INFLUENCING FACTORS TO ADOPT M-LEARNING DURING COVID-19 FOR SCHOOLS IN PAKISTAN

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Abstract

The purpose of this research is to investigate the factors exaggerated due to COVID-19 to adopt m-learning specifically in schools in Pakistan. During COVID-19, school, colleges, universities were obliged to close to implement precautionary measures. The key adopted policy to reduce pandemic was physical distancing forced all towards digital social lifestyle. Health anxiety due to pandemic exaggerated the use of digital devices. Users had to bear price of devices and services. The theoretical model of UTAUT suggests that the actual use of technology is determined by behavioural intention. The degree of association between the independent variables Performance Expectancy (PE), Effort of Expectancy (EE), Social Influence (SI), Facilitating Conditions (FC), and Physical Distancing (PD) is determined using a modified UTAUT model. Whereas the Health Anxiety and Price Value moderating factors are chosen to make the model acceptable for evaluating the study questions and hypothesis. The research is going to explore a gap in the literature by analysing the Physical Distancing and moderating variables of Health Anxiety and Price Value, which might influence the student's behaviour of Madrasa-tul-Banat High school. 210 female students of grade8,9, and 10 were selected for this research. In this study, a questionnaire survey is utilized to obtain quantitative data on student's intention and actual usage of m-learning. SPSS 27.0 software is used to evaluate the questionnaire's design and execution, and it will be utilized to examine the degree of association between the research's components.

Keywords: *M-Learning, Influencing Factors, COVID-19*

1. Introduction

The COVID-19 pandemic disrupted traditional educational activities globally, leading to increased reliance on digital technology for learning. Despite this shift, there was no unified policy for standards in digital education. To mitigate the spread of the virus, schools and universities were closed, and students had to transit to online learning. COVID-19 began in late 2019 in China and quickly spread throughout the world. COVID-19 has prompted 120 nations to stop physical presence in schools and universities, disrupting more than a billion students' educational activities. The regime's movement control decree compelled the closure of all educational institutions. For universities to sustain academic operations, digital learning has emerged as the only option. Face-to-face lessons in schools were halted, and theoretical ideas were taught remotely, but practise in the presence of

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teachers was impaired, and following COVID-19, issues with merging theory and practice were documented [1,2,3]. During COVID-19, interaction between students, parents, sports coaches, and friends was hampered, and they face new obstacles every day. Social vulnerability and digital emergence have been seen to aggravate students' unhappiness and issues regulating their educational activities. The growing use of mobile devices opens the door to new M-Learning opportunities that may meet expectations without incurring any expenditures.

This research focuses on the adoption of M-learning among Madrasa-tul-Banat High school students in Pakistan during the COVID-19 pandemic. It employs a modified Unified Theory of Acceptance and Use of Technology (UTAUT) model to investigate factors influencing students' intention to adopt m-learning, considering emerging constructs like Physical Distancing, Health Anxiety, and Price Value. The study aims to contribute to the understanding of how these factors affect students' behaviour and adoption of m-learning in a school context, particularly in introductory programming courses.

This paper will discuss the UTAUT model first, the modified UTAUT model, methodology and lastly the results and discussion.

2. Theoretical Framework and Hypothesis formulation

2.1 Development of the Theoretical Framework and Hypothesis

The Unified Theory of Acceptance and Use of Technology (UTAUT) is a significant model in the field of technology adoption. It has gained prominence due to its ability to address complex adoption challenges across various IT fields and settings. While the Technology Acceptance Model (TAM) was widely used, it had limitations in addressing diverse and complex technologies. This led to the development of customized models like TAM2 and TAM3. These models, including UTAUT, offer a more robust framework to assess the adoption of evolving technologies [4][5]

UTAUT has been applied in various contexts, such as assessing the acceptability of autonomous cars, predicting health professionals' adoption of remote care technology, and evaluating e-wallet adoption. Researchers have found UTAUT to be a reliable model for understanding technology adoption [6][7][8].

