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Understanding Students' Intention to Use Tablets for Learning in Saudi Arabia: A Gender-Based Multi-Group Analysis

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ABSTRACT

This study explores the factors influencing Saudi primary school students' intention to use tablet personal computers (TPCs) in education, with a focus on gender differences. Data were collected from 279 students across 20 public schools and analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM) and multi-group analysis (MGA). The results showed that performance expectancy significantly predicts behavioral intention in both male and female students, indicating a shared belief in the educational benefits of TPCs. Social influence had a significant negative effect only among females, suggesting possible societal or familial hesitation. Hedonic motivation had a stronger impact on females than males, indicating gender differences in how enjoyable use drives intention. In both groups, behavioral intention significantly predicted actual TPC usage. Other factors, such as effort expectancy, facilitating conditions, and habit, showed limited or no significant effects. These findings provide new insights into gendered patterns of technology adoption among young learners in a Middle Eastern context and highlight the importance of designing gender-responsive digital learning strategies.

KEYWORDS

Educational technology; Unified Theory of Acceptance and Use of Technology (UTAUT); Partial Least Squares Structural Equation Modeling (PLS-SEM); tablet; behavioral intention.

INTRODUCTION

Tablet personal computers (TPCs) have become increasingly prevalent as educational tools among students worldwide (Alfalah, 2023). Prior research highlights the benefits of integrating such mobile devices into K-12 education to enhance learning outcomes (Alowayr, 2022; Wang et al., 2022). In Saudi Arabia, aligned with Vision 2030's commitment to modernizing education through ICT, the government encourages the adoption of TPCs across all educational levels to support blended learning strategies. Several schools in Saudi Arabia have provided TPC facilities to their students. This move is aimed at enhancing the use of ICT tools in education (Alotaibi, 2021). However, the effective utilization of TPCs in primary education remains underexplored, necessitating a deeper understanding of the factors influencing students' behavioural intentions to use these devices as learning tools.

The Unified Theory of Acceptance and Use of Technology 2 (UTAUT2) model offers a robust framework to examine technology adoption by incorporating constructs such as performance expectancy, hedonic motivation, and social influence (Venkatesh et al., 2012). While prior studies have applied UTAUT2 to investigate TPC use in secondary and higher education (Villani et al., 2018; Wang et al., 2022), research focusing specifically on primary school students is limited. Moreover, demographic factors, particularly gender, have been shown to moderate technology acceptance (Cacciamani et al., 2018; Wong et al., 2019). Given Saudi Arabia's gender-segregated education system, exploring gender differences in the determinants of TPC adoption is essential.

This study aims to fill these gaps by investigating the factors influencing primary students' intentions to use TPCs in Saudi Arabia and examining the gender-based differences using partial least squares multi-group analysis (PLS-MGA). The findings are expected to provide valuable insights for educators and policymakers to promote effective integration of TPCs in Saudi primary education.

LITERATURE REVIEW

Tablet Computers in Education

TPCs are widely recognized as personal mobile learning that facilitates learning and enhances course enjoyment (Prince, 2017). They provide students with software such as writing, video-making, managing simulations, and augmented reality apps necessary for educational purposes (Cacciamani et al., 2018). Additionally, TPCs have the potential to increase student motivation and aid teachers in improving student learning outcomes (Wang et al., 2022). Therefore, TPCs have significant potential to positively impact school students' learning when utilized appropriately, particularly as technology becomes increasingly user-friendly and accessible. As technology becomes increasingly user-friendly, portable, and affordable, TPCs offer significant opportunities to positively impact student learning across diverse educational contexts.

Empirical evidence indicates that TPC use by school students aids knowledge acquisition and improves student communication and learning (Cacciamani et al., 2018). Furthermore, TPCs foster greater student engagement and promote student-centred learning. Correspondingly, student-centred learning is more efficacious than teacher-centered learning when using tablets to communicate and absorb materials (Soffer & Yaron, 2017). Recent research also highlights how TPCs can assist educators in elevating their students' learning outcomes and encourage learning opportunities beyond the traditional classroom environment (Roldán-Álvarez et al., 2021). Consequently, enhancing the use of TPCs as pedagogical tools in primary education is imperative (Cacciamani et al., 2018).

Integrating TPCs aligns with modern educational paradigms that emphasize active learning, collaboration, and the development of critical thinking skills. Thus, it is imperative to enhance the use of these devices as pedagogical tools in primary schools.

Despite these advantages, some studies report mixed findings on the effectiveness of tablet use in schools. Haßler et al. (2016), for example, found that the use of tablets for educational purposes and discovered that the effect size of tablet computer use in schools was not as expected. Simultaneously, several other studies revealed differences in learning outcomes. This suggests that the success of TPC adoption depends on several contextual factors, such as student attitudes, teacher readiness, and implementation practices. In Saudi Arabia, Alahmari (2019) found that many Saudi students consider tablets to be primarily for entertainment purposes. This underscores the significance of determining the factors that can increase primary school students' intention to use tablets as an educational tool.

Research Studies on Acceptance of Tablet Personal Computers (TPCs)

Recent studies highlight the growing integration of digital technologies in elementary education, demonstrating positive attitudes towards blended and technology-enhanced learning environments. For instance, Kara and Kaban (2023) found that elementary teachers in Turkey generally hold favorable perceptions towards implementing blended learning, indicating increasing acceptance of digital tools in classroom settings. This aligns with the increasing adoption of TPCs in Saudi primary schools, where students' intention to use such devices is influenced by factors like performance expectancy and hedonic motivation, as examined in this study.

Several studies have explored the acceptance and use of tablet PCs among students across different educational levels. Villani et al. (2018) investigated Italian students aged 14 to 18 and found significant differences in tablet acceptance based on grade level, gender, and usage frequency. Middle school students showed a higher acceptance and recognized the learning opportunities presented by tablets, while younger and older students displayed more negative attitudes. Similarly, Cacciamani et al. (2018), using the UTAUT framework, identified support conditions, perceived usefulness, and empowerment in learning as critical factors influencing high school students' adoption of tablets.

Wang et al. (2022) combined the Task-Technology Fit (TTF) model with UTAUT2 to examine factors influencing university students' intentions and actual tablet use in urban and rural settings. Their findings emphasized the impact of hedonic motivation, habit, and task-technology fit on tablet adoption, with habit being particularly important for urban students. Zheng and Li (2020) extended the Technology Acceptance Model (TAM) to study K–12 students' intention to use tablets. Their PLS-SEM analysis revealed significant relationships between attitude, intention, self-efficacy, technological anxiety, and family support, providing a solid framework to guide future educational technology initiatives.

In Saudi Arabia, research on tablet use in education is still emerging. Studies by Bajandoh et al. (2018a, 2018b) investigated societal orientation towards digital books via tablets. Despite government efforts to digitalize education, such studies remain limited. Albiladi et al. (2018a) examined challenges in using tablets for teaching English, while Sarran (2016) explored tablet adoption's impact on reading skills in young girls. Other recent work focused on parental perceptions of tablets for children with learning disabilities (Abed et al., 2021; Alhamed et al., 2021), highlighting the need for further research to assist policymakers and school administrators.

