INVESTIGATING SAUDI ARABIA UNIVERSITY TEACHERS’ LEVEL OF SELF-EFFICACY IN THE COMPONENTS OF THE TPACK MODEL

Nouf Alghamdi

Duquesne University

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INVESTIGATING SAUDI ARABIA UNIVERSITY TEACHERS’ LEVEL OF SELF-EFFICACY IN THE COMPONENTS OF THE TPACK MODEL

A Dissertation
Submitted to the School of Education

Duquesne University

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the degree of Doctor of Education

By
Nouf Alghamdi

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INVESTIGATING SAUDI ARABIA UNIVERSITY INSTRUCTORS’ LEVEL OF SELF-EFFICACY IN THE COMPONENTS OF THE TPACK MODEL

By

Nouf Alghamdi

Approved June 23, 2023

Fran Serenka, EdD
Clinical Associate Professor
(Committee Chair)

Carla Meyer PhD
Associate Professor
(Committee Member)

Tara Abbott, PhD
Assistant Professor
(Committee Member)
ABSTRACT

INVESTIGATING SAUDI ARABIA UNIVERSITY INSTRUCTORS’ LEVEL OF SELF-EFFICACY IN THE COMPONENTS OF THE TPACK MODEL

By
Nouf Alghamdi
December 2023

Dissertation supervised by Dr. Fran Serenka

This study aims to investigate the level of self-efficacy amongst instructors regarding the various components of the TPACK model in their teaching within Saudi Arabia. TPACK represents a viable nexus between technology and educational content, creating successful educational technology integration. Existing research demonstrates a need to study TPACK further in the context of instructors’ level of self-efficacy in the components of the TPACK model (Lee and Kim, 2017). However, this dissertation will investigate instructors’ level of self-efficacy towards utilizing technology in their classrooms. In doing so, the study will adopt a quantitative approach using a survey to gain insights into instructors’ self-efficacy. This study is significant because TPACK is a critical part of the Saudi Arabian education system. Instructor’s level of self-efficacy is essential as they shape not only the future of educational delivery, but
also the future of each learner. Moreover, the growing implementation of TPACK in universities in Saudi Arabia is exclusively dependent upon the instructors’ performance with this model.

The findings revealed that instructors demonstrated high levels of self-efficacy across all components of TPACK. They also exhibited confidence in using technology to enrich content, support student inquiry, and organize teaching and student learning. However, there were some areas where participants indicated a lack of self-efficacy or uncertainty. The research recommends that educational institutions support instructors through mentoring programs, collaborative learning communities, and peer observations (Marx, 2005).
DEDICATION

The process of completing this EdD has been extremely challenging, yet the journey has transformed me into a strong person. Juggling the EdD alongside other responsibilities, such as being a wife and motherhood, has molded me into a completely new person. Nonetheless, I cherish the moments when my son encouraged me to hide into my office to write right until midnight. Being as young as 8 now, he has been a guiding light to my success. His simple motivating words have inspired me to keep moving forward. I therefore dedicate this dissertation to his patience and continued love.
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Without my committee, I could not have completed this academic work. The committee supported me throughout the tough times of the Covid19 pandemic. To my dissertation chair, Dr. Serenka, who offered recommendations and direction at every turn. I keep passing along the advice you gave me to my fellow dissertation-writing colleagues. I was confident that our thoughts and efforts would mesh well, and I am beyond grateful to have you as my dissertation chair.

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In recent years, the concept known as Technological Pedagogical Content Knowledge (TPACK) has continually evolved. The concept was initially articulated by Pierson (2001), which was subsequently followed by numerous scholars advancing similar conceptualizations that embodied a more subject-focused approach to the combination of technology (Koehler & Mishra, 2005). The word ‘TPACK’ gained widespread acceptance and recognition within the academic milieu post-2006, principally as a consequence of the seminal contribution by Mishra and Koehler, wherein they outlined the model by describing its central tenets (Graham, 2011). It is pertinent to note that in earlier scholarly discourses, the term ‘TPCK’ was employed, yet in 2008, a consensus emerged within the academic field to adopt the lexically more accessible term ‘TPACK’ (Graham, 2011).

The TPACK framework is an extension of Shulman’s (1986) theoretical conception of Pedagogical Content Knowledge (PCK), with a distinctive addition, the explicit integration of technological knowledge into the model. Graphically, the TPACK framework is predominantly portrayed as a Venn diagram comprising three concentric circles, with each circle symbolizing a discrete dimension of teacher knowledge (refer to Figure 1). This framework encompasses three fundamental categories, namely: Pedagogical Knowledge (PK), Content Knowledge (CK), and Technological Knowledge (TK). The TPACK framework suggests that the combination of these key knowledge categories creates four supplementary knowledge constructs: Pedagogical Content Knowledge (PCK), Technological Pedagogical Knowledge (TPK), Technological Content Knowledge (TCK), and Technological Pedagogical Content Knowledge (TPACK). There is an emerging scholarly consensus that accentuates the incorporation of contextual
knowledge as an intrinsic component of the model (Akarasriworn & Ku, 2010; Mishra & Koehler, 2006). Figure 1 offers succinct explanation of each type of teacher knowledge represented within the TPACK framework.

TPACK is used as a tool for educators to effectively integrate technology within their teaching practices. Thus, the interactions between technological, pedagogical, and content knowledge, aid educators in designing and implementing instruction that optimally uses technology to enrich students’ learning and engagement. Moreover, TPACK serves as a conceptual lens through which teacher training programs can be developed, ensuring that aspiring educators are prepared with the necessary skills to successfully use technology in various content areas and instructional contexts. It also facilitates the critical evaluation and selection of technological tools and resources that align with pedagogical strategies and content objectives (Tondeur et al., 2020).

Technology has significantly contributed to the development of varied sectors in the world today. Specifically, educators have explored the contribution of technology in teaching and learning (Chai et al., 2019). As a result, digital learning tools are now incorporated into learning instructions at schools and colleges. The TPACK theoretical framework is an effective tool for education (Chai et al., 2019). According to Kaplan (2019), teachers should incorporate creativity into how they implement these technologies, enabling each K12 teacher to demonstrate their unique creativity to shape their knowledge towards technology (Kaplan, 2019).

The framework recognizes that teaching is a process that occurs in a changing environment (Leinhardt & Greeno, 1986 Spiro, Feltovich, Jacobson, & Coulson, 1991). The quality of educators is dependent on the accessibility of for example, libraries and e-learning platforms. Historically, since the first curriculum was developed, teachers worldwide primarily
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focus on how well they have been exposed to learning, hence the diversity. Presently, instructors’ education has changed the focusing on pedagogy, which emphasizes common pedagogical teaching at the expense of content knowledge (Archambault and Barnett, 2010). The following two circles represent this information, which illustrated that they are independent of each other.

Figure 1

*Pedagogical content knowledge circle*

![Pedagogical content knowledge circle](image)

Figure 1 portrays the pedagogical content knowledge circle and the content knowledge circle (Archambult and Barnett, 2010). Various strategies to teacher’s education have stressed upon either one or more knowledge domains, paying attention only to content knowledge. The notion of pedagogical content was proposed by Shulman (1986) as in his analyses, he treated pedagogy as a mutually exclusive domain. As a result of such exclusion, teacher education programs were pedagogy-dominated. Shulman (1986) proposed considering the relationship by introducing the concept of Pedagogical Content Knowledge (PCK) in the model to address this dichotomy. PCK represents the integration of content and pedagogy in illustrating how various elements of subject matter are structured, adapted, and signified for teaching (Archambanet & Barnett, 2010).
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Shulman (1986) contends that the subject matter and basic pedagogical strategies are insufficient for capturing teachers’ association with TPACK. It is paramount to illustrate the complexities involved in tutors arguing for pedagogical content knowledge, considering that content knowledge that deals with the teaching process includes how different subject matters are presented and comprehended by other people. To register success in this pursuit, teachers must challenge the concerns around content and pedagogy through incorporating elements of content pertinent to teaching ability. PCK is mainly concerned with how the matter is transformed for teaching. This takes place when the teacher interprets the subject matter which is transformed for teaching, which reinforces that the teacher interprets the subject matter and finds diverse ways to represent it and make it accessible to learners (Shulman, 2006).

However, Shulman’s work has been critiqued by various scholars (Koehler et al., 2007). In his initial submission, Shulman proposed the inclusion of knowledge in the curriculum and educational contexts. Shulman developed the theory by proposing inclusion of others in varying publications, further complicating the subject matter. Chai et al.’s (2011) quantitative research highlights that since its inception, PCK has improved in the areas of science and education. Multiple scholars have emphasized that the role PCK plays during teacher preparation and teacher professional development (Chai et al., 2011). More recent quantitative research conducted by Muianga et al., (2019) has also confirmed the benefits of the TPACK model on professional development. The study used the model as a theoretical framework to design teaching staff training, and through 147 questionnaire responses, it evaluated whether it modified professional pedagogic practice. The results indicated that teachers who attended the training were likely to alter their teaching styles from that of a teacher-centered approach towards a student-centered focus whilst embedding ICT into their teaching. Moreover, following the
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TPACK-led training, teachers believed that ICT improves learners’ outcomes and the educational process as a whole (Muianga et al., 2019).

Shulmans (1986) influence on the subject of scholarship of teacher knowledge interrelates the two circles in Figure 1, therefore the intersections represent PCK as the relationship between pedagogy and content. The intersection of the two circles contains subjects that are taught, for instance, explanations, and demonstrations. Figure 2 illustrates that pedagogical knowledge and content knowledge are combined into pedagogical-content knowledge (Koh et al., 2010).

Figure 2

Pedagogical-Content Knowledge

![Diagram of Pedagogical-Content Knowledge]

Note. Adapted from Koh et al. (2010)

It is noteworthy that Shuman’s (1986) analysis fails to discuss technology and its association with pedagogy knowledge and content. Shulman’s (1986) argument further lacks the element of technology. Traditional classrooms employ various technologies ranging from coursebooks to typewriters, overhead projectors and periodic tables. Yet, Hénard & Roseveare (2012) assert that technologies used in universities are more transparent. While some
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technologies are used for learners’ teaching and collaboration, others are used to communicate with other stakeholders, as well as for administrative needs of the educational organization (Hénard & Roseveare, 2012). Technology takes the form of digital computers and computer software that is not yet mainstream. Moreover, Information Communication Technologies have revolutionized how classroom studies are conducted. For example, Shulman (1986) analyses how he represents and formulates the subject to make it more understandable.

Technology has played a crucial role, including for instance, illustration on the board, sketching on a clay tablet or the internet and interactive multimedia simulations. A host of technologies have limited and facilitated various analogies. Despite the availability and accessibility of technology, some teachers have not embraced this technological innovation (McCrory, 2008). Reasons for the resistance to technology include the distress of making change, scarce time, and absence of support. The rapid rate at which new technologies are being innovated in the environment is difficult for teachers to master technology in the classroom. Furthermore, the rapid changes require teachers to have concerted effort in learning how to apply innovative technologies and skills, as existing technologies are outdated. Consequently, it is rather challenging to represent this overarching framework or theory. Teacher knowledge should mainy replicate its socially constructed environment (Gergen, 2009). Yet, it can be argued that one mostly engages in activities, whether it be technology related or not, via learning rather than by passively acquiring information. Therefore, socially constructed knowledge is inherently gained through a social process since it is embedded within a social context, as teachers work collaboratively to build awareness.

