.000
	N	450	450
	Pearson Correlation	0.657**	1
Perceived Ease of Use	Sig. (2-tailed)	0.000	
	N	450	450

The sixth hypothesis (H6) suggested that service quality would have a significant beneficial influence on digital learning usefulness. In [table 9](#), the findings found that the Pearson correlation coefficient value is .725, which indicates a high degree of correlation. When the two variables are consistently associated, this indicates a high degree of correspondence between them. As a result, hypothesis six is confirmed.

**Table 9.** Findings of Analysis of Correlation for Hypothesis (H6)

		Service Quality	Perceived Usefulness
	Pearson Correlation	1	0.725**
Service Quality	Sig. (2-tailed)		0.000
	N	450	450
	Pearson Correlation	0.725**	1
Perceived Usefulness	Sig. (2-tailed)	0.000	
	N	450	450

The seventh hypothesis (H7) predicted that perceived ease of use would have a significant beneficial influence on digital learning usefulness. In [table 10](#), the correlation coefficient is shown to be .626. Therefore, based on these findings, there is a strong positive link between the two variables. As a result, this hypothesis is supported.

**Table 10.** Findings of Analysis of Correlation for Hypothesis (H7)

		Perceived Ease of Use	Perceived Usefulness
	Pearson Correlation	1	0.626**
Perceived Ease of Use	Sig. (2-tailed)		0.000
	N	450	450
	Pearson Correlation	0.626**	1
Perceived Usefulness	Sig. (2-tailed)	0.000	
	N	450	450

H8 predicted that perceived ease of use would have a significant beneficial impact on the intention to use digital learning. The correlation coefficient was found in [table 11](#) to be .617, as seen in the chart below. Based on this result, it appears that the two constructs are significantly linked. As a result, there is evidence to support this hypothesis.

**Table 11.** Findings of Analysis of Correlation for Hypothesis (H8)

		Perceived Ease of Use	Intention to Use
Perceived Ease of Use	Pearson Correlation	1	0.617**
	Sig. (2-tailed)		0.000
	N	450	450
Intention to Use	Pearson Correlation	0.617**	1
	Sig. (2-tailed)	0.000	
	N	450	450

H9: The hypothesis that perceived usefulness would have a substantial beneficial impact on intention to employ digital learning was tested. The correlation coefficient is .766 in [table 12](#), suggesting a positive relationship. This shows that the two variables are significantly associated with one another. As a result, this suggests that there is a good chance that the hypothesis will be supported.

**Table 12.** Findings of Analysis of Correlation for Hypothesis (H9)

		Perceived Usefulness	Intention to Use
Perceived Usefulness	Pearson Correlation	1	0.766**
	Sig. (2-tailed)		0.000
	N	450	450
Intention to Use	Pearson Correlation	0.766**	1
	Sig. (2-tailed)	0.000	
	N	450	450

The eighth hypothesis (H10) was that the intention to utilize digital learning would have a significant beneficial impact on actual usage. The correlation coefficient value is .785 in [table 13](#). Furthermore, because of the high correlation between them, this strongly suggests that they are linked. As a result, the hypothesis is confirmed.

**Table 13.** Findings of Analysis of Correlation for Hypothesis (H10)

		Intention to Use	Actual Use
Intention to Use	Pearson Correlation	1	0.785**
	Sig. (2-tailed)		0.000
	N	450	450
Actual Use	Pearson Correlation	0.785**	1
	Sig. (2-tailed)	0.000	
	N	450	450

#### 4.4. Structural Equation Modelling Analysis

The study validated our research approach by comparing it to PLS-SEM, which is the most popular multistage model validation method [21]. Our findings from the PLS-SEM test, as shown in [table 14](#), indicate that system quality significantly influenced usability factors, specifically perceived ease of use and perceived usefulness (H1:  $\beta = 0.321$ ; H2:  $\beta = 0.366$ ). This supports both H1 and H2. Additionally, service quality was found to have a significant effect on both usability factors, ease of use and usefulness (H5:  $\beta = 0.371$ ; H6:  $\beta = 0.366$ ), supporting H5 and H6. Our research further revealed that perceived ease of use significantly influenced both perceived usefulness and the intention to use (H7:  $\beta = 0.315$ ; H8:  $\beta = 0.320$ ), confirming H7 and H8. Perceived usefulness also had a significant impact on the intention to use (H9:  $\beta = 0.331$ ), while the intention to use significantly affected actual usage (H10:  $\beta = 0.300$ ). Both H9 and H10 were supported by the data.

