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An Empirical Study of Mobile Teaching: Applying the UTAUT Model to Study University Teachers' Mobile Teaching Behavior

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Abstract: Technology-enhanced education has become a mix-up of electronic and mobile learning since mobile information technology, mobile devices, and mobile teaching resources are popularized among teachers and students in higher education institutions. Catering to such changes, teachers are adapting themselves to employing mobile technology in curricula design, course instruction and interaction with the learners, thus enabling mobile teaching to become new instructional practices in higher education. Nevertheless, little is known about what drives university teachers to adopt mobile technology systems and the catalysts for mobile teaching behavior in higher education. This study approaches university teachers as users of mobile information technology and explores the key factors that influence their mobile teaching intention and implementation of mobile teaching. A mobile teaching acceptance model is constructed based on the unified theory of acceptance and use of technology (UTAUT) model to conceptualize mobile teaching behavior and analyzes the driving forces for university teachers to accept and adopt mobile teaching. A measurement scale for mobile teaching intention is developed, and a survey (n=389) is conducted among teachers from a polytechnic and a university in two cities. The Smart-PLS data analysis supports that university teachers' "Performance Expectancy, Task Adaptivity, Social influence" are key determinants for mobile teaching behavior intention and actual adoption of mobile information technology in teaching practices. "Effort Expectancy and Facilitating Conditions" do not significantly impact mobile teaching behavioral intention and behavior adoption.

1. Introduction

Swift upgrading in information technology is creating "ubiquitous teaching" via distance, online, hybrid, and mobile teaching [1]. Mobile devices such as smartphones and tablets are being incorporated into learning and teaching practices in classrooms or online. Handheld devices and wireless technology enable students to conduct "seamless learning", in which students can learn across various contexts or scenarios more easily and quickly [2]. Time and space constraints imposed by a brick-and-mortal educational environment can be mitigated by teaching via mobile devices and wireless information technology [3]. The integration of mobile information technology into education thus creates a new model in technology-enhanced education, i.e., mobile teaching.

Wireless communication, mobile devices together with applications (APPs) designed for educational purposes are spectacular technological changes in higher education [4]. From 2009 to 2016, the British and American governments provided students with mobile devices to encourage teachers and students to carry out interactive instructions in the classroom [2]. In China, educational APPs developed by online education businesses such as iCourse and Rain Classroom have emerged since 2013 to enable Chinese teachers to implement intra- and extra-curricular practices online. Mobile teaching has thus captured the attention of both Chinese and foreign academics, though they have not yet reached an agreement on what value mobile information technology can add to education, how much benefit students can reap from mobile teaching in their learning outcomes and what motivates instructors and learners to accept and adopt mobile teaching as well as learning. Nevertheless, the academia mostly follows Davis [5] in the argument that the implementation of information technology systems depends on user acceptance, and user adoption of technology is a behavioural adjustment that is decided by their behavioural intention. In line with this, many empirical investigations are administered among teachers and students regarding their intention to accept and adopt mobile technology because they are the key users in the educational context. Studies show that most of the students are motivated to employ their own mobile devices in learning [6]; students can access educational resources anywhere and anytime in mobile learning [7], which generates a positive impact on the learning outcomes of students [8]. The teachers, however, tend to have an incongruent level of accepting mobile technology in education. It is generally believed that the rational use of mobile information technology in instruction effectively supplements teaching practices [9]. However, teachers' acceptance of mobile technology is subject to their "instructional practices" as well as their "technological knowledge" [10]. Shraim and Crompton [11] held that mobile devices and applications render it easy and convenient for tertiary teachers to access course material, interact with students, and better understand students' performance. Yet Siau, Lim, Shen [12] argued that small screens and keyboards, a short battery life, a high rate of a system glitch, an uncomfortable operation with the devices, etc., could frustrate mobile devices users, thus deterring teachers' behavioural intentions to implement mobile teaching. Despite the plentiful research into mobile learning and teaching, much remains unclear regarding the technological and pedagogical factors affecting teachers’ integration of mobile technology in educational practices. Little is known about the process and mechanism in the "black-box” of behavioural intention and behavioural adjustment among the university teachers if they do accept and adopt mobile devices and resources in their teaching practices. Given such knowledge gaps, this research takes the mobile teaching behaviour of teachers in tertiary institutions as the research object with an aim to answer the following questions:

a) How do university teachers perceive incorporating mobile technology into teaching? Is it effortless or technically challenging?

b) What drives and motivates university teachers to accept and adopt mobile teaching? Is mobile teaching well-received or just a temporary attempt to implement a new technology-enhanced teaching method?

In this study, we investigate university teachers' mobile teaching behavior by constructing a theoretical model of mobile teaching acceptance which elaborate the internal and external drives for behavioural intention and behavioural adoption in mobile teaching. The development of our research model adds new insight to the study of mobile technology implementation in education. It sheds some light on understanding the "black-box" of users' technology behaviour. For a pedagogical implication, this paper also provides practical guidance for incentivizing university teachers to adopt mobile information technology in their teaching practices.

