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The Roles of Mediators and Moderators in the Adoption of Madrasati (M) LMS among Teachers in Riyadh

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Abstract. This study aims to determine the mediators' and moderators' roles in the adoption of the Madrasati (M) learning management system (LMS) among teachers in Riyadh. This study used the survey approach; it involved 374 teachers, that use M LMS to deliver their instructions. The study's samples represent the larger population of 13,782 public school teachers in Riyadh; 413 responses were collected after distributing 500 questionnaires. The independent variables are performance-expectancy (PE), effort-expectancy (EE), social-influence (SI), and facilitating conditions (FC); while Madrasati (M) LMS utilisation is the dependent variable. Meanwhile, behavioural intention serves as a moderator variable, while age and gender functions serve as mediators. This study discovered that behavioural intention, age, and gender all play mediating or moderating roles in M LMS utilisation among Riyadh teachers. In terms of mediation variables, this study found that the links between PE, SI, and FC and M LMS utilisation are significantly mediated by behavioural intention. However, there is no evidence that BI plays a moderating role in the relationship between EE and M LMS. Regarding age, all age groups' moderating effects on M LMS- utilisations showed significant beta values, except on PE, which is not significant. However, EE had a substantially moderating effect on M LMS usage for teachers aged 30 and younger and teachers aged 31–40, while the beta values for teachers aged 41–50, and 51 and above, were not significant. It is suggested that future research should consider other variables, such as years of experience, which could influence the link between the variables and other components.

Keywords: Adoption; M LMS; Mediator; Moderators; Teachers

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1. Introduction

In Riyadh, Madrasati (M) technology has a significant role in education. Its usage has made teaching and learning easier than other technologies and traditional methods (Alkinani and Alzahrani, 2021). In today's world, technological advances have brought changes that support teachers and students; and they can establish a high-quality educational system that meets international standards (Albaqami, 2019). In the meantime, while e-learning systems have become increasingly popular in higher education in Saudi Arabia over the last 10 years, this is not the case in K-12 education (Al-Ohali et al., 2019).

Subsequently, M was introduced in 2020; and it has become increasingly important in K-12 education. The Ministry of Education introduced the M project as part of the Kingdom of Saudi Arabia's (KSA) Vision 2030, which aspires to bring about a significant digital transformation in K-12 education in the KSA (Mitchell & Alfuraih, 2018). Madrasati, launched in 2020, is part of the Future Gate program. It is integrated with the LMS for all Saudi-Arabian public schools (Masmali, 2020). In the meantime, Riyadh schools are well-equipped, allowing them to provide a high-quality education to the students (Alrashoud, 2020). As a result, Riyadh schools have become leading educational institutions in Saudi Arabia; and they provide outstanding K-12 public education.

The introduction of M allows a significant digital change in teaching and learning in K-12 education in the KSA. However, the utilisation of M LMS technology in KSA still needs to be improved, in order to ensure its widespread adoption across the country (Almaiah et al., 2022), particularly in Riyadh. In this sense, the teacher's role in fully utilizing M LMS technology is crucial, in line with the Kingdom's adoption enforcement. Theories and models of technology adoption or acceptance behaviour, such as the Unified Theory of Technology Acceptance and the use of (UTAUT; based on Venkatesh's et al., 2003 framework), can help explain the level of teachers' adoption of M in Riyadh (Scherer et al., 2019).

This study examines the role played by age. Earlier studies found that age plays a significant role in technological adoption and usage (Al-Hunaiyyan, Alhajri, & Al-Sharhan, 2020). The younger generation is more concerned about the link between technology usage and performance; while the older generation is more concerned about FC and SI.

Similarly, gender has also been shown to influence new technology's adoption. It is crucial to examine how male and female teachers use technology in the classrooms, given the gender segregation in the Saudi Arabian educational system. Wiseman et al. (2018) found that gender and computer use are significantly related to classroom technology usage. Studies have reported that male teachers use technology more frequently than their female counterparts.

In addition, age and gender could potentially moderate the adoption of M LMS among teachers in Riyadh. The moderating roles of age and gender have been previously reported by studies (Mahdi and Al-Dera, 2013; Al-Hunaiyyan et al., 2020; Binyamin et al., 2020) that focused on teachers' attitudes and behaviour

towards technology utilization. According to Al-Hunaiyyan et al. (2017), age moderates the influence of all UTAUT parameters on technology utilisation. Khechine et al. (2014) investigated the roles of gender and age on the intention-to-use webinars in the UTAUT model for blended learning.

According to the author, only the age variable had a moderating effect. Yu (2012) revealed that gender significantly moderated the effects of performance anticipation and perceived financial cost on behavioural intention, when using gender and age as moderators. Magsamen-Conrad et al. (2015) investigated the contributions of the four UTAUT determinants, PE, EE, SI, and FC, in predicting behavioural intention to use tablets, when using age, gender, and users' experience as moderators.

After adjusting for age, gender, and tablet use, they discovered that EE and FC were the only determinants that positively predicted tablet-use intentions. Both gender and age moderate the association between particular experiences, attitudes, and intentions. Chawla and Joshi (2020) found that this influence is more significant for younger male users.

The adoption of new technologies, such as M LMS, has become crucial in KSA teaching and learning. However, the adoption and utilisation of M technology are still poor in KSA (Al-Ohali et al., 2019; Masmali, 2020), and particularly in Riyadh. Even though M LMS has been adopted and implemented for two years (Aldossry, 2021), the system in Riyadh is still new and inadequate. There is little or no reporting on the adoption of M LMS in intermediate and secondary schools in Riyadh.

The key aims of this study are: (1) to determine the mediating role of behavioural intention in the relationship between PE, EE, SI, and FC and the utilisation of M among teachers in Saudi public schools in Riyadh; (2) in order to determine whether behavioural intention significantly influences M's utilisation among teachers in Saudi public schools in Riyadh; (3) in order to determine the role of gender and age as moderators for the utilisation of M among the teachers in Saudi public schools in Riyadh.

