UNIVERSITI PUTRA MALAYSIA

PERCEIVED USEFULNESS AS MEDIATOR ON RELATIONSHIP BETWEEN SELECTED FACTORS TOWARDS TECHNOLOGICAL PEDAGOGICAL AND CONTENT KNOWLEDGE OF FEMALE TEACHERS IN SAUDI ARABIA

HAIFA EIDHAH A ALJUAID

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By

HAIFA EIDHAH A ALJUAID

Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia, in Fulfilment of the Requirements for the Degree of Doctor of Philosophy

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DEDICATION

"And they ask you about the Sprit. Say: "The Spirit by command of my Lord: and you are not given aught of knowledge but a little."

(Al-Quran Alkareem, Surat Al-Israa, 85)

Every challenging work needs self-effort as well as the guidance of elders especially those who are close to our heart. Whose affection, love, encouragement and praise through day and night make me able to reach such success and honor and the reason of what I become today.

I dedicate my humble effort to my loving

My Mother
which always have been my epitome of strength.
My daughter , My Family, My Friends
I am really grateful to you all!

Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfilment of the requirement for the degree of Doctor of Philosophy

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HAIFA EIDHAH A ALJUAID

February 2022

Chairman : Professor Aminuddin bin Hassan, PhD
Faculty : Educational Studies

Digital technologies are revolutionising teaching and learning practices in schools and universities all over the world. With the advent of the internet and web technologies, there was a crucial need to develop technological pedagogical content knowledge (TPACK) especially for high school teachers; for the purposes of conducting successful online training that meet the ever-increasing demands of flexible teaching needs in distance education. Therefore, there was an essential need to examine the online training satisfaction, technology acceptance and attitude with technological, pedagogical and content knowledge (TPACK).

By reviewing the related literature and employing (TPACK and TAM), this study came to investigate the mediating effect of perceived usefulness in the relationship between online training satisfaction, technology acceptance and attitude with technological, pedagogical and content knowledge.

The present study was entirely quantitative with a descriptive design. The main instrument used was a questionnaire whose content validity was checked by a panel of experts. A pilot study was conducted on 45 teachers in high schools to assess the reliability of the instruments. The value of Cronbach's alpha was from 0.812 to 0.992. The sampling technique was proportional stratified random sampling and the sample size was 367 teachers. To analyse the data, descriptive statistics and the Structural Equation Modelling Technique were used.

The finding of this study indicated that shows the mean distributions and standard deviation of the responses to the items measured. According to the highest mean

belonged to pedagogical content knowledge (M=4.417, SD=0.675) followed by content knowledge (M=4.412, SD=0.779), Pedagogical Knowledge (M= 4.389, SD= 0.663), Technological Pedagogical Knowledge (M= 4.25, SD= 0.798), Technological Content Knowledge (M= 4.235, SD= 0.814), Technological Knowledge (M= 4.13, SD- 0.808) and Technological Pedagogical Content Knowledge (M= 4.088, SD= 0.761), While the lowest level was observed for Technological knowledge in a virtual platform (M=3.763, SD=0.983). Based on these results it can be concluded that all variables had a mean score of more than the midpoint of the scale (3) and close to "4" which indicates that TPACK had a high level among high school teachers.

The results indicated that the online training was shown to be the most salient variable relating to TPACK (β= 0.328, P= 0.001), followed by ATT (β= 0.272, P= 0.001), ICT (β= 0.244, P= 0.001), PU (β= 0.225, P= 0.001), and TA (β= 0.159, P= 0.001). The results also revealed ICT was the most salient variable relating to PU (β= 0.384, P= 0.001) followed by OT (β= 0.308, P= 0.001), TA (β= 0.232, P= 0.001), and ATT (β= 0.211, P= 0.001). Finally, the relationships of online training satisfaction, technology acceptance and attitude with technological, pedagogical and content knowledge (TPACK) were found to be mediated by Perceived usefulness.

The main contribution of this study has provided new insights into the understanding of the teacher's level of knowledge in Technology, Pedagogy, and Content in in Saudi Arabia schools.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk ijazah Doktor Falsafah

TANGGAPAN KEBERGUNAAN SEBAGAI MEDIATOR HUBUNGAN ANTARA FAKTOR-FAKTOR YANG TERPILIH TERHADAP PEDAGOGI TEKNOLOGI DAN PENGETAHUAN KANDUNGAN GURU WANITA DI ARAB SAUDI

Oleh

HAIFA EIDHAH A ALJUAID

Februari 2022

Pengerusi : Profesor Aminuddin bin Hasan, PhD
Fakulti : Pengajian Pendidikan

Teknologi digital telah menyebabkan revolusi amalan pengajaran dan pembelajaran di sekolah dan universiti di seluruh dunia. Dengan kemunculan teknologi Internet dan Laman Web, Pengetahuan Kandungan Pedagogi Teknologi (TPACK) yang telah dibina terutamanya untuk guru sekolah menengah, bagi menjalankan latihan dalam talian yang berjaya yang memenuhi permintaan pengajaran fleksibel dalam pendidikan jarak jauh yang semakin meningkat. Oleh itu, kajian ini bertujuan untuk mengkaji hubungan antara kepuasan latihan dalam talian, penerimaan teknologi, dan sikap terhadap TPACK.

