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INTEGRATING INFORMATION TECHNOLOGY IN PRECOLLEGE EDUCATION IN KUWAIT: TEACHERS' PERSPECTIVES ON A BOTCHED INITIATIVE

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ABSTRACT

Aim/Purpose	This study collects empirical evidence to investigate the extent to which high school teachers adopted the tablet computer in their instruction within the context of the Tablet Project in Kuwait and explores what drove their adoption behavior.
Background	The role of information technology in education is prominent and takes different forms depending on the purpose of information technology adoption and the adopted information technology systems. To utilize emerging technology in education in Kuwait, the government launched an initiative to integrate the tablet computer into high school education during the 2015–2016 academic year. Three years later, some evidence doubting the project's value had had been circulated, which motivated undertaking a thorough investigation to assess the project's effectiveness, particularly from the teachers' perspectives and its influential factors.
Methodology	We adapted an expanded Technology Acceptance Model to assess the extent of high school teachers' use of the system in their teaching practice and to examine the effects of teaching efficacy, perceived ease of use, and perceived usefulness on that use behavior. To test the research hypotheses, a data set was collected from 206 teachers and analyzed using the partial least squares structural equation modeling (PLS-SEM) method.

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Contribution	Our empirically derived results confirm the scanty information that was in circulation at the time of this study and that claimed that the Tablet Project was not progressing sufficiently or achieving its objectives. These results could guide future efforts aimed at effectively integrating information technology into high school education in Kuwait and at enhancing the ongoing online education necessitated by the COVID-19 pandemic. They also advise that effective integration of information technology into teaching and learning mandates a comprehensive redesign and digitization of the targeted educational system.
Findings	Although teachers report minimal use of the system in teaching, teaching efficacy emerges as the strongest determinant of that use behavior, followed by perceived ease of use and perceived usefulness. The fitted model also has satisfactory explanatory power as it explains 43% of the variance in use behavior.
Recommendations for Practitioners	The results of this study suggest that, in the public schools of Kuwait, teaching efficacy is a more important determinant of the use behavior of information technology in teaching than perceived ease of use or perceived usefulness. In addition, it is difficult to adopt information technology into teaching where there is inadequate awareness of the role of technology in e-learning, a lack of content modules fit for information technology-assisted teaching, poor Internet connections, a lack of technical support, and a lack of adequate professional and technical training.
Recommendations for Researchers	This study offers significant empirical results from the Arabian milieu on the utility of the Technology Acceptance Model in elucidating public high school teachers' adoption of the tablet computer in teaching practice. Our results also enhance the growing global body of knowledge on the integration of hedonic systems as well as their individual and contextual determinants in education, in general, and in teaching practice, in particular. Furthermore, teaching efficacy is an important determinant of teachers' adoption of information technology in teaching.
Impact on Society	Information technology augments traditional, face-to-face teaching and learning in societies by incorporating rich, online learning experiences and creating a motivating and efficient learning environment. Yet, the value of information technology-enabled education depends significantly on the successful integration of the systems into the educational process, and the results of this study could serve as a foundation for policies and plans aimed at successfully integrating information technology into the educational systems in Kuwait and similar societies.
Future Research	The results and limitations of this study suggest several future research topics. Future research should explore the extent of students' adoption of the tablet computer in learning activities and its important determinants to gain a better understanding of the Kuwaiti Tablet Project initiative. In addition, future research should employ other research methods (e.g., qualitative analysis), use samples from private schools' teachers, and incorporate and test other possible determinants of teachers' adoption of information technology in teaching to verify the validity and generalizability of the reported results.
Keywords	information technology (IT), education, Technology Acceptance Model (TAM), teaching efficacy (TE), perceived ease of use (PEOU), perceived usefulness (PU), Kuwait

INTRODUCTION

The use of information technology (IT) is prominent in education. This is evident in the growing interest among students and teachers, their attitudes toward the use of IT (Pamuk et al., 2013), and the unprecedent adoption of online education during the recent COVID-19 pandemic. IT-enabled education takes different forms depending on the purpose of IT adoption and the adopted IT systems. The role of IT in education ranges from merely assisting face-to-face teaching, to providing blended (or hybrid) learning modes, to enabling exclusive online learning services. Blended learning, as explored in this study, denotes hybrid learning as well as mixed-mode learning (Auster, 2016; O'Byrne & Pytash, 2015). Blended learning inspires the use of persuasive technology with an optimal focus on content, target group, context, and ethical aspects. Hence, IT enables learning in which some activities take place in a classroom and some are performed elsewhere, with students working on a computer on their own (Dang et al., 2019; Delialioglu & Yildirim, 2007; Hockly, 2018; Van Doorn & Van Doorn, 2014). Blended learning therefore augments face-to-face learning by incorporating rich, online learning experiences and creating a motivating and efficient learning environment (Engelbertink et al., 2020; Porter et al., 2016).

Pertinent research has emphasized the role of teachers in IT-augmented education (Di Marco et al., 2017; Harrell & Wendt, 2019; O'Byrne & Pytash, 2015; Postholm, 2006; Scherer et al., 2019; Zhu, 2010). Teachers play a key role in supplementing learning objectives using their professional training in organizing and structuring blended learning (Postholm, 2006). Blended learning also provides a transformative experience in which new modes of education challenge teachers to consider the best ways to educate students (O'Byrne & Pytash, 2015). Teachers, therefore, should be professionally and technically prepared to manipulate time, space, and place to improve teaching methods, learning conditions, active learning, and students guidance (Di Marco et al., 2017; Harrell & Wendt, 2019; Zhu, 2010). Nevertheless, teaching efficacy (TE), which can be improved through training and professional development, is a significant determinant of teachers' effective adoption of IT in teaching practice.

During the 2015-2016 academic year, the Ministry of Education in Kuwait launched an initiative called the "Tablet Project" to integrate the tablet personal computer in high school education. The initiative aimed to provide a blended (or hybrid) learning environment that combines face-to-face classroom instruction with online instruction (Delialioglu & Yildirim, 2007). Equipped with various applications and providing easy access to varied digital content, the tablet PC influences both teaching and learning practices and assists with formal and informal learning (Clark & Luckin, 2013; Falloon & Khoo, 2014; McGuire, 2016; Montrieux et al., 2016). Although the Tablet Project in Kuwait was equipped with applications related to the subjects taught, there existed hidden issues which could negatively influence both learning and teaching and the eventual success of the initiative (Al-Awidi & Aldhafeeri, 2017; Alenezi, 2018). These issues range from technical (e.g., the tablet PC content and Internet connection), to pedagogical (e.g., online content and online assessment methods), to managerial (e.g., conversion plan and classroom management) (Alenezi, 2018). A successful implementation of this initiative rests for the most part on the teachers' adoption of the tablet PC in their teaching practice (Alenezi, 2018; Ertmer et al., 2012; Kriek & Stols, 2010), which depends largely on their technological self-efficacy, beliefs, and attitudes (Al-Awidi & Aldhafeeri, 2017; Alenezi, 2018).

Yet, in the third year of the initiative, news suggesting that the program might not achieve its objectives was growing (Al-Awidi & Aldhafeeri, 2017). Although several researchers (Aldhafeeri et al., 2016; Alenezi, 2018; Alfelaij, 2015; Alhashem & Al-jafar, 2015; Alkhezzi & Abdelmagid, 2011; Mohammad, 2014) identified and investigated factors that possibly impede IT integration in the Kuwaiti education system in general, scant empirical evidence exists on the extent of IT adoption in teaching by high school teachers involved in the Tablet Project. Challenges to the initiative's success include, among others, a lack of a clear vision for information technology adoption in education, teachers' unpreparedness to implement a digital curriculum, insufficient technical infrastructure, students' reluctance to use IT within and outside of the classroom, and culture (e.g., social values, religion, and

politics) (Alenezi, 2018; Al-Awidi & Aldhafeeri, 2017; Aldhafeeri et al., 2016; Alfelaij, 2015; Alhashem & Al-Jafar, 2015).