One of the key strengths of UTAUT is its ability to consider social and competitive factors in technology acceptance, making it more relevant to real-world scenarios compared to TAM and other models. UTAUT addresses the influence of social factors, which TAM lacks, and this is crucial as digitalization is often influenced by social factors and can impact organizational decision-making [9].

The UTAUT model encompasses four determinants: Performance Expectancy, Effort Expectancy, Social Influence, and Facilitating Conditions. Additionally, it includes four moderating factors: age, gender, experience, and voluntariness of usage. These components help predict individual behavioral intention and usage behaviors related to technology adoption [10].

In summary, UTAUT is a significant model for understanding technology adoption, addressing the limitations of previous models, and considering both

psychological and social factors in technology acceptance. It has practical relevance in various domains and settings, making it a valuable tool for researchers and practitioners.

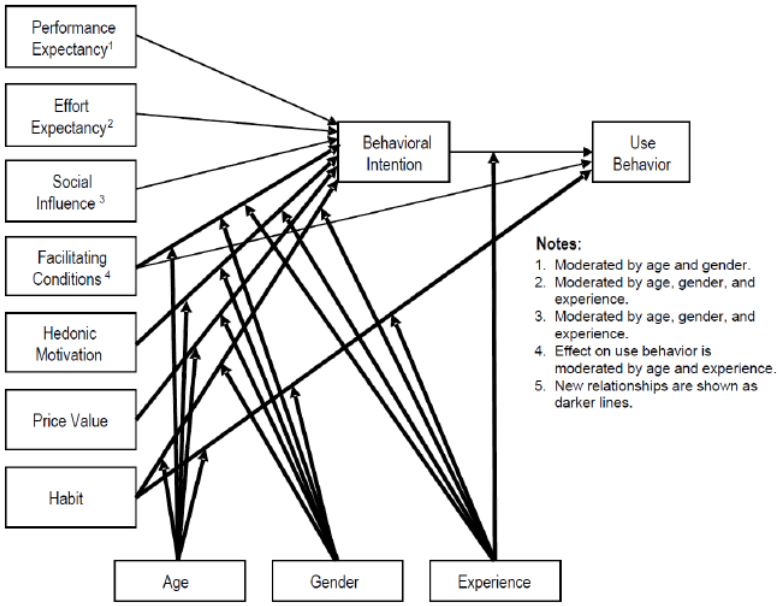

Figure 1. UTAUT Model Presented by Venkatesh ,2012 [1]

3. Modified UTAUT Model for The Current Study

The literature review highlights the significance of investigating the following variables thoroughly, particularly among Pakistani school children, in order to comprehend the student's desire to adopt m-learning. So Physical Distancing, Health Anxiety and Price Value are selected to extend UTAUT model along with main constructs of Performance Expectancy (PE), Effort Expectancy(EE), Social Influence(SI) and Facilitating Conditions (FC).

3.1 Performance Expectancy

Performance expectation was described as "the users' perception when using an M-learning system to improve their performance." It is the students' faith in the usefulness of Learning Management System (LMS) for studying. Performance Expectancy is the level of student's understanding of the LMS and how it might help them perform better in their courses [13]. Hence the following hypothesis is formulated.

H1: Performance Expectancy positively influences the Behavioural Intention (BI) of students to adopt m-learning.

3.2 Effort Expectancy

Effort expectation is "the perception of comfort when exercising the system.". One of the most essential components of the UTAUT model is effort expectancies [11,12]. The effort expectation aspect is also known as the intrinsic component since

an individual observes to capitalise on technology that is low in usual owing to the user-friendly flora of IT [12,13,14]. Effort expectation has a direct impact on behavioural intention in technology adoption systems. Thus, the researchers have formulated the following hypothesis.

H2: Effort Expectancy positively influences the Behavioural Intention (BI) of students to adopt m-learning.

3.3 Social influence

"It is the understanding of significance that others who can influence student intention i.e., parents, teachers, colleagues to use the system [2]. Significant association of behavioural intention with social influence in voluntary and compulsory settings exist [12]. Hence the following hypothesis is portrayed.

H3. Social Influence positively influences the Behavioral Intention (BI) of students to adopt m-learning.