Dengan mengkaji kajian lampau yang berkaitan dalam menggunakan TPACK dan TAM, kajian ini bertujuan mengkaji kesan pengantara persepsi kebolehgunaan dalam hubungan antara kepuasan latihan dalam talian, penerimaan teknologi dan sikap dengan TPACK.

Kajian ini menggunakan metode kuantitatif dengan reka bentuk deskriptif. Ia menggunakan teknik persampelan rawak berstrata berkadar dengan memilih saiz sampel seramai 367 orang guru. Soal selidik adalah instrumen pengumpulan data utama, dan kandungan soal selidik telah disemak dan disahkan oleh panel pakar. Di samping itu, 45 guru sekolah menengah telah mengambil bahagian dalam kajian rintis yang dijalankan untuk menilai kebolehpercayaan instrumen yang digunakan dengan nilai Alfa Cronbach adalah dari 0.812 hingga 0.992. Statistik deskriptif dan Teknik Permodelan Persamaan Struktur juga digunakan untuk menganalisis data.

Dapatan kajian menunjukkan taburan min dan sisihan piawai bagi respons terhadap item yang diukur. Min tertinggi ialah Pengetahuan Kandungan Pedagogi (M=4.417, SD=0.675), diikuti Pengetahuan Kandungan (M=4.412, SD=0.779), Pengetahuan

Pedagogi (M= 4.389, SD= 0.663), Pengetahuan Pedagogi Teknologi (M=). 4.25, SD= 0.798), Pengetahuan Kandungan Teknologi (M= 4.235, SD= 0.814), Pengetahuan Teknologi (M= 4.13, SD- 0.808), dan Pengetahuan Kandungan Pedagogi Teknologi (M= 4.088, SD= 0.761), manakala yang terendah tahap diperhatikan untuk Pengetahuan Teknologi dalam platform maya (M=3.763, SD=0.983). Berdasarkan dapatan ini, dapat disimpulkan bahawa semua pembolehubah mempunyai skor min lebih daripada titik tengah skala (3) dan hampir dengan "4", yang menunjukkan bahawa TPACK mempunyai tahap yang tinggi dalam kalangan guru sekolah menengah yang mengambil bahagian dalam belajar.

Keputusan menunjukkan bahawa latihan dalam talian adalah pembolehubah paling ketara adalah berkaitan TPACK (β= 0.328, P= 0.001), diikuti oleh ATT (β= 0.272, P= 0.001), ICT (β= 0.244, P= 0.001), PU (β= 0.225, P= 0.001), dan TA (β= 0.159, P= 0.001). Dapatan juga menunjukkan bahawa ICT adalah pembolehubah paling ketara berkaitan PU (β= 0.384, P= 0.001), diikuti oleh OT (β= 0.308, P= 0.001), TA (β= 0.232, P= 0.001), dan ATT (β= 0.211, P= 0.001). Akhir sekali, hubungan antara kepuasan latihan dalam talian, penerimaan teknologi dan sikap dengan TPACK didapati dipengaruhi oleh persepsi kebolehgunaan sebagai pengantara.

Sumbangan utama penyelidikan ini adalah memberikan perspektif baharu tentang tahap guru TPACK di sekolah Arab Saudi.

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” With the name of Allah, the most Compassionate and Most Merciful ”

Alhamdulillah, first of all I would like to express my utmost thanks and gratitude to Almighty Allah S.W.T who has given me the strength to complete this thesis research project and my Salawat to his righteous messenger, Prophet Mohamed S.A.W.

I would not have been able to carry out this research project had it not been for the generous help I received from a number of kind people. I would, therefore, like to express my gratitude to the following people:

I am particularly grateful to my lovely mother, brothers and sisters. Without their prayers and support, I would not have reached this stage in my life. Thank you for giving me constant support, encouragement, advice, wisdom and most importantly love.

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This thesis was submitted to the Senate of the Universiti Putra Malaysia and has been accepted as fulfilment of the requirement for the degree of Doctor of Philosophy. The members of the Supervisory Committee were as follows:

Aminuddin bin Hassan, PhD
Professor
Faculty of Educational Studies
Universiti Putra Malaysia
(Chairman)

Habibah binti Ab. Jalil, PhD
Associate Professor
Faculty of Educational Studies
Universiti Putra Malaysia
(Member)

Shaffe bin Mohd Daud, PhD
Senior Lecturer
Faculty of Educational Studies
Universiti Putra Malaysia
(Member)

ZALILAH MOHD SHARIFF, PhD
Professor and Dean
School of Graduate Studies
Universiti Putra Malaysia

Date:13 October 2022

Declaration by graduate student

I hereby confirm that:

- this thesis is my original work;
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- this thesis has not been submitted previously or concurrently for any other degree at any institutions;
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Signature: _____ Date: _____

Name and Matric No: Haifa Eidhah A Aljuaid

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This is to confirm that:

- the research conducted and the writing of this thesis was under our supervision;
- supervision responsibilities as stated in the Universiti Putra Malaysia (Graduate Studies) Rules 2003 (Revision 2012-2013) are adhered to.