This study collects empirical evidence to answer two fundamental research questions:

RQ1: To what extent have high school teachers adopted the tablet PC in their instruction within the context of the Tablet Project?

RQ2: What drives high school teachers' adoption behaviour of the tablet PC in their instruction within the context of the Tablet Project?

We therefore adopt a research model that is grounded in the Technology Acceptance Model (TAM; Davis et al., 1989) to evaluate the extent of teachers' adoption of the tablet PC in teaching practice, and we examine the influence of teaching efficacy (TE), perceived usefulness (PU), and perceived ease of use (PEOU) on teachers' adoption behavior. The impetus for this study is to gain a better understanding of teachers' contributions, or lack thereof, and the effective implementation of the considered IT-enabled education initiative. This study produces empirical evidence to identify and document learned lessons that can guide future initiatives aimed to embed IT in the Kuwaiti education system as well as in other similar education systems. Furthermore, it contributes results to advance theories and models that explain and predict IT-enabled education effectiveness across cultures with similar technical and pedagogical environments.

BACKGROUND

IT INTEGRATION IN EDUCATION

The prevalent use of IT has allowed individuals to access information resources anywhere and anytime, paving the way for the swift development of mobile-based information systems (Kini & Thanarithiporn, 2004; Tarasewich, 2003). The augmentation of IT, particularly portable PCs, the Internet, and Web-based communication and resources, has provided students and teachers with plentiful opportunities to explore and apply most suitable learning and teaching strategies (Dang et al., 2019; Engelbertink et al., 2020). Blended learning, a popular IT-enabled learning mode, combines the benefits of face-to-face and Web-based resources and course management tools (e.g., learning management systems [LMSs]) to create a motivating and efficient learning environment (Engelbertink et al., 2020).

Nevertheless, successful integration of IT in education is contingent on multiple contextual factors, such as the chosen IT system, Internet connection quality, the education program, the individual characteristics of participants, and culture (Alenezi, 2018; Nguyen et al., 2015; Polly et al., 2010). Adequate planning, which considers each IT integration initiative inimitable, is crucial to successfully infusing IT in a particular education system. This planning entails engaging all stakeholders in the process, developing the skills necessary to properly use the device (e.g., a tablet PC), and providing adequate support to users, including helpdesks and repair centers (Moran et al., 2010). In addition, well-established infrastructural support for the IT integration initiative is essential because it influences teachers' and students' behavioral intentions and use (Sangeeta & Tandon, 2020).

Research on IT (i.e., tablet PC) integration in education has produced mixed results. For instance, several investigations conclude that the tablet PC affects and fosters students' learning (Van De Bogart & Wichadee, 2016), lifts students' outcome expectancy (Görhan, 2014), allows learners to work more collaboratively with positive learning outcomes (Butcher, 2016), allows preschoolers to express their ideas and learning (Couse & Chen, 2010), and promotes the learning outcomes of disabled students (Beal & Rosenblum, 2018; Henderson et al., 2013). Other investigations, however, report that the adoption of the tablet PC in learning introduces challenges to the cognitive load of students (McEwen & Dubé, 2015), teachers' and students' concentration (Alenezi, 2018; Montrieux et al., 2015), adverse test performance (Venkatesh et al., 2018), health problems, and ineffective

communication between students and teachers (Duran & Aytaç, 2016). However, the generalizability of these findings may be problematic because different users (e.g., teachers and students) might value different aspects of tablet PC use as relevant to their perceptions of individual goals (Pirhonen & Rousi, 2018) as well as to the context of the adoption (Abbas et al., 2019).

The Tablet Project in Kuwait

In a step toward carrying out its vision to augment IT in the Kuwaiti education system, the Ministry of Education directed the implementation of the Tablet Project in the public school system during the 2015-2016 academic year (Turki, 2017). The initiative began in public high schools by equipping teachers and 10th, 11th, and 12th grade students with tablet PCs to access Web-based sources. The initiative required teachers to espouse teaching and learning methods that integrate innovative teaching strategies and emergent IT systems (Ministry of Education, 2015). In each school district, administrators—as well as teachers at two public schools (one for male and one for female students)—received extensive training and attended workshops on using the tablet PC. An Internet connection was provided, and hotspots were distributed in classrooms. Contracts were signed with three vendors to rent the equipment and accessories and to provide maintenance and technical support engineers. Microsoft licenses were provided to all tablet PC users, as was NetSupport School, a classroom management solution (Alramadan, 2015).

The tablet PC was the system of choice for implementing the Ministry's initiative. Several studies investigate the hedonic purposes and factors behind adopting mobile devices (i.e., the tablet PC) and mobile-based services in education (e.g., Baturay et al., 2017; Nikou & Economides, 2017; Pirhonen & Rousi, 2018). Generally, research findings suggest that the tablet PC offers teachers and students plentiful opportunities to engage in flexible teaching and learning opportunities (Alfelaij, 2015; Major et al., 2017). It is also an affordable, portable device that has multiple features that can be easily customized and integrated in the development of new curricula and pedagogical strategies (Clark & Luckin, 2013; Dhir et al., 2013). As such, public school teachers in Kuwait were required to use their tablet PCs to assign students short tests and exercises during class time as well as assignments to complete outside school hours. Students were also required to bring their tablet PCs to the classroom to engage in learning activities, including accessing online content and practices. Students were asked to use their tablet PCs to participate in out-of-class learning activities according to instructional plans developed by their teachers.

During the third year (20172018) of the Tablet Project's implementation, researchers were accumulating dispiriting evidence signaling that the initiative might not achieve its objectives (Al-Awidi & Aldhafeeri, 2017). Some of the cited challenges to the initiative's success were that high school teachers were neither technically nor pedagogically ready to implement a digital curriculum due to time constraints, lack of knowledge and skills, insufficient infrastructure, and technical problems (Al-Awidi & Aldhafeeri, 2017; Aldhafeeri et al., 2016; Alenezi, 2018; Alhashem & Al-jafar, 2015); cultural challenges (e.g., social values, religion, politics, and the use of traditional teaching methods; Alfelaij, 2015); students' reluctance to use the device within and outside of the classroom; lack of preparation; weak WiFi networks at schools; insufficient technical support; and the absence of a clear vision for tablet PC use (Alenezi, 2018). Although teachers are key to gaining the benefits of integrating the tablet PC in education (Steinweg et al., 2010; Chanlin, 2017; Ching & Roberts, 2020; Hashim, 2014; Montrieux et al., 2015; Teo et al., 2008), empirical evidence on the extent of public school teachers' adoption of the tablet PC in their teaching practice within the Tablet Project context is lacking and warrants investigation.

Teachers' Adoption of the Tablet PC

Teachers are expected to effectively adopt and embed devices in teaching methods as an integral part of instructive systems (Liang et al., 2011), use their professional knowledge and skills to organize and structure effective blended learning situations (Postholm, 2006), and provide students with the

necessary support and guidance throughout the learning process (Zhu, 2010). The literature suggests that to successfully integrate IT in teaching practice, teachers need to understand the intended use of the adopted system in education (Mang & Wardley, 2012), hold positive attitudes toward the role of IT in instruction (Courtois et al., 2014; Joo et al., 2018), have the motivation to use IT to design effective educational programs (Ciampa, 2014), perceive IT as a challenge and an opportunity to re-examine existing teaching models and enhance students' performance (Al-Awidi & Aldhafeeri, 2017; Suárez-Guerrero et al., 2016; Teo et al., 2008; Wong et al., 2013), and have adequate pedagogical and technological competencies and the time to use the technology to transform their teaching methods (Aiyegbayo, 2015; Dündar & Akçayir, 2014; Geer et al., 2017; Vaughan & Beers, 2017).