The underlying intricacies of teacher knowledge are the critical mechanisms in the TPACK analysis. The framework provides the necessary academic discourses of education
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technology. The model reflects upon the coexisting dynamics of content, pedagogy, and technology and how these train one another in the framework. TPACK provides a framework that designs pedagogical strategies and presents analysis to scholars to study the underlying changes in teachers’ expertise in successfully teaching with technology (Lee and Kim, 2017).

The literature review indicates that given an opportunity to carefully emerge into the formation of educational technology, teachers have significant progression in their sensitivity towards the multifaceted interaction of the content, pedagogy, and technology.

The initial aim of teacher education in TPACK is not to merely coach teachers towards behaving in a specific manner (Koh et al., 2014). Rather it but guides teachers to ground their teaching in reason and perform their duties skillfully. For example, for teachers to have sound reasoning, they are required to reflect on their actions and acquire a sufficient understanding of facts and principles from which to reason. Moreover, teachers should learn to apply their understanding to provide their grounds for choices and actions. The TPACK framework informs the creation of technology-based research and curriculum within the sphere of teacher education and professional development (Koh et al., 2014).

However, further research concerning the TPACK framework can influence teachers in developing the curriculum, enhancing teacher education and professional development. The TPACK process of integrating technology is open to assessing how teaching practice is evolving. More importantly, the model allows education stakeholders to identify what is important and what is not part of the ongoing discussion of teacher knowledge around the usage of technology. This study aims to explore the implementation of the TPACK model in universities in the Kingdom of Saudi Arabia (KSA). The research provides context to how instructors in KSA can achieve and improve students’ learning and educators’ teaching.
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Background of the Study

As an instructor in a Saudi Arabia university, I am aware that traditionally teaching methods are more steered towards technology rather than pedagogy. Yet the focus on varied backgrounds may influence instructors’ level of self-efficacy.

The TPACK model was introduced with the aim to develop understanding of instructors’ self-efficacy. Traditionally, technology was implemented in education by training educator’s technology skills at workshops and training seminars (Harris et al., 2009). After such training sessions, teachers were assumed to have acquired awareness to implement this in the classroom. However, some technological tools taught to the teachers were out of context, thus there was the need for a more hands-on approach (Schmidt et al., 2009). As a consequent, design experiments were conducted to explore learning by following the doing and the learning in context approach (Brown, 1992). Learning technology by design was implemented to introduce higher learning to the students and faculty (Ramsden, 2003). This allowed theories to develop, and teaching and curricular approaches that involved designing online classes and teaching tools, namely PowerPoint presentations and websites (Gothard et al., 2012). Nonetheless, content and pedagogical knowledge were available, though pedagogical content knowledge and PCK was unavailable (Koh et al., 2010). However, in unpacking pedagogical knowledge, Shulman’s (1986) reiterates that educators should fully comprehend methods to explain topics to learners in a way that students can easily understand these. Hence, they must recognize what makes the learning of certain topics either difficult or easy. Hence ICT teachers should appreciate learners’ preconceptions of best methods to address misconceptions presented by learners (Clancy, 2005).
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The TPACK framework is used by various scholars as the foundation to understand the extent of teachers’ IT proficiency (Lee and Kim, 2017). Yet little is understood on instructors’ level of self-efficacy concerning the TPACK model. Lee and Kim’s (2017) research has indicated that teachers perceive TPACK as a model that was formulated by direct effects of technological knowledge and pedagogical knowledge (Tondeur et al., 2017). As such, teachers provide methods and techniques in the classrooms as a source of information, and as a guide during the teaching process (Lye, 2013). Presently, technology has become an important facet of our life, making it necessary to integrate in our education system.

The TPACK model was designed in 1987 to support teachers in acquiring expertise to adequately incorporate technology in process of learning (Lye, 2013). Essentially, the model was developed to integrate ICT in colleges and in institutions of higher learning (Lye, 2013). Therefore, this paper intends to guide instructors in achieving this.

The discovery of the internet and digital technology has revolutionized daily practices in our lives. The proponents of technology in the education sector envisioned a similar disruption (Baturay et al., 2011). However, the expected radical changes have lagged behind the vision for far too long. This raises questions on why this is happening. Partly, this has been due to stakeholders in the education sectors failing to establish at how technology can be used in colleges and universities. Introducing technology in our classrooms is merely insufficient, hence, stakeholders should develop creative methods to apply technology. Since the inception of TPACK models, scholars, researchers, and government agencies have been heavily invested on how technology can be incorporated in our education system (Lee and Kim, 2017).

Developing a framework for educational technology is considered arduous as it involves gaining an in-depth understanding of the intricate relationship between the varying components
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of the model. It recognizes the challenges of a classroom setting and those of teachers. Therefore, there is an apparent focus upon its theoretical ideas in the context of practice. In essence, design experiments bridge the gap between practice and research (amongst theory and application) (Pamuk, 2012). In last decade scholars have had significant involvement in conducting research design. The design of this research focused on understanding teacher’s development towards technology, while simultaneously facilitating them to their teaching, based on technology. In light of this, the current study endeavors to present a holistic view of the conceptual framework that is as established in the field of education, this is a view perceived from reviewing various published work. Furthermore, there is a gap in Saudi Arabia instructors’ level of self-efficacy in terms of the TPACK components, which the current research aims to fill.

**Problem Statement**

The TPACK model is an effective tool in educational technology. According to Nicolaou, Matsiola & Kalliris, (2019), teachers need to ensure that they acquire knowledge of their disciplines and understand how technology and pedagogical techniques interact. The implementation of TPACK also requires teachers to incorporate creativity in the implementation of these technologies (Koh, 2020). Due to varying innovative techniques that teachers develop, each teacher presents a unique involvement, and level of confidence in using TPACK in their teaching. The study investigates the varying instructor’s self-efficacy measured by survey responses.
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Purpose of the Study

The study aims to investigate Saudi Arabian university instructors’ level of self-efficacy in the components of the TPACK model.

Theoretical framework

Three main theories underpin the theoretical framework for this research, namely the TPACK theory, Bandura’s (1977) Self-efficacy theory and Vygotsky’s social-cultural theory (1978) (see Figure 3).

Figure 3

Theoretical Framework

![Theoretical Framework Diagram]

Note. Theoretical framework created by Nouf Alghamdi

TPACK

Technological, Pedagogical, and Content Knowledge (TPACK) is a framework for
measuring the extent at which primary components of the TPACK framework are integrated, and subdomain contained in the TPACK instrument. This research defines TPACK as what teachers must know to successfully integrate technology into the course syllabus (for example, teaching practices. TPACK is the combination of teacher Content Knowledge (CK), Pedagogical Knowledge (PK), and Technological Knowledge (TK). Furthermore, TPACK enables teachers to understand the broad range of components available for integrating technology into their teaching practice and how this may develop them as educators. The TPACK framework has been applied by Mishra and Koehler (2006) in preservice, as well as in-service trainings. However, it is noted that Mishra, and Koehler (2006) build upon Shulman’s (1986) work around identifying TPACK as a framework.

**Bandura’s theory of Self-Efficacy**

Self-efficacy theory is pertinent to the research purpose as it refers to subject-oriented, educational and psychological domains (Schukajlow et al., 2012). Self-efficacy is regarded as a critical component of social cognitive theory, which refers to individuals’ having cognitive capabilities to self-regulate, self-reflect and self-organize their future according to environmental changes that they are enclosed in (Alrabai, 2018). Extensive research has asserted that teachers’ level of self-efficacy could influence their instructional performance and how they orientate the learning processes (Usher and Pajares, 2008). Therefore, with reference to teachers, self-efficacy theory is considered unique, and multi-dimensional Perera et al. (2021). According to Badura’s theory (1986) self-efficacy influences teachers’ preferences of activities and the amount of effort denoted towards these. Choi and Lee’s (2017) research contends that self-efficacy establishes the
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confidence and competence that teachers require in order to implement teaching that could be integrated with technology into the classroom. Thus, teachers successfully participate in activities that they can achieve with competence and avoid tasks that they feel unable to confidently achieve (Choi and Lee, 2017). More recent research conducted in Saudi Arabia confirms that teachers are often more amenable to implement innovative teaching practices during moments of profound self-efficacy (Al-Seghayer, 2022).

Vygotsky’s Social-Cultural theory

Vygotsky’s (1978) theory frames the current study as it explains how society has a key role in individual’s learning and shapes their behavior towards learning, hence learning influences by the social and cultural environment. Therefore, high level skills cannot be achieved if they are not adequately supported by the environment. Furthermore, cultural influences impact teachers’ cognitive development in relation to TPACK (Sujee et al., 2015). This well-established theory recommends that education is generally a social and cultural procedure, as such individual’s social and cultural involvements lead to their development. From a Saudi Arabian educator’s lens, it is apparent that instructors in Saudi Arabia cannot isolate from their cultural context, which involves their cultural and societal connections and influences. An example is that the Saudi Arabian cultural approach to teaching is lecture dependent (Alzhrani, 2013). Vygotsky’s theory of social capital compliments Bandura’s theory of self-efficacy in terms of Saudi Arabia instructors as their level of self-efficacy is driven by traditional teaching styles.

Collectively, the three theories underpinning this study (TPACK, Bandura’s theory of self-efficacy, and Vygotsky’s social-cultural theory) contribute towards explaining effective technology integration in teaching. Each theory presents a distinct, yet interlinked feature of the
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educational process. The TPACK creates the foundation for understanding the relationship amid technology, pedagogy, and content in the context of teaching. Simultaneously, Bandura’s self-efficacy theory (1986) offers insights into the personal belief systems and self-confidence of educators in implementing their teaching duties, particularly in relation to using technology. Meanwhile, Vygotsky’s social-cultural theory (1978) emphasises the significance of the social and cultural context in shaping teachers’ beliefs, practices, and their approach to technology integration.

Collectively, these theories create a complete picture, with TPACK identifying the specific knowledge that educators require to seamlessly integrate technology, Bandura’s self-efficacy theory highlighting teachers’ confidence in applying that knowledge effectively, and Vygotsky’s theory explains how these beliefs and practices are influenced by social and cultural factors. In light of the educational process through the lens of these interconnected theories, this holistic framework, is enhances our comprehension of the complex dynamics of integrating technology into education.

Research Questions

This research is guided by the following seven research questions:

1. What level of self-efficacy do instructors report in terms of their Technological Knowledge?
2. What level of self-efficacy do instructors report in terms of their Content Knowledge?
3. What level of self-efficacy do instructors report in terms of their Pedagogical Knowledge?
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4. What level of self-efficacy do instructors report in terms of their Pedagogical Content Knowledge?
5. What level of self-efficacy do instructors report in terms of their Technological Content Knowledge?
6. What level of self-efficacy do instructors report in terms of their Technological Pedagogical Knowledge?
7. What level of self-efficacy do instructors report in terms of their Technology Pedagogy and Content Knowledge?

Significance of the Study

This study is significant because TPACK is a critical element of the Saudi Arabia’s educational system, since it integrates the rising need to utilize technology in teaching and learning. The instructor’s level of self-efficacy with this framework matters as this could shape not only the future of education but also the future of the learners.