Signature:	
Name of Chairman of Supervisory Committee:	Professor Dr. Aminuddin bin Hassan
Signature:	
Name of Member of Supervisory Committee:	Associate Professor Dr. Habibah binti Ab. Jalil
Signature:	
Name of Member of Supervisory Committee:	Dr.Shaffe bin Mohd Daud

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LIST OF ABBREVIATIONS

ICT	Information Communication Technology
OT	Online Training
TPACK	Technological Pedagogical and Content Knowledge
CK	Content Knowledge
PK	Pedagogical Knowledge
TK	Technological Knowledge
PCK	Pedagogical Content Knowledge
TCK	Technology Content Knowledge
TPK	Technological Pedagogical Knowledge
AT	Attitude Towards
TA	Technology Acceptance
PU	Perceived Usefulness
TAM	Technology Acceptance Model
MOE	Ministry Of Education
MM	Measurements Model
SEM	Structural Equation Modelling
CFA	Confirmatory Factor Analysis
SM	Structural Model
AMOS	Analysis of Moment Structures
CFI	Comparative Fit Index
Chisq/sf	Chi Square/Degrees of Freedom
GFI	Goodness of Fit Index
IFI	Incremental Fit Index

CR	Composite Reliability
RMSEA	Root Mean Error of Approximation
CFI	Comparative Fit Index
NFI	Normed Fit Index
TLI	Tucker Lewis Index

CHAPTER 1

INTRODUCTION

1.1 Introduction

Information and communication technology (ICT) has impacted many areas of our lives and have brought remarkable changes and advances to the education field. The world has been going through a paradigm shift dominated by digitalization, triggering a diverse transformation in the education field. In particular, the unanticipated rapid and multidimensional development and spread of technology which has led to the inevitable transformation of the teaching and learning processes and all the stakeholders, such as students, teachers, school leaders, and policymakers (Heinze & Jeschke, 2014). In this digital age, the use of technology in education has generally been accepted as an integral and inevitable part of the teaching and learning experience. According to Scherer, Siddiq, and Tondeur (2019), educators have embraced the use of technology in education, and the question of how it should be incorporated into the curriculum is a major focus in this field. However, the potential of technology can only be realised in schools once it has been fully adopted and integrated by the educators themselves. The presence of digital facilities in the classroom is not enough – they need to be integrated and fully utilised in the teaching and learning process (Hennessy, Ruthven, & Brindley, 2005; Zhao & Isaacson, 2019). Successful technology integration requires far more than just getting the tools into the classroom.

Among the many challenges, teachers had to adapt to a virtual learning environment, aimed at developing both, their students' and their own digital skills and promoting quality learning as well as programs that facilitate access to the equipment and services necessary for the enjoyment of such technological possibilities. (Vieira & Silva, 2020).

In this period, the various pedagogical initiatives and practices reinforce that the simple adoption of digital technologies is not enough to address the challenges related to pedagogical mediation, social interaction, learning, and assessment. The solution to the challenges involves teacher training, reflection on teaching conditions, development of digital competencies, diversification of strategies and resources, and flexibility of pedagogical processes, the flexibility of educational processes, and their acceptance and satisfaction with online training (Camacho et al., 2020). When discussing teacher training in ICT, emphasis should be placed on factors involved in professional development such as politics and vision, curriculum and evaluation, pedagogy, ICT, diagnosis and administration, and professional training of teachers.

Perceived usefulness refers to the extent to which a teacher believes that teaching with technology will enhance individual student learning (Alenazy et al., 2019; Guo & Stevens, 2011; Ifinedo, 2017a). Studies such as Abdullah Ward and Ahmed (2016), Ashtari and Idaqahi (2017), Al-Omran, Arbachi and Salloum (2020), Al-Omran,

Mozoyev, and Kamaluddin (2021) have found evidence that perceived usefulness has a significant positive effect on satisfaction and a perceived effect on learning (International Journal of Computer-Aided Cooperative Learning, Bölem, 2020). Similarly, several studies on the use of technology in learning have shown a positive association between perceived usefulness and attitude of educators with positive beliefs towards technology often develop positive attitudes toward the use of such tools for learning purposes and are thus willing to use them (González-Sanmamed et al, 2017).

According to Hunter (2019), teachers must possess the capacity to use these resources competently if they are to take full advantage of the technology's unique features, thus integrating them into their instruction appropriately. The potential of such technology will only be realised if teachers change their instructional practices and use 21st century knowledge and skills to apply it (Bedir, 2019). ICT is vital if the effectiveness of teaching and learning in schools is to improve (Chai, Hwee, & Teo, 2019).