While prior studies have explored tablet use in secondary and higher education, little is known about the determinants of tablet adoption in Saudi Arabian primary schools, particularly when analyzed through the lens of gender differences using UTAUT2. "In summary, prior literature has provided insights into tablet adoption across various educational levels; however, there remains a clear need to explore primary school students' perspectives in the Saudi context. Additionally, limited research examines gender differences in this area through the UTAUT2 framework. This study addresses these gaps by investigating the key determinants of TPC use among Saudi primary students and testing gender as a moderating factor."

Unified Theory of Acceptance and Use of Technology (UTAUT2)

UTAUT2, the extension of the original UTAUT model, adds three constructs, such as price value, hedonic motivation, and habit, to better explain technology use in personal contexts (Venkatesh et al., 2012; 2016). UTAUT2 explains about 47% of variance in intention to use behavior in adopting technology and thus is best suited to study mobile learning and TPC adoption among students (Cacciamani et al., 2018; Nikolopoulou et al., 2021). All seven UTAUT2 constructs were found to influence TPC usage and behavioral intention (Wang et al., 2022). Here, the price value factor is removed since the participants don't purchase the devices themselves. Although UTAUT2 was originally constructed for adults, a couple of more recent studies have adopted its constructs to the K–12 setting, particularly highlighting hedonic motivation and habit as strong predictors of young learners' intention to use educational technology (Nikolopoulou et al., 2021). Recent studies have identified that UTAUT2's underlying constructs, such as performance expectancy, effort expectancy, social influence, facilitating conditions, hedonic motivation, and habit, are also applicable to the explanation of younger students' uptake of learning technologies (Cacciamani et al., 2018; Nikolopoulou et al., 2021).

For example, hedonic motivation and habit have been found to significantly influence technology use among children, as younger learners often rely on enjoyment and familiarity when engaging with digital tools (Wang et al., 2022). Furthermore, social influence from teachers and peers plays a heightened role in early education, where students' behaviors are more directly shaped by their immediate learning environment. By applying the UTAUT2 model to a primary school context, this study aims to assess the model's robustness in predicting behavioral intention and actual use of tablet PCs among young learners, while also incorporating gender as a critical moderating factor within the Saudi educational system.

Moderation of Gender

Gender plays a significant moderating role in technology acceptance, as evidenced in various studies (Alghamdi et al., 2020; Faqih & Jaradat, 2015; Yu, 2021). In Saudi Arabia, this moderation is particularly relevant due to the segregated education system, where male and female students attend separate schools taught by teachers of the same gender. This segregation influences how technology is adopted and used.

Several findings highlight gender differences in technology acceptance. For example, Venkatesh et al.(2003) showed that men are more inclined than women to use technology and to be optimistic about mobile commerce. Social influence on behavioural intention is moderated by gender, which is stronger for females. Venkatesh *et al.* (2012) postulated that gender moderated the

effect of a habit on intention. Park *et al.* (2019) provided empirical evidence to support the assertion that gender differences mediate between perceived usefulness and intention to use multimedia technology. More specifically, their findings showed that perceived usefulness has a greater impact on the intention to use for males than for females.

Venkatesh *et al.* (2012) noted that male users rely less on facilitating conditions when adopting new technologies than female users. Villani *et al.* (2018) argued that male students are more likely than females to use TPCs as learning tools. Gokcearslan (2017) found that females' perceptions are significantly higher than men's of using TPCs. At the same time, Cacciamani *et al.* (2018) observed no gender difference in the performance expectancy–behavioural intention to use tablet association.

Likewise, no moderation was identified by Nikolopoulou *et al.* (2021) in the relationship between habit, hedonic motivation, performance expectancy, and intention to utilize mobile internet. Moorthy *et al.* (2019) found that gender did not significantly moderate the relationship between hedonic motivation, habit, and students' intention to use mobile learning. The present study focuses exclusively on gender as a moderator, given its importance in the Saudi context. While other individual differences, such as age and experience, could also influence technology adoption, they are beyond the scope of this study and recommended for future research.

H1: There is a significant difference in the effect of performance expectancy on the intention to use the TPC between male and female students.

H2: There is a significant difference in effort expectancy on the intention to use the TPC between male and female students.

H3: There is a significant difference in social influence on the intention to use the TPC between male and female students.

H4: There is a significant difference in the effect of facilitating conditions on the intention to use the TPC between male and female students.

H5: There is a significant difference in the effect of hedonic motivation on the intention to use the TPC between male and female students.

H6: There is a significant difference in the effect of habit on the intention to use the TPC between male and female students.

H7: There is a significant difference in the effect of the intention to use the TPC on the actual usage between male and female students.

RESEARCH METHODOLOGY

Target population and sampling

The target population of this study consists of Saudi primary school students actively enrolled in 4th, 5th, or 6th grade in public primary schools in the Riyadh region. These specific grades were selected because students at this level are exposed to ICT and process fundamental skills relevant to technology use. Moreover, they frequently utilize TPCs as learning tools for education in the classroom. The Riyadh region was chosen as the study location because it had 22.8% of all schools (about 8707), making it the largest educational region nationally. The Riyadh region is divided into 21 administrative provinces. Riyadh City, the capital and a key urban center, is demographically diverse and represents a broad cross-section of the Saudi population. It is also home to high-earning

professionals who prioritize educational quality and often support the integration of digital tools in learning environments. This region's educational and technological infrastructure makes it a suitable representation for assessing TPC adoption among primary school students in the Kingdom.

Instrument development

The study employed a structured questionnaire composed of 31 items across eight constructs, adapted from a well-structured scale (Venkatesh et al., 2003; Venkatesh et al., 2012). A seven-point Likert scale ranging from "Strongly Disagree" (1) to "Strongly Agree" (7) was used to assess respondents' perceptions. To ensure face and content validity, the initial instrument was reviewed by two academic experts in educational technology. The questionnaire was initially developed in English and then professionally translated into Arabic. The translation process involved one certified translator and two subject matter experts to ensure conceptual and cultural equivalence. A pilot study using 30 male and female elementary school pupils was also carried out to uncover ambiguous questions. The results were deemed reliable based on Cronbach's alpha, and the modified questionnaire was subsequently used to collect the final data.

Data collection process

Data were collected through an online survey administered in 20 public primary schools in the Riyadh region. The process was coordinated through school administrators. Each school appointed one teacher as a research liaison. The survey link was shared with these teachers, who facilitated the administration in school computer labs or classrooms.

Participation was voluntary and anonymous. Teachers explained the study's purpose to the students and ensured ethical considerations were followed. Students completed the online questionnaire individually during class time under teacher supervision.

A total of 279 valid responses were collected. The gender distribution was 54.8% female and 45.2% male, reflecting the Saudi education system's gender-segregated structure. Data were collected from the three grade levels: the 4th grade was 29%, the 5th grade was about 39%, and the 6th grade was about 32%. In Saudi Arabia, schools are typically divided into separate institutions or classrooms for male and female students, particularly in public schools. As a result, males and females are often taught in different environments, which may influence the overall distribution of respondents in any study conducted within this system. This research sample, therefore, reflects the national gender distribution in Saudi schools, with more female students represented in the sample due to the higher enrollment rates of females in certain grade levels and schools.

Data analysis method

Data were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM) via SmartPLS 3.0. The analysis followed three main steps. First, the measurement model was assessed for reliability and validity using Cronbach's alpha, composite reliability, AVE, and discriminant validity (Fornell–Larcker and HTMT). Second, the structural model was evaluated to test the hypothesized relationships between constructs. Third, Multi-Group Analysis (MGA) was conducted to examine gender-based differences using the PLS-MGA approach. Before MGA, the MICOM procedure was applied to ensure measurement invariance across male and female groups.