Definition of Terms

Constructivism: Learning strategies that are inquiry-based and rooted in cognitive development and problem-solving approaches. According to Roblyer & Doering (2013), Constructivists maintain the view that learning occurs when individuals construct the necessary mechanisms for comprehension and application, drawing on their own background. This process is shaped by their attitudes, values, and personal beliefs.
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Integration of technology into the curriculum: Integrating technology, specifically digital tools, and teaching methodologies into the learning process can effectively meet educational requirements, as stated by Roblyer & Doering (2013).

Effective integration of technology into curriculum: Effective inclusion of technology into a syllabus is realized through suitable activity structures geared towards teaching specific content. It pertains to how particular technologies can be incorporated into lessons, projects, or unit designs (Harris, Mishra, & Koehler, 2009).

Content knowledge: This embraces the actual subject delivered and learned (Mishra & Koehler, 2006). CK encompasses understanding of the taught subjects, including the main facts, theories, concepts, and procedures within a specific field. It also incorporates the explanatory frameworks that link and structure ideas, as well as the rules for evidential support (Shulman, 1986; Mishra & Koehler, 2006).

Pedagogical knowledge: This pertains to a deep understanding of the teaching and learning processes and practices, including their merge with broad educational goals, values, and objectives (Mishra & Koehler, 2006). PK also represents a generic form of knowledge, including all elements of student learning, classroom management, lesson planning, implementation, and student assessment (Mishra & Koehler, 2006). In addition, PK comprises knowledge of teaching techniques to be employed in the classroom, an understanding of the learner demographic, and evaluation strategies. A grasp of cognitive, social, and developmental learning theories is required for student comprehension and is therefore applied to learners (Mishra & Koehler, 2006).

Technology knowledge: This component relates to understanding aspects of operating systems and computer hardware, including the use of standard software, namely,
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word processors, spreadsheets, browsers, and email (Mishra & Koehler, 2006).

Furthermore, TK involves the ability to install and remove peripheral devices, manage software installation and removal, as well as create and archive documents (Mishra & Koehler, 2006).

**Pedagogical content knowledge:** Pedagogical CK elements (PCK) differ amongst other content components. PCK merges content and pedagogy with the goal of promoting improved teaching practices, therefore it ultimately addresses the process of teaching (Shulman, 1986).

**Technological content knowledge:** This component refers to the way in which technology can be employed to produce novel representations for distinct content (Schmidt et al., 2009).

**Technological pedagogical knowledge:** This element of the framework denotes to the use of various technologies in educational settings, along with the recognition that the incorporation of technology may potentially modify teaching methods employed by educators (Schmidt et al., 2009).

**Technological pedagogical content knowledge:** As explained by Schmidt et al. (2009), this component sits within the broader TPACK framework and refers to educators’ understanding of how to integrate technology into their instruction across various content areas. Furthermore, instructors possess an inherent understanding of the intricate interaction between the three core components of knowledge—Content Knowledge (CK), Pedagogical Knowledge (PK), and Technology Knowledge (TK), and how to effectively teach content using the appropriate teaching methods and
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technologies. This understanding forms the comprehensive framework that instructors utilize to integrate CK, PK, and TK domains.
CHAPTER 2: REVIEW OF THE LITERATURE

Introduction

The purpose of this quantitative research is to investigate Saudi Arabian instructor’s level of self-efficacy in relation to the TPACK model. This chapter presents the reviewed literature review. The first section explores the relationship between technology and education. The second section examines adult learning theory and how the TPACK framework links to constructivism. The final section investigates the integration of technology into education and curriculum in Saudi Arabia.

Teacher Self-efficacy

Teacher self-efficacy conveys teachers’ personal beliefs concerning their skills and abilities in planning lessons and the confidence they have in their ability to promote learning (Siwatu, 2007). Thereby, teachers’ self-efficacy positively influences learners’ achievement (Denham & Michael, 1981). Ultimately, teachers with high self-efficacy can be inclined to adopt innovative teaching methods as they are more compliant in trialling creativity in the classroom (Gavora, 2010). More interestingly, highly self-efficacious teachers are committed to teaching and open to new ideas (Tschannen-Moran & Hoy, 2001). As such, they are motivated to implement new technologies in their teaching. Furthermore, Byker et al. (2018, p.119) highlight that self-efficacy has a powerful effect on teachers’ behavior in terms of their ‘instructional choice, effort and persistence’. Teachers’ self-efficacy in adopting certain technologies is a fundamental element influencing their attitude and method of integrating technology into the curriculum (Blonder et al. 2013). Teachers’ self-efficacy has been noted as a primary element of
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influencing professional behavior, namely, work fulfillment, achievement and student engagement by (George et al., 2018).

Dong et al.’s (2020) research aimed to examine the influence of technology self-efficacy on teachers’ TPACK and technostress and concluded that limited computer self-efficacy has a profound impact on the level of stress that teachers encounter from using technology. A similar emerges in the work of Choi et al. (2019) who state that teacher self-efficacy is paramount in promoting student learning. This also has a long-term impact on instructional quality (Künsting et al., 2016) and differentiated instructional practices (Suprayogi et al., 2017), Individual characteristics, such as age, gender, teaching practice, education, also affect level of teachers’ self-efficacy, whereby males, older teachers have been identified to have a greater level of self-efficacy (Gkolia et al, 2016). However, it is noteworthy that that while this study explores teachers’ characteristics to predict self-efficacy, it does not draw on TPACK.

The Relationship Between Technology and Education

A substantial and expanding body of literature exists on the incorporation of digital technology into the educational curriculum. This research on technology integration spans a wide array of areas, from its use in classroom settings and its role in educational technology, to tailor-made teacher training courses designed to align digital technology with specific course content (Leh, 2009; Graham et al., 2009; Markauskaite, 2010). Moreover, the term ‘technology integration’ has come to characterize the endeavors to utilize technology within an educational setting (Graham et al., 2009). Given that digital technology is utilized in various educational settings, many scholars have delved into the idea that the efficacy of technology surpasses that of state-of-the-art
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hardware or software alone. In their work, Okojie, Olinzock, and Okojie-Boulder (2006, p.66) report that “…integrating technology into the teaching and learning process is a perennial issues and technology used for teaching and learning should be considered an integral part of the instruction rather than as an exclusive object”. As such, this research will investigate the likely application of the TPACK framework developed by Mishra and Koehler (2006), which is mainly used as tool for teacher’s pre-service training for primary schooling. Their study also aims to establish diversities in technologies that pedagogically train faculties (University faculty in Saudi Arabia) to integrate into the curriculum, against those that non-pedagogically trained faculties choose to be amalgamated into the curriculum. The comparison included the faculty’s trends, knowledge, and their ability to make informed decisions when utilizing digital technology in the classroom setting.

The Foundation of TPACK

The early concept of Content Knowledge (CK), such as subject matter expertise, forms this knowledge base (Shulman, 1986). Shulman (1986) outlined a paradigm where administrators and policy makers engage in debates about issues concerning teachers’ professional certification. Within this context, there was a clear demarcation between CK and PK. Shulman (1986) also emphasized the requirement for a more coherent theoretical framework to illustrate the relationship between Content Knowledge (CK) and Pedagogical Knowledge (PK). When defining CK, Shulman (1986) argued that it concerns with the volume and structure of knowledge that teachers gain and how this knowledge is subsequently communicated to students. Furthermore, Shulman (1986) associated this
concept with Bloom’s (1956) cognitive taxonomy and the understanding the importance of structure in subject matters.

In response to the Holmes Group (1986) and the Carnegie Forum on Education and the Economy (1986), who researched the enhancement of public teachers, Shulman (1987) asserted that teaching initiates from educators’ understanding of what needs to be learned and how the knowledge should be imparted; this introduces the notion that a general pedagogical understanding is necessary, irrespective of the faculty type. Shulman (1987) explained a relationship between CK and PK, which is often portrayed by two intersecting circles which form the basis for the development of PCK (Figure 2).

There exists a relationship between CK and PK which aligns with a Carnegie initiative aimed at reforming the teaching profession. This relationship can enhance the national board assessment for teachers, which would mirror the certification boards for doctors (Shulman, 1987). Such investigations enable Shulman (1987, p.5) to establish how “particular kinds of content knowledge and pedagogical strategies interacted within the minds of teachers”. Shulman (1987, p.10) further reported, “The essential goal of the research conducted was to identify teacher behaviors and strategies most likely to lead to achievement gains among students”, thus linking content and PK to effective teaching practice. Shulman (1987) contended that CK and PK would not be considered in isolation with others. Expanding on Shulman’s (1987) proposition about pedagogical CK, Koehler and Mishra (2005) initiated the conceptual framework of Technological Pedagogical Content Knowledge (TPACK) for integrating educational technology into teaching. This framework highlights Technology Knowledge as an important element that teachers need to incorporate technology into their pedagogical strategies.
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A distinct intersection is formed by linking technology with knowledge. This framework emerged from a 5-year study by Mishra and Koehler (2006), which focused on the professional development of teachers. Mishra and Koehler (2006, p.1018) argued that research on technology in education has primarily focused on introducing technology into the educational process, rather than adequately addressing “what teachers need to know in order to appropriately incorporate technology into their teaching”. The framework echoes the intersecting conceptions. Mishra and Koehler (2006) extended the conceptual comparison by not only contrasting the three fundamental components, but also by scrutinizing the pairwise interrelations. This approach resulted in the identification of three basic components, three intersecting pairs, and ultimately, the amalgamation of the three pairs into the resulting triad of Technological Pedagogical Content Knowledge (TPCK). This final step demonstrates the intricate interrelationship between the three foundational components. Mishra and Koehler (2006, p. 1029) reported that, “No single technological solution applies to every teacher, every course, or every view of teaching”. Polly and Brantley-Dias (2009) suggested that the TPACK framework provides a solid approach to thinking about effective technology integration, particularly when integrating functional technology into learning environments. Nonetheless, they also concurred that the TPACK framework portrays a complex environment, and additional research is required to explore the various intricate relationships among the components of TPACK.

The Evolution of the TPACK

Learning objectives could be influenced by technology. The Milken Exchange on Education Technology (1999) inferred that learning technology tends to be less effective
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or ineffective when learning objectives are not clearly defined and the focus of the technology is scattered. As noted by Roblyer and Doering (2013, p.10), “Teachers will always be more important than technology”. They further emphasized that, “We need more teachers who understand the role technology plays in society and education, who are prepared to leverage its power and who acknowledge its limitations”.

Thompson and Mishra (2007) modified TPCK to TPACK to express the interconnectedness of the components or domains more precisely. Utilizing the TPACK framework, Schmidt et al. (2009) created a TPACK instrument to measure preservice teachers’ self-assessment of their TPACK and related domains contained within the TPACK framework. They further emphasized that the framework could potentially influence the training and professional development of both preservice and in-service teachers. As the TPACK framework became more integrated, Mishra and Koehler (2006) revised the TPACK diagram to illustrate the framework within a subject-specific context.

