

**FACTORS AFFECTING SAUDI PRIMARY
SCHOOL STUDENTS' ACCEPTANCE AND
ENGAGEMENT IN TABLET PERSONAL
COMPUTERS USAGE**

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by

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LIST OF ABBREVIATIONS

AVE	Average Variance Extracted
CA	Cronbach's Alpha
CR	Composite Reliability
CR	Composite Reliability
DOI	Diffusion Of Innovation
DV	Dependent Variable
F2	Effect Size
ICT	Information and Communications Technology
IV	Independent Variable
MGA	Multi-group analysis
MoE	Ministry of Education
MOOCs	Massive Open Online Courses
PLS	Partial Least Squares
PLS–SEM	Partial Least Squares–Structural Equation Modeling
R ²	Coefficient Of Determination
SEM	Structural Equation Modeling
TAM	Technology Acceptance Model
TPB	Theory Of Planned Behavior
TPC	Tablet Personal Computers
TRA	Theory of Reasoned Action
TTF	Technology Task Fit
UNESCO	United Nations Educational, Scientific, and Cultural Organization

USM	Universiti Sains Malaysia
UTAUT2	Unified Theory of Acceptance and Use of Technology 2
VIF	Variance Inflation Factor
WoS	Web of Science Indexing Database

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**FAKTOR-FAKTOR YANG MEMPENGARUHI PENERIMAAN DAN
PENGLIBATAN PELAJAR SEKOLAH RENDAH SAUDI DALAM
PENGUNAAN KOMPUTER PERIBADI TABLET**

ABSTRAK

Pemilikan dan penggunaan meluas komputer peribadi tablet (TPC) dalam kalangan pelajar sekolah rendah Saudi dijangka membolehkan mereka menggunakannya untuk pembelajaran, yang sejajar dengan aspirasi kerajaan dan Kementerian Pendidikan untuk mengguna pakai strategi pembelajaran teradun untuk masa depan pendidikan K–12. Walau bagaimanapun, motivasi di sebalik penerimaan mereka terhadap TPC sebagai alat pembelajaran tidak jelas kerana kajian yang terhad dalam bidang ini. Oleh itu, untuk menangani jurang tersebut, kajian ini mengabungkan *Unified Theory of Acceptance and Use of Technology 2* (UTAUT2) dan *Task-Technology Fit* (TTF) untuk menyiasat faktor-faktor yang mempengaruhi tingkah laku penggunaan TPC tersebut dan mengesan hubungan ini berdasarkan jantina pelajar. Lebih khusus lagi, melalui rangka kerja teori bersepadu, faktor UTAUT2 (jangkaan prestasi, jangkaan usaha, pengaruh sosial, keadaan memudahkan, motivasi hedonik dan tabiat) dan faktor TTF (ciri tugas, ciri teknologi dan kesesuaian teknologi tugas) telah dicadangkan untuk mempengaruhi penglibatan pelajar sekolah rendah Saudi melalui niat dan penggunaan sebenar TPC. Data dikumpul menggunakan soal selidik iaitu melibatkan 279 pelajar telah diambil secara rawak daripada sekolah rendah awam di Arab Saudi. Data dianalisis menggunakan perisian SmartPLS, dengan analisis hipotesis yang dijalankan melalui model persamaan struktur kuasa dua terkecil separa (PLS-SEM). Dapatan menunjukkan: (1) model pengukuran kelihatan mempunyai nilai

kebolehpercayaan dan kesahan yang mencukupi, (2) sembilan daripada 11 hipotesis arah untuk perhubungan langsung disokong dalam model struktur, dan (3) hanya terdapat perbezaan yang signifikan dalam kesan niat terhadap penggunaan sebenar TPC antara pelajar lelaki dan perempuan. Oleh itu, penemuan telah menjawab persoalan kajian: (1) jangkaan prestasi, pengaruh sosial, motivasi hedonik, dan tabiat adalah faktor UTAUT2 yang mempengaruhi positif niat untuk menggunakan TPC, (2) ciri tugas dan ciri teknologi mempengaruhi kesesuaian teknologi tugas dengan cara yang bertentangan: ciri tugas memberi kesan negatif, manakala ciri teknologi memberi kesan positif, (3) kesesuaian niat dan teknologi tugas mempengaruhi penggunaan sebenar TPC secara positif, (4) penggunaan sebenar TPC mempengaruhi penglibatan pelajar secara positif, dan (5) hanya pengaruh niat terhadap penggunaan sebenar TPC berbeza antara lelaki dan perempuan. Berdasarkan dapatan ini, meneliti perkaitan konstruk yang dicadangkan menunjukkan bahawa model penyelidikan yang dibangunkan adalah sesuai untuk menjelaskan penerimaan tingkah laku TPC dalam kalangan pelajar sekolah rendah Saudi. Oleh itu, kerajaan dan sekolah harus mempunyai penyelesaian yang praktikal dan membina untuk meningkatkan penggunaan TPC di sekolah rendah. Dalam kes ini, pengetua dan kerajaan perlu menyediakan pelajar dengan latihan dan model pembelajaran reka bentuk, yang boleh digabungkan dengan penggunaan TPC. Sekolah juga boleh menggalakkan kesederhanaan menggunakan TPC dan media pembelajaran interaktif berasaskan teknologi lain dengan melaksanakan beberapa latihan.