RESULTS

Assessment of the measurement model

This study conducted construct validity to ensure the items measured what the study operationalized to measure (Hair et al., 2017). Table 1 presents the convergent validity results on each item with the factor loadings. The loading factor value for female and male primary school students ranged from 0.425 to 0.915 and 0.684 to 0.923, respectively. Each construct's average variance extracted (AVE) is 0.50 or higher, as Hair et al. (2017) suggested. Only one habit item was deleted (HB4) to increase the internal consistency of the construct (Hair et al., 2017). Indicators with loadings of 0.40 to 0.708 should typically only be considered for removal if doing so increases reliability or convergent validity (Hair et al., 2019). As presented in Table 2, the composite reliability (CR) value for female and male students ranges from 0792 to 0.921 and from 0.883 to 0.934, respectively. Therefore, the measurement model for data has good convergent validity.

Table 1: *Results of the assessment of the measurement model for the constructs*

Construct		Female			Male		
	Item	Factor Loading	CR	AVE	Factor Loading	CR	AVE
Performance Expectancy (PE)	PE1	0.852			0.859		
	PE2	0.740			0.700		
	PE3	0.882			0.836		
	PE4	0.839	0.898	0.688	0.860	0.888	0.666
Effort Expectancy (EE)	EE1	0.846			0.889		
	EE2	0.915			0.923		
	EE3	0.902			0.931		
	EE4	0.786	0.921	0.745	0.719	0.925	0.756
Social influence (SI)	SI1	0.903			0.854		
	SI2	0.845			0.878		
	SI3	0.881	0.909	0.768	0.905	0.911	0.773
Facilitating Condition (FC)	FC1	0.668			0.884		
	FC2	0.765			0.929		
	FC3	0.807	0.948	0.859	0.911	0.934	0.824
Hedonic Motivation (HM)	HM1	0.726			0.817		
	HM2	0.890			0.893		
	HM3	0.846	0.862	0.678	0.893	0.902	0.754
Habit (HB)	HB1	0.506			0.823		
	HB2	0.738			0.791		
	HB3	0.797	0.792	0.561	0.790	0.844	0.643
Intention to Use Tablets (INT)	INT1	0.506			0.612		
	INT2	0.738			0.795		
	INT3	0.797			0.890		
	INT4	0.820			0.836		
	INT5	0.799	0.856	0.550	0.816	0.894	0.632
Actual Usage (ACT)	ACT1	0.847			0.807		
	ACT2	0.821			0.873		
	ACT3	0.425			0.684		
	ACT4	0.806	0.825	0.555	0.860	0.883	0.655

Discriminant validity

The Fornell-Larcker criterion (1981) was checked to establish the discriminant validity. The AVE value must exceed the correlation value between variables. As shown in Tables 2 & 3, the square root of each construct's AVE is greater than (the diagonal value in bold) the correlation value between latent variables for male and female groups. Therefore, the discriminant validity is sufficient (Hair et al., 2017).

Table 2: *Discriminant Validity for Males*

	ACT	EE	FC	HB	HM	INT	PE	SI
ACT	**0.745**							
EE	0.547	**0.863**						
FC	0.454	0.702	**0.927**					
HB	-0.104	0.033	0.074	**0.703**				
HM	0.391	0.35	0.332	-0.314	**0.823**			
INT	0.685	0.489	0.447	-0.146	0.440	**0.741**		
PE	0.492	0.708	0.712	0.072	0.280	0.547	**0.830**	
SI	0.438	0.663	0.847	0.161	0.297	0.315	0.637	**0.877**

Table 3: *Discriminant Validity for Females*

	ACT	EE	FC	HB	HM	INT	PE	SI
ACT	**0.745**							
EE	0.530	**0.863**						
FC	0.470	0.720	**0.927**					
HB	-0.110	0.030	0.060	**0.703**				
HM	0.390	0.330	0.340	-0.310	**0.823**			
INT	0.680	0.490	0.440	-0.150	0.430	**0.741**		
PE	0.510	0.700	0.710	0.080	0.270	0.560	**0.830**	
SI	0.450	0.670	0.840	0.170	0.300	0.330	0.640	**0.880**

The MICOM

The MICOM should be established for both groups of female and male students as a requirement to perform MGA before assessing the structural model (Matthews, 2017). The partial MICOM of two groups is required to compare and understand the group-specific variations in the MGA's PLS-SEM results. This study employed the 5000 permutation approach with a two-tailed default significance level of 0.05 to test MICOM in PLS-SEM (Matthews, 2017). Table 4 presents the findings of the MICOM analysis, thereby signifying the achievement of partial measurement invariance. Consequently, drawing on the information presented in Table 3, the MGA method can be used to compare the two groups' path coefficients and conduct hypothesis testing.

Table 4: *Summary of Invariance Measurement Testing Using Permutation Results*

Construct	Configurational Invariance (Step 1)	Compositional Invariance (Step 2)			Equal Mean Assessment (Step 3a)			Equal Variance Assessment (Step 3b)			
		Original Correlation	5.0%	Partial Measurement Invariance	Original Differences	Confidence Interval	Equal	Original Differences	Confidence Interval	Equal	Full Measurement Invariance
ACT	Yes	0.994	0.993	Yes	0.128	[-0.239; 0.237]	Yes	-0.456	[-0.310; 0.333]	No	No
EE	Yes	0.997	0.994	Yes	0.091	[-0.240; 0.233]	Yes	-0.131	[-0.245; 0.252]	Yes	Yes
FC	Yes	1.000	0.998	Yes	0.028	[0.228; 0.813]	Yes	0.043	[-0.205; 0.222]	Yes	Yes
HB	Yes	0.997	0.547	Yes	0.023	[0.226; 0.839]	Yes	-0.106	[-0.249; 0.253]	Yes	Yes
HM	Yes	0.992	0.979	Yes	-0.095	[0.232; 0.433]	Yes	-0.163	[-0.241; 0.253]	Yes	Yes
INT	Yes	0.999	0.994	Yes	0.151	[-0.238; 0.218]	Yes	-0.427	[-0.373; 0.383]	No	No
PE	Yes	0.996	0.993	Yes	-0.078	[0.235; 0.512]	Yes	-0.030	[-0.244; 0.255]	Yes	Yes
SI	Yes	0.997	0.948	Yes	0.009	[0.226; 0.942]	Yes	0.057	[-0.220; 0.233]	Yes	Yes

Assessment of structural models

To evaluate the structural model, it is imperative to evaluate multicollinearity through the values of the variance inflation factor (VIF) across all constructs. Additionally, the assessment of R-squared (R^2) and Stone-Geisser criterion (Q^2) for both intention and actual usage is crucial. Furthermore, the significance of the path coefficients for the two groups must also be appraised (Hair et al., 2017). The VIF value should not exceed five to ensure the construct has no multicollinearity problem (Lin et al., 2020). The results showed that the VIF values do not exceed 3.475 for male and 4.508 for female data. This indicates that the model has no multicollinearity problems.