**Figure 4**

*The technological pedagogical content knowledge (TPACK) framework*

![TPACK Diagram](image)

Note. Adapted from Mishra and Koehler (2006)
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In service teachers present a unique relationship with technology. As a consequent, Shin et al. (2009) carried out research to examine whether in-service teachers’ beliefs of teaching in general, the use of technology, and the concept of TPACK differed after experiencing three-series of online and face-to-face educational focused technology courses during a period of six weeks. The research build upon respective studies carried out in the previous four years which applied TPACK as the framework. In their study, Shin et al. (2009) completed a one-group pre-test and post-test strategy by reflecting on the deign adopted by Campbell and Stanley (1963); this assisted Shin et al. (2009) to ascertain how educators perceived the relationship between content, technology and pedagogy. Shin et al.’s (2009) research consisted of 26 participants that were predominantly in-service educators with extensive teaching experience, and they were studying on college-level courses.

The comparison of pre-test and post-test survey scores in each subcomponent of the TPACK framework was conducted using a dependent sample t-test (Shin et al., 2009). The findings revealed a surge in students’ comprehensive technology knowledge, though their understanding of content and pedagogy did not show similar growth. Nonetheless, an enhancement was observed in students’ comprehension of the interplay among technology, pedagogy, and content, collectively known as TPACK (Shin et al., 2009). The findings of Shin et al.’s (2009) research affirmed that the TPACK survey could be used as a measuring tool for integrating technology into the curriculum. While Shin et al. (2009) acknowledges that there are limitations in their research, the findings add to the wider body of literature concerning the TPACK framework. Moreover, the research validates that the greater number of in-service teachers with a sufficient understanding of
the intricate interrelationship between technology, pedagogy, and content results, the
higher the chance of them effectively integrating technology into the curriculum.

Diverse definitions of the TPACK framework are available. Cox and Graham
(2009) carried out a conceptual analysis of the TPACK framework aiming to address an
escalating concern regarding the definitions of TPACK’s subcomponents. As per the
authors, such a conceptual investigation is typically performed to enhance the collective
comprehension of words and concepts. In their investigation, Cox and Graham (2009)
constructed both broad and specific definitions for each subcomponent of TPACK. They
further juxtaposed these definitions with multiple case studies to examine if the meanings
 corresponded to the concepts and whether these concepts could align with the scenarios
presented in the case studies. The outcome was a more detailed model of the TPACK
framework, enriched by the comprehensive contributions of numerous authors. (Koehler
and Mishra, 2005; Koehler, Mishra and Yahya, 2007; Harris et al., 2009; and Shin et al.,
2009).

The TPACK in the Content Areas

As the TPACK framework gained more popularity, researchers began
implementing it within particular areas of content. For example, Jimoyiannis (2010)
evolved the TPACK framework to include science specific knowledge. Jimoyiannis (2010)
modified the TPACK framework by combining it with traditional learning to create as an
enhanced framework for a science teacher training program in Greece. Despite the small
sample size (six science teachers with 10-25 years of experience), the findings showed that
all participants displayed improved TPACK knowledge and skills within their specific
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subject area. Moreover, they also displayed an increased confidence and willingness to incorporate technology into the general curriculum (Jimoyiannis, 2010). The study demonstrates the flexible utilization of the TPACK framework within a distinct content area, aligning with earlier findings regarding TPACK’s flexibility. Jimoyiannis (2010) supports this by asserting that this adaptability also corresponds with the need for more explicit instruction for teachers about the selection and usage of technology in the curriculum, reinforcing the framework’s capability to measure the integration of effective educational technology effectively.

Certain content areas apply TPACK as an overarching framework to understand the interconnections of content, pedagogy, and technology. Jimoyiannis (2010) corroborated prior research (Culp et al., 2005; Mishra & Koehler, 2006; Cox & Graham, 2009; Shin et al., 2009) which confirms that a large portion of the integration of educational technology is about supplementing regular classroom instruction with technology, rather than strategically choosing and integrating effective technology aligned with curricular objectives. Jimoyiannis’ (2010) study contends that challenges could occur when increasing students’ abilities in using new technology. Conversely, the majority of teachers are continually focusing upon the lower levels of using technology as opposed to integrating the tools into the pedagogical application.

There is a multiplicity of domains of the TPAK model. Walter et al. (2010) carried out the EcoScienceWorks Project within the framework of Maine’s middle school laptop program. The project’s objective was to re-design three current ecology computer simulations (SimBiotic Software’s EcoBeaker) and integrate a feature enabling students to design their own simulations.
Walter et al. (2010, p.36) states that the project was a “collaboration including simulation software developers; middle school science teachers; the Maine laptop program; environmental educators; an external evaluator; and a lead organization skilled in teacher-guided curriculum development”. Walter et al. (2010) applied the TPACK framework, weaving together its three central domains for their project. They worked with a cohort of 23 high school science teachers, who were actively involved in the project, offering regular feedback. Prior to commencing the project, these teachers had reported no previous experience with programming. Therefore, the project introduced them to hands-on experience with the modules and gradually challenged them with programming new simulation exercises, each progressively more intricate than the previous. Walter et al.’s (2010) study concluded that such workshops highlighted the necessity of scaffolding exercises. This approach enables teachers to progressively build their skills and confidence in using and adapting simulation technology. They identified teacher confidence as a crucial outcome of the program, given that these teachers were expected not only to use the tools with their own students, but also to impart instruction to their middle-school teacher colleagues during in-service training (Walter et al., 2010).

An adequate integration of technology is foreseen by teachers. Walter et al. (2010) indicated that through this process, teachers enhanced their knowledge of computer simulations and models, thereby broadening their overall technological skill set. Teachers acknowledged the importance of effectively integrating technology into diverse ecology curricula and its potent impact on promoting student learning and engagement with the coursework. While this program was specifically targeted at a high school curriculum-focused group, it emphasized the adaptability of the TPACK framework, aligning with
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Jimoyiannis’ (2010, p.42) adjustable scale. In essence, the findings from Walter et al.’s (2010) EcoScienceWorks project furnished insights into a technology-centered curriculum development model that encourages the growth of TPACK skills in teachers. Broadly speaking, there was considerable enhancement in teachers’ technological abilities, enhanced content knowledge, and positive changes in pedagogy (Walter et al., 2010).

Research examines the impact of applying TPACK in teaching. Harris and Hofer (2011) carried out an investigation focusing on secondary social studies teachers, aiming to ascertain their TPACK ratings, as reflected in their planning processes. The goal was to understand the impact of TPACK and explore the potential for its enhancement. To facilitate this, the authors created a range of social studies learning tasks applying the TPACK development strategy. Harris and Hofer (2011, p.214) associated the students’ learning needs alongside “consciously chosen, content-based learning activities supported by suggested educational technologies”. Recurring themes became apparent among the participants. When planning, the teachers observed the particular details of the curriculum content (based on standards) and primarily tailored their planned learning activities to the nature of the content, rather than adapting them to the students’ developmental learning needs. Participants chose activities that they believed would engage students, provided that these activities primarily met the content requirements. Following professional development, participants were more likely to select technology that intellectually stimulated students. Some teachers assessed the new technological abilities based on how it could be applied to their subject matter, or they defaulted to technology that they were more familiar with prior to embracing the new technology (Harris and Hofer, 2011).
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The Use of TPACK in Saudi Arabia

TPACK portrays some gaps which raises concerns around its validity. Koh et al. (2010) conducted research to address the perceived gaps in developing the TPACK instrument. The research assessed the construct validity of a TPACK survey by embracing exploratory factor analysis of 1500 responses from teachers in Saudi Arabia. The study found that the internal reliability of diverse TPACK instruments were consistent across their research. The authors created a survey consisting of 30-questions survey, which determined that TK and CK should be separates entities, while all other items must be categorized into three elements: knowledge of teaching with technology, knowledge from critical reflection, and PK instead of the seven sub-components of the TPACK framework (Koh et al., 2010). The study also found that male teachers were more confident with using technology, demonstrated a positive attitude towards using technology, competency, and scored higher in TK in comparison to their female counterparts. Yet, Koh et al.’s (2014) more recent research endorses that further research is required to compare general and subject-specific TPACK surveys, which would determine the robustness of context-specific components of the TPACK framework.

Koh et al. (2014) projected a theory or framework can only be considered effective once it has been tested, proven, and re-tested. Accordingly, Koh et al. (2014) assessed the validity of the TPACK model in their factor analysis of a modified 24-item survey amongst a sample of 596 virtual teachers in Saudi Arabia. The research identified that the TPACK framework is beneficial from an organizational perspective, yet detaching the subdomains is challenging (Koh et al., 2014). In response, Archambault and Barnett (2010) argued that the seven widely recognized domains of the TPACK model
may not be distinct entities in practical situations. As such, it is apparent that the
domains of the TPACK framework are unclear, making it challenging for teachers to
disconnect the concepts from one another (Archambault and Barnett, 2010). It is possible
that teachers with greater teaching experience may consider particular teaching methods
for certain topics. Furthermore, in the context of online teaching, the technology domain
becomes an inherent and integral part of the equation, making it difficult to distinguish
aspects of content, pedagogy, and technology. The integration of technology in the online
medium obscures the boundaries between these domains, which presents challenges in
implementing the TPACK framework (Archambault and Barnett, 2010).

It is vital for teachers to be observed in integrating technology. According to Lux
et al. (2011, p.416) “Assessing teachers’ TPACK is important not only for evaluating
technology integration competencies within educational environments but also for
evaluating the quality of instructional technology training that occurs in teacher
preparation programs”. Teachers’ pre-service education coordinators are continually
encountering challenges in effectively integrating technology into their practice (Morsink
et al., 2010; Luthra, 2010; Abbitt, 2011; Niess, 2011).

The persistent advancement of the TPACK framework and tool suggest that these
are transformative. Kohen and Kramarski (2012) conducted a study involving nine
preservice high school teachers from multiple subject areas in Israel. These participants
were part of a university course taught in a computer lab, which emphasized teaching and
learning methods grounded in the TPACK conceptual framework. According to Kohen
and Kramarski (2012), Self-Regulated Learning (SRL) can be considered a three-stage
cyclical process that includes planning, action, and reflection. They further emphasized
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that to effectively enhance TPACK, practicing the three domains of knowledge (Technology, Pedagogy, and Content) in isolation is not beneficial. Rather, it is the integration of these knowledge domains that holds value. However, Kohen and Kramarski (2012) also acknowledged that this integration can present challenges for both preservice and in-service teachers. Kohen and Kramarski (2012), incorporated Self-Regulated Learning (SRL) into the TPACK framework (TPACK-SRL), and confirmed that TPACK could effectively guide teachers’ understanding of the interactions between technology, pedagogy, and content. Their study demonstrates that the framework is flexible, valid, and reliable. In addition, Kohen and Kramarski (2012) highlight that teacher-librarians have a distinctive role in providing support for both students and teachers.

This new role empowers teachers with technology skills and allows them to confidently utilize digital content for delivering their curriculum (Linton, 2012). According to Linton (2012), the initial step for implementing the TPACK model is establishing content knowledge (CK), implying that teachers must develop a deep understanding of their specific content area and recognize how learning evolves within that domain. Furthermore, librarians have a unique position within educational institutions, where they can aid teachers in linking their specialized knowledge through cooperative networks consisting of versatile staff members, educational technologists, among others (Linton, 2012).