Although computer technology has the potential to create powerful learning environments, its implementation does not currently realise that potential (Alharbi, 2019). Although studies have indicated that technology is being utilised effectively in other sectors of society, this does not imply that the same results are being achieved in educational settings. A recent study conducted in Saudi Arabia indicated that the government has paid a great deal of attention to ICT development for educational purposes, engaging in several relevant initiatives (Alghamdi & Holland, 2020). Also, The Saudi Arabian government has invested massively in ICT, but still lags behind other developed nations.

The Ministry of Education (MOE) in the Kingdom of Saudi Arabia, through the King Abdullah, Public Education Development Project, provided US$2.4 billion to fund the development of selected public schools and planning with the aim of becoming a ‘smart’ country. This shows that the Kingdom of Saudi Arabia intends to shift towards excellence in education (Tayan, 2017). Based on this perspective, investment in professional development is more important than investment in resources associated with technology. According to the vision of the Crown Prince Mohammed bin Salman 2030. The goal of Saudi Arabia is to diversify the sources of economy by improving the educational system, knowledge production and investment in order to transition into a knowledge economy. (Quamar, 2018).

In the latest edition of the Saudi Arabian National Policy on Education, the MOE stipulated an educational requirement for schools to implement ICT in their educational practices. The policy encourages the coordination of science and technology as a means of cultural, social, and economic development. As stated on the MOE’s website, it is hoped that ICT will help ‘to raise the standard of our country and nation to fulfil our role in world cultural progress’ (MOE, 2019).

Alqahtani and Mohammad (2015) indicated that to reform educational policy, it is necessary to use ICT and maintain pace with technological developments. He added that the government needs to establish an independent council to reside over educational policy, which should comprise experts in this area who are also MOE employees.

1.2 Background of the Study

In this digital age, combining technology with pedagogy has a high potential when executed effectively. Emerging technologies can be used for teaching and learning or as a pedagogical approach by educators when they organise their instruction following social constructivist learning with technologies, ultimately relying on a more advanced, transformed version of TPACK (Malik, 2019).

Therefore, digital learning has become increasingly important since the 1990s due to the spread of the Internet as a tutoring system. Moving on from traditional pedagogical approaches to integrated technologies based on ICT requires female teachers to relearn, rethink, and redefine the teaching and learning they were trained for (Passey, 2019). Educators need to be forward thinking and open minded about the 21st century skills emerging in the classroom because it is increasingly critical for students to learn how to apply them in the real world (Berok & Yunus, 2019).

Teachers are the main drivers of change and development in the education system. Their roles and responsibilities have changed radically, to achieve goals in the field of education in accordance with the developments of the times. Teachers have become facilitators and leaders of the educational process. Teacher are the starting point towards knowledge and not absolute knowledge (Hassan, 2018, 224).

In view of the successive scientific and technical developments, there is an urgent need to prepare teachers that keep pace with recent developments and changes, is an effective producer of knowledge and a developer of his teaching skills, able to deal with students who depend mainly on the use of technology for communication and learning, a need for teachers that are aware of and keep up with global developments in terms of technology and education who are also keen on improving their teaching skills and impart knowledge effectively to their students through the integration of technology in their teaching process(Mason & Charlene, 2016).

Currently, ICT skills are seen as a crucial employability criterion in the 21st century. However, they must overcome various challenges to realise the opportunities of the 21st century for all without inequalities (Karaçor, Güvenek, Ekinci, & Konya, 2018).

ICT is increasingly used in various fields. As such, the field of ICT has a major role in education due to the presence of hardware in most classrooms. Some nations have invested heavily in networking classrooms and increasing the number of computers in schools (Abdalmenem, Arqawi, Amuna, Naser, & Al Shobaki, 2019; Al-Abdullatif, 2019; Amirat & Zaidi, 2020).

Although the few aforementioned studies have produced useful information, they lack empirical data as they have not sufficiently provided deep insights into how ICT is being used against the rationale for its use in the educational process in Saudi classrooms. The Saudi Arabian government has invested massively in ICT, but still lags behind other developed nations.

Therefore, the government needs to focus on developing an effective strategy for the integration and practical application of ICT in education. Studies addressing the impact of educational technology on various aspects of learning have been steadily increasing; nevertheless, a gap still exists in the literature in the form of limited documentation in this area, which is now vital to fill for a more comprehensive consideration of the role of the female teachers in online training (OT) using ICT.

Thus, the MOE has made it a priority to improve the quality of Saudi education. Research has indicated that the prevailing philosophy of education in Saudi Arabia places the teacher and students at the centre of the learning process (Abdullah, 2016). In May 2016, the government officially announced the Saudi Vision 2030 strategic framework to the public, in which education quality is emphasised through training for teachers, curriculum refinement, planning, reform, and evaluation as well as through engaging parents in their children's learning process (Ministry of Education [MOE], 2019).