**FACTORS AFFECTING SAUDI PRIMARY SCHOOL STUDENTS'
ACCEPTANCE AND ENGAGEMENT IN TABLET PERSONAL
COMPUTERS USAGE**

ABSTRACT

The widespread ownership and use of tablet personal computers (TPCs) among Saudi primary students are expected to enable them to use them for learning, which aligns with the government and the Ministry of Education's aspiration to adopt blended learning strategies for the future of K–12 education. However, the motivations behind their acceptance of TPC as a learning tool are unclear due to limited studies in this area. Thus, addressing the gap, this study integrated the Unified Theory of Acceptance and Use of Technology (UTAUT2) and technology task fit (TTF) to investigate the factors influencing such TPCs usage behaviour and detect any difference in this influence considering the students' gender. More specifically, through the integrated theoretical framework, the UTAUT2 factors (i.e., performance expectancy, effort expectancy, social influence, facilitating conditions, hedonic motivation, and habit) and TTF factors (i.e., task characteristics, technology characteristics, and task technology fit) were proposed to influence Saudi primary student engagement through the intention and actual usage of TPCs. Data were collected using a cross-sectional survey using an administrated questionnaire in which 279 students were randomly sampled from public primary schools in Saudi Arabia. The data were analyzed using the smartPLS software, with hypothetical analysis being carried out through the partial least squares structural equation model (PLS-SEM). Findings indicate: (1) the measurement model appeared to have sufficient reliability

and validity values, (2) nine out of 11 directional hypotheses for the direct relationships were supported in the structural model, (3), and there was only a significant difference in the effect of intention on actual use of TPCs between male and female students. Thus, the findings have answered research questions: (1) performance expectancy, social influence, hedonic motivation, and habit are the UTAUT2 factors that positively influence intention to use TPCs, (2) task characteristics and technology characteristics influence task-technology fit in opposite ways: task characteristics have a negative impact, while technology characteristics have a positive impact, (3) intention and task technology fit positively influence actual use of TPCs, (4) actual use of TPCs positively influence on student engagement, and (5) only the influence of intention on actual use of TPCs differs between males and females. Based on these findings, examining the relations of the proposed constructs shows that the developed research model is appropriate to explain the acceptance of TPCs behaviour among Saudi primary school students. Therefore, the government and schools should have practical and constructive solutions to increase the use of TPCs in primary schools. In this case, the principals and government need to provide students with training and design learning models, which can be combined with the use of TPCs. Schools could also promote the simplicity of using TPCs and other technology-based interactive learning media by implementing some training practices.

CHAPTER 1

INTRODUCTION

1.1 Introduction

The usage of mobile devices is expanding rapidly, transforming daily life, offering new capabilities, and having a positive effect on many industries, including education (Alowayr, 2021; Asghar et al., 2021; Wang et al., 2022). Mobile learning involves using mobile wireless devices, such as smartphones, laptops, and tablets, to support learning anytime and anywhere. It allows students to leverage technology, expanding their educational experiences beyond the confines of traditional classroom settings (Alfalah, 2023; Zhang et al., 2020). As a result, tablet personal computers (TPCs) have significant potential in academia. The rapid penetration of TPCs among students boosts learning outcomes and capacities when used effectively (Cacciamani et al., 2018; Wang et al., 2022).

There are many reasons why TPCs appeal to students at the primary education level in the Saudi context. Among the foremost reasons is the TPCs' support for students' development as independent learners outside of the classroom and student-centered learning (Alahmari, 2019). In response to the epidemic of COVID-19 and the fourth industrial revolution, the Saudi government has recently introduced TPCs in schools and on digital platforms. It is also believed that using TPCs could increase the abundant benefits of e-learning systems from teachers to students and access to more learning resources, like the Madrasati remote learning platform. Madrasati is an e-learning platform by the Ministry of Education (MoE) in Saudi Arabia to support learning during COVID-19.

TPCs are used in learning environments to enable wireless communication between teachers and students, to deliver learning curricula, and to improve play comprehension when used alone or with others (Courage et al., 2021). More importantly, it should be noted that mobile learning has long been recognized by the Saudi MoE as a crucial part of its transformational strategy for education (DCunha, 2022). Mobile learning integration, such as TPCs, has become essential and required in teaching and learning for all K–12 levels in Saudi Arabia (Alotaibi, 2021). Saudi Arabia's 2030 Vision further supports this rapid need, which calls for a 50% increase in the country's digital economy (Al-Abdullatif et al., 2022). TPCs are experiencing a growing trend in popularity as an effective learning tool within K-12 educational environments. This is due to their ability to facilitate learning at any given time and place, thus enhancing the educational experience. As a result, this can boost students' motivation and engagement, ultimately improving learning outcomes (Chou et al., 2019; Pila et al., 2019).

Despite the numerous studies that have been conducted on the subject matter, students may not always be welcome to use TPCs in the classroom (Wang et al., 2022; Zheng & Li, 2020). Some students had neutral or unfavorable views on tablets and did not believe they would increase course interest or facilitate learning. Mulet et al. (2019) stressed the need to comprehend the perceptions and obstacles that either encourage or prevent the usage of tablets for learning, as these perceptions determine the use and, consequently, the worth of tablets for learning.

Understanding the factors that influence students' intention to use tablets as a learning aid is crucial for enhancing their successful adoption and use. These factors include performance expectancy, social influence, effort expectancy, hedonic

motivation, habit, and facilitating conditions, which are key components of the Unified Theory of Acceptance and Use of Technology (UTAUT) that shape tablet usage among school students (Mulet et al., 2019; Zheng & Li, 2020). However, research indicates a scarcity of studies focusing on these factors within the Saudi context (Alahmari, 2019). Additionally, task characteristics and technology characteristics are also significant in influencing task-technology fit, which influences students' actual use of mobile devices for learning (Wan et al., 2020; Faqih & Jaradat, 2021).

The dearth of studies focused on primary education (Al-Huneini et al., 2020; Hamhuis et al., 2020) calls for the need for investigation of acceptance of TPC with this target of students (Mulet et al., 2019). This gap in research is particularly important because understanding the factors that influence tablet usage can directly impact student engagement. Investigating these factors can provide valuable insights into how tablets can be leveraged to foster deeper, more interactive learning experiences, enhancing overall student engagement in primary education. In general, the current research discusses the various factors anticipated to impact the utilization of TPCs by students in primary schools in Saudi Arabia, thereby influencing their educational engagement within the classroom setting.