The model's structural fit analysis is seen in the total variance (R^2). This model explains 36.8% of behavioral intention and 68.3% of actual tablet usage for males, as shown in Figures 1 & 2. The model explains 42.7% variance in behavioural intention and 46.9% in actual tablet usage for female students, as shown in Figure 1. The R2 values of endogenous variables showed an acceptable (moderate to high) score for males and females. The value of Q2 should be greater than zero to demonstrate the predictive capability of a structural model (Hair et al., 2019); in this case, we found Q2 values of 0.181 and 0.242 for intention and actual usage for female data, respectively. In addition, Q2 values of 0.152 and 0.433 for intention and actual usage for male data, respectively. These values are considered high, indicating the model's excellent predictive capabilities.

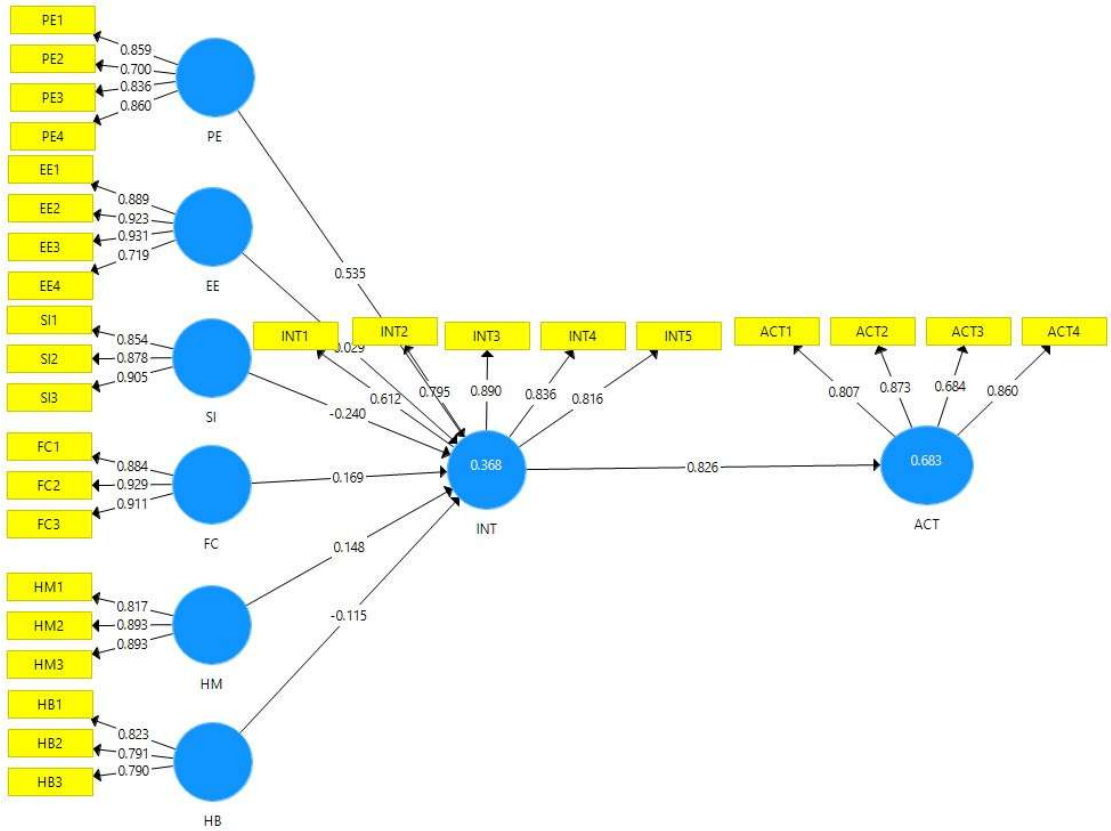

Figure 1: Measurement Model analysis with R^2 value for males

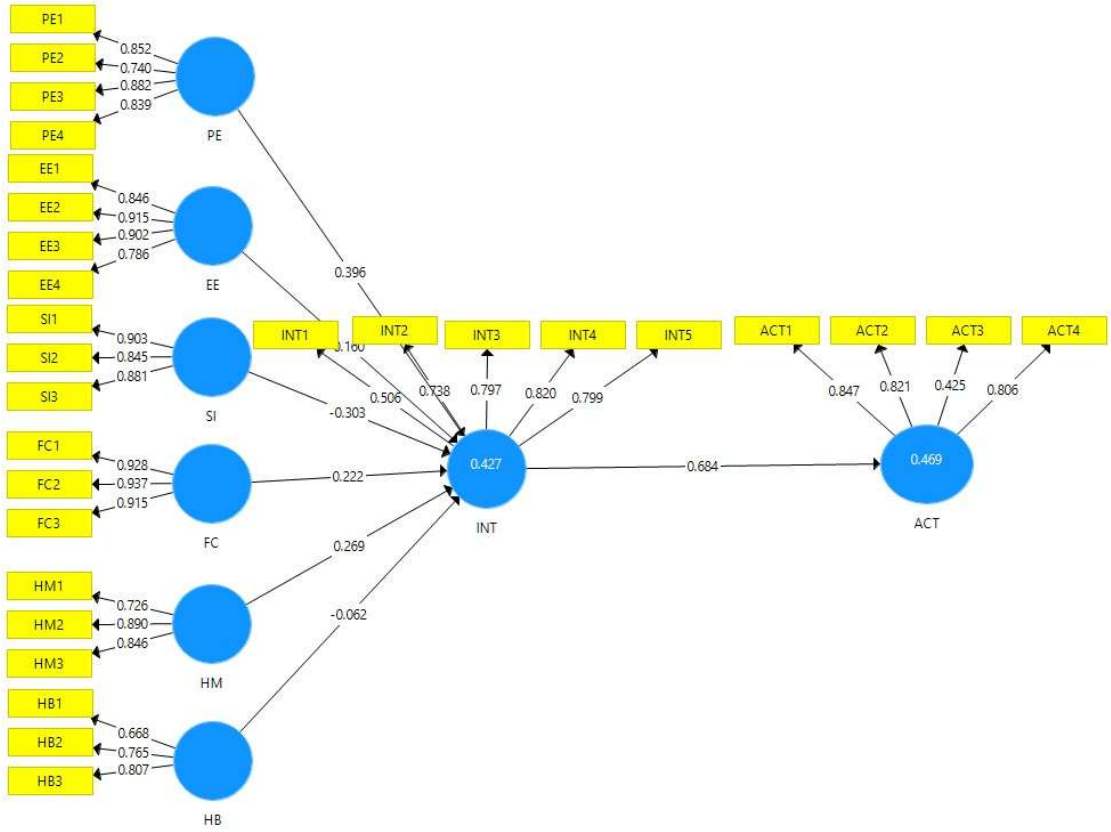

Figure 2: Measurement model analysis with R2 value for females

Structural coefficient estimates among the latent variables for each model are shown in Tables 4 & 5 and Figure 3. Performance expectancy has had the highest effect on the intentions of students to use tablets as learning tools for females ($\beta = 0.535$, $p < 0.05$) and males ($\beta = 0.396$, $p < 0.05$). In contrast, hypothesis 2 test results in this study showed that effort expectancy does not affect students' intention for male and female data ($p > 0.05$). Social influence in hypothesis 3 also did not affect the intention ($p > 0.05$). In contrast, for female students, social influence had a significant and negative effect, meaning that Hypothesis 3 was accepted ($\beta = -0.303$, $p < 0.05$)

Regarding hypothesis 4, facilitating conditions ($\beta = 0.222$, $p > 0.05$) do not affect the intention of students to use TPCs for both male and female data. Additionally, hypothesis 5 shows that the habit does not affect the intention of female and male students to use the TPCs ($p > 0.05$). H6 shows that hedonic motivation had the second-largest positive effect after performance expectancy on the intention of female primary school students to use TPC as learning tools ($\beta = 0.269$, $p < 0.05$); however, this factor did not influence the intention for male data ($p > 0.05$).