Based on the above, the researcher justifies the need for female high school teachers to be well equipped with education related information and technology as education aims to prepare individuals for life within a particular society especially in Saudi Arabia. At the time this research was proposed, no research had explored the use of ICT for teaching and learning development in Saudi Arabia. Therefore, this study aims to provide enriched insights to fill knowledge gaps related to ICT integration in the teaching and learning process of Saudi Arabian classrooms.

1.3 Statement of the Problem

The widespread use of technology and ICT tools in education and technological literacy has made it a necessity for an interactive learning and training environment especially in this era of rapid development and constant change (Fatouh and EL-Harbi, 2016).

The change in the role of the teacher, the development of communication technologies, and the multiplicity of sources of learning led to fundamental changes in the requirements of educational situation in terms of knowledge transfer and the role of the teacher, which has led to the transition from traditional roles where the teacher is only a transmitter of knowledge to a facilitator and guide (Fatouh and EL-Harbi, 2016).

Designing and demonstrating an effective lesson requires teachers to acquire the merged knowledge of teaching and content (Shulman, 1986, 1987). With the increasing demand for the use of technology, the educational system must maintain pace with this use and seek to activate it in the educational learning environment. Furthermore, Teachers also need opportunities and exposure to enhance their instruction through the purposeful integration of each TPACK domain, through which they can advance the integration of technology into subject matter and pedagogy as an outcome of professional development (Chai et al., 2019).

According to Saubern, Urbach, Koehler, and Phillips (2020), the TPACK framework is commonly used for understanding, learning, and describing different knowledge. Proper guidance is provided by decision-makers and policymakers while formulating the policy for an education system to develop and implement technologies in teaching and learning (Sahay & Dawson, 2019). However, technological advancements in education should not be the only focus; there is also a need for more effective learning tools for supporting ICT (Alayyar & Fisser 2019). ICT has a positive impact on various learning processes and its use affects performance in the classroom. The added value of TPACK can be found in the support that it provides to students through technology in learning as well as the development of conceptual and procedural traits (Tondeur, Scherer, Siddiq, & Baran, 2020; Voogt, Fisser, & Jin, 2019).

The teaching practices developed during this time of social isolation aimed at remote teaching (Hodges et al., 2020) required the incorporation of digital technologies as a vector capable of overcoming the distance between educational institutions and students, digital technologies have become a condition for most teaching and learning processes at different levels of education.

Therefore, it is also crucial to understand the current situation of ICT integration by the Saudi MOE, as it is the responsible body in that education system. Whether ICT in the education process is successful depends on the support and encouragement of the MOE. Today, teachers lack the knowledge and skills related to digital technologies, which correlates with their limited experience in the effective integration of digital technology in education, both in primary and higher education (Niess & Roschelle, 2018; Niess, 2011).

Saudi teachers are not like their world counterparts as many have never used digital technologies in their teaching despite the state pursuing major reforms in the education system, which are considered some of the most important education reforms in the nation (Allmnakrah & Evers, 2020).Others have implemented such technologies with

limitations, either because they have no access to digital technologies in their classroom or received limited training in integrating technology into teaching (Taufik & Hanafiah, 2019; Al-Zahrani, 2015; Oyaid, 2009).

Based on a review of the results of the international tests of mathematics and science TIMSS in which the Saudi Arabia participated for three consecutive sessions in the years (2007, 2011, 2017), found that students from Saudi obtained lower results than the international averages, which shows that they are not at par with other nations in science and mathematics. According to the TIMSS 2019 Assessment, 28% of Saudi Arabian mathematics teachers reported having participated in professional development in integrating technology into teaching. The ways in which teachers use technology are related to their instructional practices and awareness of various tools (Baran, Canbazoglu Bilici, Albayrak Sari, & Tondeur, 2019). It became clear that there is a defect in the use of technology in teaching. Thus, it stands as an obstacle to the development of teaching the curriculum and improving students' performance.

However, no studies have highlighted the mediating effect of the relationship between OT satisfaction and TPACK. Mediation analysis using structural equation modelling (SEM) is a powerful statistical technique for understanding the relationship between variables. The technology acceptance model (TAM) is widely used to explain the acceptance of new technology (Akman & Turhan, 2017; Gkolia, Koustelios & Belias 2018; Lee & Hallak, 2018; Scherer et al., 2019; Shamuganathan & Karpudewan 2015; Teeroovengadu, Heeraman, & Jugurnath, 2017).

Cidral, Oliveira, Felice, and Aparicio (2018) demonstrated that perceived usefulness and online training satisfaction are interdependent, and both have a positive impact on the teaching performance of female teachers and their acceptance of the digital tools. The researcher argued that technological platforms should allow the articulation of communication and collaboration between students and teachers. This greatly satisfies the learner, and furthermore, the quality of the information has a significant impact on the course content. Learning institutes must implement self-assessment in various attractive forms, such as tests, quizzes, and other ways that are meaningful to students. Moreover, all content must be user friendly, meaning that it should be easily retrievable, interesting, reliable, valid, understandable, and responsive.