Based on these objectives, this study hypothesised that:

- H1: Behavioural intention mediates the PE on M utilisation among teachers.
- H2: Behavioural intention mediates the EE on M utilisation among teachers.
- H3: Behavioural intention mediates the FC on M utilisation among teachers.
- H4: Behavioural intention mediates the SI on M utilisation among teachers.
- H5: Gender moderates the influence of PE on M LMS utilisation among teachers.
- H6: Gender moderates the influence of EE on M LMS utilisation among teachers.
- H7: Gender moderates the influence of SI on M LMS utilisation among teachers.
- H8: Gender moderates the influence of FC on M LMS utilisation among teachers.
- H9: Age moderates the influence of PE on M LMS utilisation among teachers.
- H10: Age moderates the influence of EE on M LMS utilisation among teachers.
- H11: Age moderates the influence of SI on M LMS utilisation among teachers.
- H12: Age moderates the influence of FC on M LMS utilisation among teachers.

H13: There is a direct effect of behavioural intention on M utilisation among teachers.

The findings of this study are important in increasing the utilisation level of M LMS among Saudi teachers. It is expected to add to the literature the usage of M LMS among teachers, in addition to assisting in developing and supporting strategies to increase M LMS use among Saudi teachers.

2. The Literature Review

2.1 The mediating role of behavioural intention

Behavioural intention has been identified as a mediating component impacting the use of technology (Urhahne, 2015; Bervell, Nyagorme, and Arkorful, 2020). According to these studies, technology's use as a mediator, which mediates the relationship between the independent and dependent variables, has no significant effect on behavioural intention. However, Singh and Sinha (2020) found that technology use has a considerable impact on behavioural intention; and that the mediating function of intention is critical in understanding the effect of technological origin and acceptability characteristics.

Similarly, Shanmugam et al. (2014) discovered that behavioural intention plays a significant role in mediating all paths between technology and acceptability. Moreover, Bervell, Nyagorme, and Arkorful (2020) found that in remote education, LMS-enabled blended learning use intentions to moderate the role of attitude, based on technology-related stimulus-response.

In summary, the behavioural intention towards LMS adoption and usage can influence teachers' teaching attitudes. This mindset influences their actual behaviour in the classroom, when it comes to the use of technology. This implies that behavioural intention may mediate the relationship between several factors (such as FC and attitudes) and LMS use.

2.2 The moderating role of Age and Gender

Demographic factors, such as age and gender, have been discovered to have a considerable moderating effect on technology use. In line with this, Binyamin et al. (2020) discovered a substantial negative moderating influence of age, gender, and experience on EFL teachers' use of technology. However, a number of research have found that age and gender are insignificant modifiers of technology adoption (Mahdi and Al-Dera, 2013; Wiseman et al., 2018).

Gender has been utilised as a direct factor in UTAUT studies between technological uptake and teachers' usage. Yu (2012) revealed that gender moderated the effects of PE and perceived financial cost on behavioural intention when gender and age were employed as moderators. Magsamen-Conrad et al. (2015) used age, gender, and users' experience as moderators, in order to examine the contributions of the four UTAUT determinants, PE, EE, SI, and FC, in predicting behavioural intention on using tablets.

After adjusting for age, gender, and tablet use, they discovered that EE and FC were the only predictors positively predicting tablet-use intentions. Gender moderates the effects of SI on behavioural intention and FC on usage behaviour (Guo, 2014). Both gender and age moderate the association between select antecedents and attitude and intention (Chawla and Joshi, 2020), with the influence being stronger for males and young users. However, Mahdi and Al-Dera (2013) did not suggest using age as a moderator; because it is a continuous variable.

2.3 Performance Expectancy

Studies have reported that PE is a significant influencing factor in LMS utilisation (Coleman and Mtshazi, 2017). Teachers acknowledged the function of LMS in assisting them in improving their jobs or assignments (Alahmari and Kyei-Blankson, 2018). According to Do Nam Hung et al. (2019), the PE was strongly linked to and varied with the users' possession and use of digital mobile devices. According to Pangaribuan and Wulandari (2018), PE significantly impacted behavioural intention. Furthermore, PE has a negligible effect on ICT adoption (Attuquayefio & Addo, 2014) and a substantial direct effect on behavioural intention to use Moodle, according to Ziraba, Akwene, & Lwanga (2020). Similarly, Onaolapo and Oyewole (2018) discussed how PE impacts behavioural intentions to accept smartphones.

2.4 Effort Expectancy

Studies have found that EE declines as teachers become more comfortable with the new technology (Funmilola et al., 2019). In terms of LMS, the more familiar a teacher is with the internet, the less effort they believe is required to utilize one (Nyembezi and Bayaga, 2015). According to Ling et al. (2020), teachers adopt new technology when they perceive it as easy to use and requires less effort. Users would be apathetic towards unstable systems. The EE is the general ease with which the system can be accessed.

In this regard, Venkatesh et al. (2003) defined EE as people's perceptions of how easy or difficult it is to use technology. EE has been demonstrated to have a negative impact on risk perception (Nyembezi, N., and Bayaga, 2015). The study employed the UTAUT model to evaluate the risks associated with ICT adoption; and they discovered that risk strongly predicts the components contributing to behavioural intention and enhancement (Gunasinghe et al., 2019). Dong (2019) found that EE is one of the most important factors in creating positive behavioural intentions for e-learning adoption among teachers. Sánchez-Prieto et al. (2017) found a correlation between EE and behavioural intention to use e-governance technologies.