1.2 Research Background

The introduction of mobile learning in education has been shown to improve learning not only inside the classroom but also outside of it, motivating students to take charge of their educational experiences (Alowayr, 2021; Alturki & Aldraiweesh, 2022). According to the United Nations Educational, Scientific, and Cultural Organization (UNESCO), mobile learning has the potential to improve student test scores and the overall quality of education. UNESCO also recommends that governments leverage

new technology to ensure widespread mobile connectivity and provide more learning opportunities for children (Chao, 2019).

In recent years, the usage of TPCs has become increasingly enticing to educators and researchers as it is a widely prevalent mobile device that has made its way into learning environments at school (Villani et al., 2018; Wang et al., 2022). This spreading technology is because of the decreasing prices of physical devices and wireless connections being more widely available in schools (Ifenthaler & Schweinbenz, 2016; Zheng & Li, 2020). TPCs have become essential tools for students to study, record, and review lessons, providing new learning opportunities in the classroom for both primary and secondary school students (Cacciamani et al., 2018). The integration of TPC into learning environments is crucial for helping students complete assignments, communicate with teachers, read e-books, take notes, and engage in online learning (Chou & Feng, 2019; Villani et al., 2018).

TPCs can provide software (such as writing, video-making, simulation management, and augmented reality apps) and hardware (such as cameras and microphones) that enable students to create their materials and engage in complex knowledge domains. They also allow teachers to digitally monitor students' progress in real-time (Cacciamani et al., 2018; Chou & Feng, 2019). TPCs might replace students' bulky book backpacks while enhancing their digital literacy and fostering learner autonomy (Al-Huneini et al., 2020). Additionally, TPCs can be viewed as versatile technology with various uses that could help students improve their learning by intensifying engagement in activities in or outside classrooms (Cacciamani et al., 2018; Zainuddin et al., 2020). Motivated by these advanced and interactive features of TPCs, students can improve their writing, reading, and math abilities (Patchan & Puranik,

2016; Zheng & Li, 2020). The advantages of utilizing TPCs are among the fundamental rationales for employing TPCs as an activity system in primary school classrooms to cater to the learning requirements of students (Al-Huneini et al., 2020; Hamhuis et al., 2020).

Saudi primary school students have been reported to experience low motivation, decreased interaction between teachers and students, and low engagement in the overall learning process (Alghamdi et al., 2020). This is often due to the traditional lecture-based format in the majority of primary schools, where there are more than 20 courses and at least 20 students per class (General Authority for Statistics, 2021). The issue of poor student engagement, the adoption of conventional learning, and the continued dominance of teacher oral explanations as the primary form of classroom instruction are all challenges in Saudi educational learning systems (Alahmari, 2019). In conventional learning situations, young learners cannot be educated using direct instruction approaches. Given this, the Saudi government has strongly emphasized digitalizing the current education system by incorporating modern technological tools such as tablets and encouraging schools to allow students to use TPCs instead of paper books and notebooks (Albiladi et al., 2018a; Al Ohali et al., 2018).

One of the objectives outlined by the Ministry of Education in its path to achieving the goals of Vision 2030 is the employment of technology in all educational settings. Furthermore, according to recent statistics, Saudi Arabia's society is rapidly adopting mobile digitalization, with Internet penetration at 93%, cellphone ownership at 92%, laptop usage at 57%, and tablet usage at 34%. These data imply that Saudi Arabia has the ICT infrastructure to implement mobile learning methods (Alfalah, 2023). However, the extent to which learners perceive this learning will determine its

success. As a result, it is envisaged that Saudi students in primary schools could employ various techniques to enhance learning in this context and engage in adaptable learning experiences by utilizing the rapidly evolving digital learning environment, like TPCs.

The widespread ownership and use of TPCs among Saudi students also indicate the potential of these mobile technologies to increase educational opportunities for this group of students (Alhamed & Ohlson, 2021; Albiladi & Alshareef, 2018). In line with this, the academic potential of TPCs can be fully realized to promote flexible and fluid types of 'connected learning' only if students actively and effectively use them both inside and outside the classroom (Cacciamani et al., 2018; Ifenthaler & Schweinbenz, 2016). Thus, this ultimately suggests the importance of exploring Saudi primary school students' acceptance of TPCs, particularly in classroom activities.

There is increasing interest in using tablets in K–12 education due to their advantages (Mulet et al., 2019; Zheng & Li, 2020). It seems that tablets are now prevalent in schools today. These are frequently utilized for teaching and learning. The World Bank and other financing organizations are launching programs to encourage educational decision-makers to buy tablets for classroom use; this would yield better results (Hamhuis et al., 2020; Nikolopoulou et al., 2021). Acceptance and use of tablets by students must be necessary for the benefits of these devices to be realized in their learning.

Typically, the problems with tablets are that students do not recognize their usefulness, do not feel comfortable utilizing them, and will not use them (Zheng & Li, 2020). Given the crucial function of users' acceptance, a deeper comprehension of the critical variables affecting this dimension is required to ensure the successful integration of TPCs into educational procedures (Cacciamani et al., 2018; Hamzah et al., 2020;

Mulet et al., 2019). The potential of TPCs as educational means of learning is still open and requires further investigation (Villani et al., 2018; Wang et al., 2022). Future research should also look into and support earlier findings about the impact of students' acceptance of TPC use in school (Villani et al., 2018).