The remainder of this paper is as follows: A theoretical overview is provided in the next section by reviewing the literature on mobile learning, mobile teaching, and the UTAUT model. Then a mobile teaching acceptance model is developed backed by the previous rationale, and six hypotheses are proposed for mobile teaching behavioural intention and behavioural adoption. Subsequently, structural equation modelling is employed to substantiate our conceptual model, generating data analyses. Conclusions and recommendations are lastly discussed for this paper.

2. Theoretical Overview

2.1. Mobile Learning and Teaching

Mobile learning is a learning model that uses the cellular or wireless internet, mobile phones, tablet computers, and other mobile terminal devices to mobilize learning resources anytime and anywhere and carry out teacher-student interaction [13]. In the action of mobile learning, students can interact with each other, the teachers, information, and the mobile systems anytime in both physical and virtual environments [14]. A mobile teaching and learning system is constructed upon technological logistics as mobile Internet, mobile terminals, application programs,i.e., educational APPs, and other miscellaneous mobile educational resources. The concept of mobile teaching in this paper is a variant of "mobile learning" which characterizes teachers as users of mobile technological logistics to deliver knowledge and interact with the learners for educational purposes.

It would be futile to attempt to “map one singular path” for integrating mobile information technology into teaching and learning that can apply to all instances in education [15]. Chinese teachers mostly depend on three types of “mobile platforms” to deliver lectures and interact with their students in a formal or informal classroom context, i.e., educational APPs, such as "Learning" and "Rain Class"; social media APPs such as "WeChat" And "QQ"; online video conferencing platforms, such as "Tencent Conference" and "Dinging". Mobile phones are used to teach French grammar and vocabulary to students in undergraduate programs at Prince Nova University in France [15]. iPhone and iPod Touch are deployed to all freshmen and selected faculty in the Mobile Learning Initiative (MLI) launched by Abilene Christian University in the US to support teaching-learning activities in and out of class and fulfill student assessments [16]. With the trend of reforming traditional teaching modes with mobile information technology being on the rise, the literature is teeming with research, administered particularly among university teachers and students, on the impact of mobile learning and teaching or to assess the incentives and obstacles for teachers and students to embrace mobile technology in education. Perkins and Saltsman (2010) surveyed both the faculty members and students in the Mobile Learning Initiative of Abilene Christian University, with “improved academic performance, academic engagement” reported by students and “(students) be more collaborative, communicative, and organized” commented by teachers [16]. Persson and Nouri (2018) argued that applying mobile technology in teaching and learning, as compared to other forms of computer-assisted instruction, is a more effective tool for second language learning [17] and mobile learning is claimed in many language education studies to produce positive learning outcomes such as stronger speaking, listening and vocabulary skills [18]. While validating the enhanced students’ performance induced by mobile learning, recent studies claim that teachers place a key role in “a successful implementation of technology” in education [19], particularly at the time of the Covid-19 epidemic; teachers’ adoption of technology in instruction subjugates to their attitudes and beliefs in information technology [20]. Thus many researchers attempt to explore teachers’ intention to implement mobile teaching on the ground of technology acceptance behavior with Information System (IS) theories such as TAM (The Technology Acceptance Model), UTAUT (The Unified Theory of Acceptance and Use of Technology), TPB (The Theory of Planned Behavior) and IDT (Innovation Diffusion Theory). Mixed results of such studies are summarized in Table 1.

Table 1: Studies on Mobile Technology Acceptance and Implementation in Education

Study	Theoretical Lens	Empirical Findings
Teachers' Acceptance of Mobile Technology in Teaching and Learning	TAM	Perceived usefulness and perceived ease of use in mobile technologies are the key determinants of mobile technology adoption in teaching and learning.[21,22]
Factors Affecting University Teachers' Acceptance and Adoption of Mobile Technology	UTAUT	Performance expectancy, facilitating conditions, hedonistic motivation and habit are the most significant drivers for university teachers to accept and adopt mobile technologies in instruction and teaching activities. [23]
Intention of Utilizing Mobile Teaching Applications	TPB, IDT	University teachers' self-factors have a decisive influence on the acceptance of mobile teaching software, and the external environment and support conditions have no influence on the acceptance of university teachers' mobile teaching.[24]

2.2. UTAUT: The Unified Theory of Acceptance and Use of Technology

Venkatesh, et al., in 2003 synthesized IS technology acceptance theories such as TPB, IDT, SCT (Social Cognition Theory), and MM (Motivation Model), and constructed a new conceptual model of UTAUT in IS theories [25]. UTAUT stems from TAM and incorporates other IS models to predict and elaborate an individual's intention to accept and adopt an information technology [26]. It is one of the "most cited" IS models in literature on the research subject of "individual technology adoption and use" [27]