2.5 The Social Influence

Teachers are more likely to use new technologies if they receive support and encouragement from others regarding their social impact (Al-Gahtani, 2016; Fu et al., 2020). According to Singh and Sinha (2020), for an LMS to be effective, it must fit and engage instructors' learning styles. Hence, institutions intending to use an LMS must provide sufficient direction and motivation to educators, demonstrating how it can and should be integrated into their teaching

(Zimmermann, 2020). Teachers must be active users and supporters of technology; and the correct levels of institutional encouragement impart a level of social influence to which learners respond (Funmilola et al., 2019). The social dimension concentrated on the function of peers in motivating one another.

Furthermore, SI is concerned with how others influence an instructor's attitude towards technology, whether positively or adversely. Ling et al. (2020) discovered that teachers' attitudes influenced their own computer usage and predicted computer usage among students. Bervell et al. (2020) reached the same conclusion about SI's role in LMS implementation in Saudi-Arabian colleges. Both educators and students may use technology in the teaching and learning process, as the result of a greater awareness of how it satisfies their needs and those of their students (Cabero-Almenara et al., 2019).

2.6 Facilitating Conditions

Several studies have discovered that FC is a significant external element influencing respondents' willingness to accept an ICT-based learning system (Peñarroja et al., 2019). However, the study's recommendations stated that the findings should be validated. FC is frequently regarded as a resource, and technological considerations consider compatibility difficulties that affect consumption (Onalapo and Oyewole, 2018). When all other factors are equal, it is reasonable to predict that the intention to use, and the actual use, would be less likely if there is less time and capital available, and when technical compatibility declines (Alghamdi and Holland, 2020).

In this light, the FC can also be viewed as being external and controlled by the environment. Hence, behaviour cannot occur if the facilitator is externally controlled.

On the other hand, FC has been found to moderate the intention to use e-learning (Tarhini et al., 2017). A major issue linked to environmental considerations is the lack of availability and quality of technical help. Regardless of whether these past studies were conducted, they all pointed to the need for increased technological assistance for the LMS. This requirement stays true, regardless of the technical-to-non-technical employee ratio. Therefore, the implementation of LMS in Saudi Arabia has been greatly hampered by the lack of top-notch technical support.

2.7 The Conceptual Framework

This study used the UTAUT model as a conceptual framework (Figure 1). This conceptual framework shows that PE, EE, SI, and FC are independent variables. The study's mediator variable is behavioural intention. At the same time, gender and age are the moderating variables directly impacting M LMS utilisation (the dependent variable) among teachers. It can be safely concluded that age and gender would be hypothesised as moderators of the utilisation of M LMS. Furthermore, these variables affected the efficacy of UTAUT as an instrument for this study.

The conceptual framework is expected to assess how the selected UTAUT factors influence teachers' behavioural intentions to utilise M LMS. In this light, the study considered the research population's distinct culture and context. This is because studies found that these aspects contribute to the body of knowledge in this discipline. It would also be especially useful because there is still a scarcity of empirical research that examines BI as a mediator in LMS usage (Al-Busaidi and Al-Shihi, 2012). In Saudi Arabia, especially when M LMS is used, such scarcity is noticeably severe.

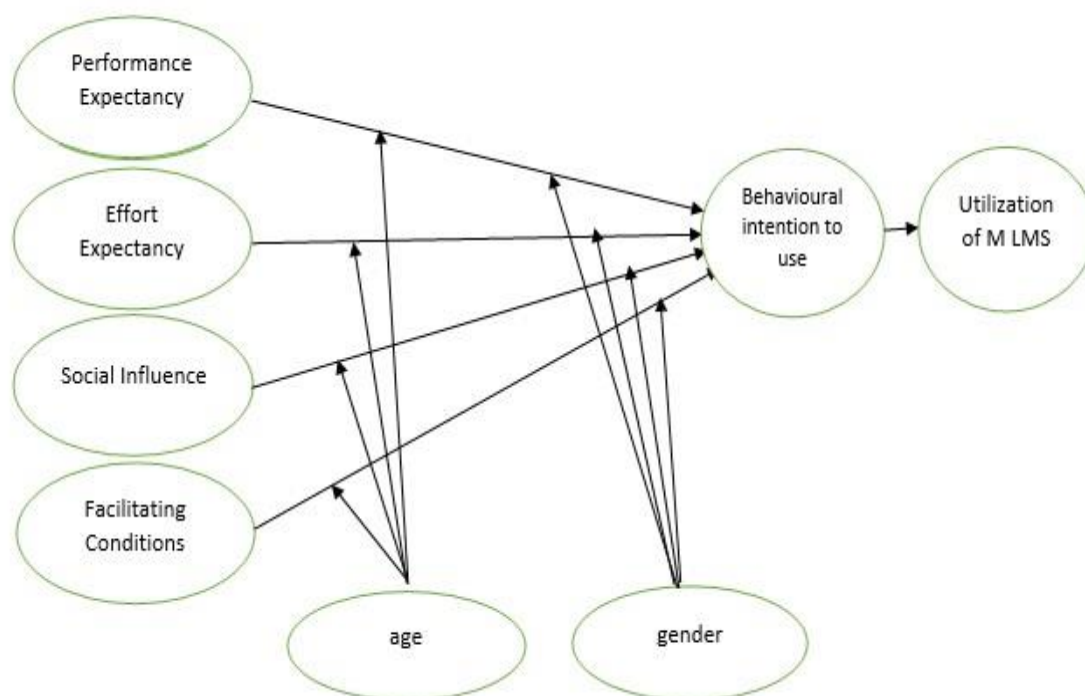


Figure 1: The Conceptual Framework

3. The Methodology

3.1 The Research Design

The study used a quantitative research design; specifically, the survey method was utilised to determine the factors (PE, EE, SI, and FC) impacting teachers' behavioural intentions (mediator), as moderated by age and gender on M LMS utilisation in Saudi public schools in Riyadh. The problem is described by using a quantitative approach. It is useful for developing behaviour, for testing hypotheses, and when figuring out the opinions and behaviours of a large group.