The present researcher noted the existence of various strategies and methods of teaching in the provision of scientific material, some of which are not keeping pace with the digital transformation in the educational system. Accordingly, she generated a sense of the problem: the need to study the mediating effect of perceived benefit on the relationship between satisfaction with OT and acceptance of technology and the situation with TPACK for secondary school teachers in the Kingdom of Saudi Arabia. The researcher thus hoped to contribute to raising the technical efficiency of teachers, developing their performance to maintain pace with technological developments, and introducing them to methods of employing some technological innovations to aid the teaching and learning process.

Therefore, the problem of the study lies in Saudi Arabian high school teachers' inefficiency of producing learning elements that incorporate OT satisfaction, technology acceptance, and technology attitude with TPACK. Based on the discussion and knowledge gap, there is a need to study OT satisfaction and the effect of PU on TPACK using the TAM. The following research objectives were developed based on this problem.

1.4 Research Aim and Objectives

1.4.1 General Research Aim

This study aims to investigate the mediating effect of PU in the relationship between OT satisfaction, technology acceptance, and attitude with TPACK among female high school teachers in Saudi Arabia.

1.4.2 Specific Research Objectives

The specific objectives of this study are as follows:

1. To determine the levels of online training satisfactions, technology acceptance, technology attitude, information and communication of technology, perceived usefulness and TPACK among high school female teachers.
2. To investigate the relationships between OT satisfaction, technology acceptance, technology attitude and information and communication technology with TPACK.
3. To investigate the relationships between OT satisfaction, technology acceptance, technology attitude and information and communication technology with perceived usefulness.
4. To investigate the relationship between perceived usefulness and TPACK.
5. To examine the mediating effect of perceived usefulness in the relationship between OT satisfaction and TPACK.
6. To examine the mediating effect of perceived usefulness in the relationship between technology acceptance and TPACK.
7. To examine the mediating effect of perceived usefulness in the relationship between technology attitude and TPACK.
8. To examine the mediating effect of perceived usefulness in the relationship between ICT and TPACK.

1.5 Research Questions

Specifically, the study attempts to answer the following research questions:

1. What are the levels of online training satisfactions, technology acceptance, technology attitude, information and communication of technology, perceived usefulness and TPACK among high school female teachers?
2. Are there any significant relationships between OT satisfaction, technology acceptance, technology attitude and information and communication technology with TPACK among high school female teachers?
3. Are there any significant relationships between online training satisfactions, technology acceptance, technology attitude and information and communication of technology with perceived usefulness among of high school female teachers?
4. Are there any significant relationship between PU and TPACK?
5. To what extent does perceived usefulness mediate the relationship between OT satisfaction and TPACK?
6. To what extent does perceived usefulness mediate the relationship between technology acceptance and TPACK?
7. To what extent does perceived usefulness mediate the relationship between technology attitude and TPACK?
8. To what extent does perceived usefulness mediate the relationship between information and communication technology and TPACK?

1.6 Research Hypotheses

This study developed the following hypotheses:

H1 : A significant relationship exists between OT satisfaction and TPACK.

H2 : A significant relationship exists between technology acceptance and TPACK.

H3 : A significant relationship exists between technology attitude and TPACK.

H4 : A significant relationship exists between information and communication technology and TPACK.

H5 : A significant relationship exists between OT satisfaction and PU.

H6 : A significant relationship exists between technology acceptance and PU.

H7 : A significant relationship exists between technology attitude and PU.

H8 : A significant relationship exists between information and communication technology and PU.

H9 : A significant relationship exists between PU and TPACK.

H10 : PU significantly mediates the relationship between OT satisfaction and TPACK.

H11 : PU significantly mediates the relationship between technology acceptance and TPACK.

H12 : PU significantly mediates the relationship between technology attitude and TPACK.

H13 : PU significantly mediates the relationship between information and communication technology and TPACK.

1.7 Significance of the Study

This study investigates the relationship between, online training satisfaction, technology acceptance, attitude toward technology and perceived usefulness It describes the level of relationship between TPACK and information communication technology. At the same time, this study will be a source of reference for other universities and schools to improve instructors' teaching in order to raise the quality of online training in Saudi education. The findings of this study will reinforce the importance of TPACK for the development of online training system policies in their institutions. This study will provide useful data for administrators to enhance online training system policies in their institutions as this study is a result of the need for improvement in the policies of the online training system in Saudi Arabia. With this priority in view, the present study will aid in the goal of providing proper support to teachers by providing the necessary data on teachers' needs. Therefore, the findings of this study can be a resource for TPACK trainers who provide online training courses in order to update their policies regarding online learning. The findings should also help education quality.