3.4 The facilitating Conditions

The extent to which an individual feels that an organisational and infrastructure exists to enable system use [2]. Facilitating Conditions were identified as one of the most significant predictors to adopt digital learning [14]. In the context of the e-learning environment, the facilitating conditions range from operational to human aid to technological support to organisational backing, the availability of technological infrastructure to accept and use the LMS is highlighted as a helpful requirement [12]. As a result, the following hypothesis is posed.

H4. Facilitating Conditions positively influences the Behavioral Intention (BI) of students to adopt m-learning.

3.4.1 Physical Distancing

According to WHO standards, during a pandemic, people should isolate themselves from one another in order to minimise pandemic transmission. People rushed to the internet to satisfy their day-to-day activities such as education, meetings, religious activities, socialisation, and so on, due to WHO's physical distance restrictions. Physical distancing was assessed by researchers and found its significant association with behavioural intention[11, 15].

The following hypothesis is made.

H5. Physical distancing positively influences the Behavioral Intention (BI) of students to adopt m-learning.

3.5 Health Anxiety as a moderator

Health anxiety is described as abnormal or excessive health awareness and fear of being ill soon or later. Health anxiety is a kind of neurosis [16] . Health anxiety was not a part of original UTAUT and UTAUT2 model, but it was evaluated by a

number of researchers during Covid-19. During COVID-19, 35.72% of Italians reported increased levels of health anxiety, compared to 21.40% before to the lockdown. In Italy, there was a considerable increase in health concern in moderate to severe cases during the pandemic, rising from 6.69% to 16.86%. Women expressed heightened levels of health concern during COVID-19 in Turkey. Detrimental physical and emotional impacts of social isolation on students were observed[3].

Hence the following hypothesis are framed for the following study.

H6.Health Anxiety moderates the association between BI and Performance Expectancy.

H7.Health Anxiety moderates the association between BI and Effort Expectancy.

H8.Health Anxiety moderates the association between BI and Social Influence.

H9.Health Anxiety moderates the association between BI and Facilitating Conditions.

H10. Health Anxiety moderates the association between BI and Physical Distancing.

3.6 Price Value as a moderator

Is the degree of benefits as compared to cost of the tool. Price value highly has a strong effect on student's behaviour intention. Price Value is a powerful predictor of willingness to embrace proposed technology [18]

Hence the following hypotheses is portrayed here.

H11. Price Value moderates the association between BI and Performance Expectancy.

Table 1 summarises the proposed factors in the modified UTAUT model.

Table 1. The proposed factors in the modified UTAUT model

Factor	Description	Effects on Technology Adoption
Physical Distancing	Measures implemented to curb the spread of COVID-19.	Increased reliance on the internet for various activities, including education and meetings.
Social Isolation	A potential consequence of social distancing, highlighting the importance of social interaction.	Emphasizes the need for social media and online platforms to maintain social connections.
Health Anxiety	Excessive fear and concern about one's health, amplified during the pandemic.	Extends technology acceptance models to consider its moderating effects on adoption decisions.
Unemployment	Economic challenges arising from job loss during the pandemic.	Exerts direct effects on individuals' behaviours

		and their ability to adopt new technologies.
Price Value	The perceived benefits of adopting a technology compared to its cost.	High relevance, particularly due to economic hardships caused by unemployment and poverty.

4. Methodology

4.1 Research Participants

The research focuses specifically on Pakistan secondary school students' intention to adopt M-learning, as they are novice to it. 210 female participants were selected of grade 8^{th},9^{th} and 10^{th}. Rao soft calculator with 90% confidence level was adopted to calculate the study sample size. Design and implementation of the questionnaire was pretested by SPSS 27.0 software.