Positivism is based on quantifiable observations that lead to statistical analyses. In this regard, this study used the quantitative-positivist approach to examine a high degree of generalisability (McMurtry, 2020). Quantitative approaches, such as surveys, structured questionnaires, and certified statistics, are preferred by positivists; because they are more reliable and representative (Wang et al., 2020). The approach of this investigation was backed by a positivist epistemology.

3.2 The population of the study

The study targets teachers in public middle and secondary schools in Riyadh, Saudi Arabia, who adopt the Madrasati platform. According to M LMS administrators and administration, approximately 13,782 public school teachers in Riyadh utilise Madrasati in all phases, constituting the study's population. The sample size for this study was calculated to be 374 samples, using Cochran's formula (Raosoft® software). Teachers at Riyadh's public schools were picked from a pool of candidates. The samples used in the study are a subset of a larger population because they are representative of the whole.

3.3 Sample and sampling

The participants of this study include public school teachers utilising M LMS in Riyadh at all school levels, regardless of their experience in teaching. This study used suggestions given by Hair et al. (2010) to determine the sample size of this study. Hair et al. (2010) suggested that the ideal sample size suitable for SEM analysis should be approximately between 300 and 800 samples. Based on this suggestion, the sample size for this study was 374 samples. In addition to this, Raosoft® software and Cochran's formula (2007) were used to calculate the sample size.

Although a sample size of 374 was sufficient to test the hypotheses for this study, 500 survey questionnaires were randomly distributed via the internet to target the participants. This study oversamples, in order to account for difficulties like sampling flaws or potential participants' unwillingness to complete surveys. 500 surveys were sent out, and 425 participants responded. Mistakes and missing data were detected in 12 responses. These responses were removed from the analysis, and only 413 responses were used in the actual data analysis. The valid data are based on the return rate of 85 percent. According to Pallant (2020), a 60% rate of return is adequate for analysis.

3.4 The Research Instrument

This study adopted the survey method. Participants' data were collected using questionnaires as a survey instrument. A survey questionnaire is the most utilised instrument in quantitative research on technology adoption and e-learning. The questionnaires for this study used a 5-point Likert scale (Ziraba, Akwene, and Lwanga, 2020). On a five-point rating scale, the respondents were asked to express their agreement or disagreement with each statement in each item, including 1 to 5-1 = Strongly Disagree; 2 = Disagree; 3 = Undecided; 4 = Agree; 5 = Agree Strongly.

Google Forms were used to conduct the survey. The questionnaire was distributed to all the targeted teachers in Riyadh, Saudi Arabia, who were adopting Madrasati. A consent letter and a direct link to the poll were included in the emails. Because instructors often have less time to check their email at weekends, the survey was sent out during school hours, and at a time that was convenient for them (free time). A covering letter, or consent form, was included with the questionnaire survey.

3.5 The Mediation Analysis

When the relationship between two variables, such as dependent and independent, can be explained with the help of a third variable, the mediation effect occurs (Hayes and Preacher, 2014). The effect of behavioural intention on independent variables (PE, EE, SI, and FC) and on the dependent variable, M LMS, was investigated in this study. The indirect effect was used to further examine the relevance of the mediation in this study, which was assessed by using a bootstrapping approach (Hayes and Preacher, 2014). The bootstrapping analysis approach has the advantages of not assuming that the standard-error distribution is associated with the indirect effect; and it gives the necessary confidence intervals for the estimation.

The substantial indirect impact of the two variables is decided on the basis of the P-value. The null hypothesis indicated that there was no indirect effect between the two variables; since the t value was greater than 1.96. Hence, this hypothesis was rejected. The bootstrapping analysis was used to measure the mediating effect of this research. For the mediation analysis, Hair et al. (2003) proposed bootstrapping. The author also suggests that simple and many models be analyzed via bootstrapping.

3.6 Reliability and Cronbach's alpha (α)

A Cronbach's alpha test was employed to determine each variable's internal consistency. According to Hayes and Coutts (2020), 0.7 is a satisfactory reliability coefficient. In this regard, PE ($\alpha=0.730$), EE ($\alpha=0.867$), SI ($\alpha=0.878$), FC ($\alpha=0.846$), and BI (0.835) all show high and satisfactory reliability. This result demonstrated that each of the five variables is reliable. It was possible to employ Cronbach's Alpha statistics for data analysis; because the reliability values were higher than the suggested cut-off point of 0.700.

3.7 The Data Analysis

The Statistical Package for Social Science (SPSS), version 23 was used to examine the quantitative data in this study. Percentages, means, and standard deviations were included in the descriptive analysis of the data. The data were also loaded into the Analysis of Moment Structures (AMOS) v23, in order to investigate the hypotheses using Structural-Equation Modelling (SEM) by considering PE, EE, SI, and FC as independent variables; while M LMS was loaded as a dependent variable.

AMOS was used to examine the factors (PE, EE, SI, FC, and M LMS) in the three-steps: confirmatory-factor analysis (CFA), measurement-model analysis, and structural-model analysis (Morin et al., 2020). Skewness and kurtosis were employed to determine the data's normalcy. The skewness is between -0.038 and 1.506, and the kurtosis was between 1.506 and 1.506. The significance level was set at $p < 0.05$ for all the variables.

4. The Result

4.1 The Role of mediators

Figures 2 and 3 illustrate the results of the boot-strapping analysis to examine thepossible mediating effect of BI in the relationship between PE, EE, SI, and FC on M LMS utilisation. The bootstrap estimates the magnitude of the indirect effects; and it examines the statistical significance of the indirect effects. The upper and lower limits for the 95% confidence-interval values correspond to the 2.5th and 97.5th percentiles from the lowest to the highest rank-ordered estimates of the indirect effect derived from the 500 samples.