This study contributes to the activation of the national development plan, including the Saudi Vision 2030 goals in developing the educational process through the integration of ICT. Numerous researchers have already contributed by explaining and recognising the roles of teachers and the urgent need for professional development training in technology. Therefore, this study seeks to encourage the TPACK application in Saudi Arabia and improve teachers' learning attitudes towards such trainings, which will ensure that ICT is used effectively by teachers in Saudi high schools. In turn, this provided insights into how prepared teachers are to develop and deploy effective ICT implementations and how equipped schools are to enable OT. Currently, very little research have been carried out on high school teachers' use of ICT in Saudi Arabia. Therefore, the present study is significant because it attempts to contribute to the knowledge and fill this research gap.

Furthermore, this study is helpful for system designers and providers as it provides technological features that enable a collaborative environment, which is an important aspect of online learning. Technology provides platforms that allow a medium of communication and collaboration between students and educators, thereby influencing learner satisfaction. The outcomes of this study also imply that information quality has a significant impact on satisfaction with OT as the content is retrievable in various ways.

Moreover, this study can be use as resource for other learning institutes and scholars seeking to improve instructors' teaching in terms of training online satisfaction, technology acceptance, and CK, thus raising the quality of online learning in Saudi education. The findings of this study reinforce the importance of technology integration for online learning environment. It is important to add new issues that are related to online learning to the research agenda in Saudi universities. Therefore, more research is necessary to not only identify the TPACK framework in a new population, namely Saudi schools, but also to study how Saudi instructors integrate technology in OT which has never been examined before. In addition to that, the findings of this study can advise e-learning practitioners and designers to create learning activities that match teacher perceptions and learner performance in Saudi Arabia on the whole.

Moreover, the findings of this study may enrich the theoretical knowledge of TPACK; provide considerable ideas and suggestions for developing in-service teachers' attitude towards TPACK. It may also help educational policymakers and planners in the reformulation and improvement of strategies to achieve successful implementations of online learning technologies in teaching. Furthermore, they may help in examining the quality of teachers and professional training programmes to equip teachers with all of the desired TPACK, thus ensuring a seamless and effective integration of digital technology into the teaching of curricula. Finally, with the growing interest in building a framework to integrate digital technology in learning effectively, this study may facilitate the growth of communities in the Saudi Arabian population specifically. The contribution of the present research to the body of knowledge on ICT implementation is undeniable.

1.8 Scope of the Study

This study examines the status of instructors' TPACK in online courses among Saudi schools to provide practical suggestions for improving the quality of online education in Saudi Arabia. In this study, examining the relationship between OT satisfaction, technology acceptance, and attitude towards TPACK was crucial for obtaining a clear view of one of the important pillars of the educational process. Instructors' confidence in their teaching in a traditional learning environment might lead to them building an incorrect perception of their skills and knowledge in OT.

This study was designed to research the effect of PU on the relationship between OT satisfaction, technology acceptance, and attitude towards TPACK utilisation by female high school teachers. As the scope of the study was limited to only female teachers, the findings cannot be generalised to all schools in Saudi Arabia – they can merely act as guidance.

Furthermore, a questionnaire instrument was adopted in this study, which was validated by a pilot study, but it highly depended on the accuracy of the respondent who completed the questionnaire. The study participants were selected permanent female high school teachers from an administrative area known as Makkah Taif in Saudi Arabia. The teacher participants were aged between 25 to 45 years of age. The Taif region was chosen for

several reasons. First, budgetary constraints precluded the possibility of conducting a nationwide study. Second, the researcher is employed at the Center of Distance Training located in the targeted region, which simplified the collection of data from the structured respondents. Third, the chosen region is large and diverse, comprising both rural and urban areas with varying degrees of access to technology while being culturally similar to other regions of the country.

1.9 Definition of Terms

1.9.1 Technological Pedagogical Content Knowledge

Concept Definition: TPACK is a framework for identifying what teachers must teach effectively within the technology framework. The basic concept was introduced and discussed by Mishra and Koehler (2006). TPACK summarises a series in learning, where the ability to master technology is integrated and cannot be separated from its constituent components of (P), (C), and (K). TPACK requires the occurrence of multi-interactions and combinations of components, namely unique and synergistic ICT-based subject matter, pedagogy, and technology.

Operational Definition: In this study, TPACK for Teachers is a model that focuses on teachers' understanding of technologies, pedagogical interactions, and CK for successful teaching using technology (Koehler & Mishra, 2008). The TPACK framework describes the types of knowledge required by teachers for successfully integrating technology into teaching. She suggested that female teachers need to know the use of technology, pedagogy, and content, and specifically how these areas of knowledge interact and influence each other in unique and specific contexts (Mishra & Koehler, 2006). With regard to teaching with technology, he pointed out that it affects not only what we teach but how we teach it.