Numerous studies have examined the factors of technology adoption and use by extending existing models of technology adoption. The Unified Theory of Acceptance and Use of Technology (UTAUT2) is a key theory in the literature that explains how users accept and adopt new technologies, such as TPCs in this study (Venkatesh et al., 2008). The UTAUT2 claims that the actual use of a technology depends on the person's intention to use it, which is influenced by the six factors: performance expectancy, effort expectancy, social influence, hedonic motivation, habit, and facilitating conditions.

Furthermore, several empirical studies analyzed the variables affecting the incorporation of TPCs in education using the UTAUT2 model (Li & Zhao, 2021; Wan et al., 2022; Wang et al., 2022). However, there are still certain limitations. The UTAUT2 model primarily concerns the usage and its antecedent, but the task component was not considered (Mulet et al., 2019). For instance, even if students think TPCs are helpful and straightforward, they can stop using them if they cannot satisfy their learning requirements or improve their learning results.

The Task-Technology Fit (TTF) model suggests that users will embrace and continue to use technology when there is a good fit between the technology's characteristics and the task's requirements (Goodhue, 1995; Wan et al., 2022). While UTAUT2 theory explains the personal factors influencing the adoption of new technologies, TTF theory addresses the suitability of the technology for the tasks at hand, considering both task characteristics and technology characteristics, and clarifies

the technical factors that affect the adoption and use of technology (Wan et al., 2020). Several studies in the field of mobile learning have integrated the UTAUT2 and TTF frameworks, as they are mutually supportive (Li et al., 2020a; Li et al., 2020b; Wang, 2018). In a few studies, the UTAUT2 model and the TTF model are combined to explain why users embrace TPCs for learning (Wang et al., 2022). According to their findings, both models' variables strongly influence how users adopt new technologies. This study will combine the UTAUT2 and TTF models to create an efficient conceptual model to explain student engagement in the learning process. The goal is to precisely identify the variables and mechanisms influencing primary school students' intention to use TPCs and actual use.

Based on previous studies on the UTAUT2 model's constructs, both effort expectancy and performance expectancy positively predict students' attitudes toward TPCs (Cacciamani et al., 2018). Additionally, social influence, facilitating conditions, hedonic motivation, and habit influence the behavioral intention to use TPCs (Nikolopoulou et al., 2021; Wang et al., 2022; Zheng & Li, 2020). In other words, the intention is for students to be influenced by the simplicity of utilizing TPCs for studying (i.e., effort expectancy) and the benefits relating to learning performance from using the tablet (i.e., performance expectancy), as well as use them in their daily lives (i.e., Habit).

Students are more likely to use a tablet when they experience social influence from important individuals, enjoyment (i.e., hedonic motivation), and technical support through available resources (i.e., facilitating conditions). In the context of Saudi Arabia, the majority of prior investigations that have incorporated the UTAUT2 have been limited to investigating the impact of the factors on the acceptance of mobile learning among students in higher education (e.g., Alfalah, 2023; Al-Mamary, 2022; Alowayr,

2022; Alturki & Aldraiweesh, 2022). Therefore, the extent of the influence of the UTAUT2 constructs on primary school students' intention and use of TPCs for their learning is unclear and requires further investigation.

TPC use is mainly voluntary and motivated internally by the end-users because it is still in its infancy in many educational institutions, including Saudi Arabia (Al-Huneini et al., 2020; Howard & Howard, 2017; Kayapinar et al., 2019). The likelihood of students using TPCs as an educational tool may also be affected by external factors, such as technology-related concerns, increased teacher workload, and access to a reliable internet connection (Al-Huneini et al., 2020). As a result, by determining the influencing factors, which is the goal of this study, pertinent stakeholders like computer science instructors, school administrators, and the TPCs developers may be able to identify the potential support areas, as well as issues to be taken into consideration, to help optimize actual TPC use, which will increase student engagement in the classroom (Wang et al., 2022; Zheng & Li, 2020). For these reasons, more research is needed to better understand how Saudi primary school students use TPCs, especially how they view the variables that influence their usage and consequently affect their classroom engagement.

In the context of educational technology, the UTAUT has been widely used to examine the factors that influence students' decisions to adopt and use digital tools, including TPCs. The original UTAUT model identifies four key moderators—gender, age, experience, and voluntariness—that affect technology adoption. However, previous studies have produced conflicting results regarding the role of gender in students' intentions to use mobile learning tools, particularly in the case of TPCs for educational purposes. Research by Cacciamani et al. (2018) and Mulet et al. (2019)

highlights the lack of consensus on how gender moderates the acceptance of technology, suggesting that its impact may vary depending on contextual and demographic factors. Despite the importance of this issue, the gender-based moderating effect on the use of TPCs in primary education remains inconclusive, underscoring the need for further investigation into this aspect.

1.3 Problem Statement

In line with the advancement of technology, particularly in this century, Saudi primary students are projected to be able to use TPCs in the classroom. In Saudi Vision 2030, education is one of the key sectors of focus. This aligns with the Ministry of Education's vision, which promotes the integration of blended learning strategies across all educational levels to support effective initiatives that enhance classroom learning (Aladsani et al., 2022). Moreover, as many students in Saudi schools already own and use tablets (Alfalah, 2023), their educational opportunities have significantly increased (Alahmari, 2019; Alhamed & Ohlson, 2021). These students, who are accustomed to mobile digitalization, are expected to have a high rate of tablet usage for learning, highlighting the importance of TPCs for students (Alfalah, 2023; Albiladi & Alshareef, 2018).

Likewise, results of various previous research have demonstrated that Saudi students use their TPCs for science and English learning (Alahmari, 2019; Albiladi & Alshareef, 2018). Unfortunately, Alhamed and Ohlson (2021) found that Saudi classroom practices did not align with the switch to TPCs' usage objectives. If TPCs are not used in the classroom, it could lead to disengagement and a lack of motivation in learning. One of the primary concerns arising from the investigations into the education system of Saudi Arabia was the correlation between deficient student

performance and inadequate engagement in the educational process, particularly in cases where traditional teaching techniques were employed in the classroom (Alghamdi et al., 2020; Knowledge Series Report, 2023).