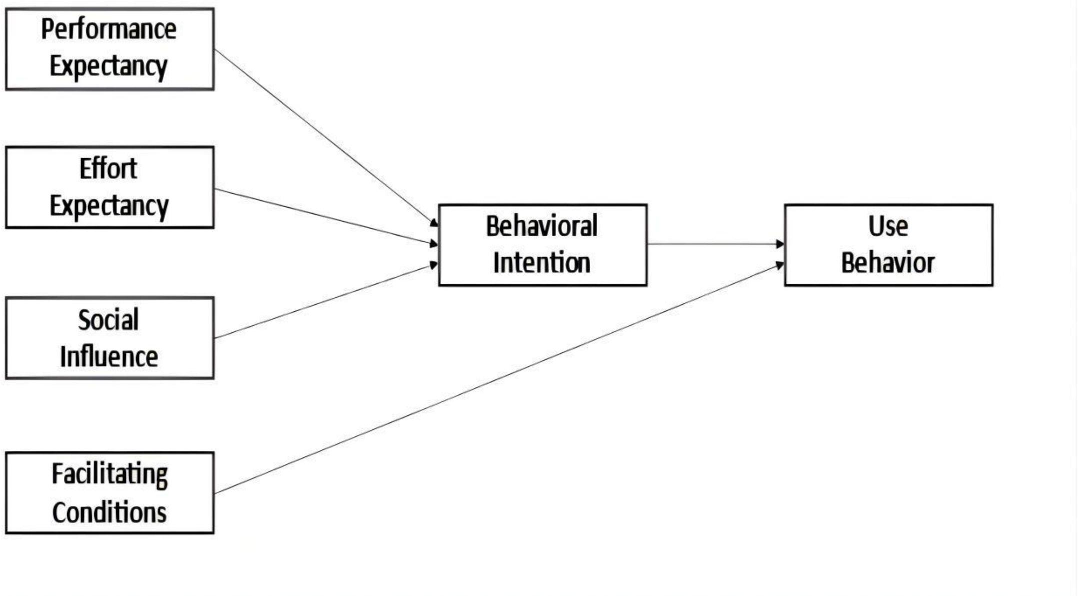


Figure 1: The UTAUT Model [25]

Figure 1 illustrates the causal relationship of the constructs in UTAUT. In UTATUT, users' behavioral intentions to accept technology are directly affected by the constructs of "Performance Expectancy", "Effort Expectancy" and "Social Influence". "Facilitating Conditions" is directly related to users' adoption of technology [25]. Most studies that apply UTAUT in the field of technology-enhanced education have reached a consistent conclusion i.e., "Performance Expectancy" will affect the information technology acceptance intention and behaviours adoption in educational context. However, for the other constructs in the model, studies have shown mixed results. Table 2 is a summary of previous studies on technology acceptance in education from the theoretical lens of UTAUT.

Table 2: Previous Studies on Educational Technology by UTAUT

	Study	Sample	Results
Gao [28]	online teaching	teachers	Effort Expectancy and Social Influence determine the teacher's acceptance of online teaching and the level of online teaching.
Zhang et al. [29]	online learning space	teachers	Effort Expectancy has no significant impact on teachers' use of online learning space.
Li et al. [30]	information teaching	teachers	Effort Expectancy and Social Influence significantly affect teachers' informatization teaching intentions, and Effort Expectancy and Facilitating Conditions significantly affect teachers' informatization teaching behaviors.
Sumak et al [31]	Moodle	students	Social Influence determines students' acceptance of Moodle.
Xu and Zheng [32]	mobile learning	students	Effort Expectancy and Facilitating Conditions have nothing to do with intention and adoption of mobile learning.
Hashim et al. [33]	mobile learning	students	Effort Expectancy influences students' acceptance of mobile language learning.

As far as we know, there seems to be disagreement in the literature whether "Effort Expectancy", "Social Influence" and "Facilitating Conditions" in UTAUT directly impact users' acceptance of educational technology except for "Performance Expectancy" only. The empirical results in some studies even conflict with one and another. The previous literature also lacks a systematic investigation into mobile teaching in which mobile devices, teaching APPs, mobile course material or wireless communication technology etc. are all integrated for instructional purposes, particularly from the standpoint of university teachers. It is to address this void in studies on educational technology at a tertiary level that prompts us to delve into the mechanism driving mobile teaching intention and adoption by approaching universality teachers as mobile technology users

3. Research Model and Hypotheses Development

A mobile teaching acceptance model is constructed by extending the conceptual framework of the UATUT model with a new construct of task adaptivity (TA) from the work performance theory developed by Griffin et al. [34] (Figure 2). Task adaptivity is an individual ability to cope with “unanticipated changes”resulting from the “rapidly changing technologies for effective work performance” [34]. Education has witnessed profound changes in its practices since mobile information technology permeates teaching and learning activities. A teacher’s task adaptivity reflects his or her propensity to embrace mobile technology in teaching and adapt the pedagogy for effective instructional practices or work performance (in teaching) to borrow a phrase from Griffin et al.(2007).