The intention in hypothesis 7 is the predictor with the largest significant influence on primary school students' use of tablet computers as learning tools for females ($\beta = 0.684$, $p < 0.05$) and males ($\beta = 0.826$, $p < 0.05$). Tables 5 & 6 show the detailed hypothesis testing for both male and female students.

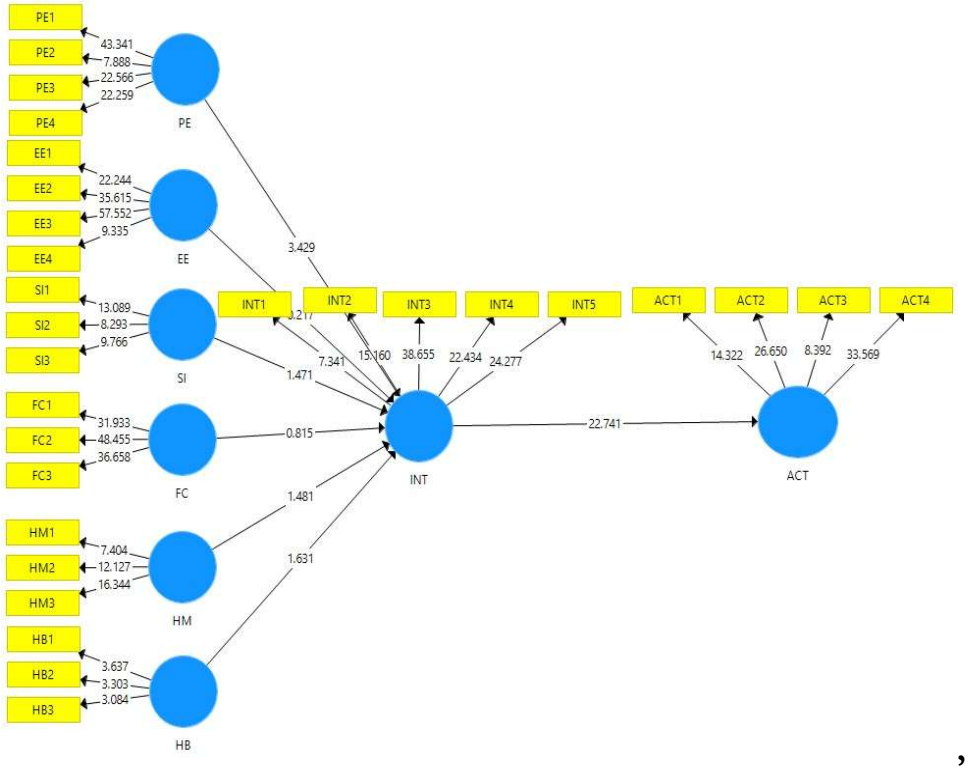

Figure 3: *Structure Model for Females*

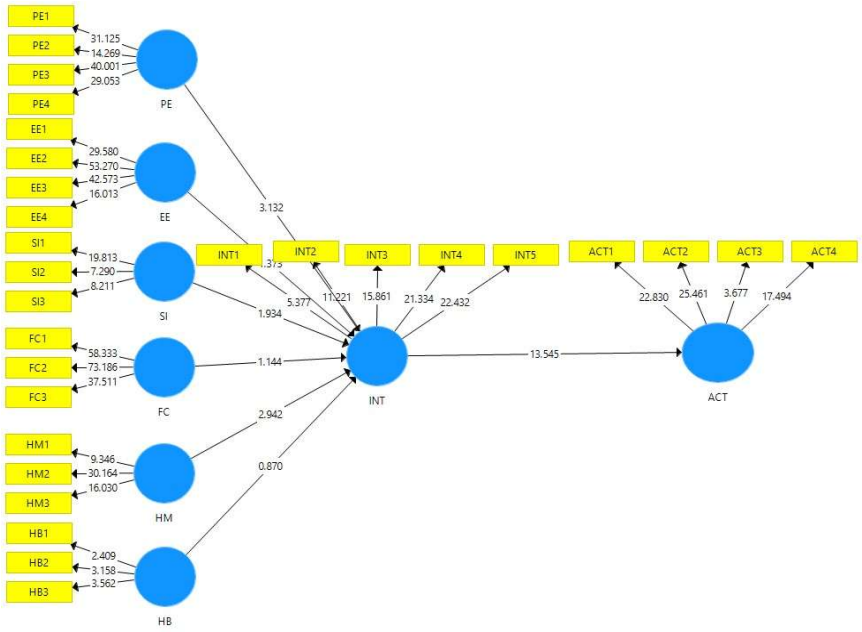

Figure 4: *Structure Model for Males*

Table 5: *The Results of the Hypothesis Testing for Males*

		β	Std.	T Statistics	P Values	Decision
H1	Performance Expectancy -> Behavioral Intentions	0.535	0.156	3.429	<0.001	Supported
H2	effort expectancy -> Behavioral Intentions	0.029	0.088	1.382	0.083	Not Supported
H3	Social influence -> Behavioral Intentions	-0.240	0.163	1.471	0.071	Supported
H4	facilitating conditions -> Behavioral Intentions	0.169	0.208	0.815	0.208	Not Supported
H5	Habit -> Behavioral Intentions	-0.115	0.07	1.631	0.052	Supported
H6	Hedonic motivation -> Behavioral Intentions	0.148	0.1	1.481	0.069	Supported
H7	Behavioral Intentions -> Actual Usage of Tablet Computer	0.826	0.036	22.741	<0.001	Supported

Note: $p<0.05$ indicates statistical significance at the 5% level; $p<0.01$ at the 1% level; $p<0.001$ at the 0.1% level.

Table 6: *The Results of the Hypothesis Testing for Females*

		β	Std.	T Statistics	P Values	Decision
H1	Performance Expectancy -> Behavioral Intentions	0.396	0.126	3.132	0.001	Supported
H2	effort expectancy -> Behavioral Intentions	0.160	0.117	1.373	0.085	Not Supported
H3	Social influence -> Behavioral Intentions	-0.303	0.156	1.934	0.027	Supported
H4	facilitating conditions -> Behavioral Intentions	0.222	0.194	1.144	0.126	Not Supported
H5	Habit -> Behavioral Intentions	-0.062	0.071	0.870	0.192	Not Supported
H6	Hedonic motivation -> Behavioral Intentions	0.269	0.092	2.942	0.002	Supported
H7	Behavioral Intentions -> Actual Usage of Tablet Computer	0.684	0.051	13.545	<0.001	Supported

Note: $p<0.05$ indicates statistical significance at the 5% level; $p<0.01$ at the 1% level; $p<0.001$ at the 0.1% level.