Moreover, Alfallaj (2020) highlighted managerial issues, technological difficulties, financial limitations, and cultural considerations as the main barriers to implementing digital and mobile learning in Saudi K–12 education. These barriers could play a significant role in understanding the factors influencing the acceptance and effective use of TPCs in the educational setting. For example, technological issues, such as unreliable internet access, insufficient technical support, or device malfunctions, could limit the effectiveness of TPCs in the classroom. Financial Limitations: In the context of your study, facilitating conditions (such as financial resources for maintaining or upgrading devices) influence the intention to use and actual use of tablets. Students in schools with limited financial resources might face barriers that prevent them from fully utilizing TPCs, affecting their engagement and learning outcomes. Cultural factors, such as societal attitudes toward technology, could shape students' motivation to use TPCs, as well as their engagement.

In the context of TPCs, Alahmari (2019) highlighted that although most students own TPCs, they are often unaware of the best practices for using these devices for learning. In primary education in Saudi Arabia, many students still have limited knowledge and understanding of TPCs as general learning tools. To this assertion, many Saudi primary students view tablets in the classroom as entertainment tools rather than learning tools, despite some having little to no experience using them for studying at home or school.

This issue is concerning because it would hinder the adoption of tablets as a supported learning tool in primary schools, as targeted by the government. It has become apparent that the factors that may likely encourage students in Saudi primary schools to accept and effectively use TPCs remain unknown. Studies on students' use of TPCs in Saudi Arabia are still limited (Alahmari, 2019; Albiladi & Alshareef, 2018). There is a scarcity of survey data and inadequate responses from primary school students in Saudi Arabia regarding their use and interaction with TPCs. The majority of research in Saudi Arabia has been conducted on the application of TPCs in Science and English language acquisition (Alahmari, 2019; Albiladi & Alshareef, 2018; Al-Omari & AbuSeileek, 2023). This study differs from previous Saudi studies by integrating the TTF model and UTAUT2 to explore the actual use of TPCs in a broader context, beyond subject-specific applications. Additionally, this study examines the relationship between the actual use of TPCs and student engagement, an aspect that has been underexplored in the existing literature. Moreover, gender differences are investigated as a moderating factor that influences the relationship between the factors affecting the actual use of TPCs.

Despite the considerable interest in the subject matter, it is worth noting that there is a dearth of empirical evidence concerning the factors that exert an influence on the intention and utilization of TPCs, and by extension, the levels of student engagement that are observed in the context of Saudi Arabia. According to Alahmari (2019) and Alhamed and Ohlson (2021), researchers must closely examine the problems that hinder the adoption of to use of TPCs for learning among potential users such as students.

This deficiency makes it difficult for stakeholders and decision-makers to come up with solutions for students who hardly ever use TPCs, which may impair Saudi

Arabia's MoE's plans to change the dominance of traditional learning through mobile learning and digital learning. The ministry has invested much time and money in preparing schools with the latest technological tools to help teachers incorporate technology into their lesson plans (Albiladi & Alshareef, 2018). Saudi Arabia recently approved an education development strategy aligned with the 2030 Vision, which aims to foster innovation and creativity. This is especially true given that earlier research has demonstrated that such tactics might be developed by examining the variables that affect TPCs' intention and use behavior among primary students (Al-Huneini et al., 2020; Hamhuis et al., 2020; Zheng & Li, 2020).

Research into the factors influencing primary school students' behavioral intentions toward using TPCs for learning is urgently required. According to Mulet et al. (2019), investigations on the acceptance and use of tablets for education in primary schools present a unique perspective on the subject area. Also, a gap exists in research that determines the intention and behavioral use of tablets, but may also predict other critical factors for student engagement in the learning process. Accordingly, this study aims to investigate primary school students' engagement and identify the key factors influencing the intention and actual use of TPCs. More specifically, it examines the factors influencing the intention to use TPCs among primary school students using the UTAUT2 model.

UTAUT2 considers seven key factors influencing a person's behavioral intention to use a new technology, such as performance expectancy, habit, effort expectancy, habit, hedonic motivation, social influence, and facilitating conditions. All seven factors play a significant role in influencing students' choices to embrace and employ TPCs (Hamzah et al., 2020; Wang et al., 2022; Zheng & Li, 2020). These

elements have also been shown to impact how mobile learning is adopted and used in the classroom (Chatti & Hadoussa, 2021; Salloum & Shaalan, 2019).

However, the six primary constructs of UTAUT2 may not be able to adequately describe how TPCs are used in the primary education context of this study. This is because UTAUT2 was explicitly created to explain technology usage behavior in the context of the workplace and did not take into consideration technologically related issues. Furthermore, other research examined students' intentions to use tablets and their actual utilization (Wang et al., 2022; Zheng & Li, 2020) rather than focusing on student engagement due to using TPCs as learning tools. Prior studies have demonstrated that TTF serves as an indicator of the intention to utilize mobile learning technology and the subsequent actual implementation of said technology (Wan et al., 2020; Wu & Chen, 2017). It remains unclear whether task characteristics and technology characteristics influence TTF, and whether a good task-technology fit will impact a student's actual use of TPCs and subsequently affect their level of engagement. Wang et al. (2022) suggest that future research include applying the TTF model to TPCs usage.

Furthermore, task and technology characteristics of TTF factors have been widely reported as closely related to task technology fit, which influences the actual use of technology (Abdekhoda et al., 2022; Al-Rahmi et al., 2020; Hizam et al., 2021). Despite this, empirical evidence on their application in studying TPCs acceptance and use is limited (Wang et al., 2022). Hence, this situation has created a gap following the task and technology characteristics that account for the actual use of TPCs among Saudi primary students.