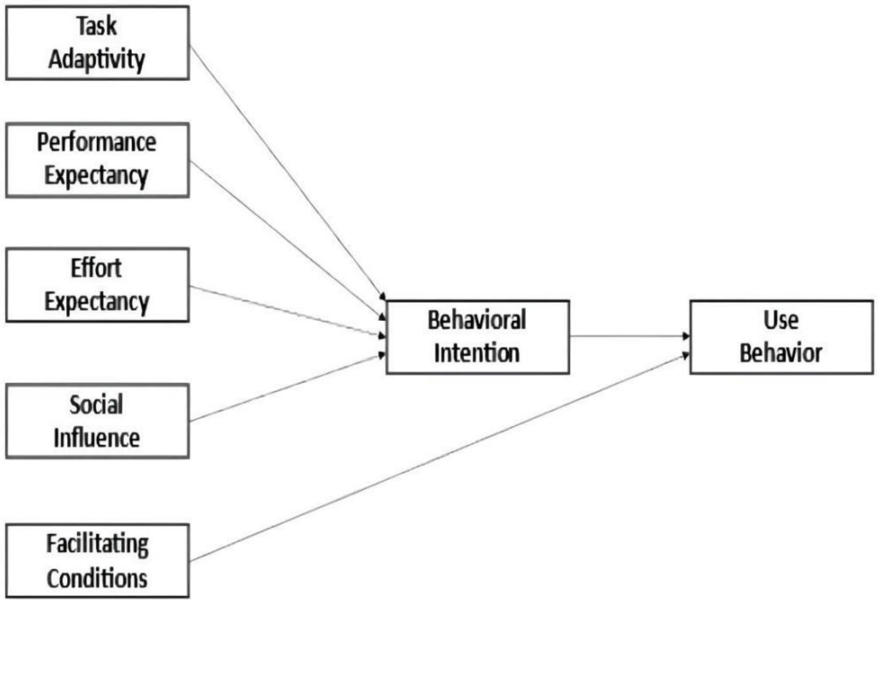


Figure 2: A Conceptual Model for Mobile Teaching Acceptance

Performance expectancy is a teacher’s belief that mobile teaching can facilitate strong performances and results in their instructional practices. Effort expectancy describes the “complexity, ease or difficulty of use” [25] when a teacher employs mobile devices, educational APPs and other mobile teaching resources. Social influence refers to the influence upon a teacher’s intention to implement mobile teaching from relevant stakeholders in a higher education institution. Facilitating conditions include guidance and assistance from internal administrative personnel inside schools or external technicians from mobile educational platforms or APPs developers. In line with Venkatesh et al. 2003, the teaching acceptance model postulates that mobile teaching intention and implementation are users' behavioral intention and adoption of mobile information technology. Thus mobile teaching behavioral intention and adoption will be affected by teachers’ "Performance Expectancy, Effort Expectancy, Social Influences, and Facilitating Conditions." Besides, teachers' adaptivity to teaching tasks integrated with new technology also impacts mobile teaching intentions and behaviors. Within the theoretical framework of the mobile teaching acceptance model, six hypotheses are proposed in this study:

H1: Task adaptability (TA) positively affects mobile teaching behavioural intention (BI). Task Adaptivity (TA) is the behavioral adjustments made by employees in response to changes in core tasks, work equipment, procedures, and processes [34]. The core task of teachers is teaching practice. Mobile information technology is pervasive in the teaching environment by providing new equipment for teaching activities and adding new features such as momentary interaction, instant communication, and fragmented content in the current teaching model. When encountering such changes in their teaching practices, university teachers' task adaptivity determines that they may voluntarily adopt mobile teaching.

H2: Performance Expectancy (PE) positively affects mobile teaching behavioural intention (BI). Performance expectancy is an essential factor in determining technology acceptance [18]. For university teachers, their performance expectancy is their perception that mobile information technology can improve teaching efficiency and generate better learning outcomes on the students. Such performance expectations directly influence teachers' intention to accept mobile teaching behaviour.

H3: Effort Expectancy (EE) positively affects mobile teaching behavioural intention (BI). Effort Expectancy means users' perception of easiness when operating technology [25]. Some previous studies have proved that users tend to have a high level of technology acceptance when the new technology is easy to learn and effortless in its operation. University teachers' acceptance of mobile teaching depends on whether they feel it is effortless for them to employ mobile technology and mobile teaching resources in their teaching practices.

H4: Social Influence (SI) positively affects mobile teaching behavioural intention (BI).