The indirect effect showed that PE, EE, SI, and FC had beta values of 0.193, 0.143, 0.114, and 0.191, respectively (Figure). The derivation of the mediating effect of BI in this study was based on this percentile confidence interval. If it does not include zero, the indirect effect is statistically significant with bias-corrected at a 0.05 level of significance (Figure 2). This finding revealed that the indirect effect of PE on M LMS through the mediator BI is statistically significant at the 0.05 level of significance (Figure 2). The direct and mediation models' results were compared to explain the mediation effect (Figure 3). Due to the statistical significance of the direct impact, it can be argued that BI somewhat mediated the association between PE and M LMS. Thus, BI partially mediates the relationship between PE and M LMS (Figure 3). The null hypothesis was rejected.

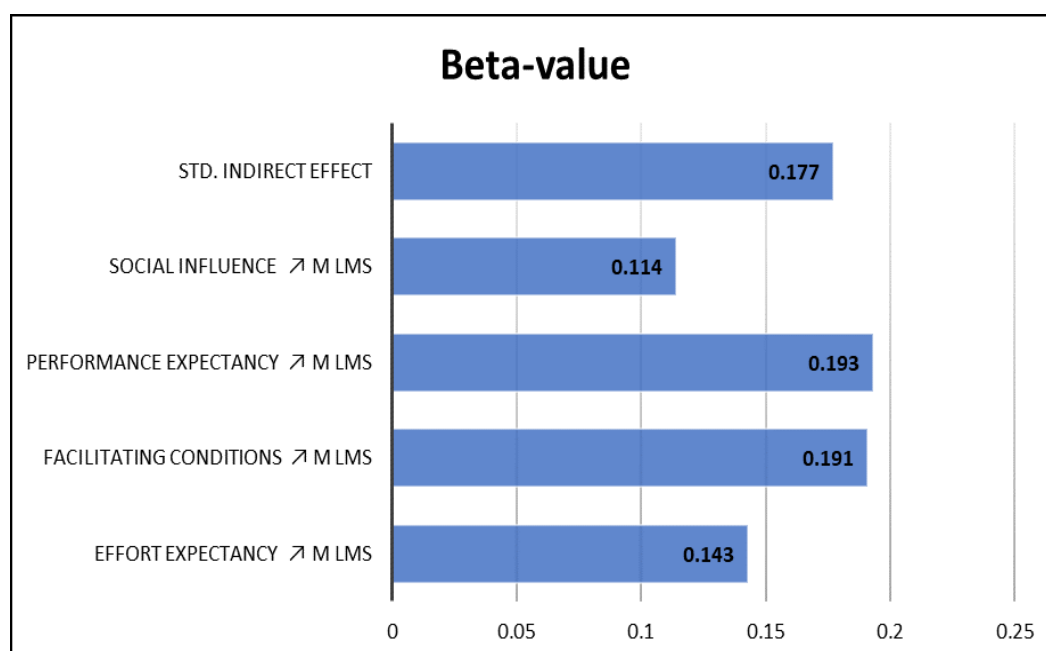


Figure 2: Mediation Effect Beta-value of PE, EE, SI, and FC on M LMS through behavioral intention

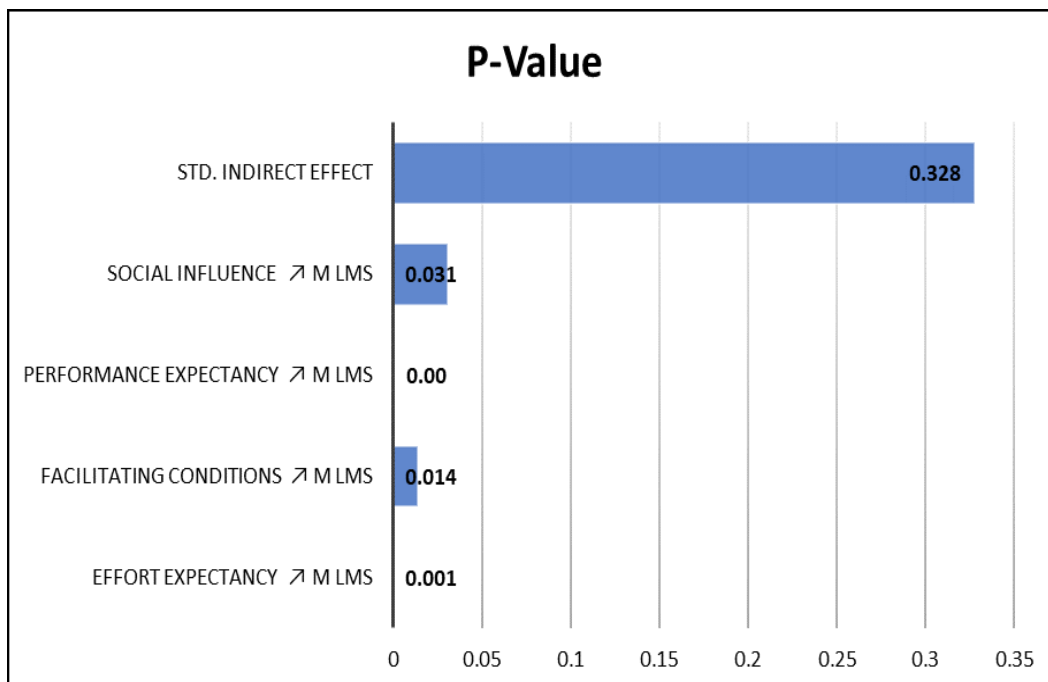


Figure 3: Mediation Effect P-value of PE, EE, SI, and FC on M LMS through behavioural intention

This finding revealed that the indirect effect of EE on M LMS through mediator BI is not statistically significant; as the p-value of the standardised indirect effect is higher than 0.05, which indicates no significant mediation (Figure 2). The direct and mediation models' results were compared to explain the mediation effect. Due to the lack of statistical significance of the direct impact, it can be stated that BI did not mediate the relationship between EE and M LMS. Furthermore, the indirect effect of SI on M LMS through mediator BI is statistically significant; as the standardised indirect effect is less than 0.05 (Figure 2), which indicates a significant mediation effect of BI in the relationship between social influence and M LMS. Also, the findings revealed that the indirect effect of FC on M LMS through mediator BI is statistically significant; as the p-value of the standardised indirect effect is less than 0.05, which indicates a significant mediation effect. Thus, the null hypotheses were rejected. Therefore, BI partially mediates the relationship between SI, FC, and M LMS utilisation.