To better understand how students view using tablets for learning, this study aims to extend the model by fusing UTAUT2 and TTF as ground theory. UTAUT2

focuses on general factors influencing technology adoption, while TTF focuses on how well the specific features of a technology align with the tasks students need to perform. Hence, UTAUT2 focuses on understanding general factors that influence people's adoption of new technologies. The TTF model focuses specifically on how well a technology's features match the specific tasks that users need to perform. UTAUT2 asks if people find a technology generally useful and easy to use, while TTF asks if a specific technology is well-suited for the particular tasks the users need to do. Combining UTAUT2 and TTF models can offer a more comprehensive understanding of student intention to use tablets for learning.

Besides, much literature has indicated the influence of tablet use on student engagement for participants in multiple learning contexts (Bluestein & Kim, 2017; Howard & Howard, 2017; Kayapinar et al., 2019; Zainuddin et al., 2020). Mulet et al. (2019) recommended that future studies assess students' engagement with their tablet-based learning projects instead of only evaluating perceptions. This is one of the most critical issues that should be targeted to increase the students' engagement in the learning process. However, there is limited evidence of the effect of tablet use on student engagement in primary school; therefore, this investigation will address this gap.

The decision to include gender as a moderator in the current study, while excluding other moderators such as age, experience, and voluntariness, is based on the ongoing debate and inconsistent findings regarding the role of gender in the adoption and use of mobile learning technologies, particularly tablet personal computers (TPCs). The original UTAUT model highlights four key moderators—gender, age, experience, and voluntariness—that influence technology acceptance. However, earlier research has

produced contradictory results regarding the impact of gender on students' decisions to adopt and use mobile learning tools. The contradictions in earlier research regarding how gender affects students' decisions to adopt and use mobile learning, especially TPCs for learning (Afandi, 2022; Cacciamani et al., 2018; Moorthy et al., 2019; Mulet et al., 2019) suggest that the gender-based moderating impact is not conclusive, which justifies the need for further investigation into this variable. By focusing on gender, this study aims to contribute to the understanding of its role in the acceptance of TPCs for learning, considering that gender dynamics can shape attitudes, usage patterns, and interactions with technology in distinct ways.

Saudi Arabia has seen significant shifts in educational policies, especially with the increasing integration of digital tools in schools, yet gender differences in technology use remain a crucial area of investigation. Age and experience may not play a significant role in primary school students' adoption of TPCs, as most students in this age group are likely to be relatively similar in terms of their familiarity with technology. Also, in the context of Saudi primary schools, the use of TPCs as an educational tool is likely mandated or encouraged by the educational authorities. Given that the government is promoting the integration of digital tools in the classroom, the voluntariness of TPC use may not significantly affect students' behavior. By focusing on gender, this study aims to shed light on how cultural and social factors influence the acceptance and use of TPCs for learning in Saudi primary schools, ultimately contributing to a better understanding of the role gender plays in technology adoption in the Saudi educational context.

1.4 Research Objectives

The main goal of this study is to investigate the factors affecting the usage of TPCs among primary school students in Saudi Arabia by establishing the relationships between the factors from UTAUT and TTF. Finally, this study proposes a model that explains the relationship between the factors that influence the usage of TPCs and student engagement in Saudi Primary schools' educational context and investigates the moderating effect of students' gender on the studied relationships. The following are the research objectives of this study:

- RO 1 To investigate the influence of the task characteristics and technology characteristics on task technology fit among students in Saudi primary schools.
- RO 2 To examine the influence of performance expectancy, effort expectancy, social influence, facilitating conditions, hedonic motivation, and habit on intention to use TPCs among students in Saudi primary schools.
- RO 3 To examine the influence of task technology fit and intention to use tablets on actual usage of TPCs among students in Saudi primary schools.
- RO 4 To examine the influence of actual usage of TPCs on student engagement in Saudi primary schools
- RO 5 To investigate whether the influence of the factors on actual usage of TPCs among students in Saudi primary schools differs between genders

1.5 Research Questions

To achieve the above objectives, this present study will answer the following questions:

- RQ 1 Do the task characteristics and technology characteristics significantly affect task technology fit among students in Saudi primary schools?
- RQ 2 Do the performance expectancy, effort expectancy, social influence, facilitating conditions, hedonic motivation, and habit significantly affect intention to use TPCs among students in Saudi primary schools?
- RQ 3 Do the task technology fit and intention to use TPCs significantly affect the actual usage of TPCs among students in Saudi primary schools?
- RQ 4 Does the actual usage of TPCs significantly affect student engagement in Saudi primary schools?
- RQ 5 Do the influences of the factors on actual usage of TPCs among students in Saudi primary schools differ between genders?

1.6 Research Hypotheses

The following hypotheses are based on the research questions and Figure 1.2:

1.6.1 Directional Hypotheses

- H_{a1} Task characteristics positively influence task technology fit.
- H_{a2} Technology characteristics positively influence task technology fit.

- H_{a3} Performance expectancy positively influences the intention to use the TPCs in learning.
- H_{a4} Effort expectancy positively influences the intention to use the TPCs in learning.
- H_{a5} Social influence positively influences the intention to use the TPCs in learning.
- H_{a6} Facilitating conditions positively influence the intention to use the TPCs in learning.
- H_{a7} Hedonic motivation positively influences the intention to use the TPCs in learning.
- H_{a8} Habit positively influences the intention to use the TPCs in learning.
- H_{a9} Intention positively influences the actual usage of the TPCs in learning.
- H_{a10} Task technology fit positively influences the actual usage of the TPCs in learning.
- H_{a11} Actual use positively influences student engagement.