4.2 Research Instrument

There are two sections to the questionnaire. The first section asks about modified UTAUT model variables including performance expectation, effort expectation, enabling conditions, social impact, physical distance, and moderating factors. Pakistani students' intents to adopt M-Learning are assessed using health anxiety and price value. The second segment, which was given at the conclusion, dealt with demographics. Each variable is assessed by specific items that are adjusted based on the study parameters. There were 22 measuring questions chosen to examine the five determinants PE, EE, SI, FC, BI, SB, and Physical Distancing, as well as 10 items to assess the moderating variable Physical Distancing. A 5-point Likert scale was used to collect student answers for the study. 1 means completely disagree, 2 means slightly disagree, and 3 means neutral. 4 represents moderate agreement and 5 represents entire agreement. A pilot study was done among 15 students to check the quality of the questionnaire survey, and the final version was prepared after deleting unnecessary, confusing, and difficult questions from the first draught.

4.3 Data Collection

Before collecting data from selected population, a pilot study was conducted among 10 students to ensure the quality and efficiency of the research. A survey was made available online. As a result of this study, the number of items was reduced to 32. As this dissertation is quantitative in nature, an online google form was created to get demographic responses and send to evaluate independent variables, Performance Expectancy, Effort Expectancy, Social Influence, Facilitating Conditions, Physical distancing, and their relationship with moderating variables i.e., Health Anxiety and Price Value to collect responses from students of Madrasa-tul-banat High School.

4.4 Reliability

The reliability of the questionnaire is determined by the measurement's reliability, which relates to the stability and consistency of the measurement findings [19]. To test the reliability of Likert-type scale assessments, the Cronbach coefficient approach is utilised. The Cronbach's α coefficient primarily represents the scale's internal consistency, or the degree of correlation between the items. Cronbach's $\alpha \geq 0.7$ is considered acceptable. Table 2 shows the findings of the reliability analysis for the variables in the questionnaire after the SPSS statistical test [19].

Table2. Scale reliability analysis

Variable	Cronbach α Coefficient	Item
PE	0.884	4
EE	0.821	4
SI	0.781	4
FC	0.762	3
PD	0.880	3
PV	0.884	5
HA	0.922	5
BI	0.870	3
Overall	0.912	

To ensure the reliability of the data Cronbach's α value should be ≥ 0.7. All item value is greater than 0.7 and most of them are greater than 0.8 (Table 2). Hence the reliability of the data is confirmed.

4.5 Validity

The Kaiser-Meyer-Olkin (KMO) sample adequacy metric was utilized in this investigation and and Bartlett's tests of the sample in SPSS to measure the validity of the scale.

Table 3. KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.858
Bartlett's Test of Sphericity	Approx. Chi-Square	504.189
	Df	36
	Sig.	.000

In general, factor analysis is not appropriate when the KMO value is less than 0.5. Table 3 reveals that the KMO value of the variable is 0.858, which is more than

0.8, suggesting that the validity of each variable in the sample data is good. Bartlett's test has an estimated chi-square of 504 (df=36). The significance level for Bartlett's test is 0.000, which < p 0.01.

In conclusion, the reliability and validity of each variable in this study meet the criteria for future hypothesis testing.

4.6 Data Analysis

Simple linear regression, multiple regression and descriptive statistics were among the quantitative data analysis approaches used for this research. Hypothesis were examined to identify whether the factors influence the student intention to adopt M-learning. The software used was SPSS 27.0.

4.7 Hypothesis for the current study

In accordance with research objectives and model, Performance Expectancy, Effort Expectancy, Social Influence, Facilitating Conditions and Physical Distancing are independent variables. Whereas students' behaviour intention to adopt M-learning and their actual behaviour are dependent variables. As moderating variables, Price Value and Health Anxiety are chosen. It's important to recall that student's behavioural intention to adopt M-learning predicts actual behaviour, it also functions as an independent variable in forecasting students' actual mobile learning usage. Table 4 summaries the hypothesis with the analysis results.