4.2 The Moderating Role of Gender-Based on Individual Path

The moderation effects on the individual paths were tested once the moderation effects were established in the overall structural model. The test was based on Hair et al. (2010), which stated that a two-group moderator has a moderation effect if 1) one group's beta is significant, while the other group's beta is non-significant, or 2) both groups' betas are significant, but one group's beta is positive, while the other group's beta is negative. The male beta value for PE on M LMS utilisation is significant because the p-value is 0.000.

In contrast, the female beta value for PE is insignificant; since the p-value is 0.155 and it is larger than 0.05 (Table 1). Moreover, the male beta value for EE on M LMS

is significant because the p-value is 0.000; whereas the female beta value for EE is insignificant; since the p-value is 0.306, which is higher than 0.05.

Table 1: The mediating role of gender results with individual path

Hypotheses				Beta	SE.	CR.	P	Decision
Male	M LMS	<---	PE	0.290	0.071	3.972	***	Mediate
Female	M LMS	<---	PE	0.101	0.076	1.423	0.155	
Male	M LMS	<---	EE	0.253	0.060	4.040	***	Mediate
Female	M LMS	<---	EE	0.062	0.043	1.023	0.306	
Male	M LMS	<---	SI	0.242	0.068	3.206	0.001	Mediate
Female	M LMS	<---	SI	-0.013	0.076	-0.188	0.851	
Male	M LMS	<---	FC	0.059	0.101	0.541	0.588	Mediate
Female	M LMS	<---	FC	0.149	0.042	2.110	0.035	

The male beta value for SI on M LMS is significant; because the p-value is 0.001, whereas the female beta value for SI is insignificant; since the p-value is 0.851, which is higher than 0.05 (Table 1). Furthermore, the male beta value for FC on M LMS was not significant; because the p-value was 0.588, which is greater than 0.05. Meanwhile, the female beta value for FC is significant; since the p-value is 0.035, which is less than 0.05.

4.3 The Moderation Role of Age based on the Individual Path

The multi-group analysis (MGA) was used to assess the study's hypotheses. We divided the participants into four age groups: 30 years and under; 31-40 years old; 41-50 years old; and 51 years and above (Table 2).

Table 2: The moderating role of age results, according to the individual path

Hy. No.	Age Groups	Relationships			Beta	SE.	CR.	P	Decision
H1	30 years old and less	M LMS	<---	PE	0.230	0.188	1.898	0.058	Does not Moderate
	31-40 years old	M LMS	<---	PE	0.199	0.137	1.712	0.087	
	41-50 years old	M LMS	<---	PE	0.129	0.100	1.568	0.117	
	51 years and above	M LMS	<---	PE	0.129	0.050	1.458	0.145	
H2	30 years old and less	M LMS	<---	EE	0.210	0.105	2.162	0.031	Moderate
	31-40 years old	M LMS	<---	EE	0.207	0.077	2.200	0.028	

Hy. No.	Age Groups	Relationships			Beta	SE.	CR.	P	Decision
	41-50 years old	M LMS	<---	EE	0.089	0.069	1.075	0.282	
	51 years and above	M LMS	<---	EE	0.089	0.042	1.164	0.244	
H3	30 years old and less	M LMS	<---	SI	0.273	0.095	2.624	0.009	Moderate
	31-40 years old	M LMS	<---	SI	0.200	0.106	1.837	0.066	
	41-50 years old	M LMS	<---	SI	0.059	0.127	- 0.387	0.699	
	51 years and above	M LMS	<---	SI	0.059	0.052	0.693	0.488	
H4	30 years old and less	M LMS	<---	FC	0.247	0.122	1.980	0.048	Moderate
	31-40 years old	M LMS	<---	FC	- 0.113	0.079	- 1.059	0.289	
	41-50 years old	M LMS	<---	FC	0.027	0.082	1.709	0.087	
	51 years and above	M LMS	<---	FC	0.027	0.059	0.319	0.750	

Based on the results in Table 2, the beta values of all the age groups for PE on M LMS utilisation are not significant, as the p-values of all the groups are higher than 0.05. This indicates that all the groups do not show any significant effect, and all of them have similar results, confirming no moderation effect. The result of the moderating effect of age between EE and M LMS is statistically significant; because the p-values of groups 30 and under and 31-40 are significant, but the beta values of groups 41-50 years old and 51 years and above are insignificant; because the p-value is greater than 0.05.

The moderating effect of age in the link between SI and M LMS was found to be statistically significant; as the p-values of the groups 30 years old and less are significant. However, the beta values of 31-40, 41-50, and 51 and above were found insignificant; as the p-value was more than 0.05. However, the result of FC was found to be statistically significant; as the p-values of the age group of 30 and under are significant. In the meantime, the beta values for the age groups of 31-40, 41-50, and 51 years and above were found to be insignificant; as the p-value was more than 0.05.

5. Discussion

The findings of this study revealed that behavioural intention has a direct impact on M usage among teachers, implying that technology is used positively. Individuals who see the purpose of using an LMS, according to Ifinedo et al. (2018) and Zheng et al. (2018), use it favourably to improve their achievements. A person's conscious or purposeful intention to engage in either positive or negative action is known as behavioural intention (Chao, 2019).