The findings in Linton’s (2012, p.27) study highlighted that, “The ultimate goal of all instructional support positions, regardless of the job description, is improved instruction in order to increase student learning”. In addition, the role of librarians is central to integrating digital technology into teaching (Linton, 2012).
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Teachers need to have a full understanding of the role technology has in education (Roblyer and Doering, 2013). Roblyer and Doering (2013) presented a future-oriented perspective for educators, capturing six lessons from the past six decades relating to the application of technology in education:

1. Technology should not be viewed as a cure-all solution in education.
2. Typically, teachers do not develop technology-based materials or curricula.
3. Where something is technically feasible, this does not imply that it can be practically applicable.
4. The pace at which technologies evolve often exceeds teachers’ ability to remain updated.
5. Outdated technologies can be valuable
6. The value of teachers will always surpass that of technology.

These insights draw from historical methods of integrating technology into professional development.

Historical methods integrated technology for professional development. Graham et al.’s (2009) case study involved 15 in-service teachers who engaged in a science teacher training program at Brigham Young University. Graham et al. (2009, p.70) noted that, “Educators recognized that technology skills alone did not serve them well because one could know how to operate a piece of technology without knowing how to use it effectively to promote student learning”. These findings echo earlier research, by highlighting that the integration of technology involves more than just the introduction of digital tools into a classroom setting. Over the past twenty years, TPACK research has emerged as a crucial tool for capturing key aspects of teachers' understanding required for
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the effective incorporation of technology in education. This concept builds upon Shulman's (1987) proposition and is further expressed by Mishra and Koehler (2006), who note that the focus tends to rest on exploring the range of technologies available rather than examining the current or ideal use of these technologies in educational settings.

Conventional teaching approaches reflect historical practices. According to comments made by Hu and Fyfe (2010), from the time since Mishra and Koehler (2006, p.184) initiated the TPACK framework and the TPACK instrument, there “has been an emerging body of literature reiterating the importance of TPACK”. In accordance with professional development, all educators indicated that they have acquired new strategies and methods which they can select and employ based on their students’ individual needs (Mishra and Koehler, 2006). Harris and Hofer’s (2011, p.226) research stressed that, “A content-based, activity-types approach to technologically inclusive instructional planning is compatible with existing approaches to teaching”. Fyfe (2010) documented a higher education teacher training program that utilized the TPACK framework in the structure of the institution's preservice Information and Communications Technology (ICT) course. This ICT course, created for undergraduate students, aimed to cultivate their technical skills.

Hu and Fyfe (2010, p.188) explains that TPACK “enables teachers to select appropriate ICT tools to be used in their classroom to enhance what they teach”, and the TPACK framework approach improves teacher confidence and skill in productive technology integration. Furthermore, Mishra and Koehler (2006, p.1028) affirmed that TPACK has evolved both as a framework and as an instrument to measure TPACK as an “emergent form of knowledge”. Table 1 is a graphical view representing a summarization
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of the TPACK literature used within this chapter. It demonstrates the evolution of the TPACK framework and instrument from 2005 to 2013.
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Table 1

*Summarization of TPACK Literature 2005–2013*

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<th>Method</th>
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Note. ICT = information and communication technology: TPCK/TPACK = Technological pedagogical content knowledge; SRL = self-regulated learning

Research concerning TPACK draws upon both K-12 and higher education. Voogt et al.’s (2013) review of TPACK literature between 2005 and 2011, signifies that TPACK research that is available, mostly associates with teachers. Similarly, Ward and Benson (2010) argue that considerable attention is towards TPACK research in K–12 teacher education. However, the same inquiry into TPACK that relates to higher education was not evident (Ward and Benson, 2010). Rienties et al. (2013, p.7) appreciated that conducting prior research with teachers is taking “important steps towards validating and refining the TPACK model; however, limited research is available in a higher education context”.

Technology in higher education is the core of student’s learning (Ashe and Bibi, 2011). This statement sets the lens that teachers employed to view and understand the TPACK framework and its implications in higher education teaching and how this affects
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students’ approach to learning. Ashe and Bibi (2011) further posit that higher education institutions are now focusing on technology-facilitated environments for quality teaching improvement and students expect a measure of technology and technological access during their educational journey. Moreover, Ashe and Bibi (2011) advocate that technology has the possibility of changing the learning context to activate different knowledge elements in their schema. Additionally, an instructor’s understanding of technology and its integration into curriculum becomes an important aspect of an educator’s expertise of teaching 21st century students.

Empirical research asserts that in the past, teachers struggled to step away from traditional teaching and adopt innovative teaching approaches. Decades prior to Ashe and Bibi (2011), White (1996, p.69) drew attention to social studies teachers on a higher education teacher preparation program, by articulating that “We are doomed to teach the way that we have been taught”. White (1996) addressed the issue of teacher preparation and change the method of delivery from a teacher-centered transmission model of teaching to a constructivist student-centered model. According to White’s (1996) work in the field of social studies, teachers were largely becoming irrelevant in K–12 schools because they were not engaging the students and creating a learning environment. Rather, the teachers were teaching how they had been taught in the university, which according to White, was the fundamental issue at hand. White (1996, p.70) stated that there were two items that needed to be incorporated into the teacher preparation program: “a constructivist framework and the appropriate use of technology” in instruction. White (1996) posited that technology and constructivist integration are vital to develop problem-solving and critical thinking skills that allow learning to be embedded in context that is
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relevant to a student. Furthermore, White (1996, p.71) stressed that technology is a major component of a constructivist approach and that information technologies are “motivating, creative, and interactive” and that they promote meaningful learning.

Technology applications directly support the constructivist strategies, depending upon how they are employed within the learning environment (Roblyer and Doering, 2013). Furthermore, Roblyer and Doering (2013, p. 45-46) stated, “Today’s constructivist integration strategies often focus on having students use data gathering tools (for example, mobile technologies) to study issues in their locale, and on creating multimedia products to present their new insights”. Roblyer and Doering (2013) stressed the integration of the content, the environment, the technology, and especially the learning outcome of creating the learning environment.

Constructivist strategies have been linked directly to integrating technology into the curriculum. Baumgartner et al. (2003, p. 9) articulated that constructivism or constructivists believe that learning is a search for meaning and that, in contrast to behaviorism, knowledge is not merely ‘out there’ to be attained. Instead, it is constructed by learners applying existing understanding to the tasks. Constructivism as a sociocultural theory emphasizes that interaction between an individual and their societal and cultural influences directly contributes to individual development. More importantly, this interaction also includes technology. In relation to theory, Vygotsky (1978) argued that society could not be separated from the learning and development of an individual and that social interaction is critical for the development of an individual.

Huang (2002, p.35) examined the impact of constructivist learning theory through the lens of adult learners in an online educational setting and determined, “Constructivist
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ideals provide ideas help instructors create learner-centered and collaborative environments that support critical reflection and experiential processes”. Huang (2002) recognized the previous work of Dewey (2005), Piaget (1968), Vygotsky (1978), and Bruner (2006) in which they proposed that online learners could actively learn by reflecting on prior involvements in an activity. In a constructivist environment, the educator assumes the role of a facilitator, helping to create an environment in which learners can use prior understandings, the classroom skills, and the environment affecting the learner to help the learner create or construct useful understandings. Huang (2002) also asserted that Piaget and Dewey believed that educators shape and enhance student learning by offering them real-life situations to be involved in. Huang (2002) referred to Vygotsky’s (1978) work around the social context of learning takes and its impact on what is learned. However, Vygotsky (1978) placed critical importance on the interaction of people (other learners and educators) in his theory of social constructivism. Therefore, Huang (2002) evidentially agreed that the well-constructed environment is conducive to a learner’s ability to construct useful and meaningful understandings. Huang (2002) drew a congruent thread from Dewey’s work to Bruner and Knowles’ and emphasized that adult learner characteristics lend themselves to experiential learning, by which common technologies enable an educator to construct the learning situation to meet the varied needs of adult students. Technologies are not deliverers of content, but tools that educators and students use to construct understanding and share meaning. Using technology and cultural tools to communicate, exchange information, and construct knowledge is fundamental in constructivism (Vrasidas & McIsaac, 2001).
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Trends of Integrating Digital Technology

For more than 20 years, educational researchers have struggled to identify the value of technology in education, to the extent that our understanding of how technology accentuates student learning as a major part of the problem (Baylor and Ritchie, 2002). Therefore, in this section, research in the following three areas will be examined (a) teachers’ expertise of technology, (b) barriers to digital literacy and personal use of technology and how it influences adopting further uses, and (c) higher education and adult education faculties’ knowledge of technology in their courses.

Technology is not an end in itself, but rather a tool used in conjunction with other tools for educators to solve problems in society, especially in education. Roblyer and Doering (2013, p.xvii) contend, “Technology is us—our tools, our methods, and our own creative attempts to solve problems in our environment”. The authors further stated the four core principles they used to encompass their thoughts, strategies, and techniques. According to Roblyer and Doering (2013), if teachers use these four core principles, they can visualize their role in shaping the future of education. The principles illustrate educationally sound methods for teachers to use when integrating effective practices into their curriculum.

The National Defense Education Act (1958) largely targeted college education and is mostly recognized as providing federal loans for students. However, the National Defense Education Act (1958) also provided funds to state educational agencies for the purposes of improving teaching. Over the past decade, digital technologies have gone from being an optional tool for the few to a required tool for the majority. Warschauer and Liaw (2010) highlight that 74% of people in the Saudi Arabia use the internet at home or work
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today, of which 87% are aged between 18–29.

Although information and communication technologies have become an integral part of life in Saudi Arabia, they have not yet been adequately integrated into adult language and literacy programs (Warschauer & Liaw, 2010). Although Warschauer and Liaw (2010) referred to adult language and literacy programs in particular, in the National Education Technology Plan (Duncan, 2010), the U.S. Secretary of Education, advocated a call to apply the advanced technologies used in the personal lives of Americans into the entire education system. The administration was concerned that the Saudi Arabia ranked ninth out of 36 developed nations in college completion rates, citing innovation and ingenuity as key components of how to achieve the goal of leading the world by 2020 (Duncan, 2010). Integration of advance technology would be a key as well as focusing on the content and method of teaching to match people’s needs and learning styles (Duncan 2010, p. v).

López-Pérez et al. (2011, p.818) reinforced the goal of the National Education Technology Plan (Duncan, 2010) by stating, “A persistent concern in teaching is the aim to achieve a better outcome and to reduce the number of students dropping out of a course”. Using first year undergraduate students in the General Accounting courses offered by a university in Spain, López-Pérez et al. (2011) examined the effect of blended learning on course outcomes and investigated student understanding of a blended learning classroom. A blended learning approach is generally defined as the integration of traditional classroom teaching methods with online or digital technology activities, enhancing or replacing portions of the course objectives. However, Bonk and Graham (2006, p.5) defined blended learning as “face-to-face instruction with computer-mediated
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instruction”. According to Bonk and Graham (2006), this definition is the most accurate reflection of the historical emergence of blended learning. Therefore, Bonk and Graham (2006, p.5) confirm that “Blended learning is the combination of instruction from two historically separate models of teaching and learning: traditional face-to-face learning systems and distributed learning systems”. In their experiment, López- Pérez et al. (2011) included a blended learning environment. A larger percentage of registered students took the final exam, which according to López-Pérez et al. (2011), contributed to a positive trend in the results achieved for students passing the final exam. From a student’s perspective, the blended learning environment, inclusion of educational technology to expand or replace certain course objectives. This demonstrated that students perceived this as useful for understanding and learning the subject content. One of the limitations of their study is that this research did not include the faculty’s expertise of using technology, however, it did note that students gained more from the instructor–learner interaction (López-Pérez et al., 2011).