Social Influence comes from important groups around technology users, and Social Influence refers to whether the groups will approve of particular new technology [25]. Colleagues and students are relevant and important social groups for university teachers in their working context, and they both exert a strong social impact on teachers. Therefore, social Influence in educational context determines whether teachers integrate mobile technologies in their instruction.

H5: Facilitating conditions (FC) positively impact the adoption of mobile teaching behaviour (UB). Facilitating conditions are the institutional and technical support users receive when adopting new technologies [25]. Facilitating conditions will significantly impact university teachers' intention to implement mobile teaching.

H6: Mobile teaching behavioural intention (BI) positively affects the adoption of mobile teaching behavior, i.e., teachers' intention in mobile teaching is the determinant for their adoption of mobile teaching practices.

The conceptualization of mobile teaching acceptance aims to single out personal and impersonal determinants for universality teachers to approve and enact mobile teaching. The hypotheses assumption and testing shall explain why the approval of utilizing mobile technology in teaching at a tertiary level varies among university teachers and help to understand how to incentivize them to accept and adopt mobile teaching behavior.

4. Methodology

We collected the data via an online survey of mobile teaching among teachers in a polytechnic's English program and teachers in a university's business program in two separate cities. These two groups of subjects were selected because both schools lectures delivered in the classroom and tutorials in the labs in each curriculum design (In the English program, teachers deliver the course on speaking and listening in language labs; in the business program, teachers deliver the course on stock or banking transactions in trading labs.). Besides, the program difference and the geographical distinction of these two higher education institutions can help mitigate the sampling survey's selection bias.

The questionnaire in the survey has two parts: a) whether the university teachers employ mobile technology, educational APPs, instant messaging APPs, or teaching resources on mobile devices in their instruction or to complete teaching tasks; b) what factors will drive university teachers to accept mobile technology in teaching as well as their demographics such as gender, age, education and teaching experience in years. In total, 389 questionnaires were distributed online, with 346 valid. The validity rate was 89%, which meets the threshold, as required in a survey that acceptable sample size is five to ten times the count of measurement items in the questionnaire [35].

The measurement scales from UTAUT and E-learning user acceptance model [27] [36] were integrated and adapted to the context of mobile teaching. For the measurement items pertinent to Task Adaptivity (TA) in the model, we use the scale from Griffin et al. (2007). Following previous studies of Griffin et al. (2007), Venkatesh et al.(2003) and Wu and Zhang (2018), we use a five-level Likert scale for each measurement item in the questionnaire, with "1" representing "completely agree or completely agree" and "5", "completely agree or completely disagree." All measurement items are listed in Table 3.

Table 3: Measures for Variables in Mobile Teaching Acceptance Model

Variables	Coding	Measurement Items	Study
Task Adaptivity	TA1	I adapt well to changes in method, procedure and equipment in core teaching tasks.	Griffin et al. 2007 [34]
	TA2	I will cope with changes to complete the core teaching tasks.	
	TA3	I will learn new skills to cope with changes in teaching.	
Performance Expectancy	PE1	Mobile teaching is very effective.	Venkatesh et al. [27]
	PE2	Mobile teaching helps me in my teaching.	
	PE3	Mobile teaching improves my efficiency in teaching.	Wu and Zhang [36]
	PE4	Mobile teaching improves my teaching results.	
Effort Expectancy	EE1	Mobile teaching is easy to practice.	Venkatesh et al. [27]
	EE2	Mobile teaching mode is clear and easy to understand.	
	EE3	It is easy to learn mobile teaching.	Wu and Zhang [36]
	EE4	It is easy to excel at mobile teaching.	
Social Influence	SI1	My supervisors are supportive of mobile teaching.	Venkatesh et al. [27]

	SI2	My universitys [1] approve mobile teaching.	Wu and Zhang [36]
	SI3	My students accept mobile teaching.	
Behavioral Intention	BI1	I believe it is worthy of practicing mobile teaching.	Venkatesh et al. [27]
	BI2	I am planning to practice mobile teaching regularly.	
	BI3	I will recommend mobile teaching to others.	Wu and Zhang [36]
	BI4	I will practice mobile teaching.	
Use Behavior	UB1	I practice mobile teaching at a high frequency.	Venkatesh et al. [27]
	UB2	I practice mobile teaching in a long period of time weekly.	Wu and Zhang [36]

Partial least squares structural equation modeling (PLS-SEM) is employed in this study as PLS-SEM is considered the most suitable method for multivariate analysis in social science research at present [37]. Following Ringle et al. [38], we conduct a two-step data analysis since PLS-SEM modeling comprises a measurement model and a structural model. The measurement model verifies the relationship between latent variables and their measurement indicators, whereas the structural model testifies the hypothetical relationship postulated in-between the latent variables. Smart-PLS2.0 program is employed to analyze the data collected from the survey for the measurement model and the structural model analysis in this study.