This indicates that if a person expects to benefit from specific activities or jobs, they will engage in them. Behavioural intention is important in learning and development; because it helps us understand how new behaviours are acquired and habits can be developed. Behavioural intention, according to Alharbi et al. (2014), has a mediated function in affecting the adoption of technology, like M LMS. The research data also showed that behavioural intention has a positive mediating effect on M LMS use among Riyadh public school teachers.

This study also showed that behavioural intention mediates the PE on M utilisation among teachers. The results suggest that the behavioural intention of teachers to get a task done in public schools can be translated into PE. This finding is consistent with those reported by Bervell et al. (2020), who exhibited that behavioural intention mediated PE towards technology usage. The M LMS utilisation was achieved through improvement in PE, as supported by facilitating conditions in the public schools.

The finding also revealed that behavioural intention mediated the FC on M utilisation among teachers, which implied that the higher the FC, the ultimate the behavioural intention towards M LMS utilisation. This showed the significant impact of behavioural intention serving as a mediator in the relationship between FC and the usage of M LMS. Consistent with this finding, Pangaribuan and Wulandari (2018) found a significant relationship between FC and behavioural intention. However, behavioural intention did not mediate the EE on M utilisation among teachers.

The explanation for this could be that the instructors' behavioural aims, as they create a practice of continuous usage of LMS in a Riyadh public school have yet to be fully fulfilled. According to Magsamen-Conrad et al. (2015), the only characteristics that positively predict technology use intentions are EE and FC. When the influence of FC is controlled, the findings imply that FC has a considerable impact on behavioural intention; but EE has no effect. Likewise, the results of this study also exhibited that behavioural intention mediates the SI on M LMS utilisation among teachers, indicating that behavioural intention has a mediating effect on PE, FC, and SI.

Another finding is that gender, specifically that of male teachers, is a significant moderator in the link between PE, EE, and SI on M LMS utilisation among school teachers in Riyadh. while female teachers play no significant moderating role. This finding confirms the gender-moderation effect on the overall model. This suggests that the male teachers performed better in terms of new technological advancements, such as M LMS, than did the female teachers. This finding was supported by Guo (2014), who discovered that gender moderates the effects of SI on BI and FC on user behaviour, which is consistent with the findings here. However, the present result showed that FC has no male-gender moderating role on M LMS. Since FC could not moderate the influence of males on M LMS utilisation among Saudi teachers, this factor might not be a matter of concern in the context of Riyadh. However, the current findings do not agree with the findings of Yu (2012), who indicated gender and age as moderators, and who

found that gender significantly moderates the effects of PE and the perceived financial cost on behavioural intention. Similarly, it does not agree with the findings of Binyamin et al. (2020), which showed that gender has no moderating effect on the acceptance of LMS in Saudi Arabia.

The association between EE, SI, and FC was shown to be moderated by age, implying that teachers' age category (30 and below, between 31 and 40 years old, between 41-50, and 51 years and above) directly impacts M LMS usage in Riyadh schools. This suggests that the overall impact of the UTAUT factors on M LMS utilisation through behavioural intentions among the school teachers. However, both the p-value and beta values for the 31-40 age group, the 41-50 age group, and 51 and above with regard to PE are insignificant. Hence, age has no significant moderating role in the relationship between PE and M LMS utilisation. In this light, age plays a major role in teachers' lives, because younger teachers are more concerned with their performance, while older ones are more concerned about FC.

Consequently, it may not have the same effect on teachers who are experienced in teaching and in the use of technology. The results contradict the results reported by Yu (2012), who found that age considerably moderates the effects of PE and the perceived self-efficacy on actual adoption behaviour. Conversely, Wiseman et al. (2018) considered the age range of faculty members to be relatively wide, with the participants ranging from 20 to 57 years old, and the effect between the two variables was found to be insignificant.

6. Conclusion

The findings of the study revealed that behavioural intention, age, and gender played mediating and moderating roles in M LMS utilisation among Riyadh teachers. In terms of mediation, behavioural intention was found to significantly mediate the relationship between PE, SI, and FC on M LMS utilisations. However, BI was found to have no significant mediating role between EE and M LMS. In terms of age, the beta values of all the age groups' moderating effects on M LMS utilisation were significant, except for PE, which was not significant. However, the moderating effect of age of EE on M LMS utilisation is significant for age groups 30 and under and 31-40 years old, but the beta values of age groups 41-50 years old and 51 years and above were insignificant.

In terms of gender, the moderating influence of male beta value for PE and EE on M LMS was found to be significant. In contrast, no moderating role was observed for the female beta value; because PE and EE were insignificant. The moderating effect of SI on M LMS was significant, whereas the female beta value for SI was insignificant. Furthermore, the male beta value for FC on M LMS is insignificant, while the female beta value for FC is significant. The finding showed that teachers' gender (male) significantly moderates the role of PE, EE, and SI on M LMS utilisation among teachers in Riyadh.

As this study found, the moderating role of age and gender in the relationship, it is recommended that future studies should consider other factors, such as time and experience, which might also moderate the relationship between BI and other

variables. Therefore, these variables should be deemed as moderators in future studies.

The limitations of this study include: (i) Schools in Riyadh widely use Moodle, which further limits the scope of this study to this Moodle, thereby limiting the generalisation of the findings to other related cities within Saudi Arabia, which are using different LMS tools, such as M LMS. (ii) The selected population was limited only to teachers in Riyadh public schools. The results may also not be generalised to all the teacher population in Saudi Arabia, but rather to studies that have similar characteristics.