Faculties receive an insufficient level of training for the instructors to feel comfortable using the technology (Warschauer and Liaw, 2010 and Roblyer and Doering 2013) In an earlier study, Kotrlik and Redmann (2005) examined the impact of technology on the teaching–learning process, barriers to technology integration, technology anxiety, and teaching effectiveness and articulated the state of technology integration in adult basic education (ABE). It is noteworthy that Kotrlik and Redmann’s (2005) research included 311 ABE teachers employed by public secondary school systems in Louisiana. Kotrlik and Redmann (2005, p.215) stated, “ABE teachers are in the early stages of integrating technology into instruction,” but are “more active in the more
exploratory stages of using technology in the teaching–learning process”. However, ABE teachers are not being innovative in integrating technology at an advanced level. This attributed the lack of innovation to the level of technology education for the instructor to misunderstanding of how technology fits into the curriculum or having no defined means to assess the impact of technology. The research concluded that teachers must continue to devise ways to integrate technology into their classrooms and curricula and that educational leaders at all levels must encourage teachers to expand using technology in the teaching–learning process (Kotrlik and Redmann, 2005).

A successful PT3 project conducted at ASUW of 41 College of Education faculty members was designed for the integration of technology into their classes. This was analyzed by Wetzel and Williams (2004), who concluded that the faculty used technology in their classes aligned with the NETS-T; the NETS-T was developed by the International Society for Technology in Education (2000). Wetzel and Williams (2004) conducted a study in response to the concerns of recent graduates of the ASUW College of Education K–12 program. The findings indicated that participants did not feel prepared to teach with technology. In addition, ASUW graduates cited inconsistent or lack of extensive modelling on using technology and a dearth of exemplary practices during classroom or field work by the faculty. As with López-Pérez et al. (2011) throughout the ASUW experiment, it was generally accepted that students valued the technology usage within the coursework. However, faculty usage of technology and attitudes towards technology reflected in teacher integration of technology within coursework; this was a key factor in graduates integrating technology within their classrooms.
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**Personal Use of Technology**

The technology revolution has brought pressure upon higher education faculty from both the administration and the students to incorporate technology into curriculum (Shafie et al. 2019). The author discovered that although the faculty participants in the study were aware that technology has a central role in both their personal and professional lives, additional technology training is required to conform PLS into educational technology usage. Martin (2018) concluded that not only does technology play a large part in individual’s personal lives, but it can also transform teaching practices where faculties are shown how to best use it. Yet although Czaja et al.’s (2006) data on the use of technology has demonstrated several influences, for example: education, socioeconomic status, attitudes toward the technology, the perceived benefits of technology, and access to technology that influences technology adoption. Likewise, Czaja et al. (2006) hypothesized that the higher the self-efficacy or confidence in using technology, the lower the anxiety. The author predicted a higher technology adoption rate and the usage of more types of technology.

Kennedy et al.’s (2008) data collection was carried out in 2006 amongst more than 2,000 incoming first year Australian university students. The date revealed that the trend of tech-savvy students is increasing, which aligns with Prensky’s (2001) predictions. However, it can be noted that, although the trend has increased, it is by no means universal, nor does it mean that students are more information literate. Kennedy et al. (2008) similarly found that individuals who are early adopters who embrace emerging technologies in everyday life for non-educational usages might also perceive the same technologies as having an educational application and be more willing to use the
technology. Kennedy et al. (2008) also asserted the positive association between a students’ use of technology and their preference for its use at university, which leaves unanswered the question of whether students’ everyday skills with emerging technologies will correspond to skills associated with beneficial, technology-based learning. Kennedy et al. (2008) advocated that further investigation required in this field for a deeper understanding of the emerging issues.

User satisfaction is generally considered to be one of the key components for acceptance of technology or information systems (Walker and Johnson, 2008). Using the Technology Acceptance Model developed in 1989, Walker and Johnson argued that perceived usefulness and perceived ease of use were fundamental variables determining a user’s acceptance of technology. The data gathered from 143 university instructors, determined a high correlation between perceived usefulness of technology and the instructor’s intent to use the technology (Walker and Johnson, 2008).

Kukulska-Hulme (2012) contend that faculty engagement with technology must go beyond exposure in faculty development and into adoption in their own personal lives to fully adapt to the technological conditions of the new higher education environment. Alexander (2004) believed that faculty should themselves be prepared to learn social software and mobile learning while understanding the pedagogical importance of harnessing the technology. According to El-Hussein and Cronje (2010), the evolution of handheld devices and wireless technology presents changes not only in personal lives, but also in education. El-Hussein and Cronje (2010) articulated that PLS is prevalent and is reshaping a user’s daily life; therefore, visionary educators must consider the implications on the teaching and learning environment. According to Mumtaz (2000), literature
demonstrated that those faculty members who are regular users of technology and faculty that perceive technology is useful in their personal lives are more likely to incorporate technology into their instruction.

Teachers should ideally be encouraged in using computers in the home environment to learn about them in their own time (Cradler et al. 2002). Cradler et al. (2002) presented their findings and implications related to preparing teachers to integrate technology effectively into curriculum and instruction through summarizing 26 studies, surveys, and reports related to professional development. In a study of a faculty at a medical university, Kazley et al. (2013, p.68) reported that most faculty considered e-mail, PowerPoint®, Word, calendar tools, Informational Websites, Smartboard, and basic Microsoft Office® applications as “always used” technology. However, additional training was essential as the faculty felt “they were not using the software to the fullest extent rather than requesting training that the majority of students reported might be more effective”. Many of the conditions for integrating technology and successful technology integration appears to be in place in many institutions, such as access to technology, favorable institutional support, and training for instructors to deliver online education (Ertmer, 2005). However, the identified barriers are instructor’s pedagogical beliefs, which argue for enhanced professional development. Likewise, Okojie et al. (2006) noted that using technology for instruction partially depends on the instructors’ ability to explore the relationship between technology and pedagogy. Yet the mere presence of technology in a classroom does not guarantee its use, rather the instructor must accept the notion of the requirement of educational technology in the classroom and reaffirm technology self-efficacy or being comfortable in using technology (Kiraz and Ozdemir, 2006). Aligned
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with the work of previous researchers, Kiraz and Ozdemir (2006) articulated that an individual’s positive attitude toward the use of technology contributes to the overall intent of its use. The extent to which technology is used outside the classroom for non-school activities might be an indicator of an instructor’s interest and corresponding skill in using technology within the classroom (Baylor and Richie, 2002). Furthermore, the authors discovered a combination of personal technology improvement coupled with institutional support for professional development, and increased faculty confidence and competence. Similarly, Baylor and Ritchie (2002) asserted that the faculty’s understanding of technology and openness to change were more willing to trial innovative ideologies in the classroom as well as in their personal life.

Faculties Integrating Technology

The Ministry of Education and Ministry of Higher education has initiated training programs aimed at eliminating ICT illiteracy amongst Saudi teachers (Al Gamdi and Samarji, 2016). Barriers to successfully integrating technology were categorized as teacher level barriers, and institution level barriers. The teacher level barriers stemmed down to negative attitudes towards technology integration, a lack of teacher competence and confidence, and resistance to change. Alternatively, institution-level barriers were ascribed to a lack of time, adequate training, resources and technical support. However, the finding of 214 questionnaires revealed that barriers to ICT integration includes the absence of ICT policy encompassing the motivation, planning, monitoring, and evaluating process. The authors also highlight the need for frequent professional development, alongside technical and maintenance support to digitally enrich classrooms (Al Gamdi and Samarji, 2016).
Alexander (2004) enquired whether higher education faculty was aware of assessing technology for pedagogical needs. In addition, Mumtaz (2000) and Savery (2002) demonstrated that faculty knowledge of usefulness is a key factor in determining whether a faculty member will employ ICT into their learning environment. Therefore, in this section, the researcher will review the literature concerning faculty knowledge of technology. Diverse elements influence teachers to embed technology into the curriculum. Mumtaz (2000) reviewed literature from the past two decades and presented evidence of the positive effects of ICT on learning. Mumtaz’s (2000) literature review also drew upon factors that hinder an instructor’s willingness to use technology and factors that encourage faculty usage of technology. Regardless of such projects, the numerous training programs and ICT resources in schools, has failed in valuing the effects of ICT (Passey & Samways, 1997; Cox, Preston, & Cox, 1999). According to Mumtaz (2000, p.320), a number of factors were identified that affect a teacher’s willingness to incorporate technology into curriculum, including limited teaching involving ICT and a “lack of on-site support for teachers using technology; and lack of time required to successfully integrate technology into the curriculum”. Kotrlik and Redmann (2005) established that the key issues identified in Mumtaz’s (2000) review continue to persist as it presents similar barriers in their research. These mainly included barriers encountered ABE teachers while trying to integrate technology into their educational curriculum and the classroom.

Other barriers were the availability of time to plan for integration of technology into the lesson plan, scheduling sufficient time for students to research on the internet, the availability of technology, administrative support for technology, and teacher anxiety about using technology. Demirbilek (2010) also conducted a study to determine the current state
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of the adult educators’ attitudes towards using mobile technology and games in educational curricula. Adult education was defined as “any formal or informal education or training aimed at an adult population that is older than a traditional university student” (Demirbilek, 2010, p.235). Demirbilek (2010) extended the notion of educational technology studies and added the additional component of mobile devices that have become very prolific among the general population. Demirbilek (2010, p.244) identified one barrier to technology use stating, “Adult educators’ intent to use electronic games and mobile devices begins with their knowledge and attitude towards using them in their daily teaching and learning practices”. This attitude extends into the educators’ willingness to use or extent of technology use in their personal lives. Another barrier for educators stems from curriculum planners not involving educators of adults prior to introducing mobile games into educational course material. Kazley et al. (2013) conducted surveys and focus groups at a medical university located in the south-eastern Saudi Arabia of 21 staff members, 250 students, and 29 faculty. They examined the use, and training needs in the area of educational technology of faculty, staff, and students. The university in Kazley et al.’s (2013) study comprised of 11 academic programs in the health sciences. Two of the programs were at the bachelor’s degree level and nine were at the graduate degree (master’s or doctoral) level. Three programs were taught in a blender or fully online, distance education format.

Faculty members in the college used many educational technology tools: Smartboards and Sympodia, audience response systems, learning management systems, lecture capture, video-conference/recording, patient simulation, and many other hardware and software tools. Kazley et al. (2013, p.63-64) concluded from the survey responses that
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“the major usage of technology by faculty included accessing Internet resources, word processing, and email and quite often, technology is used by faculty more for administration and research than for instruction”. In a review of current literature, Kazley et al. (2013) determined that the literature indicated that the perceived value of technology is often be affected by a person’s expertise in technology. Specifically, Kazley et al. (2013, p.64) stated, “Students can perceive technology to have little value—and even to create negative consequences- when it cannot be adequately operated or integrated in class”. Kazley et al. (2013, p.67) reported that most faculty participants admitted to the challenges of keeping current with educational technology use while sorting through the “good” versus the “ineffective”. Lastly, Kazley et al. (2013, p.69) recognized that “personal teaching philosophies, together with available time to learn about technology and the demands related to instruction; determine how a faculty member approaches learning about technology and how they choose to integrate it into their teaching”.