Research on teachers' adoption of the tablet PC in instruction has produced inconclusive results. While some studies confirm teachers' effective adoption of the tablet PC in teaching practices across diverse teaching settings (e.g., Burden et al., 2012; Hu & Garimella, 2014; Phiri et al., 2014; Wong et al., 2013), others find that integrating the tablet PC in the classroom leads to distraction, time mismanagement issues, negative student behaviors, and interruptions (Durak & Saritepeci, 2017; Montrieux et al., 2015). In addition, few teachers believe that IT improves instruction and learning (Ifenthaler & Schweinbenz, 2013), and they may not know how to use IT capabilities to facilitate these practices (e.g., Al-Awidi & Aldhafeeri, 2017; Alkhezzi & Abdelmagid, 2011; Kalonde, 2017; Karsenti & Fievez, 2013).

IT integration in instruction is a multi-dimensional process that requires a thorough understanding of how IT is interrelated with pedagogy and content (Alenezi, 2018; Koehler et al., 2007; Polly et al., 2010). One approach to understanding teachers' adoption of tablet PCs in teaching practice is to analyze the adoption process from the technology-task fit (TTF) perspective. The TTF model explains individuals' performance and adoption of an IT system (Goodhue & Thompson, 1995). The model assesses separately the influence of task and technology on fit and signifies that a good fit between task and technology positively influences performance and IT adoption success (Gebauer et al., 2010; Goodhue & Thompson, 1995). This TTF-based analysis considers three dimensions of fit: system functionality, user interface, and adaptability (Gebauer et al., 2010). Adaptability is particularly important since it depends mainly on the teachers' ability (or efficacy) to integrate a system to match their use situation.

Teachers' knowledge (e.g., pedagogical, content, pedagogical-content knowledge) and skills (professional, technological, and inter-personal skills) influence their ability to integrate IT in teaching (Alenezi, 2018; Karolcík et al., 2016; Rodríguez Moreno et al., 2019). The Technological, Pedagogical, and Content Knowledge (TPACK) model (Mishra & Koehler, 2006) offers a lens for explaining whether and why teachers adopt IT in their teaching practice (Alenezi, 2018; Polly et al., 2010). The model identifies the three areas of technology knowledge, pedagogy knowledge, and content knowledge as well as their intersections (Koehler et al., 2007). Yet, the interactions among the three types of knowledge are essential to effectively integrate IT in instruction (Koehler et al., 2007; Niess, 2006).

While technological-pedagogical knowledge allows teachers to understand general pedagogical strategies for applying IT in education, technological-content knowledge enables them to understand the mutual effect of IT and content and effectively integrate IT into instruction. Likewise, pedagogical-content knowledge denotes teachers' ability to turn content into instruction while considering students' needs (Koehler & Mishra, 2009). Teachers, therefore, should be empowered with essential IT and pedagogical skills to effectively transform teaching practice by integrating IT, content, and pedagogical knowledge (Alenezi, 2018; Koehler et al., 2007; Koehler & Mishra, 2008; Voogt & McKenney, 2017). Drawn from the TPACK model (Chanlin, 2017), TE in this study denotes the teacher's beliefs regarding their ability to fit IT (e.g., tablet PC) into content and delivery methods (Alenezi, 2018). We incorporate TE in our research model as a potential driver of teachers' adoption of the tablet PC in instruction.

In summary, to take advantage of the prominent role of IT in education, the Kuwaiti government initiated the Tablet Project to provide a blended learning environment in high school education. Although successful integration of IT into education depends on multiple contextual factors (e.g., the individual characteristics of participants, the adopted IT systems, the characteristics of the targeted education program, the quality of the supporting technological and organizational infrastructure, and culture), the teachers' role is particularly paramount to that success. Yet, empirical evidence on the extent of public-school teachers' adoption of the tablet PC in teaching practice within the Tablet Project context is lacking. This study bridges this gap and investigates teachers' adoption of the tablet PC in teaching and the motivation for their adoption behavior.

RESEARCH MODEL AND HYPOTHESES

THE RESEARCH MODEL

Several models exist in the literature on IT adoption, and researchers appear to agree on the factors that influence an individual's decision to adopt a particular system (Saghafi et al., 2017; Venkatesh et al., 2018), especially in work environments where IT is mainly adopted to improve task performance (Abbas et al., 2019; Yu et al., 2017). In addition, the relevant literature documents numerous studies that espouse diverse theories and models to examine factors influencing the adoption of different types of technologies in various learning/teaching contexts. Some studies adopt general-purpose theories, such as the theory of planned behavior (Courtois et al., 2014) and the cognitive load theory (e.g., McEwen & Dubé, 2015). Others adopt IT-specific theories and models, such as TAM (e.g., Chanlin , 2017; Hsu, 2016; Joo et al., 2018; Okumuş et al., 2016; Sun & Jiang, 2015; Teo et al., 2008; Wong et al., 2013), the unified theory of acceptance and use of technology (UTAUT) (e.g., Ifenthaler & Schweinbenz, 2013; Moran et al., 2010), and the innovation diffusion theory (e.g., Montrieux et al., 2015).

Given that teachers may adopt tablets for efficiency, research models designed to investigate tablet PC adoption should incorporate constructs related to product usability. This study adopts and extends the TAM (Davis et al., 1989) to examine teachers' adoption of tablet PCs in their instructions in the context of the Tablet Project in Kuwait. TAM is a popular, key model for investigating and understanding predictors of individuals' IT adoption behavior (Cheng, 2019; Marangunić & Granić, 2015). Founded on the belief–attitude–intention model (Ajzen & Fishbein, 1977), TAM postulates that external factors influence beliefs about a behavior outcome, which in turn form attitudes toward that behavior. Attitudes, in turn, influence behavioral intentions and actual behavior (Fishbein & Ajzen, 1975). Hence, TAM assumes that individuals' beliefs and attitudes influence their acceptance of systems (Alenezi, 2018; Davis et al., 1989; Sumak et al., 2011; Venkatesh et al., 2018). These beliefs include the PU of a particular IT system and the PEOU of that system. PU denotes the individual's belief that using the specific system enhances their performance, and PEOU denotes their belief that using that system is free of effort (Davis et al., 1989).

Despite its criticism due to the lack of precise definitions of its components (e.g., Alenezi, 2018; Graham et al., 2019), researchers have adopted TPACK-related constructs to investigate IT adoption in education. Our research model extends the TAM model to include TE as an external latent variable, along with the original TAM's latent variables of PU and PEOU (Figure 1). TE is assumed to affect teacher attitudes toward the adoption of the tablet PC, and it is therefore hypothesized to influence PU, PEOU, and use behavior (UB). In addition, PEOU is hypothesized to influence UB and PU, which in turn influences UB.