1.9.2 Attitude towards Technology, Pedagogical, and Content Knowledge

Concept Definition: Attitude is a person's collection of beliefs about something (cognitive component) and associated episodes linked with emotional reactions (affective component). The stimulation of these reactions results in decisions to engage in behaviour (behavioural component), which includes a person's predisposition or readiness for action, as well as his or her actions concerning the 'behavioural object' (Ankiewicz, 2016). Attitudes, despite the multidimensionality of the construct as well as the challenges it poses, have commonly been measured in pupils' attitude toward technology studies using questionnaires consisting of Likert scale items, which are ordinal scales used to determine students' levels of agreement or disagreement.

Operational Definition: In this study, attitude refers to positive and negative feelings towards OT. Knowledge about these relationships may help researchers to further develop existing models of technology acceptance and TPACK, and furthermore, it can

provide educators with valuable information about what to emphasise on to enhance TPACK. Substantive knowledge about these empirical relationships between TPACK and ICT situations contributes to the advancement of technology acceptance and TPACK models (Chai, Koh, & Tsai, 2016; Mei, Brown, & Teo, 2018).

Regarding the positive and significant relationships between TPACK in general, PU, and public attitudes to ICTs, one common element in relevant studies is that both TPACK and attitudes have been represented by total scores as indicators without specifying their own aspects. Some researchers argued that the development of TPACK or self-efficacy in teaching with ICT cannot be achieved independently of attitudes towards ICT (Tondeur et al., 2017).

1.9.3 Technology Acceptance

Concepts Definition: Technology acceptance is described as a (positive) attitude towards technology. The TAM, developed by Davis (1989), is one of the most popular research models for predicting individual users' use and acceptance of information systems and technology. The TAM has been widely studied and verified in many studies, which have examined the individual technology acceptance behaviour in different information system constructs.

Operational Definition: Technology acceptance A model consisting of behavioral and external factors that help measure the effectiveness of assistive technology based on technical learning applications. When a person uses a new technology, several factors suggested by the model will appear to him that will fundamentally influence his decisions and guide him as to how or when to use the technology. It aims to anticipate the extent of acceptance of the use of information and communication technology in education and to determine the changes that may be required within the framework of that system and to be more acceptable for female high school teachers.

1.9.4 Perceived Usefulness

Concept Definition: PU can be explained as 'the degree to which a person believes that using a particular system would enhance his or her job performance' (Davis, 1989, p. 321). In other words, it refers to the extent to which an individual believes that using the system improves his/her performance. The TAM's PU subscale is used to assess this variable (Davis, 1989). PU could be defined as the degree to which teachers believe that using a system could improve his/her OT (Davis, 1989).

Operational Definition: This study follows Davis in defining PU as the degree to which a person believes that using a particular system would enhance their functional performance (Davis, 1989). The importance of PU has been widely recognised in the field of OT and ICT, so the benefit that an application perceived usefulness The use of technology systems can provide Perceived Usefulness to users, in obtaining information

that is relevant, accurate, timely and complete, so that this can increase the productivity and performance of the users of the ICT and will improve the way in which a user can complete a particular task for female high school teachers in Saudi Arabia.

1.9.5 Online Training

Concept Definition: OT is a learning process that provides greater flexibility and more opportunities for personalised learning than face-to-face classroom training (Cambridge, 2019). It can be defined as institutionally based formal education where the training group is divided, and collaborative communications systems are used to connect instructors, learners, and resources (Holden, Westfall, & Gamor, 2010). It is used to express the type of teaching and learning processes that occur through technological appliances and devices. In the context of this study, OT can be defined as formal education training used to connect teachers and learners in learning OT for ICT.

Operational Definition: The present study defines OT as a type of asynchronous training that is carried out through different virtual Platforms. The interactive process during which training is transferred and managed remotely, between trainers and trainees, through appropriate means of communication, with the aim of delivering training services to the beneficiaries in their locations. Learning can happen anywhere and anytime as technology advances, as long as electronic devices are at one's side (Almutairi, Gutub, & Al-Juaid, 2020).

Mobile devices such as smartphones, laptops, tablets and virtual platforms such as zoom meeting, Microsoft Teams, and Blackboard are living necessities that contribute to the activation of remote training, and the process of training has changed with the use of such technology.

1.10 Chapter Summary

This chapter provides an overview of the research background. This includes the effect of Perceived Usefulness on the relationship between Online training satisfaction, technology acceptance, and attitude towards TPACK utilisation. The statement of the problem and purpose of the study were highlighted to justify the need for the proposed research. This chapter also presents a brief introduction to ICT and TPACK, which includes its aims, missions, and objectives. Research questions and research hypotheses of this study examines the mediating effect of Perceived Usefulness in the relationship between online training satisfaction, technology acceptance and attitude with (TPACK) and to identify teachers' perceptions and reactions. Apart from that, this chapter also presents the significance of the study along with operational and conceptual definitions of relevant technical terms used in this research in order to give a clear view and direction for the study. Lastly, this chapter also details the limitations of the current study. The following chapter will present reviews of related literature.

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