4.1. Measurement Model Analysis

According to Gefen and Strau [39], the measurement model examines the reliability, internal consistency, convergent as well as discriminant validity of the measurement indicators for the latent variables. Indicators reliability are measured by outer loading and its cut-off value is 0.708. Internal consistency are assessed by composite reliability coefficient (CR) and Cronbach's alpha coefficient. The threshold values for these two coefficients in confirmatory research should be greater than 0.8 [32]. Table 4 is a summary of the reliability and internal consistency assessment.

Table 4: Reliability and Internal Consistency

Variables	Indicator Coding	Outer Loadings	Composite Reliability	Cronbach's alpha
Task Adaptivity	TA1	0.921	0.961	0.939
	TA2	0.953		
	TA3	0.958		
	PE1	0.931	0.948	0.927

Performance Expectancy	PE2	0.851		
	PE3	0.921		
	PE4	0.92		
Effort Expectancy	EE1	0.86	0.915	0.878
	EE2	0.853		
	EE3	0.818		
	EE4	0.885		
Social Influence	SI1	0.79	0.92	0.868
	SI2	0.941		
	SI3	0.935		
Facilitating Conditions	FC1	0.897	0.901	0.85
	FC2	0.919		
	FC3	0.842		
	FC4	0.76		
Behavioral Intention	BI1	0.871	0.965	0.952
	BI2	0.942		
	BI3	0.973		
	BI4	0.952		
Use Behavior	UB1	0.967	0.963	0.924
	UB2	0.961		

The data analysis generated by Smart-PLS2.0 shows that the outer loadings, composite reliability coefficient (CR), and Cronbach's alpha coefficient in the mobile teaching acceptance model are above the threshold values of 0.708 and 0.8, thus attesting to the reliability and internal consistency of measurement indicators for variables in mobile teaching acceptance model.

Average extraction variance (AVE) is an instrument in examining the convergent validity. The standard value for AVE should be greater than 0.5. For the discriminant validity, two criterion are employed here: Fornell-Larcker standard, and HTMT values [35]. Table 5 and Table 6 summarize the data results for convergent validity and discriminant validity analyses.

Table 5: Convergent Validity Analysis Results

Latent Variables	Coding	AVE
Task Adaptivity	TA	0.891
Performance Expectancy	PE	0.822
Effort Expectancy	EE	0.73
Social Influence	SI	794
Facilitating Conditions	FC	0.698
Behavioral Intention	BI	0.875
Use Behavior	UB	0.929

As indicated in Table 5, the AVEs of latent variables in the mobile teaching acceptance measurement model exceed the threshold value of 0.5, thus confirming the convergent validity of the measurement indicators assigned to the same variable in the model.

Table 6: Discriminant Validity Analysis Results

Fornell-Larcker criterion	BI	EE	FC	PE	SI
BI	0.935				
EE	0.677	0.854			
FC	0.678	0.753	0.835		
PE	0.796	0.776	0.588	0.906	
SI	0.753	0.661	0.622	0.758	0.891
TA	0.768	0.685	0.615	0.664	0.65
UB	0.769	0.553	0.635	0.595	0.619
HTMT	BI	EE	FC	PE	SI
BI					
EE	0.725				
FC	0.774	0.808			
PE	0.845	0.836	0.677		
SI	0.826	0.728	0.733	0.831	
TA	0.812	0.74	0.704	0.708	0.716
UB	0.816	0.603	0.717	0.637	0.682

Table 6 shows that the square root of the AVE for a variable in the mobile teaching acceptance model is greater than the correlation coefficient between the same variable and the remaining variables, thus attaining the Fornell-Larcker standard for discriminant validity. Likewise, all HTMT values are lower than the threshold of 0.850, further reinforcing the discriminant validity of the indicators used in this study to measure the latent variables.

4.2. Structural Model Analysis

The structural model analysis comprises a path analysis and a model predictability evaluation: the former testifies the hypothetical relationship among the variables in the teaching acceptance model, and the latter justifies the model's explainable power and its predictability inside and outside the survey. Path coefficient (β value) is the indicator for the path analysis. The larger the β value is, the more influence the independent variables have on the dependent variables. According to Hussain et al., 2018 [37], the path coefficient analysis should also combine the T-test value and the P-value. All values of the path analysis for the mobile teaching acceptance model are generated by SmartPLS 2.0 Bootstrapping calculations (5000 iterations), as shown in Table 7.