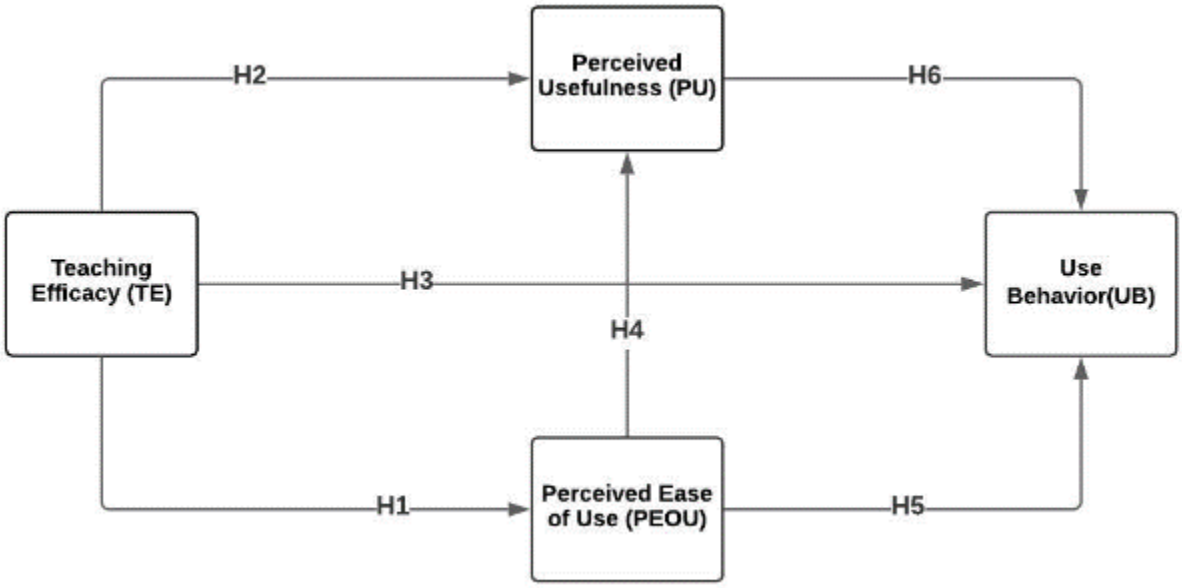

Figure 1. The research model

Hypotheses Development

The Influence of Teaching Efficacy

In social cognitive theory (Bandura, 1997), self-efficacy signifies a person's belief in their ability to organize and execute the courses of action required to produce given activities. It also refers to an individual's belief in their ability to perform a given task and could increase technology-based learning and professional development (Bandura, 1986; Yang et al., 2019). Hence, self-efficacy is an essential predictor of attitudes and behavior (Ajzen & Fishbein, 1977; Bandura, 1986). In the context of this study, TE implies a teacher's confidence and belief in their ability to fit the tablet PC and its applications into content and delivery methods (Alenezi, 2018; Batiibwe & Bakkabulindi, 2016; Moran et al., 2010). A teacher's TPACK is assumed to foster teachers' skills with integrating the tablet PC into teaching practice (Alenezi, 2018; Ertmer & Ottenbreit-Leftwich, 2010). Koehler et al. (2007) also claim that teachers who have the required knowledge or skills to use IT should be able to integrate it successfully in teaching.

As for the results of prior studies, Kabakci Yurdakul and Çoklar (2014) note that the extent of Turkish preservice teachers' IT usage predicts TPACK competencies. Hsu (2016) finds that English as a foreign language (EFL) teachers' TPACK influences both the PEOU and PU of mobile-assisted language learning (MALL). Using TPACK and TAM, Okumuş et al. (2016) report that PEOU and PU correlate with perceptions and use of two software tools for teaching mathematics. In addition, Scherer et al. (2019) conclude that the TPACK of preservice teachers in Belgium correlates with general IT attitudes, attitudes toward IT in education, PEOU, and IT self-efficacy. Al-Awidi and Aldhafeeri (2017) find that perceived effectiveness of digital technology drives high school teachers in Kuwait to integrate IT in teaching practice. Chanlin (2017) states that teachers' TPACK skills are crucial to tablet PC adoption in Japanese schools. Furthermore, Joo et al. (2018) find that Korean preservice teachers' TPACK influences self-efficacy, PEOU, and PU of IT in the classroom, but not the intention to use IT. In China, Yang et al. (2019) find that primary and secondary school teachers' TPACK levels influence the acceptance of e-Schoolbag through PU and PEOU. Kimmerl (2020) observes that teachers' self-perceptions influence intentions to adopt LMSs (e.g., Google Classroom). Also, Mailizar et al. (2021) report that TPACK influences teachers' acceptance of online professional

development. However, Mayer and Girwidz (2019) find that TPACK has no influence on the PU of multimedia applications in physics teaching.

Based on the assumptions of the TPACK model and the results of the previous relevant studies, we predict that TE influences the belief that the use of the tablet PC will be effortless (PEOU), useful (PU), and adopted in teaching practice (UB). These expectations are formalized in the following three hypotheses:

H1: Teaching efficacy has a positive significant effect on the perceived ease of use of the tablet PC in teaching practice.

H2: Teaching efficacy has a positive significant effect on the perceived usefulness of the tablet PC in teaching practice.

H3: Teaching efficacy has a positive significant effect on the adoption of the tablet PC in teaching practice.

The Influence of Perceived Ease of Use

PEOU measures how effortless teachers perceive using the tablet PC to be. A difficult system will not be easy to use, will be perceived as less useful, and will probably be aborted (Davis et al., 1989). As such, teachers' beliefs influence the levels and types of IT adoption in teaching practice (Alenezi, 2018; Mueller et al., 2008; Tondeur et al., 2008). Integrating the tablet PC in teaching could be stressful and affect teachers' attitudes, as it may result in a high level of distraction caused by activities and people in the use context (Gebauer et al., 2010; Tarasewich, 2003). Teo et al. (2008) add that IT complexity influences teachers' attitudes toward its adoption. Hence, higher levels of distraction increase the mental effort of the teacher and therefore negatively influence PEOU.

Teachers may also experience the use of the tablet PC in teaching differently depending on their individual characteristics and use circumstances (Orlikowski, 2000; Schwarz et al., 2004). Teachers' TPACK, especially regarding the technological component, could impact their compatibility with the tablet PC and their perceived ease of using it in teaching practice. Moreover, connection quality, such as network availability, reliability, bandwidth, and stability (e.g., Gebauer et al., 2010; Kini & Thanarithiporn, 2004), could influence teachers' perceptions of how easy it is to use the tablet in teaching activities. A low-quality Internet connection makes adopting the tablet PC within and outside of classroom teaching difficult.

The literature provides abundant evidence of the effect of PEOU on IT adoption, either directly or indirectly through PU (Davis et al., 1989; Wong et al., 2013). In the context of education, Park et al. (2008) find that PEOU influences PU, which in turn influences instructors' behavioral intentions to use an Internet-based course management system in a US university. Joo et al. (2018) find PEOU to be a key determinant of attitudes toward IT and its adoption in teaching and learning. Similarly, MacCallum et al. (2014) find that PEOU is a critical factor in teachers' behavioral intentions to use IT for learning. Hsu (2016) reports that EFL teachers' PEOU influences their PU of MALL. In addition, Okumuş et al. (2016) conclude that PEOU correlates with the perceptions and use of two software tools for teaching mathematics.

Based on the TAM assumptions and the findings of previous studies, we predict that PEOU influences PU of the tablet PC and the extent of its adoption in teaching practice. This prediction is formalized in the following two hypotheses:

H4: Perceived ease of use has a significant positive effect on the perceived usefulness of using the tablet PC in teaching practice.

H5: Perceived ease of use has a significant positive effect on tablet PC use behavior in teaching practice.

The Influence of Perceived Usefulness

The adoption of the tablet PC could influence an individual's work, study, or life (Liu & Li, 2011). According to TAM, the adoption and use of a system such as the tablet PC could assist a teacher in performing their job duties more efficiently (Davis et al., 1989; Venkatesh et al., 2018); in addition,

the teacher can develop a positive attitude toward a system that likely enhances performance and produces solutions to common problems (Sussman & Siegal, 2003).

The findings of previous studies mostly support a significant effect of PU on IT adoption in education. Steinweg et al. (2010) find the use of the tablet PC in education in both K–12 public schools and universities to be a valuable tool for educators. Wong et al. (2013) report that PU and attitudes toward IT use have positive impacts on teachers' intentions to use IT in teaching and learning in Malaysian schools. Similarly, Park et al. (2008) report that PU is a key determinant of attitudes toward mobile IT adoption. MacCallum et al. (2014) also find PU to be a critical factor in teachers' behavioral intentions to use IT for learning. Okumuş et al. (2016) note that PU correlates with perceptions and use of two software tools for teaching mathematics. In Kuwait, Alenezi (2018) finds that PU is an important determinant of teachers' intentions to adopt the tablet PC in teaching in intermediate schools. In addition, Sangeeta and Tandon (2020) conclude that performance expectancy (or PU) correlates with attitudes and behavioral intentions to hold online classes during the COVID-19 pandemic in India. However, in their study of teachers' acceptance of the tablet PC in the classroom, Ifenthaler and Schweinbenz (2013) conclude that few teachers believe that the use of IT improves learning and instruction; likewise, Hsu (2016) notes that EFL teachers' PU influences neither attitudes toward the use nor the actual use of MALL.

Based on the TAM assumptions and the results of the relevant previous studies, we predict that PU influences teachers' adoption of the tablet PC in their teaching practice. This prediction is stated in the following hypothesis:

H6: Perceived usefulness has a significant positive effect on tablet PC use behavior in teaching practice.