Multigroup analysis (MGA)

Two conservative and nonparametric approaches – Henseler's MGA method and 5000 permutation test- were used to analyze the difference between the factors of students' intention in male and female groups to use the tablet as a learning tool (Matthews, 2017). Table 7 shows the results of the MGA based on Henseler's MGA and the permutation method, which show a significant difference in the effect of intention on actual usage for female and male students. The effect of intention on actual usage is much higher for female than male students.

Table 7: *Results of Hypothesis Differences Testing*

H		Path Coefficients Original (Male_Gen(1.0))	Path Coefficients Original (Female_Gen(2.0))	Path Coefficients Original Difference (Male_Gen(1.0) - Female_Gen(2.0))	Path Coefficients Permutation Mean Difference (Male_Gen(1.0) - Female_Gen(2.0))	2.50%	97.50%	Permutation p-Values	Henseler's MGA p-Values	Result
H8	PE -> INT	0.396	0.535	-0.139	0.006	-0.384	0.404	0.50	0.236	Not supported
H9	EE -> INT	0.160	0.029	0.132	0.000	-0.367	0.354	0.488	0.223	Not supported
H10	SI -> INT	-0.302	-0.303	-0.24	-0.062	0.005	-0.442	0.474	0.380	Not supported
H11	FC -> INT	0.222	0.169	0.053	-0.009	-0.591	0.572	0.861	0.423	Not supported
H12	HM -> INT	0.269	0.148	0.122	-0.002	-0.288	0.297	0.431	0.280	Not supported
H13	HB -> INT	-0.062	-0.115	0.053	0.003	-0.176	0.172	0.541	0.280	Not supported
H14	INT -> ACT	0.684	0.826	-0.142	-0.001	-0.13	0.136	0.034	0.011	Supported

Interestingly, the results explain that gender moderates the linkage between intention and actual usage, which differs significantly on a 5 percent level between females (β = 0.826) and males (β= 0.684). This means that the actual usage is strongly caused by intention for female students and is weaker for male students. Moreover, the results of Table 5 also indicated no significant differences between other path coefficients and relationships across both groups. This indicates that there is no significant difference between females vs. males in terms of the effect of performance expectancy (H8), effort expectancy (H9), social influence (H10), facilitating conditions (H11), hedonic motivation (H12), and habit (H13) on behavior intention. Therefore, it can be concluded that the results for MGA support hypothesis H14, and other hypotheses suggested by this study (H8–H13) cannot be supported by the results obtained.

DISCUSSION

The SEM analysis revealed that performance expectancy significantly influences students' intention to use TPCs for both male and female groups (H1). However, the multi-group analysis (MGA) showed no significant gender differences in this relationship (H6), suggesting a similar perception among male and female students regarding the usefulness of TPCs in enhancing learning. This aligns with the findings of Wang et al. (2022), who concluded that the relationship between performance expectancy and behavioral intention remains consistent across genders.

Conversely, effort expectancy did not significantly influence students' intention to use TPCs in either group (H2), nor was there a significant gender difference in this relationship (H9). These findings support previous studies (e.g., Cacciamani et al., 2018; Hamzah et al., 2020) and suggest that students, regardless of gender, do not perceive TPC use as demanding. This could be due to students' familiarity with digital devices and exposure to IT instruction, especially in the selected grades.

Interestingly, a significantly negative relationship was found between social influence and intention among female students only (H3). This suggests that female students may adopt TPCs despite receiving limited encouragement from their social circles. As Abed et al. (2021) and Mulet et al. (2019) suggest, this could stem from family members' concerns about overuse of technology or screen time, despite the educational potential of TPCs. However, no significant gender differences were found in this relationship (H10), diverging from Nikolopoulou et al. (2020), who found otherwise.

Facilitating conditions were not significant predictors of intention for either gender (H4), and no gender difference was detected (H11). This supports prior research (Alasmari & Zhang, 2019; Wan et al., 2022), which posits that facilitating conditions are more predictive of actual use rather than intention. Given the age homogeneity of the sample (9–12 years), such external conditions may be less individually assessed by the students themselves.

The analysis revealed that hedonic motivation does not significantly affect female students' intention to use tablet PCs (H5). However, female students may find TPC use enjoyable and engaging, potentially due to the types of activities they typically engage in, such as role-playing and interactive learning (Alahmari, 2019). Moreover, MGA revealed a significant gender difference in this relationship, indicating hedonic motivation plays a more important role for females, consistent with Nikolopoulou et al. (2020). In contrast, habit was not found to significantly influence intention in either group (H6), echoing results from Wang et al. (2020) and Prasetyo et al. (2021). This may be because students' TPC usage has not yet formed into automatic behavior, especially at a young age,

where school-controlled use may not yet lead to habitual engagement. Importantly, the relationship between intention and actual use of TPCs was found to be positive and significant in both male and female groups (H7). This reinforces earlier findings (e.g., Ifenthaler & Schweinbenz, 2016; Cacciamani et al., 2018; Hamzah et al., 2020) emphasizing the pivotal role of behavioral intention in driving technology use in education. However, a significant gender difference was found in this relationship (H13), with female students showing a stronger link between intention and actual use. This supports the UTAUT and UTAUT2 frameworks (Venkatesh et al., 2003; 2012), which recognize gender as a key moderator. Additionally, it aligns with Gokcearslan (2017), who noted that female students often display a more favorable attitude toward educational technology.

Implications

The findings of this study offer several key implications for education policymakers, school administrators, and curriculum planners for enabling the effective adoption of TPCs in primary education, particularly in the Saudi context.

Theoretical Implications

The study contributes to the UTAUT and UTAUT2 extensions by confirming their applicability to younger students within an elementary school setting. It was highlighted by the current research that basic constructs like performance expectancy and hedonic motivation still remained strong predictors of technology adoption even for 9–12-year-old children. Furthermore, gender-based analysis reinforces the theoretical model by confirming gender as a good moderator, particularly between hedonic motivation and intention to use and between intention and utilization. This result proves that technology acceptance models can effectively be adapted for younger populations and emphasizes the necessity to consider demographic variables like gender while applying such models in schools.

Practical Implications

Design Gender-Sensitive Interventions

As hedonic motivation had such a significant role in the intention of female students to use TPCs, and with a more significant intention-to-use relationship for females, more fun and engaging digital content must be designed by developers and teachers, particularly for female students. These can include interactive, gamified, or collaborative learning experiences that would attract them.

Highlight Performance Benefits for Both Genders

The significant influence of performance expectancy for both genders suggests that emphasizing the learning benefits of TPCs, either improved learning results or efficiency, can positively influence students' intention to use them. Teachers' introductions or school promotions to the usage of TPCs should be able to communicate these benefits to students effectively.

Counter Negative Social Influences Among Females

The negative impact of social influence on female students suggests the need to clarify potential parental or peer doubts regarding the use of TPCs. Schools must engage families, particularly in conservative or technology-hesitant populations, in information sessions, workshops, or communication campaigns that highlight the pedagogical value of TPCs and counteract misunderstandings.

Redefine the Role of Facilitating Conditions

Since enabling conditions did not have a significant impact on intention in this young population, efforts to improve infrastructure or teacher support may not have direct implications for students' motivation to use TPCs. Instead, these resources should be allocated to teachers and system-level integration, and not with the expectation of direct motivational impact on students.