1.6.2 Moderating Hypotheses

- H_{a12} There is a significant difference in the effect of performance expectancy on the intention to use tablets between male and female students.
- H_{a13} There is a significant difference in the effect of effort expectancy on the intention to use tablets between male and female students.
- H_{a14} There is a significant difference in the effects of social influence on the intention to use tablets between male and female students.

- H_a15 There is a significant difference in the effects of the facilitating conditions on the intention to use tablets between male and female students.
- H_a16 There is a significant difference in the effects of hedonic motivation on the intention to use tablets between male and female students.
- H_a17 There is a significant difference in the effects of the habit on the intention to use tablets between male and female students.
- H_a18 There is a significant difference in the effects of the intention to use tablets on the actual usage of TPCs between male and female students.

1.7 Theoretical Framework

The UTAUT2 offers a straightforward environment for understanding adoption in the context of individual use. Yet, perceptions about technology held by individuals might not be reliable enough to forecast adoption (Goodhue & Thompson, 1995). In other words, the TTF hypothesis was developed to determine whether technology is being used effectively to support task accomplishment in accepting new technology. According to the TTF paradigm, users will embrace and reuse a technology based on how well the task's requirements and attributes match up (Goodhue, 1995). Additionally, integrating TTF with the UTAUT2 offers a fantastic chance to comprehend the use of the adoption of technology in educational contexts (Faqih et al., 2021). Few studies combine the UTAUT2 and TTF models to explain user acceptance of tablets in learning (Li & Zhao, 2021; Wan et al., 2022; Wang et al., 2022; Zheng & Li, 2020). Thus, this research employed the integrated UTAUT2 and TTF models based on previous studies to determine the relationships between the relevant theories and the variables derived from the theories underpinning this study.

More specifically, this study attempts to combine the UTAUT2 model, the TTF model, and the actual use of TPC to explore the determinants of students' engagement in learning. Although TAM (Davis, 1989) and its extensions (such as UTAUT2) focus more on the acceptance and use of technology, they can be adapted to explain engagement by examining how perceived ease of use and perceived usefulness influence not only the intention to use technology but also the degree of engagement. For instance, if students find mobile learning tools easy to use and believe they are useful for their learning, they may be more likely to engage with these tools in a meaningful way.

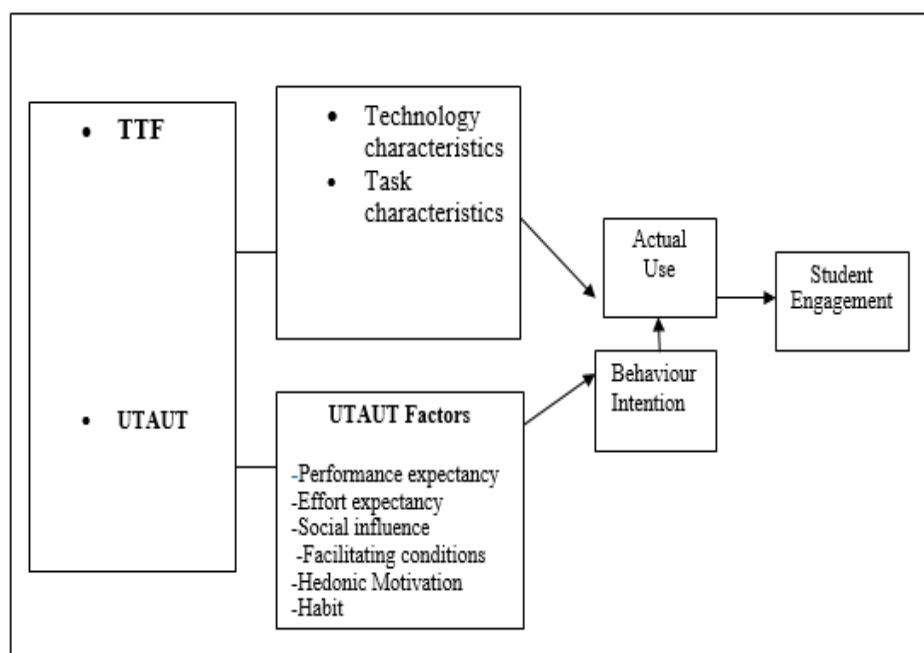


Figure 1.1: Theoretical Framework

As demonstrated in the theoretical framework (Figure 1.1), the performance expectancy, hedonic motivation, social influence, habit, facilitating conditions, effort expectancy, and facilitating conditions influencing students' intention to use TPCs are derived from the UTAUT2 model. Technology characteristics and task characteristics

influence TTF, which in turn influences the actual use of TPCs, on the other hand, is also one of the internal influencing factors but originates from the TTF model. This study included student engagement as an outcome variable to track the development of intention and user acceptance, which are commonly used predictors of the actual use of TPCs. The present study sought to determine whether gender moderates the relation between UTAUT and behavioral intention and actual usage of TPCs among the student sample.

Based on the research objectives and the theoretical framework, a conceptual framework (Figure 1.2) has been developed to address the research questions of this study. As illustrated in Figure 2.1, the framework is structured to align with the study's objectives. The first part of the model explores the direct relationship between TTF factors and TTF, as well as the association between UTAUT2 factors and students' intention to use TPCs. The second part of the model examines whether TTF and the intention to use influence the actual use of TPCs. Finally, the last section of the framework investigates the impact of actual TPC use on student engagement. This conceptual framework is designed to systematically address how various factors influence the adoption, usage, and educational outcomes related to tablet use among primary school students in Saudi Arabia.