7. References

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QUESTIONNAIRE (sample)



Dear esteemed teacher,

I would like to thank you in advance for your cooperation in completing this survey, which aims to clarify the most important factors influencing teachers' behavioural intentions and utilization of Madrasati (M) in Saudi Public Schools. E-learning encompasses the management of the entire learning process, as well as the integration of computer systems to manage teaching and learning procedures, commonly referred to as Learning-Management Systems (LMS). Madrasati is a system that enables the teacher to manage the educational process electronically, provide educational activities, prepare lessons, manage courses, disseminate class assignments, present topics related to the objectives of the course for discussion in the course forums, record student attendance, manage the dialogue synchronously and asynchronously with the learners, and provide electronic educational tastings and evaluation processes to determine the level of the learner's performance.

This survey is important as a part of data-collection purposes, and your feedback is important to the study. The data and information will be treated with confidentiality. The researcher hopes to receive genuine and truthful feedback from the respondents. Your participation in this study is strictly voluntary. Feel free to contact me if you wish to be excluded from this study. Any questions or enquiries about the questionnaire are welcome by e-mail or contact number. Finally, I thank you for giving me this part of your precious time.

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Part A: Demographic Characteristics

Please, read each statement and answer:

Please fill in the blank or tick the appropriate boxes for each of the following questions. Please make sure that you have answered all the questions.

1. Gender

- Male
- Female

2. Age

- 30 years old and less
 31-40 years old
 41-50 years old
 51 years old and above

3. Education Level

- Undergraduate
 Postgraduate

4. Experience (years)

- 7 years and less
 8-14 years
 15-21 years
 22-28 years
 29 years and above

5. What number of Madrasati (M) workshops have you attended in this year?

- One workshop
 Two workshops
 Three workshops
 More than three workshops

Part B: Factors influencing the utilization of Madrasati

Please circle the number that best reflects your opinion.

1 = Strongly Disagree

2 = Disagree

3 = Neutral (not sure, don't care, not a factor to me)

4 = Agree

5 = Strongly Agree

No	Performance Expectancy (PE)	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
6	Madrasati helps me to teach.	1	2	3	4	5
7	Madrasati enables me to accomplish tasks (e.g. to provide assignments, reports etc.) more quickly.	1	2	3	4	5
8	Madrasati improves the quality of my work (e.g. assignments, reports etc).	1	2	3	4	5
9	Madrasati increases my knowledge of the subject matter	1	2	3	4	5
10	Madrasati is well integrated with all other aspects of my teaching assignment	1	2	3	4	5

No	Effort Expectancy (EE)	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
11	Madrasati is user-friendly	1	2	3	4	5
12	Madrasati is easy to use	1	2	3	4	5
13	The features in Madrasati are clear and easy to understand hence operating the system becomes much easier	1	2	3	4	5
14	Madrasati's features are straight-forward	1	2	3	4	5
15	Using the Madrasati requires time and effort appropriate and it rewarding normal duties	1	2	3	4	5

No	Social influence (SI)	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
16	Being amongst the first to use the Madrasati within my circle of friends and family makes me special.	1	2	3	4	5
17	In general, the management of the school has supported the use of the Madrasati.	1	2	3	4	5
18	People who are important to me think that I should use the Madrasati	1	2	3	4	5
19	Current technology trends in social life have increased the popularity of Madrasati	1	2	3	4	5
20	Nowadays, society expects that learning include the use of LMS like Madrasati	1	2	3	4	5

No	Facilitating Conditions (FC)	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
21	I have the resources necessary to use the Madrasati	1	2	3	4	5
22	A specific person (or group) is available in school for assistance with Madrasati	1	2	3	4	5
23	The facilities (e.g. Internet accessibility, WiFi) provided by management to use the Madrasati fully, meets users' needs	1	2	3	4	5
24	The workshops and training to familiarise teachers with the Madrasati are helpful and sufficient	1	2	3	4	5
25	Management support services and infrastructure gives teachers the confidence.	1	2	3	4	5

Part C: Behavioural Intentions (BI)

No	Behavioural Intention (BI)	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
55	I predict that I will continue to use Madrasati.	1	2	3	4	5
56	I believe that teachers will increasingly familiarize themselves with the Madrasati in the next 6 months	1	2	3	4	5
57	I am looking forward to attend workshops about the effective use of Madrasati	1	2	3	4	5
58	I expect to fully enjoy the use of Madrasati	1	2	3	4	5
59	I intend to make the Madrasati central to my learning in school.	1	2	3	4	5

Part D: Madrasati Utilisation

Please circle the number that best reflects your opinion.

Never = Not ever used at all

Rarely = Used at least once a month

Sometimes = Used at least once a week

Often = Used at least three times a week

Always = Used every day

No	Level of M Utilization	Never	Rarely	Sometimes	Often	Always
65	I use the "Announcement tool" to add updates related to the course I am teaching.	1	2	3	4	5
66	I use the "Forum tool" to enhance the dialogue with my students.	1	2	3	4	5
67	I use the "File-exchange tool" to share the course documents with my students.	1	2	3	4	5
68	I use the "chat tool" for synchronous communication in real-time with students on topics related to the course.	1	2	3	4	5
69	I use the "Glossary tool" to insert new terms and definitions related to the course I am teaching	1	2	3	4	5
70	I use the "Assignment tool" to send/download/ upload tasks for all or particular students.	1	2	3	4	5
71	I use the "Assessment Tool" to conduct online short tests/exercises.	1	2	3	4	5
72	I see the information of students registered in the course for the purposes of communication (such as: see personal information, e-mail, mobile phone number	1	2	3	4	5
73	I use the "Questions-bank tool" to create /prepare tests for my student.	1	2	3	4	5
74	I use the "Survey manager tool" to explore the students' perceptions on the course I am teaching.	1	2	3	4	5
75	I use the "Grade book tool" to record/edit or delete students' scores.	1	2	3	4	5
76	I use the "Tracking forum Participation tool" to track student participation in forums.	1	2	3	4	5
77	I use the "Virtual classroom tool" to enable synchronous communication with my students by using multimedia features. (For example audio, video, text chat, application sharing).	1	2	3	4	5