Lee et al. (2010) used Ajzen’s theory of planned behavior (TPB) to conduct an experiment in which secondary and high school faculty used computers only to create and deliver lessons, and then used the TPB to investigate teachers’ decisions or intentions to use technology in curriculum. Although the research was conducted on secondary and high school faculty, the results were consistent with other higher education literature (for example, Matus et al., 2011; Tamim et al., 2011). Lee et al. (2010, p.152) determined that, “Regardless of their [faculty] perceived self- competence; teachers may not use technology if they do not value it in their teaching”. Lee et al. (2010, p.154) reflected upon previous experiments using TPB that may have led to inconclusive results to describe teachers’ beliefs and intentions regarding the integration of electronic technology since there was a
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wide variety of technology available; there are also multiple methods for teachers to use a specific technology in the classroom. Therefore, Lee et al. (2010, p.154) stated, “Teachers’ attitude, subjective norm, and perceived behavioral control. The relative importance of these three factors as predictors of behavioral intention may significantly vary between technologies thus impacting the intention to implement technology into curriculum”.

Distance learning has a key role in broadening educational access and higher educational prospects (Tabata and Johnsrud, 2008, p. 625). However, they also note that the success of distance education is primarily hinged upon faculty who provide quality instruction. Tabata and Johnsrud (2008) noted that, faculty uses assorted technologies such as electronic mail to contact colleagues and talk to students, and electronic libraries, and Internet searches to facilitate their work. Yet they resist using technologies in delivering distance education for a number of reasons: PLS and individual competencies, time, workload, and institutional support. Faculty members who perceive using technology has a positive effect on their work are more likely to use it (Tabata and Johsrud, 2008). In addition, once faculty members start to use technology and become well-informed and tend to use it more often. They also found that faculty members desire training to become more comfortable with the technology (Tabata & Johnsrud, 2008). This training usually requires institutional support because faculty members are unmotivated to participate in distance education without a strong infrastructure providing technical support, training, and workshops.

In a separate study, Marx (2005, p.25) noted that university faculty members are “often reluctant users of technology within their classrooms”. Marx (2005) indicated that the main issue is the existing university workload of teaching their class load, conducting research, and publishing requirements detract from the faculty member’s ability to learn
and deliberately integrate meaningful technology into their curriculum and courseware.

Marx (2005) highlighted faculty training through using workshops, individual mentoring, and using various incentives to help entice faculty to explore new and different ways of integrating technology into their coursework. Marx (2005, p.23) noted that the technology integration training sessions were offered as voluntary sessions within the faculty professional development program and that “often in the case of voluntary professional development programs, only a core of faculty attended”. During the training sessions, Marx (2005) became concerned that the focus of the training was strictly on the basics of using the technology and little or no instruction occurred with integrating technology into the curriculum. Very little focus of student-centered curricula occurred on the next level of integration by linking pedagogy with the technology. Marx (2005) was concerned that without the constructivist linking of content, pedagogy, and technology, using technology would not be meaningful.

Building upon Baylor and Ritchie’s (2002) premise regarding educational researchers’ struggle to identify the value of technology and educators’ understanding of technology is a significant part of the problem. Thus, this section will examine effective educational technology, technology in higher education, and faculty development and technology. According to Ward and Benson (2010), using online technologies has become an increasingly important challenge in academic staff development, more research is therefore required to provide a basis for the right choice when using different technologies. Ward and Benson (2010) assert that technology has dramatically changed 21st Century learners. In addition, professional development focused on understanding the dynamic association between content, pedagogy, and technology would result in a greater number of
satisfied learners and confident instructors.

**Effective Educational Technology**

Technology is a tool for faculty as a means to an end (Cagel and Hornick, 2001). Furthermore, the faculty is not merely to master technology, but to master it using the technology to enable students to achieve curricular objectives. Therefore, this section will review literature around effective educational technology. Effective technology is on a scale of two factors. The scale addresses two central issues concerning technology: (a) whether technology applications can improve student outcomes (efficacy) while studying technology applications as they are actually used, and (b) asking whether they actually improve student outcomes (effectiveness). According to Agodini et al. (2003) a researcher must consider the conditions and practices [the pedagogy] under which technology is effective in enhancing learning. Moreover, it is useful to consider possible approaches for studying the effectiveness of educational technology by conceptualizing the links that connect technology and achievement (Agodini et al., 2003). Therefore, a conceptual framework is suggested for a technology application to support teachers in instruction. However, it is noteworthy that although Agodini et al. (2003) demonstrated the model on a K–12 system, it can be applied to the level of university courses.

Agodini et al. (2003) used this conceptual framework to demonstrate the connection between technology and context: (a) that the institution has specific learning objectives with a measurable outcome, (b) that the instructor has a choice to integrate technology that supports the learning outcome desired, and (c) that the achievement can be measured to
determine an whether an increase in learning has occurred. Using this framework, Agodini et al. (2003) linked technology, pedagogy, content, and context to a measurable outcome that demonstrated the effectiveness of integration. Furthermore, the framework was modified under teacher instructional approach to include the ability of one group of teachers to not include technology in the approach to isolate the differences between teachers who did and did not incorporated technology (Agodini et al., 2003). This approach can generate two outcomes which can be measured to provide quantifiable evidence of successful or effective integration (Agodini et al., 2003).

According to Vrasidas and McIsaac (2001, p.129), for “successful technology integration in schools, teacher education programs must play a crucial role”. Teacher preparation on technologies should provide teachers with a solid understanding of the various media, their capabilities, and their constraints. Such understandings can only emerge when teachers are actively involved in teaching and learning with technology across various disciplines (Vrasidas and McIsaac, 2001).

Although this research focuses on K–12 teachers, a translation occurs to a higher education setting. Research conducted by Vrasidas and McIsaac (2001) agreed with Barron and Goldman’s (1994) original findings, suggesting that teachers should not be taught about technology. Rather the findings suggest how to use technology for constructing, organizing and communicating knowledge, and that one can best learn to use a computer while working on a meaningful task. The study further states that in a course on educational technology for teachers, the goal should not “simply be to teach the use of several technology systems, their advantages and disadvantages; instead, the goal should be to provide students with opportunities to think like experts in making instructional
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decisions, selecting media for appropriate use, structuring learning activities and
employing sound pedagogical strategies in real-life contexts” (Baron and Goldman, p. 130).

The rapid growth of IT provides access to educational resources and learning
opportunities like no other time (Kagima and Hausafus, 2001). This access is both a
challenge to higher education institutions and an opportunity. According to Kagima and
Hausafus, using educational technology can enhance the range and scope of what
students can learn by creating an environment that supports effective educational
practices. In addition, technology must be integrated thoughtfully to support meaningful
learning for engaging learners. Faculties integrating technology into their learning
environments “allows educators to tailor educational resources for a diversity of learning
styles, cultural differences, skill levels, motivations, disabilities, and educational
objectives” (Kagima and Hausafus (2001, p. 34). Furthermore, teachers must believe that
student learning is more effective with technology integrated than without. In addition,
the faculty must receive institutional support to address the lack of educational
opportunities, promotion, and tenure rewards (Kagima and Hausafus, 2001).

Technology in Higher Education

Technology is pervasive in teachers and students’ lives, thus the faculty and public
demand that technology becomes part of the educational process (Wilson, 2003).
However, the integration of technology into higher education creates barriers, including
the need to develop technology support programs for faculty and staff, time for faculty to
learn the technology, understanding how to employ it, and incentives for faculty to
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develop the effective use of technology in the learning environment. Wilson (2003, p.61) stated that “Exemplary teaching combines the skillful use of pedagogy with content expertise and innovative use of technology”.

Integration of Technology

The TPACK framework allows educators to consider the knowledge required to integrate technology into teaching and how this can be developed within themselves (Mishra and Koehler, 2006). Previously, there was a tendency to examine technology in itself, and not at how it was used (Mishra and Koehler, 2006). Garrison et al. (2010) emphasized that distance education and later blended education has a special connection to technology and adult education from the earliest forms of distance education using the technology of the postal system. Distance education was developed primarily to address the geographic barriers that hinder adult learning opportunities. Kasworm et al. (2010) posit that distance education has a long and strong connection to adult education. The theory and practice of distance education are very largely a subset of the theory and practice of adult education (Kasworm et al. (2010). Furthermore, distance education is dependent upon some form of technology to help facilitate communication among students, which is often taken for granted in face-to-face settings. However, Bonk and Graham (2006) add that the convergence of face-to-face instruction and computer-mediated instruction into a blended learning environment is the greatest unrecognized trend in higher education today. Similarly, according to Carlson et al. (2012), most universities have capitalized on advances in technology by offering more online courses and higher education administrators are encouraging instructors to teach online courses or combine modes of
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delivery via the hybrid or blended learning course model. Additionally, Carlson et al. (2012, p.336) asserted that the explosion of new media has “slowly placed increasing pressure on instructors to incorporate online media in a way that achieves learning outcomes equal to face-to-face instruction” and have changed how professors deliver content to students. The internet and emerging technologies have redefined the instructor’s role and the teacher–student relationship, for technology expands the boundaries of the classroom, creating new instructional interactions other than face-to-face collaboration (Carlson et al. 2012).

The instructor’s role is to select the type of technology and technology use that is consistent within the context to facilitate student learning, for which instructional strategies significantly contribute to adult learning (Greer and Mott, 2009). Collins (2010) stated that an instructor’s understanding of learning styles is an integral part of designing a course that uses technology appropriately. This aligns with adults’ learning styles, which should match with the use of technology. Greer and Mott (2009) asserted that the learner owns a portion of the responsibility for learning that also includes conducting a self-assessment of their own technological readiness and acquiring and maintaining the skills to support their learning. Consequently, many higher education institutions are now publishing student technology requirements prior to student enrolment in a course (Greer and Mott, 2009).

Higher education institutions are currently in a position of having to adapt to external conditions created by the wide-spread adoption of technology (Kukulska-Hulme, 2012). The explosion of social media, social networking and the proliferation of mobile devices provide a unique challenge to higher education faculty faced with a much more highly diverse student population where social technology has become an unquestionable
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part of their learning. In their study, Kukulska-Hulme (2012) pointed out that faculty must adopt a lifelong learning perspective that will enable the higher education workforce to adapt to this technologically saturated environment. Not only are the digital natives of Prensky (2001) entering higher education looking for technology enabled learning content, but also more mature learners are entering and even returning to study and update their skills for career advancement.