Design for Habit Formation Through Long-Term Exposure

The lack of influence of habit's strong effect indicates that students' use of TPCs is not yet a habit. Longer, ongoing exposure to structured tablet use in school lessons may be required before TPC use becomes habitual. Developing clear usage routines and introducing tablets in all school subjects could help to establish this habit in the long term.

Support Female Students' Continued Use by Strengthening Intention

With the more robust intention-actual use relationship for female students, support and reinforcement of their early intentions through measures such as praise, progress tracking, or student-centered digital projects can sustain TPC use and maximize learning gains.

Prepare Teachers for Gender-Sensitive Technology Integration

Teacher preparation programs need to encompass gender-sensitive pedagogies and focus on the different motivational drivers for male and female students. By being aware of these nuances, educators can develop more effective and inclusive tech-based curricula.

Foster Evidence-Based Policy and Longitudinal Research

To optimize the utilization of TPCs for educational purposes, policy decisions must be informed by empirical findings such as those presented here. Furthermore, longitudinal studies must track how use patterns and motivations evolve with time and whether gender differences remain constant or shift as students navigate adolescence.

CONCLUSION

This study contributes to the growing body of research on educational technology by extending the applicability of the UTAUT2 model within the context of primary education in Saudi Arabia. While much research has been conducted on the use of TPCs in education, this study uniquely focuses on a non-Western setting and younger learners in a segregated school system. By exploring both internal (e.g., performance expectancy, hedonic motivation) and external (e.g., social influence, facilitating conditions) factors, the study provides a nuanced understanding of what drives students' intention and actual use of TPCs in Saudi primary schools.

One of the key theoretical implications is the identification of gender as a significant moderator between behavioral intention and actual usage. Specifically, the relationship between intention and TPC usage was found to be stronger among female students. This highlights the importance of considering gender-specific factors when developing interventions or policies aimed at integrating TPCs into learning environments.

The findings also confirm that performance expectancy remains the most influential factor affecting students' intention to use TPCs. This suggests that students are more likely to adopt tablets when they perceive them as tools that can enhance their learning outcomes. Educational policymakers should leverage this by involving students in technology planning processes and emphasizing the educational benefits of TPC use.

Interestingly, facilitating conditions did not significantly impact students' intentions, indicating that the desire to use TPCs persists even in the absence of robust infrastructure or technical support. However, this should not downplay the importance of providing adequate resources. Ensuring that schools are well-equipped with the necessary technological infrastructure remains critical to support sustainable adoption.

Another notable finding is the influence of hedonic motivation, especially among female students. Enjoyment, ease of use, and engaging features such as colors, multimedia, and creative tools were significant motivators. Therefore, tablet developers and educational content creators are encouraged to design more user-friendly, visually appealing, and interactive tools to foster higher engagement and sustained usage among young learners.

In summary, this study provides valuable insights for educational stakeholders, policymakers, and technology developers seeking to implement TPCs effectively in primary school settings, particularly in contexts like Saudi Arabia. Future research should further explore the influence of age, experience, and school-level factors to build a more comprehensive framework for technology adoption in early education.

LIMITATIONS AND FURTHER RESEARCH

This study, while offering valuable insights into the adoption of TPCs in primary education, is not without limitations. First, the research was grounded in the UTAUT2 framework, focusing exclusively on gender as a moderating variable. Other potentially influential individual characteristics, such as age, grade level, and prior experience with technology, were not examined. Future studies should consider incorporating these variables to offer a more comprehensive understanding of technology adoption among young learners. Second, the data were collected solely from students in the Riyadh region, which, while significant in terms of population and educational infrastructure, may not fully represent the broader population of Saudi primary students. To enhance the generalizability of findings, future research could include comparative studies across various regions within the Kingdom. Finally, while the study identified habit and hedonic motivation as relevant factors, further cross-cultural validation is needed. Replicating and expanding the model in different educational systems or countries would help confirm the influence of these constructs in diverse settings. Such efforts would contribute meaningfully to the growing body of knowledge on mobile learning technologies in K–12 contexts.

REFERENCES

Abed, M. G., & Shackelford, T. K. (2021). Saudi parents' perspectives on the use of touch screen tablets for children with learning disabilities. *International Journal of Inclusive Education,* 1-15. https://doi.org/10.1080/13603116.2021.1991491

Alahmari, S. (2019). Using Educational Applications on Tablets to Support Science Learning Among First-Grade Saudi Primary School Children, PhD thesis, University of Sheffield.

Alasmari, T., & Zhang, K. (2019). Mobile learning technology acceptance in Saudi Arabian higher education: an extended framework and A mixed-method study. *Educ Inf Technol*, 24, 2127–2144.https://doi.org/10.1007/s10639-019-09865-8.

Alfalah, A. A. (2023). Factors influencing students' adoption and use of mobile learning management systems (m-LMSs): A quantitative study of Saudi Arabia. *International Journal of Information Management Data Insights*, 3, 100143.https://doi.org/10.1016/j.jjimei.2022.100143.

Alhamed, N., & Ohlson, M. (2021). The Digital Transition from Textbooks to Tablets in Saudi Arabia', *Journal of Interactive Learning Research,* 32(1), 67-98. https://digitalcommons.unf.edu/etd/968 .

Al-Huneini, H., Walker, S. A., & Badger, R. (2020). Introducing tablet computers to a rural primary school: An activity theory case study. *Computers in Education*, 143. https://doi.org/10.1016/j.compedu.2019.103648.

Al-Mamary (2022). Understanding the use of learning management systems by undergraduate university students using the UTAUT model: Credible evidence from Saudi Arabia. *International Journal of Information Management Data Insights,* 2(2). https://doi.org/10.1016/j.jjimei.2022.100092

Alotaibi, M.S. (2021). Early childhood education and the Saudi Vision 2030. *Edu. J. Fac. Educ. Sohag*, 91,181–204.https://doi.org/10.12816/EDUSOHAG.2021.

Alowayr, A. (2022). Determinants of mobile learning adoption: extending the unified theory of acceptance and use of technology (UTAUT). *International Journal of Information and Learning Technology*, 9(1), 1-12. https://doi.org/10.1108/IJILT-05-2021-0070.

Cacciamani, S., Villani, D., Bonanomi, A., Carissoli, C., Olivari, M. G., Morganti, L., ... & Confalonieri, E. (2018). Factors affecting students' acceptance of tablet PCs: A study in Italian high schools. *Journal of Research on Technology in Education*, *50*(2), 120-133.. https://doi.org/10.1080/15391523.2017.1409672

Cao, T. M., & Nguyen, N. P. (2022). Factors affecting students in Vietnam's intention to use smartphones for learning on the mobile learning platforms. *J. Educ. Soc. Res.* 12, 113–125. https://creativecommons.org/licenses/by-nc/4.0/.

Chatti, H., & Hadoussa, S. (2021). Factors affecting the adoption of e-learning technology by students during the COVID-19 quarantine period: the application of the UTAUT model. *Eng. Technol. Appl. Sci. Res.,* 11, 6993–7000.https://doi.org/10.48084/etasr.3985.

El-Masri, M., & Tarhini, A. (2017). Factors affecting the adoption of e-learning systems in Qatar and the USA: extending the Unified Theory of Acceptance and Use of Technology 2 (UTAUT2). *Educ. Technol. Res. Dev.,* 65, 743–763. https://doi.org/10.1007/s11423-016-9508-8.