Table 7: Path Coefficient and Hypotheses Testing

Hypotheses	Path	*β*	T-Value	*P*-Value	Results
H1	TA→BI	0.384	4.217	0	Supported
H2	PE→BI	0.412	3.849	0	Supported
H3	EE→BI	-0.058	0.641	0.522	Not Supported
H4	SI→BI	0.229	2.423	0.015	Supported
H5	FC→UB	0.21	1.798	0.072	Not Supported
H6	BI→UB	0.627	6.235	0	Supported

The SmartPLS 2.0 results evidences that hypotheses 1, 2, 4, and 6 in the mobile teaching acceptance model are well supported by the survey data. Task Adaptivity positively impacts mobile teaching behavioural intention (β = 0.384, T = 4.217, $P < 0.01$), and Performance Expectancy positively affects mobile teaching behavioural intention significantly (β =0.412, T = 3.849, $P < 0.01$). Social Influence positively impacts mobile teaching behavioural intention (β = 0.229, T = 2.423, $P < 0.05$), which affects the adoption of mobile teaching behaviour significantly (β = 0.627, T = 6.325, $P < 0.01$). Hypothesis 3 is rejected because the path coefficient between Effort Expectancy and Mobile Teaching Behavioural Intention is negative; the *P*-value is larger than 0.05, the T-value is lower than the threshold of 1.96. Hypothesis 5 is also rejected, though the path coefficient is 0.276, the P-value is more than 0.05, and the T-value is less than 1.96, suggesting no significant causality between facilitating conditions and mobile teaching behaviour.

The determination coefficient (R^2) and common factor variance (Q^2) are used in this study to assess the predictive power of the mobile teaching acceptance model. According to Hair et al. [36], the determination coefficient (R^2) evaluates the explanatory power of the independent variable to the dependent variable. If the determination coefficient is lower than 0.25, the explanatory power is weak; 0.25 to 0.5 is considered a moderate explanatory power; 0.5 to 0.7, a strong one. The SmartPLS 2.0 calculates that "mobile teaching intention" and "mobile teaching behaviour." have an R^2 value of 0.757 and 0.615, respectively (Table 8 and Figure 3). The data shows that 61.5% of mobile teaching behaviours are attributable to variables as teachers' Task Adaptivity, Performance Expectancy, and Social Influence. These variables can justify 75.7% of Mobile teaching behavioural intention. Thus, the mobile teaching acceptance model has strong explanatory power.

Common factor variance (Q^2) is a second criterion for assessing a model explanatory power. The three cut-off values for common factor variance are 0, 0.25, and 0.50, 0 considered weak, 0,25 medium, and 0.50 strong for the model's predictive accuracy [35]. The SmartPLS analysis shows that the common factor variance for each variable is more than 0.5, proving that the mobile teaching acceptance model has a strong predictive accuracy for the sample outside the survey from this study.

Table 8: Predictive Power of the Model

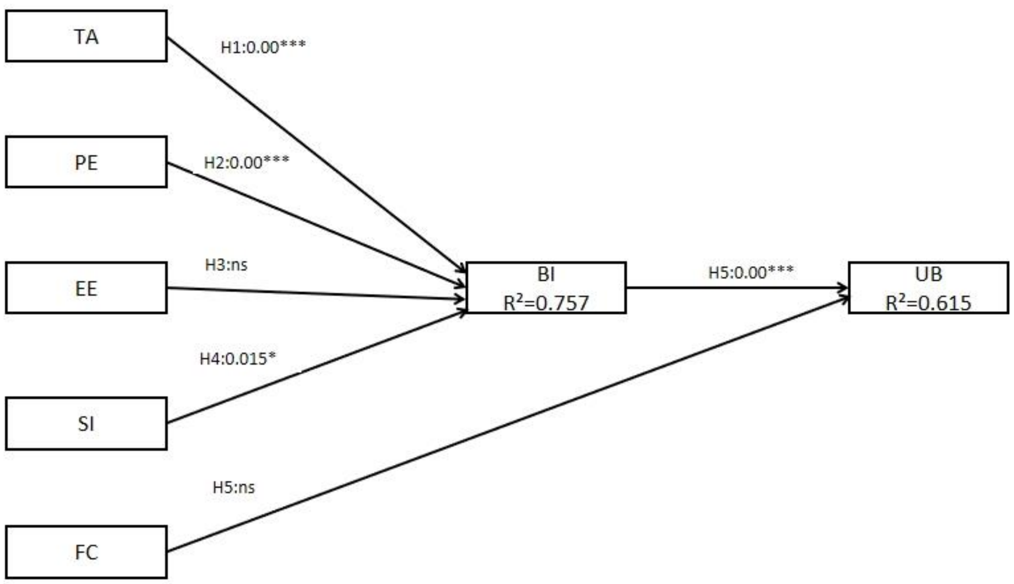
Variables	Q^2	R^2
UB	0.636	0.615
BI	0.77	0.757
EE	0.536	
FC	0.501	
PE	0.681	
SI	0.57	
TA	0.726	

Based on the path analysis and predictability evaluation, it can be concluded from the survey data that the mobile teaching acceptance model is an effective elaboration of mobile teaching behavioral intention and adoption among university teachers. It is proven that task adaptivity, performance expectancy and social influence are positively related to mobile teaching intention and adoption, whereas effort expectancy and facilitating conditions are not. A strong linear relationship can be observed between the independent variables (TA, PE, EE, SI, FC, BI) and the dependent variables (BI, UB) in SmartPLS analysis, confirming that the mobile teaching acceptance model has a good explainable power and predictability for mobile teaching behavior.