Table 4. Hypothesis Analyses

Hypothesis number	Hypothesis Content	Significance Value	Results
H1 (PE–> BI)	Performance Expectancy has positive influence on BI of students to adopt m-learning.	0.000	Accepted
H2 (EE–> BI)	Effort Expectancy has positive influence on BI of students to adopt m-learning	0.003	Accepted
H3 (SI–> BI)	Social Influence has positive influence on BI of students to adopt m-learning	0.000	Accepted
H4 (FC–> BI)	Facilitating Conditions does not have positive influence on BI of students to adopt m-learning.	0.246	Rejected
H5 (PD–> BI)	Physical Distancing has positive influence on BI of students to adopt m-learning.	0.001	Accepted
H6 (HAx PE)	Health Anxiety is moderating the association between BI and PE.	0.506	Rejected
H7 (HA x EE)	Health Anxiety is moderating the association between BI and EE.	0.106	Rejected
H8 (HA x SI)	Health Anxiety is moderating the association between BI and SI.	0.042	Accepted
H9 (HA x FC)	Health Anxiety is moderating the association between BI and FC.	0.255	Rejected

H10 (HA x PD)	Health Anxiety is moderating the association between BI and PD.	0.100	Rejected
H11 (PV x PE)	Price Value is moderating the association between BI and PE.	0.331	Rejected
H12 (BI–> UB)	Behaviour intention is a significant and affirmative predictor of user behaviour.	0.006	Accepted

4.8 Moderation analyses using multiple regression

The findings demonstrated that Price Value had no effect on the relationship between Performance Expectancy and Behaviour Intention. Furthermore, Health Anxiety was shown to be negligible in moderating the relationship between Performance Expectancy, Effort Expectancy, Facilitating Conditions, Physical Distancing, and Behaviour Intention. Health Anxiety was discovered to be a moderator between social effect and Behaviour Intention, as well as Price Value and Health Anxiety have a direct, positive, affirmative, cogent, and substantial effect on Pakistan high school students' behaviour intention. Multiple regression analysis was used to determine whether the constructs of Performance Expectancy, Effort Expectancy, Social Influence, Facilitating Condition, Physical Distancing, Price Value, and Health Anxiety are significant predictors of Pakistan high school students' intention to adopt M-Learning. Facilitating Conditions was shown to be an insignificant predictor of student behaviour intentions. So, in the context of the current study, the amount to which Pakistani high school students feel that existing organisational and technological infrastructure enables them to embrace M-Learning had no effect on their behaviour intention. Facilitating conditions is an unimportant predictor of behaviour intention in the original UTAUT model[2].

5. Results and Discussion

The current study examined Pakistani high school students' adoption of M-Learning using a modified UTAUT theoretical framework, with the proposed final model in Figure 2. According to the statistical findings, the majority of students employed M-learning to bridge the gap created by Physical Distancing and Health Anxiety during COVID-19. Pakistani high school pupils recognised and considered M-Learning to be a useful tool for their education.

Performance Expectancy was found significant. We may conclude that the degree to which students believed M-Learning significantly improved their academic performance increased their intention to use M-Learning. [2,4,9] also reported PE as significant predictor of user intention.

Effort Expectancy is a significant predictor of Pakistani school student’s intention to adopt M-learning. This finding is corroborated by previous studies [2,32,33].

Social Influence was found positive predictor of M-learning. It suggests that Pakistani high school students feel that the belief of M-Learning adoption by their parents, instructors, school mates, and academic infrastructure influences their behaviour intention.

Physical Distancing was turned out a significant construct for this study. Results indicates that Pakistani high school students believe that the implementation of M-Learning to overcome physical distance effects their behaviour intention. The findings were consistent with earlier research [33,41,9].

Price Value has a non-significant moderating influence on Performance Expectancy. As a result, the behaviour intention of Pakistani high school students to use M-Learning was impacted by their positive view in receiving benefits in comparison to expenditures. So, before implementing M-Learning, the cost and benefit must be considered. The findings agreed with earlier studies [4,49].

As a consequence, it was proposed that Health Anxiety does not moderate the relationship between PE, EE, FC, PD, and behavior intention, but it was a substantial, reliable predictor of Pakistani high school pupils, as well as moderating the relationship between social influence and behaviour intention [28,29]. Adequate knowledge has been added to the M-Learning and UTAUT model's main cluster.