**Table 14.** Analysis of SEM results.

Hypotheses	Path	Impact	$\beta$	SE	t-value	Results
H1	SYQ→EUS	Positive (+)	0.321	0.051	4.733	Supported
H2	SYQ→PUS	Positive (+)	0.366	0.042	4.137	Supported
H3	IYQ→EUS	Positive (+)	0.299	0.084	2.878	Supported
H4	IYQ→PUS	Positive (+)	0.354	0.044	3.471	Supported
H5	SIQ→EUS	Positive (+)	0.371	0.091	3.114	Supported
H6	SIQ→PUS	Positive (+)	0.366	0.066	5.108	Supported
H7	PEU → PU	Positive (+)	0.315	0.065	4.137	Supported
H8	PEU → NU	Positive (+)	0.320	0.069	1.354	Supported
H9	PU → INU	Positive (+)	0.331	0.021	3.399	Supported
H10	INU → AU	Positive (+)	0.300	0.498	3.090	Supported

## 5. Discussion

In the recent years, Digital-learning platforms were regarded as one of the most essential solutions for higher education. The actual usage of Digital-learning platforms, on the other hand, is still in its early stages and requires more planning and study to see how quality indicators may help improve the usefulness of Digital-learning platforms. The study evaluated the influence of these quality measures on enhancing Digital-learning platforms usability with three primary quality factors and twelve items from Delone & McLean's model that may meet the Digital-learning platforms need. Then the study looked at how these quality indicators impacted the usefulness of Digital-learning platforms apps. The study used the DeLone and McLean model to test and evaluate the relationships between quality factors and usability factors using our proposed methodology. According to the results, system quality has the most influence on perceived ease of use and usefulness of Digital-learning platforms with  $\beta$  values of 0.321 and 0.366. The study also found that system quality had a significant influence on Digital-learning platforms usability criteria. This implies that the usability of Digital-learning platforms among students will improve when the Digital-learning platforms system is simple to access, user-friendly, navigable, easy to use, and effective in teaching skills. As a result, system quality had a significant impact on Digital-learning platforms usability. These findings were supported by [10], [11], [12] prior investigations. According to the findings, quality of learning content and information had a strong impact on perceived ease of use and usefulness of Digital-learning platforms. Digital-learning platforms usefulness is primarily predicted by the quality of information. Furthermore, when Digital-learning platforms content is clear, accuracy, relevance, efficiency, and completeness of material will improve student use of Digital-learning platforms. Based on that, information quality had a big impact on Digital-learning platforms usability. These findings were comparable to those reported in other studies conducted by [13]. Quality of service also had a strong impact on both perceived ease of use and Digital-learning platforms usefulness. This implies that service quality has a big influence on the usability of Digital-learning platforms. Because of this, the usefulness of Digital-learning platforms will improve when the Digital-learning platforms system is trustworthy, quick, and customized. As a result, the investigation of service quality had a significant influence on Digital-learning platforms usability. These findings were supported by previous research carried out by [12]. According to our study, perceived ease of use had a strong impact on Digital-learning platforms usefulness and intention to use. This implies that ease of use is the key predictor for actual usage through perceived usefulness and intent to use of Digital-learning platforms. Furthermore, the use of Digital-learning platforms that are user-friendly and simple to utilize will increase student involvement in Digital-learning platforms. These findings were comparable to those reported by [14] in previous studies. The research found that perceived usefulness is highly linked to intentions to use Digital-learning platforms, this indicates that the perception of usefulness is the key predictor of Digital-learning platforms usage through intention to use. Finally, the findings revealed that intention to utilize Digital-learning platforms significantly impacted actual usage. These findings were in line with those obtained by [24] in previous studies. Finally, the findings underscore the importance of quality dimensions in driving acceptance and utilization towards digital learning. Acceptance of digital learning technologies often hinges on their perceived ability to address student demands and enhance the quality and efficiency of service delivery. Digital learning that priorities quality of

system characteristics and services are more likely to foster acceptance and successfully leverage digital learning tools to meet evolving student needs.

## 6. Conclusion

Since the Covid-19's debut has resulted in a high rate of Digital-learning platforms software adoption for instructional and learning processes. As a result, this research attempted to fill the gap by looking at how the use of quality metrics from the DeLone and McLean model affects Digital-learning platforms usability. The study developed a research model that incorporates three types of quality measurements and four usability criteria: perceived ease of use, perceived usefulness, intention to use, and actual usage. The study revealed that system quality was the most critical factor influencing the perceived ease of use and usefulness of Digital-learning platforms. Information quality also had a significant impact on both perceived ease of use and usefulness. Additionally, service quality affected these usability factors as well. Perceived ease of use was found to significantly impact both perceived usefulness and the intention to use, while actual usage of Digital-learning platforms was influenced through perceived usefulness and the intention to use. The research identified a strong positive relationship between perceived usefulness and the intention to adopt Digital-learning platforms. Finally, the findings showed that actual usage was determined by the intention to use. There are several limitations for this research. First, the research is focused only on universities in Jordan context. Second, our findings could not be generalized to primary educational level. Finally, other models like TAM and UTAUT could be considered in the future work.

## 7. Declarations

### 7.1. Author Contributions

Conceptualization: T.A., M.A.A., R.S., and R.A.; Methodology: R.S.; Software: T.A.; Validation: T.A., R.S., and R.A.; Formal Analysis: T.A., R.S., and R.A.; Investigation: T.A.; Resources: R.S.; Data Curation: R.S.; Writing Original Draft Preparation: T.A., R.S., and R.A.; Writing Review and Editing: R.S., T.A., and R.A.; Visualization: T.A. All authors have read and agreed to the published version of the manuscript.

### 7.2. Data Availability Statement

The data presented in this study are available on request from the corresponding author.

### 7.3. Funding

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### 7.4. Institutional Review Board Statement

Not applicable.

### 7.5. Informed Consent Statement

Not applicable.

### 7.6. Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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