METHODOLOGY

MEASUREMENT

To operationalize and measure the research constructs, this study adapts items that prior studies have developed and validated. The items measuring the TAM original constructs (PEOU, PU, and UB) have been adapted mainly from Davis et al. (1989), Teo et al. (2008), and Venkatesh et al. (2018), and they have been slightly revised to fit the context of this study. PEOU and PU are each measured with five items; UB is measured with six items. In addition, TE is measured using five items adapted from Sahin (2011), who developed and documented the reliability and validity of this TE proxy measure. We adapt this short TE measurement scale because the TPACK instruments are generally long and have varied validity and reliability indicators (Abbitt, 2011). Appendix A describes the measurement of the research constructs.

THE DATA-COLLECTION INSTRUMENT

The data-collection instrument was developed in English first. The English version was translated into Arabic by one of the researchers, and the translation was verified and back translated into English by a bilingual translator. The bilingual instrument was piloted by 20 high school teachers to confirm readability, and a few minor issues were noted and fixed.

The final instrument has three sections. The first section is designed to gather demographic information (e.g., sex, nationality, age, education, teaching experience, prior experience with the tablet PC, and the use of the tablet PC in teaching). The second section is designed to collect the respondents' views on the four research variables (TE, PEOU, PU, and UB) using a five-point Likert scale (1 = strongly disagree, 5 = strongly agree). The third section consists of two open-ended questions to solicit the teachers' opinions on (1) the main predicaments with the implementation of the Tablet Project initiative in public high schools, and (2) what schools could do to improve the ongoing initiative-implementation process.

Sampling and Data Collection

Teachers in Kuwait public high schools are the informants in this study. Public schools started the Tablet Project during the 2015-2016 academic year, and the data-collection phase of this study took place at the end of the third year of the project. Upon the approval of the Ministry of Education and prior to the start of the COVID-19 pandemic, we sent paper copies of the survey to high schools across the six governorates in Kuwait. We requested that school administrators volunteer teachers to participate in this study and complete the survey. However, we received only a small number (50) of responses before the Kuwaiti government imposed a series of partial and full lockdowns. Subsequently, we had to continue the data-collection process online using social medial groups of public school teachers. The link to the survey was sent to high school teachers and administrators who were asked to encourage teachers to participate in the survey. The process produced a total of 206 complete surveys (50 of which were paper based). The results of a *t*-test for two-independent samples comparing the responses of the two groups (paper-based vs. online) confirmed no significant differences between the two groups.

Sample Profile

Almost 80% of the sample is female and 62% is Kuwaiti nationals. Of the five age groups included, more than 50% belong to the two youngest groups. Most of the respondents have more than 15 years of teaching experience; most (82%) hold a bachelor's degrees (or equivalent), and 18% hold a post-graduate degree. Furthermore, while 50% of the respondents reported moderate prior experience using a tablet PC, 17.5% reported no prior experience.

Analysis and Results

We first performed a preliminary evaluation of the measurement model via a confirmatory factor analysis to describe relationships between hidden variables of the model (Wu et al., 2016) and to verify the reliability and convergent validity of the constructs. Table 1 summarizes the resultant measurement model. The measuring items that do not meet the loading factor threshold (≥ 0.60; Hair et al., 2010) have been excluded. Reliability is estimated using Cronbach's alpha (α), and convergent validity is estimated using factor loadings and the average variance extracted (AVE). The overall AVE produced by the constructs (factors) is 0.843, with a reliability coefficient of 0.948. TE comprises the original five items (AVE = 0.885 and $\alpha = 0.968$). PU includes four of the original five items (AVE = 0.858 and $\alpha = 0.944$). PEOU includes four of the original five items (AVE = 0.731 and $\alpha = 0.876$). Finally, UB comprises four of the original six items (AVE = 0.832 and $\alpha = 0.932$). These results suggest that all constructs in the model have adequate reliability ($\alpha \leq 0.70$) and convergent validity (AVE ≤ 0.50 and factor loadings ≥ 0.60; Chin et al., 1997; Hair et al., 2010).

Table 1. The confirmatory factor analysis results

Dimensions	Factor loading	Reliability coefficient (α)	Average Variance Extracted (AVE)
Teaching Efficacy (TE)		.968	.885
TE1	.894		
TE2	.880		
TE3	.893		
TE4	.859		
TE5	.911		

Dimensions	Factor loading	Reliability coefficient (α)	Average Variance Extracted (AVE)
Perceived Usefulness (PU)		.944	.858
PU1	.762		
PU2	.856		
PU3	.812		
PU4	.831		
Perceived Ease of Use (PEOU)		.876	.731
PEOU1	.805		
PEOU2	.830		
PEOU3	.723		
PEOU5	.673		
Use Behavior (UB)		.932	.832
UB2	.816		
UB3	.870		
UB5	.824		
UB6	.798		
Overall		.948	.843

Table 2 portrays descriptive statistics for the research variables. Based on the means and the associated *p*-values, teachers in the sample report modest agreement regarding their TE (mean = 3.498, $p < .001$), PU of the system in teaching practice (mean = 3.535, $p < .001$), and PEOU of the system in teaching practice (mean = 3.385, $p < .001$). Yet, they report only slight agreement regarding their UB in teaching practice (mean = 3.164, $p = 0.044$).

Table 2. Descriptive statistics

Variables	Min	Max	Mean	Std. Dev.	*t*-value	*p*-value*
TE	1.00	4.99	3.498	1.0279	6.847	.000
PU	1.00	5.00	3.535	.9420	7.966	.000
PEOU	1.00	5.00	3.385	.8506	6.366	.000
UB	1.00	5.00	3.164	1.1388	2.029	.044

* The difference from 3 (the midpoint of the scale) is significant at $p \leq .05$.

We then used the partial least squares structural equation modeling (PLS-SEM) approach to further verify the measurement model (the research variables and their indicators) and model fit, and to evaluate a structural model in relation to the data set and test the hypotheses. PLS-SEM is an appropriate approach for both exploratory and confirmatory research (Hair et al., 2017), and it has been widely used in a variety of fields, including information systems (Hair et al., 2014, 2019; Ringle et al., 2012). As such, we used the Smart PLS 3.0 software (Ringle et al., 2015) and the bootstrapping method run by 5,000 subsamples (Sarstedt et al., 2016) to assess both the measurement and structural models.

Assessment of the Measurement Model

The measurement model assessment further verifies the reliability and validity of the constructs. The assessment entails examining the internal consistency reliability, convergent validity, and discriminant validity of the adapted measures (Marcoulides & Saunders, 2006). Reliability was first assessed by examining the indicator loadings (Appendix B), and all loadings are well above the recommended level (≥ 0.708; Hair et al., 2019). We also assessed the internal consistency of the reflective measurement model using Cronbach's α (Ringle et al., 2015) as the lower bound of internal consistency reliability and composite reliability as the higher bound (Hair et al., 2019). Except for TE, all α values in Table 3, similar to the α coefficients in Table 1, fall within the recommended 0.70–0.95 range (Hair et al., 2019). The out-of-range Cronbach's α value (0.966) for TE suggests the possibility of existing indicator redundancy, which could compromise the content validity of the TE measures (Hair et al., 2019). The results, however, suggest that each construct explains more than 50% of the indicator's variance, thus providing acceptable item reliability (Hair et al., 2017, 2019).

Table 3. Construct reliability and validity

Constructs	Cronbach's alpha	Composite reliability	Average Variance Extracted (AVE)
PEOU	0.872	0.913	0.725
PU	0.944	0.960	0.856
TE	0.965	0.973	0.878
UB	0.931	0.951	0.829

In addition, all composite reliability coefficients in Table 3, which are a more appropriate measure of internal consistency reliability (Hair et al., 2014, 2017), are well above the recommended threshold (≥ 0.50; Hair et al., 2019). These results demonstrate the reliability of the adapted measures. We also assessed the convergence validity of the measurement model by examining the AVE. All AVE values in Table 3 are well above the recommended threshold (≥ 0.50; Fornell & Larcker, 1981; Hair et al., 2019), which indicates convergent validity.