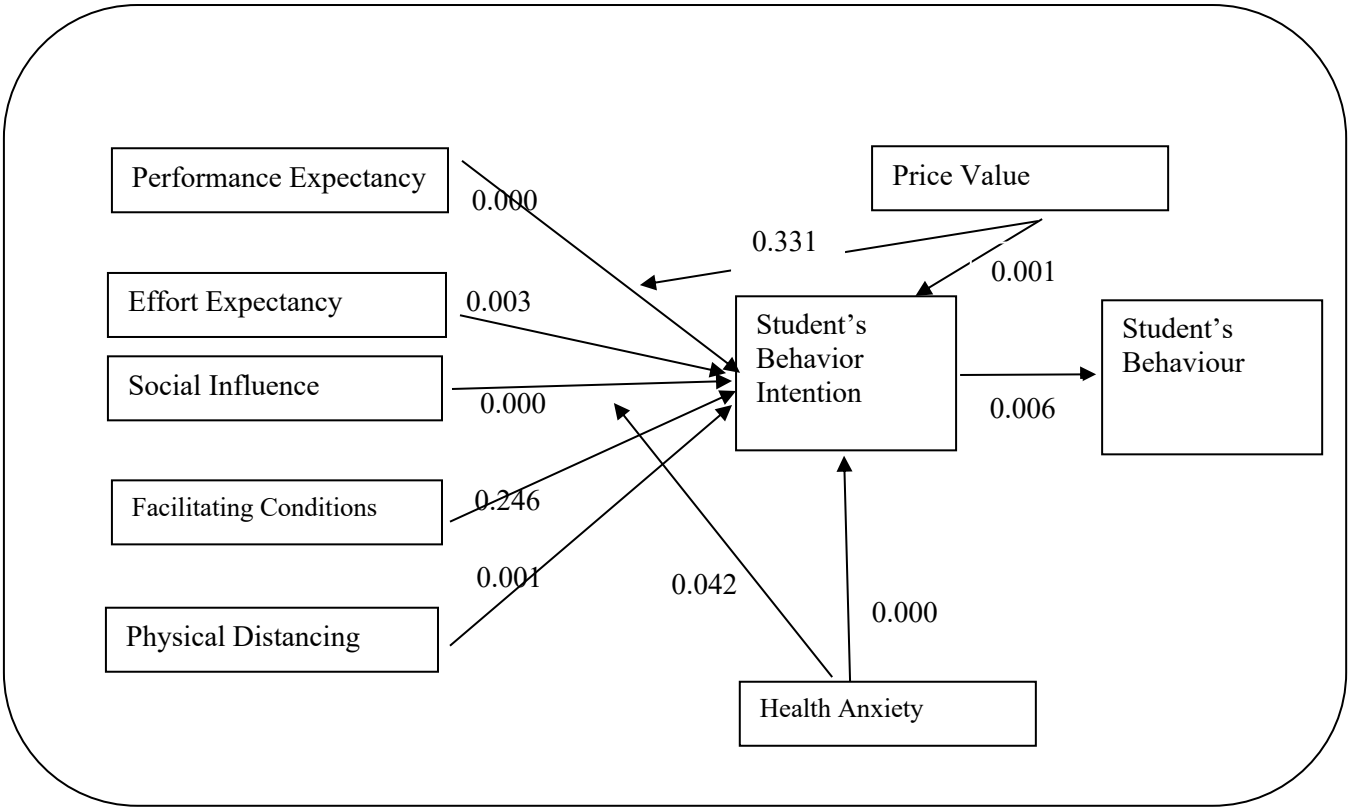

Figure 2. Final adopted model

6. Conclusion

The study found that health anxiety and price value directly and significantly influence the intention of Pakistani high school students to adopt m-learning, with

health anxiety also moderating the effect of social influence on this intention. Multiple regression analysis showed that performance expectancy, effort expectancy, social influence, physical distancing, price value, and health anxiety are significant predictors of m-learning adoption intention, while facilitating conditions are not. The research contributes to the body of knowledge on m-learning and the UTAUT model, offering practical recommendations for implementing m-learning in Pakistani schools to enhance attendance and effectiveness. Limitations include a small sample size from a single private school, suggesting future research should broaden the scope to include more schools and utilize analytical methods that can establish cause-and-effect relationships.

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