Gokcearslan, S. (2017). Perspectives of students on acceptance of tablets and self-directed learning with technology. *Contemporary Educational Technology,*8(1), 40–55.

Haßler, B., Major, L., & Hennessy, S. (2016). Tablet use in schools: A critical review of the evidence for learning outcomes. *Journal of Computer Assisted Learning*, *32*(2), 139-156. https://doi.org10.1111/jcal. 12123.

Hair, J.F., Hult, G.T.M., Ringle, C.M., & Sarstedt, M. (2017). A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM), 2nd Edition, Sage Publications Inc., Thousand Oaks, CA.

Hair Jr, J. F., Howard, M. C., & Nitzl, C. (2020). Assessing measurement model quality in PLS-SEM using confirmatory composite analysis. *Journal of Business Research,* 109,101-110. https://doi.org/10.1016/j.jbusres.2019.11.069.

Hamzah, W. W., Yusoff, M., Ismail, I., & Yacob, A. (2020). The behavioural intentions of secondary school students to use tablets as a mobile learning device. *International Association of Online Engineering,* 14(13), 161-171. https://doi.org/10.3991/ijim.v14i13.13027.

Ifenthaler, D., & Schweinbenz, V. (2016), 'Students' Acceptance of Tablet PCs in the Classroom', *Journal of Research on Technology in Education*, 48(4), 306-321.

Kara, G., & Kaban, A. L. (2023). Experiences of elementary school teachers towards blended learning implementation. *International Journal of Learning Technology*. https://doi.org/10.1504/ijlt.2023.132762

Lin, H. M., Lee, M. H., Liang, J. C., Chang, H. Y., Huang, P., & Tsai, C.C. (2020). A review of using partial least squares structural equation modeling in e-learning research. , *Br. J. Educ. Technol,* 51,1354–1372. https://doi.org/10.1111/bjet.12890.

Matthews, L.M. (2017). Applying multi-group analysis in PLS-SEM: a step-by-step process', in Latan, H. and Noonan, R. (Eds.): Partial Least Squares Structural Equation Modeling – Basic Concepts, Methodological Issues and Applications, Springer International Publishing AG, Berlin, Germany, in press.

Moorthy, K., Yee, T. T., T'ing, L. C.,& Kumaran, V. V. (2019). Habit and hedonic motivation are the strongest influences in mobile learning behaviours among higher education students in Malaysia, *Australasian Journal of Educational Technology*, *35*(4), https://doi.org/10.14742/ajet.4432.

Mulet, J., van de Leemput, C. & Amadieu, F. (2019). A Critical Literature Review of Perceptions of Tablets for Learning in Primary and Secondary Schools. *Educ Psychol Rev*, 31, 631–662. https://doi.org/10.1007/s10648-019-09478-0.

Nikolopoulou, K., Gialamas, V., and Lavidas, K. (2020). Acceptance of mobile phone by University students for their studies: an investigation applying the UTAUT2 model. *Educ Inform Technol,* 25(5), 4139-4155. https://doi.org/10.1007/s10639-020-10157-9.

Nikolopoulou, K., Gialamas, V., & Lavidas, K. (2021). Habit, hedonic motivation, performance expectancy, and technological pedagogical knowledge affect teachers' intention to use mobile internet, *Computers and Education Open,* No.2, pp. 100041. https://doi.org/10.1016/j.chb.2018.11.029.

Park, C., Kim, D., Cho, S., & Han, H.-J. (2018). Adoption of multimedia technology for learning and gender differences. *Computers in Human Behavior*, 92, 288-296. https://doi.org/10.1016/j.chb.2018.11.029

Prince, J. (2017). English language learners in a digital classroom. *CATESOL Journal,* 29(1), 51–73.

Prasetyo, Y.T., Roque, R., Chuenyindee, T., Young, M. N., Diaz, J., et al., & Redi, A. (2021). Determining factors affecting the acceptance of medical education e-learning platforms during the COVID-19 pandemic in the Philippines: Utaut2 approach, *Healthcare,* 9, 780. https://doi.org/10.3390/healthcare9070780.

Racero, F. J., Bueno, S.,& Gallego, M. D. (2020). Predicting students' behavioral intention to use open source software: A combined view of the technology acceptance model and self-determination theory. *Applied Sciences*, *10*(8), 2711. https://doi.org/10.3390/app10082711.

Roldán-Álvarez, D., Martín, E., & Haya, P.A.(2021). Collaborative video-based learning using tablet computers to teach job skills to students with intellectual disabilities. *Educ. Sci.,*11, 437. https://doi.org/10.3390/educsci11080437.

Saroia, A.I., & Gao, S. (2019). Investigating university students' intention to use mobile learning management systems in SwedenInnovations. *Education and Teaching International,* 56(5), 569-580. https://doi.org/10.1080/14703297.2018.1557068.

Soffer, T., & Yaron, E. (2017). Perceived learning and students' perceptions toward using tablets for learning: The mediating role of perceived engagement among high school students. *Journal of Educational Computing Research,* 55(7), 951-973. https://doi.org/10.1177/0735633117689892.

Venkatesh, V., Thong, J. Y., & Xu, X. (2012). Consumer acceptance and use of information technology: extending the unified theory of acceptance and use of technology. *MIS Quarterly*, 157-178. https://doi.org/10.2307/41410412.

Villani, D., Morganti, L., Carissoli, C., Gatti, E., Bonanomi, A., Cacciamani, S., ...& Riva, G. (2018), 'Students' acceptance of tablet PCs in Italian high schools: Profiles and differences. B*ritish Journal of Educational Technology, 49*(3), 533-544. https://doi.org/10.1111/bjet.12591

Wan, L., Xie, S., & Shu, A. (2020). Toward an understanding of university students' continued intention to use MOOCs: When UTAUT model meets TTF model, *S*AGE Open, 10. https://doi.org/10.1177/2158244020941858.

Wang, F., Wijaya, T. T., Habibi, A., & Liu, Y. (2022). 'Predictors Influencing Urban and Rural Area students to Use Tablet Computers as Learning Tools: Combination of UTAUT and TTF Models', *Sustainability*, 14 (21), 13965. https://doi.org/10.3390/su142113965.

Wang, H., Tao, D., Yu, N., & Qu, X. (2020). Understanding consumer acceptance of healthcare wearable devices: An integrated model of UTAUT and TTF. *International Journal of Medical Informatics,* 139, 104156. https://doi.org/10.1016/j.ijmedinf.2020.104156.

Wong S-M, Leong C-M, & Puah C-H. (2019). Mobile internet adoption in Malaysian suburbs: the moderating effect of gender. *Asian J Bus Res.* 9(3), 90–114. https://doi.org/10.14707/ajbr.190069.

Yu, Z.. (2021). The effects of gender, educational level, and personality on online learning outcomes during the COVID-19 pandemic. *Int J Educ Technol High Educ*, *18*(14).https://doi.org/10.1186/s41239-021-00252-3.

Zheng, J., & Li, S. (2020). What drives students' intention to use tablet computers: An extended technology acceptance model. I*nt. J. Educ. Res. 102*,101612.

Zhou, Y., Li, X., & Wijaya, T.T. (2022). Determinants of Behavioral Intention and Use of Interactive Whiteboard by K-12 Teachers in Remote and Rural Areas. *Front.* Psychol., 13, 934423. https://doi.org/10.3389/fpsyg.2022.934423.