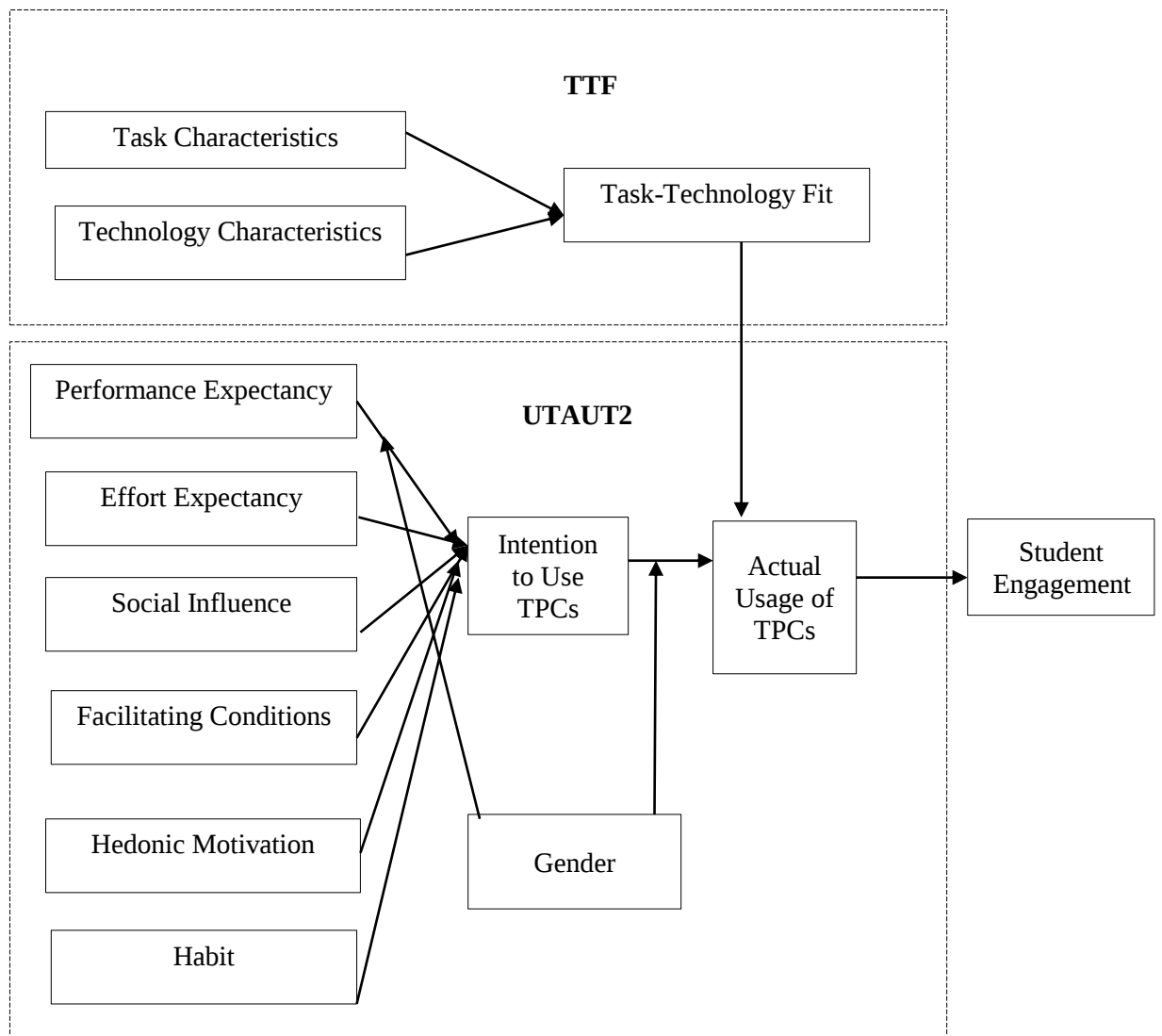


Figure 1.2: Conceptual Framework

1.8 Hypothesized Model Research hypotheses

This research employed the integrated UTAUT2 and TTF model based on based previous studies to determine the level of alignment between the capabilities and characteristics of the TPCs and the tasks that students must complete in the process of use (Li & Zhao, 2021; Wan et al., 2022; Wang et al., 2022; Zheng & Li 2020). As shown in Figure 1.2, the hypothesized model was created by applying the UTAUT2 and TTF models as a framework that serves to examine the driving forces behind TPC acceptance

in a primary education setting. Twelve factors make up the research model for this study, of which seven are connected to UTAUT2, which are performance expectancy, hedonic motivation, social influence, facilitating conditions, effort expectancy, intention, and actual usage; and three constructs are TTF model-related, including technology characteristics, task-technology fit, and task characteristics. This study included student engagement as an outcome variable to track the development of intention and user acceptance, which are commonly used predictors of the actual usage of TPCs.

The influence of task characteristics (H_{a1}) and technology characteristics (H_{a2}) is adopted from the model (Goodhue & Thompson, 1995) and has a direct relationship with the task–technology fit variable. The influences on behavior intention to use tablets from performance expectancy (H_{a3}), effort expectancy (H_{a4}), social influence (H_{a5}), facilitating conditions (H_{a6}), hedonic motivation (H_{a7}), and habit (H_{a8}) were adopted from the UTAUT2 model (Venkatesh et al., 2012). The study has also confirmed the importance of behavioural intention in enhancing students’ actual usage behavior of TPCs. A direct relationship between task technology fit and actual usage of tablets hypothesized the relationship between the two models – (H_{a10}).

Likewise, in the context of tablet usage in the learning process, students can perceive that their intention to use the TPCs could enhance their actual use (H_{a9}). Also, several scholars (Alyoussef, 2021; Wang et al., 2022) have reported that TTF positively influences the actual use of tablets (H_{a10}) only when the functions of the tablet can match well with education tasks (i.e., task–technology fit). Moreover, the actual use can support students’ engagement in learning (Alalwan, 2022). Based on this, the hypothesis was settled that the actual use positively affects student engagement (H_{a11}).