Finally, we assessed the discriminant validity of the measures following Fornell and Larcker's (1981) criterion. For discriminant validity to exist, the square root of the latent variables' AVEs should be greater than the correlation that each construct has with the other constructs; the results depicted in Table 4 demonstrate the existence of discriminant validity. The heterotrait–monotrait ratio of correlations (HTMT) was also used to evaluate the discriminant validity of the measurement model. All HTMT rations, depicted above the diagonals in Table 4, fall well below the recommend threshold (< 0.90; Henseler et al., 2015).This result further verifies the discriminant validity of the adapted measures. As such, the reliability and validity results collectively support the adequacy of the measurement model.

Table 4. Discriminant validity

	PEOU	PU	TE	UB
PEOU	0.851	0.755	0.499	0.579
PU	0.687	0.925	0.565	0.616
TE	0.458	0.538	0.937	0.582
UB	0.521	0.580	0.556	0.910

Assessment of the Structural Model

Since the consequential model is a predictive model that aims at maximizing the explained variance in the endogenous variable (i.e., UB), we used procedures that have been specifically designed to assess the adequacy of the prediction-oriented PLS-SEM models (Shmueli et al., 2016). This is because using covariance-based structural equation modeling (CB-SEM) is inappropriate in evaluating a PLS-SEM-based structural model (Hair et al., 2017, 2019; Sarstedt et al., 2016). In other words, using CB-SEM fit statistics could sacrifice the predictive power of the consequential PLS-SEM model to achieve a better fit of that model (Hair et al., 2017). To assess the appropriateness of the consequential model results (Figure 2), we used R^2 (the coefficient of determination) as a standard assessment criterion that measures the predictive accuracy of the model. R^2 values of 0.19–0.33, 0.33–0.67, and > 0.67 indicate weak, moderate, and strong powers of explanation, respectively (Hair et al., 2010; Wu et al., 2016). The R^2 values for the three endogenous variables in the model (PEOU, PU, and UB) are 0.209, 0.535, and 0.437, respectively. Yet, since UB is the ultimate predicted variable in the model, an R^2 value of 0.437 suggests moderate predictive accuracy for the model. As to multicollinearity, the inner VIF (variance-inflation-factor) values for the independent variables (TE, PU, and PEOU) in the model range from 1.00 to 1.265. Since these VIF values are well below the threshold (VIF = 5; Menard, 2001), there is no concern about the existence of multicollinearity in the model.

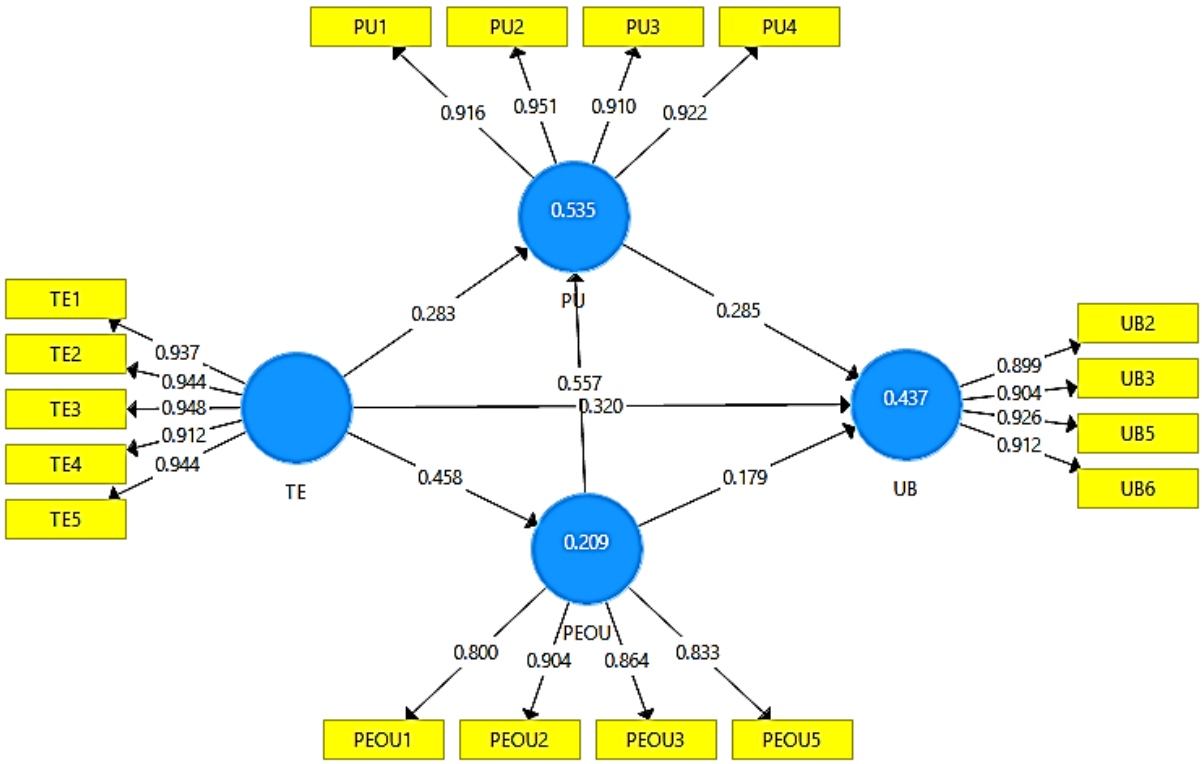

Figure 2. The consequential model

We also used the blindfolding-based cross-validated redundancy measure Q^2 to evaluate the predictive relevance of the model (Hair et al., 2019; Shmueli et al., 2016). Q^2 measures the difference between the predicted and original values; the greater the Q^2 value, the greater the model's predictive accuracy (Chin, 1998). As a rule of thumb, Q^2 values greater than 0, 0.25, and 0.50 indicate small, medium, and large predictive relevance, respectively (Hair et al., 2019). The blindfolding procedure with an omission distance of 8 produced a Q^2 value of 0.352, which suggests modest predictive relevance of the fitted model.

Although they have yet to be well documented in SmartPLS bootstrapping of final results (Sarstedt et al., 2016), the standardized root mean square residual (SRMR) and normed fit index (NFI) are two indices that could be used to assess the goodness of fit of the model (Henseler et al., 2015).

SRMR estimates the average degree of discrepancy in the observed and expected correlations; a small SRMR value (<0.08) indicates good model fit (Henseler et al., 2015). Since the reported SRMR index is 0.045, the model is adequately fitted. In addition, the closer the NFI is to 1, the better the model fit. The reported NFI index (0.899) is very close to the recommended threshold (≥0.90; Henseler et al., 2016), a result that further substantiates the adequacy of the fitted model.

Testing the Research Hypotheses

Table 5 depicts the causal relationships (paths) between the exogenous and endogenous variables in the structural model. It also shows the direct, indirect, and total path coefficients (PC), *t*-values, and *p*-values. The total PCs, which determine the magnitude of the direct and indirect effects that the exogenous variables have on the endogenous variables (Albers, 2010), are used in testing the research hypotheses.

Table 5. Path coefficients

Paths	Path coefficients	*t*-value	*p*-value	Sig.*	Hypotheses
Direct Effect					
TE ➡ PEOU	0.458	6.690	0.000	S	
TE ➡ PU	0.283	4.512	0.000	S	
TE ➡ UB	0.320	3.728	0.000	S	
PEOU ➡ PU	0.557	9.086	0.000	S	
PEOU ➡ UB	0.179	1.859	0.063	NS	
PU ➡ UB	0.285	2.756	0.006	S	
Indirect Effect					
TE ➡ PEOU ➡ UB	0.082	1.730	0.084	NS	
TE ➡ PU ➡ UB	0.081	2.356	0.019	S	
TE ➡ PEOU ➡ PU	0.255	4.784	0.000	S	
TE ➡ PEOU ➡ PU ➡ UB	0.073	2.272	0.023	S	
PEOU ➡ PU ➡ UB	0.159	2.588	0.010	S	
Total Effect					
TE ➡ PEOU	0.458	6.690	0.000	S	H1
TE ➡ PU	0.538	8.606	0.000	S	H2
TE ➡ UB	0.556	9.485	0.000	S	H3
PEOU ➡ PU	0.557	9.086	0.000	S	H4
PEOU ➡ UB	0.338	4.259	0.000	S	H5
PU ➡ UB	0.285	2.756	0.006	S	H6

* S = significant, NS = not significant.