A separate collinearity diagnosis was also conduced in this study. The mobile teaching acceptance model uses reflective measurement indicators, so the internal variance expansion factor value (Inner VIF Values) was employed for collinearity detection. Data analysis shows that the VIF values of all constructs are lower than the threshold value of 5.0, so it is concluded that the mobile teaching acceptance model does not have the problem of multicollinearity.

Table 9: Collinearity Diagnosis

Variables	BI	UB
BI		1.851
EE	2.904	
FC		1.851
PE	3.496	
SI	2.603	
TA	2.201	



*** $P < 0.001$ ** $P < 0.01$ * $0.01 < P < 0.05$

Figure 3: Structural Model Analysis Results

5. Conclusions and Recommendations

Mobile teaching is a new path and strategy for integrating and innovating information technology and education. Mobile teaching uses mobile technology, mobile network, and mobile resources to carry out teaching activities or implement teaching tasks. Based on the UTAUT, a mobile teaching acceptance model is developed to analyse university teachers' mobile teaching behavioural intention and adoption from the dimension of technology acceptance behaviour. The structural equation modelling analysis indicates that Task Adaptivity, Performance Expectancy, and Social Influences significantly affect teachers' mobile teaching behavioural intention and consequently determine whether they will conduct teaching practices supported by mobile technology. Effort Expectancy and Facilitating Conditions do not significantly impact university teachers' mobile teaching intention and behaviour.

Performance Expectancy has the strongest impact on mobile teaching behavioural intention (β = 0.41). Whether university teachers are willing to carry out mobile teaching is mainly determined by the teacher's perception of how much actual value can be created by integrating mobile information technology into teaching activities, as is consistent with empirical research on education technology at home and abroad. For university teachers, the primary purpose of integrating information technology and teaching is to improve teaching performance and teaching efficiency. The flexibility, instantaneousness, and high interactivity of mobile communication technology and mobile learning resources help teachers break time constraints and space limitations and promptly and timely interact with learners and complete teaching tasks. Universities can promote mobile teaching as an effective supplement and extension to the conventional onsite and online teaching, and provide teachers with new strategies and auxiliary methods for mixed teaching, thereby improving the efficiency and effectiveness of mixed teaching.

Task Adaptivity also has a significant impact on mobile teaching behavioural intention and behaviour, showing that university teachers' adaptivity to the changes in educational technology, teaching process, and teaching mode in the working environment will directly affect whether teachers can accept mobile information technology and use mobile technology to assist teaching activities. The introduction of new technologies in the work environment, the design of new workflows, and the activation of new strategies can all activate employees' task adaptability and prompt employees to adjust their work behaviours promptly [34]. The dynamic changes in the work environment will inevitably prompt teachers to actively adjust their teaching ideas and strategies to adapt to the teaching process. Thus, universities should offer incentives and training to drive teachers to tap into their task adaptivity, practice mobile teaching, and experiment with mobile teaching strategies.

Effort Expectancy does not significantly impact university teachers' intention and behaviour of mobile teaching, which may be partly because of the increasingly intelligent development of mobile terminals [40]. As a user of mobile technology, university teachers will not be deterred from mobile teaching resulting from a lack of technical support or the cumbersome operation in mobile technology. Based on the user-friendliness of mobile technology, universities can encourage teachers to design hybrid teaching plans supported by mobile technology systems.

6. Limitations and Future Research

By approaching university teachers as technology users, this study constructs a mobile teaching acceptance model on IS and work performance theories and exposes the factors that drive teachers' intention and adoption of mobile teaching at a tertiary level of education. Teachers from a polytechnic and a university are used as convenient samples to survey their intentional and actual usage of mobile technologies in teaching context. The sample size and regional distribution of the survey data are limited, which may restrict the generalization of the empirical findings and reduce the explanatory power of the mobile teaching acceptance model developed in this study. It is thus suggested that in future research, random data could be collected from more tertiary institutions across different regions to validate the conceptual model and the hypotheses developed in the theoretical framework of this study. Four out of the six hypotheses in this research have been evidenced by data analysis though, caution still holds that the empirical results could have some variance if the survey is conducted among a different group of samples at a different time frame. Considering that, we recommend that further investigation be conducted to reveal what can possibly moderate or mediate the hypothetical relationship postulated in this study. Overall, the mobile teaching acceptance model provides the management in the educational institutions with cues on encouraging and supporting teachers in approving and practicing new technology in the educational context to enhance students' outcomes and improve teaching performance. This could be another crucial topic in the advancing research into technology-enhanced education in the future.

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