TE has significant positive effects on PEOU (PC = 0.458, p < .001), PU (PC = 0.538, p < .001), and UB (PC = 0.556, p < .001). These results support *H1*, *H2*, and *H3*. Also, PEOU has significant positive effects on PU (PC = 0.557, p < .001) and UB (PC = 0.338, p < .001). These results support *H4* and *H5*. PU has a significant positive effect on UB (PC = −0.285, p < .001), a result that supports *H6*. Notably, although PEOU has a nonsignificant direct positive effect on UB (PC = 0.179, p = .063), its significant indirect positive effect on UB through PU (PC = 0.159, p = .010) makes the total effect statistically significant. Moreover, besides its direct significant effect on UB, TE indirectly affects UB through the PEOU path (PC = 0.82, p = .084) and through the PEOU–UP path (PC = 0.0.23, p = .023).

DISCUSSION

Our results support all hypotheses, as the three exogenous variables (TE, PU, and PEOU) are significant determinants of teachers' adoption of the tablet PC in instruction. Collectively, TE, PEOU, and PU explain approximately 43% of the variance in UB. The fitted model therefore exhibits satisfactory explanatory power, and these results confirm other researchers' (Chanlin, 2017; Yang et al., 2019) conclusions that TAM can be used to explain teachers' adoption of the tablet PC in teaching practice.

While teachers in the sample discretely agree that they possess the requisite TE to adopt the tablet PC in teaching practice, and that the system is easy to use and useful, they only slightly agree that they adopted the system in their teaching. Hence, although teachers hold sensible beliefs regarding the ease of use of the system and its usefulness to teaching activities, they have only partially translated these beliefs into actual adoption and use of the system in their teaching practice. They report only minimal adoption of the system in teaching. They are also somewhat satisfied with their experience using the system in performing teaching activities, such as outfitting the teaching methods, preparing and presenting online learning modules, interacting with students, and conducting online assessments of student performance. The teachers' remarks further support the reported low level of system adoption in teaching, as only 50% of them agreed to continue using it for teaching purposes.

The teachers attribute the low use of the system in teaching practice to multiple reasons, including poor preparation for IT-integrated learning modules, lack of proper technical training for both teachers and students, the unavailability of enough quality tablet PCs for teachers and students, poor Internet connections in schools and classrooms, lack of technical support, insufficient class time, and unenthusiastic and improper student use of the system within and outside of the classroom. These barriers echo many of the challenges of IT integration in education cited in the literature (e.g., Alenezi, 2018; Kalonde, 2017).

Moreover, TE emerges as the strongest determinant of teachers' use of the tablet PC in teaching. Drawn from the TPACK model, TE reflects teachers' beliefs that their professional and technological knowledge and skills enable them to integrate appropriate instructional methods into their curricula and subjects, select strategies and technologies to effectively teach their subjects, teach effectively by combining technology and knowledge, apply different instructional strategies and computer applications, and take a leadership role in the integration of technology and knowledge. These beliefs influence teaching practice (Scherer et al., 2019) directly and indirectly (via PEOU and PU). As such, the higher the teacher's TE, the better they will perceive the system to be effortless to use and useful in teaching, and the more they will use it in their teaching practice. This result confirms the findings of several prior investigations that concluded that TE influences EOU and PU (e.g., Hsu, 2016; Joo et al., 2018; Scherer et al., 2019; Yang et al., 2019) and IT adoption in teaching (e.g., Al-Awidi & Aldhafeeri, 2017; Chanlin, 2017; Kimmerl, 2020; Mailizar et al., 2021; Yang et al., 2019). However, it contradicts some other investigations that found that TE has no effect on PU (Mayer & Girwidz, 2019) and the intention to use IT in education (e.g., Joo et al., 2018).

Integrating IT in teaching could be stressful and therefore affect teachers' attitudes toward IT (Gebauer et al., 2010; Tarasewich, 2003; Tondeur et al., 2010). Although PEOU has a nonsignificant direct positive effect on UB, it comes second in its total (direct and direct) influence on teachers' UB of the system in teaching practice. As such, the more the teachers believe the system is easy to use and the more they believe the system is useful and advantageous, the more they will use it in their teaching activities. This result supports the results of several studies that showed that teachers' PEOU influences PU, intentional behavior, and adoption of IT in teaching practice (e.g., Hsu, 2016; MacCallum et al., 2014; Okumuş et al., 2016; Park et al., 2008).

Yet, teachers in the sample believe, to some extent, that they are skilled in using the system in teaching activities, to assign and grade online exercises and assignments, to prepare and present online learning modules, and to interact with students. In their comments, the teachers attributed this relatively low PEOU to poor Internet connections in classrooms and schools, which make using the system in teaching rather difficult (e.g., Gebauer et al., 2010; Kini & Thanarithiporn, 2004). This result generally corroborates Al-Awidi and Aldhafeeri's (2017) observation that teachers in Kuwait do not have the requisite knowledge, technical, and pedagogical skills to use emerging technologies in education.

Similarly, the teachers in the sample believe, to some extent, that the adoption of the tablet PC is beneficial to their teaching. They somewhat believe that the system can help them with refining their teaching methods, interacting with students within and outside the classroom, using online performance assessment methods, teaching content innovatively, and preparing and presenting online learning modules. Subsequently, PU has a significant effect on teachers' UB of the system in instruction. The higher the teachers' PU of the system, the more likely they will be to adopt it in their teaching activities. This result is in agreement with the findings of several previous studies that PU is a significant determinant of teachers' intention to adopt and their adoption of IT in education practice (e.g., Alenezi, 2018; MacCallum et al., 2014; Okumuş et al., 2016; Sangeeta & Tandon, 2020; Wong et al., 2013). At the same time, it contradicts Hsu's (2016) finding of no effect of PU on attitudes toward, and actual use of the system.

IMPLICATIONS

The findings of this study generate a number of implications for researchers and practitioners.

IMPLICATIONS FOR RESEARCHERS

For researchers, our results add to the growing global body of knowledge on the integration of hedonic systems (i.e., tablet PC) as well as its individual and contextual determinants in education, in general, and in teaching practice, in particular. This study offers significant empirical results from the Arabian milieu on the utility of the TAM in elucidating public high school teachers' adoption of the tablet PC in teaching practice. It also reinforces the cultural validity of TAM (Alenezi, 2018) since it explains 43% of the variance in IT UB by Arab users (i.e., teachers). Our results also support the notion that the characteristics of IT adoption situations (e.g., technology efficacy, system characteristics and functionalities, distraction, and poor-quality network connections) are particularly challenging for the design and implementation of IT-based blended learning systems (Gebauer et al., 2010). Furthermore, TE emerges as the most important determinant of teachers' adoption of the tablet PC in teaching. This result confirms that PEOU and PU play a lesser role in explaining and predicting the tablet PC's adoption in teaching than hypothesized. Interested IT-adoption researchers should therefore verify the value of incorporating external variables into TAM and testing only their indirect effects (via PEOU and PU) on IT adoption.

Implications for Practitioners

For practitioners, our results advocate that, in the public schools of Kuwait, TE is a more important determinant of the UB of IT in teaching than PEOU or PU. In addition, the teachers' annotations indicate that it is difficult to continue adopting the tablet PC in teaching for multiple reasons, including the following frequently cited factors: inadequate awareness of the role of technology in e-learning, lack of content modules fit for IT-assisted teaching, poor Internet connections, lack of technical support, and lack of adequate professional and technical training. These results calibrate the findings of other investigations from Kuwait (Alenezi, 2018; Alhashem & Al-jafar, 2015; Mohammad, 2014).

Yet, a few months after we started this research, and after spending approximately US$100 million, the Ministry of Education decided to discontinue the Tablet Project with nearly no reasons officially given. Therefore, the implications presented below could guide future efforts aimed to effectively integrate IT into education in Kuwait and to enhance the ongoing online education necessitated by the COVID-19 pandemic.

Efforts to effectively integrate IT in education should be made within the technology, organizational processes, and performance framework (Orlikowski, 2000). These efforts must be part of a comprehensive strategy aimed to digitize all processes and functions within the education system. Focus should be on the content and pedagogical methods that should be transformed, the enabling technologies, the integration process, and the significant stakeholders at all organizational levels. Stakeholders (e.g., teachers, administrators, and students) should have the basic mindset (or digital attitudes) needed to adopt IT and transform teaching and learning activities. This digital mindset includes the intercultural and collaborative mindset, the critical and creative mindset, the trust mindset, and the autonomous and responsible mindset (Dombrowski & Bogs, 2020). Notably, however, developing the new digital mindset is a challenging task. While professional competencies can be easily acquired, changing values, behaviors, and attitudes usually demands significant effort.

The digital mindset, vision, objectives, strategy, and plan for integrating IT in education should be drafted and aligned with the educational core vision, objectives, strategies, and plans. The IT strategy should identify the enabling, contemporary, general, and education-specific technologies needed to accomplish the objectives for IT integration. The IT integration plan should specify the IT integration scope, processes, phases and tasks, participants, time, and budget. Yet, the plan must be flexible enough to reflect emerging technologies and possible differences that might exist across schools and education programs. Stakeholders at all levels of the education system must participate in the planning process and buy into the final plan.

The IT integration plan should include sufficient information describing the processes and outcomes regarding the necessary new and/or revised content and pedagogical methods, performance assessment methods, IT infrastructure (e.g., systems, networks, Internet connection, IT staff, and technical support), and training programs. Teacher training is particularly important since TE is a fundamental determinant of IT adoption in teaching practice. Not all teachers are ready to change their conventional teaching methods (Alenezi, 2018), nor do they have the requisite knowledge and skills to apply IT in teaching. Teachers' professional and technological competencies must be assessed, and training programs must be customized and delivered based on assessment results. The training programs should focus on enhancing teachers' TPACK skills to learn how IT can foster the efficacy of the learning process, and to bring about significant transformation in the teaching methods (Aiyegbayo, 2015; Geer et al., 2017; Vaughan & Beers, 2017). The development of the administrators in the education system is also important because they must understand and lead the transformation process for integrating IT into teaching and learning. They are also responsible for making policies and developing change-management strategies to successfully implement the needed transformation process.

LIMITATIONS AND FUTURE RESEARCH

The results of this study should be interpreted in light of its limitations. First, our results are derived from perceptual data collected from a cross-sectional sample of high school teachers. Hence, the reported causal inferences from the quantitative analysis may be questionable (Simonovic et al., 2020). Future similar research may therefore employ other methods (e.g., observations, focus group discussions, qualitative analysis) to improve the validity of the results reported here. Second, UB of the tablet PC is the dependent variable in this study, and the teachers could have overrated their UB since it is a socially desirable activity. Therefore, the relationships between the investigated variables could be misleading. Future investigations should attempt to reduce this social desirability using appeals to be candid, promises of privacy, and guaranteed secrecy (Nancarrow et al., 2001). Third, the results of this study are produced from a data set drawn from public high schools in Kuwait. As such, these results may not be generalizable to teachers' adoption of IT in teaching practice in private high schools. Future similar research should investigate the private high school teachers' adoption of IT in teaching practice and compare the results with those reported here.

Fourth, the fitted research model of this study explains approximately 43% of the variance in teachers' UB with the tablet PC in teaching practice. Future research models should be designed to incorporate and test other possible determinants (e.g., facilitating conditions, social norms, individual characteristics) to explain a higher percentage of teachers' UB with IT in teaching. Fifth, the results of this study inform on only the teachers' perspectives on the implementation of the Tablet Project initiative. To gain a better understanding of the Tablet Project initiative, future research should be carried out that explores the extent of students' adoption of the tablet PC in learning activities and its important determinants.

CONCLUSIONS

The role of IT in education is prominent and takes different forms depending on the purpose of IT adoption and the adopted IT systems. In a step toward utilizing emerging technology in education in Kuwait, the Ministry of Education launched a project to integrate the tablet PC in high school education during the 2015–2016 academic year. The initiative aimed to establish a blended learning environment that combines face-to-face classroom instruction with online instruction. Three years later, the project's effectiveness was uncertain.

Since the successful implementation of IT integration in education rests mostly on the teachers' adoption of the chosen technology in teaching practice (Alenezi, 2018; Ertmer et al., 2012; Kriek & Stols, 2010), this study sought empirical evidence on the extent of the public high school teachers' adoption of the tablet PC and the influence of TE, PEOU, and PU on teachers' UB. Although the studied teachers believe that they have the requisite TE to adopt the tablet PC in teaching practice, and that the device is relatively easy to use and useful, they hardly use it in their teaching. Collectively, TE, PEOU, and PU explain approximately 43% of the variance in UB, and TE appears to be the most influential factor in determining UB.

These empirically derived results confirm scant information that was in circulation at the time of this study and that claimed that the Tablet Project was not progressing sufficiently or achieving its objectives. A few months later, the government abruptly stopped the project. Despite its limitations, these results could guide future efforts aimed to effectively integrate IT into high school education in Kuwait and to enhance the ongoing online education necessitated by the COVID-19 pandemic. Most importantly, effective integration of IT in teaching and learning seems to mandate a comprehensive redesign and digitization of the targeted educational system.

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APPENDIX A: MEASUREMENT OF THE RESEARCH CONSTRUCTS

Teaching Efficacy (TE)	
TE1	Integrating appropriate instructional methods into courses.
TE2	Selecting strategies and technologies to help teach content effectively.
TE3	Teaching successfully by combining technology knowledge.
TE4	Taking a leadership role in the integration of technology knowledge.
TE5	Teaching a subject with different instructional strategies and computer applications.
Perceived Usefulness (PU)	
PU1	The tablet PC is helpful in refining teaching methods.
PU2	The tablet PC is useful in interacting with students in and outside the classroom.
PU3	The tablet PC is helpful in applying students' performance assessment methods.
PU4	The tablet PC is useful in innovatively teaching my courses.
PU5*	The tablet PC is helpful in preparing and presenting online learning modules.
Perceived Ease of Use (PEOU)	
PEOU1	I'm skillful in using the tablet PC in teaching.
PEOU2	I generally find the tablet PC easy to use.
PEOU3	I easily give and grade online exams and assignments.
PEOU4*	I easily use the tablet PC to prepare and present online learning modules.
PEOU5	I easily use the tablet to interact with students.
Use Behavior (UB)	
UB1*	I use the tablet to outfit my teaching methods.
UB2	I use the tablet in my teaching activities.
UB3	I use the tablet to interact with students.
UB4*	I used the tablet to test students and evaluate their performance online.
UB5	I use the tablet to prepare and present online learning modules.
UB6	Overall, I'm pleased with the tablet-PC-based teaching experience.

* Items excluded from the measurement model

APPENDIX B: THE OUTER LOADINGS

	PEOU	PU	TE	UB
PEOU1	0.800			
PEOU2	0.904			
PEOU3	0.864			
PEOU5	0.833			
PU1		0.916		
PU2		0.951		
PU3		0.910		
PU4		0.922		
TE1			0.937	
TE2			0.944	
TE3			0.948	
TE4			0.912	
TE5			0.944	
UB2				0.899
UB3				0.904
UB5				0.926
UB6				0.912

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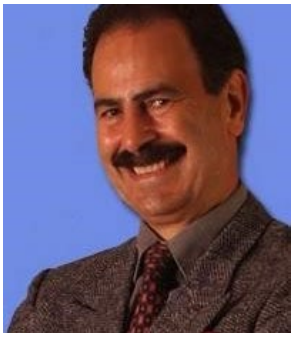

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