Brooks (2010) observed that, in this age of technological advancement, higher education faculties are asked to learn and employ technological approaches within their classroom. Furthermore, given the technological pressures on faculty, significant changes have occurred to the roles and objectives that must be considered and met within the institution (Brooks, 2010). Technological innovation is occurring at a rapid speed as technologies become an integral part of a person’s everyday life (Bonk and Graham, 2006). With this technological expansion emerges the ever-expanding range of opportunities and possible solutions that can be applied to teaching and learning. Ross and Gage (2006) assert that blended learning has become a highly effective means of addressing the diverse needs of higher education institutions as blended learning technologies are being used to meet student and higher education institutional challenges. Although many universities are using distance learning, blended learning has increased in popularity to meet the diverse student population needs and, in some cases, they have reduced time to graduation by increasing scheduling options for students to complete required course work (Ross and Gage, 2006, p.3). In other cases, some universities have enhanced certain programs to create blended degree programs where a student is not “a traditional student” or an “online student”, rather they select from all types of courses to
achieve their degree. Looking into the future, Ross and Gage (2006) predicted that institutions differ between one another in how blending learning is used, rather than whether they use it.

Faculty Development and Technology

Given the extreme number of adjunct faculty employed throughout institutions of higher education, Green (2007) argued that adjunct faculty members have a crucial role in fulfilling institutions’ mission and have a significant impact on institutional culture. Therefore, it is critical that institutional leaders develop effective professional development activities. Diegel (2013) affirmed that most institutions claimed to have the program defined to some extent, to ensure adjunct faculty development. Faculty development programs are widely varied as professional development for adjunct faculty is highly dependent upon institutional resources, such as financial, space, appropriate personnel to conduct the courses, and policies of mandatory attendance for faculty (Diegel, 2013). Williams (2003) discussed institutional technology upgrades and integration at the University of Delaware to establish classroom technology levels. This was to meet faculty needs and technology usage requests from the faculty create classrooms that serve different teaching and learning styles. Although this classroom upgrade was to be mainly hardware and software in the classroom, the measure of technology integration would be determined by faculty requests and use instead of simply measuring technology integration as a classroom that contains technology (Williams, 2003).

With reference to research around the role of technology and learning styles, Collins (2010) argued that literature concerning technology and learning styles focuses
specifically on online environments. However, Collins (2010) also suggested that technology is equally applicable to face-to-face instruction; therefore, instructors must design learning activities according to various learning styles. Furthermore, Collins (2010) claimed that instructors’ familiarity with different learning styles can allow them to make decisions about which technologies to integrate into the course. Greer and Mott (2009) noted that various researchers have confirmed that further research is required to determine educational strategies and instructional methods that would best match individual learning styles. Greer and Mott (2009, p.33) also determined that, through the innovative use of technology, the instructor–student relationship promotes positive learning and that, “when used effectively, any number of instructional technologies can facilitate processes of communication, and so enhance the development of learning relationships”.

In an experiment using a learning-by-design course as part of faculty development, Koehler and Mishra (2005) noted that introducing technology by itself to the educational process is inadequate to ensure technology integration. Furthermore, technological learning environments serve as the context for instructor professional development. In addition, training must go beyond simple technology skill instruction to teach technology in a context that honors the connection between technology, content, and pedagogy (Koehler and Mishra, 2005). Congruent with the concern of professional development of all faculty members, Umbach (2007) advocated that institutional support for contingent (adjunct) faculty likely increases their commitment to the institution and manifests itself as increased performance and other work behaviors; therefore, it presents a more positive effect on students.

When a new building containing state-of-the-art technology in every classroom
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was opened at Notre Dame University in 1992, a new era in education began (Laughner, 2003). Laughner (2003) predicted that technology would play an integral role in teaching and learning. Recognizing that technology of that time was an emerging concept; the institution dedicated services for faculty support including both IT professionals and multiple short training classes to reduce or eliminate obstacles for faculty success. Laughner (2003) pointed out that the underlying philosophy of support to faculty included four philosophical imperatives for conducting technology integration with the faculty. Imperative 1 was “No faculty member has to use technology” (Laughner, 2003, p. 6), rather he or she would do so out of choice, choosing, given time, appropriate technology for their courses. Imperative 2 was “Technology is only part of the equation” (Laughner, 2003, p. 6), for pedagogical consequences must be considered. Imperative 3 was “Faculty and student time are precious resources” (Laughner, 2003, p. 7); therefore, IT support personnel would prioritize classroom support to fix instructor technology issues. Imperative 4 was “Even if faculty decides to use technology, they often don’t want to become computer experts” (Laughner, 2003, p. 6); therefore, faculty members would be the subject matter experts for the technology development team, not the technology expert for the team (Laughner, 2003).

The challenge for a higher education institution is to find a cost-effective yet engaging solution to the problem of getting faculties to take their own professional development of technology more seriously (Kukulska, 2012). Faculty members often receive more training about technology, with less training on how teachers learn with technology and less training on how to use the technology to teach. Brooks (2010) stated that as technology continues to evolve rapidly and as expectations for faculty to
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incorporate technology increase, more faculty members will need timely assistance and support to achieve integration of technology.
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CHAPTER 3: METHODOLOGY

Introduction

The purpose of this quantitative study was to investigate Saudi Arabian instructors’ responses to questions related to self-efficacy of the various components of the TPACK model. This chapter begins by revisiting the research focus. Next, the research journey is presented through clarifying the methodology in terms of the research questions, design, and rationale. Bryman (2016) notes that the type of questions formulated, guided the nature of data gathered. The research aimed to answer the following seven research questions which will shape the selected methodological approaches:

1. What level of self-efficacy do instructors report in terms of their Technological Knowledge?

2. What level of self-efficacy do instructors report in terms of their Content Knowledge?

3. What level of self-efficacy do instructors report in terms of their Pedagogical Knowledge?

4. What level of self-efficacy do instructors report in terms of their Pedagogical Content Knowledge?

5. What level of self-efficacy do instructors report in terms of their Technological Content Knowledge?

6. What level of self-efficacy do instructors report in terms of their Technological Pedagogical Knowledge?

7. What level of self-efficacy do instructors report in terms of their Technology Pedagogy and Content Knowledge?

The chapter establishes the researcher’s ontological and epistemological position, in relation to their philosophical stance, which informed the researchers’ understandings and
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observations of the implementing TPACK in the classroom setting. In addition, an analysis of the selected research design is provided, whereby the chosen method and approach to gathering data are justified. Furthermore, the chapter deliberates decisions made when attempting to gather data. Finally, methods of preparing data for analysis, and the process of data analysis are explained, from which the emergent themes are identified.

**Reflexivity**

According to social sciences, the Cambridge University Press (2020) defines reflexivity as:

> the fact of someone being able to examine their own feelings, reactions, and motives (= reasons for acting) and how these influence what they do or think in a situation

During the process of completing this dissertation, the researcher engaged with the literature and the data, while reflecting on their background, which has shaped and guided the study. For instance, the extensive review of literature shaped the thinking process when producing this dissertation. It permitted an awareness and appreciation of the use of digital technology in Saudi universities. Furthermore, completing the Doctorate in Education (EdD) in instructional technology, and critically reviewing relevant literature has empowered the researcher with valuable insights of this field.
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Philosophical Positionality

Cohen et al. (2018) assert that having awareness of individual positionality and ontology is paramount for research projects, since these attributes determine the design of the methodology. Ontology refers to the reality, the being and how existence is understood, which aligns with the researcher’s view of social reality (Mack, 2010). Thus, ontology enables deep insights into societies’ views, behaviors, interactions, and understandings. The researcher’s ontological stance is using technology in education, making her an ‘insider’, hence enhancing opportunities to reflect. Such personal reflections have allowed the researcher to frequently engage in reflexivity with the attempt to understand their own self, which is beneficial for future actions (Boodhoo, 2017).

Epistemology addresses the thoughts of knowledge gained and transmitted to the audience. Epistemology is defined as “the study of the nature of knowledge and justification” (Dawson, 2009, p.18). For the purpose of this project, the researcher’s epistemic position involves knowledge acquired from respondents’ lives, feelings and thoughts which were expressed in the data. Moreover, epistemology informs the paradigms used in the study. Collectively, epistemology and ontology have a significant impact on the current research by shaping the researcher’s position in terms of her conscious and unconscious assumptions and bias (Hammersley and Gomm, 1997).
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Paradigms

The paradigm is the overarching umbrella of a research project; it informs, the research purpose, research questions, methodology and approaches (Rahman, 2020). The paradigm represents two distinctive yet contrasting approaches: positivist and interpretivist. The positivist paradigm involves gathering statistical data (Kebeni, 2012); this research steers towards a positivist paradigm to gain understanding of human behaviors.

Research Design

This research has adopted a quantitative method of surveys to gather data from universities in Saudi Arabia for the purpose of creating new insights. Online surveys were utilized as the data collection method in this research. This approach was considered suitable in terms of aligning with the research design and answering the research questions. In addition, online surveys offer a more feasible solution in terms of both cost and time efficiency.

Research instruments

Schmidt et al.’s (2009) TPACK survey was adapted for the purpose of this research. The initial survey was created for teachers, though in this research, the survey was used with university instructors. The validity and reliability of the tool was tested by Schmidt et al. (2009) pilot’s study consisting of 124 preservice teachers at Midwestern University, Illinois. Schmidt et al.’s (2009) research details each phase to develop and validate the design of the tool, which includes reviewing literature on other TPACK tools that assess the use of technology in educational institutions (for example, Koehler and Mishra, 2005; Koehler, Mishra, and Yahya,
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2007; Archambault and Crippen, 2009). The validity and reliability of the survey were assessed through quantitative research approaches, and the content validity of the survey was analysed by external experts (Schmidt et al., 2009). The tool (TPACK survey) is therefore applicable to the current study as it was designed for university educators and has been widely tested.

Bell (2010) highlights the importance of critically analyzing the validity and reliability of the chosen research methods, as this tests the appropriateness and accuracy of the research methods. Denscombe (2010) affirms that testing the reliability of research instruments ensures that they generate consistent data when applied in diverse instances. This suggests that reliable methods can be repeated with similar research participants, within a similar context, and produce similar outcomes (Denscombe, 2002). On the other hand, Denscombe (2002) asserts that validity refers to the accuracy of the questions asked with reference to their purpose, hence it may be considered more complex as it is assessing the design of the research instrument, in this case, the questionnaire. This study tested the validity and reliability of the survey instruments by conducting a pilot with two participants. The survey responses determined that the questions asked were relevant in meeting the research aim.

**Sampling technique**

A convenience sampling technique was adopted. According to Mason (2017), a convenience sample is a population with a group of individuals who are conveniently available for study. The convenience sample presented a degree of risk, as not all faculty members responded to the survey, thereby their views were excluded from the study, thus the results may not have been entirely indicative of the broader population. However, as noted by Kaiser (2012),
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it is not always feasible to include the entire population in the survey, therefore, in the current research, the response rate of 56 participants was deemed adequate, providing results that are likely to be indicative of the views within the larger population.

Schmidt et al.’s (2009) survey was posted on an online platform for participants to access. Similarly, in the current study, the surveys were emailed to Saudi Arabian university instructors to elicit their self-efficacy of the TPACK model. The Director of faculty emailed the survey to instructors at the Education College Department of King Khalid University. All completed surveys were returned to the researcher. Written permission was obtained by the Director of faculty to proceed with this process.

**Ethical Considerations**

Dawson (2009) articulates that ethical issues could occur at any stage of the research, for example when requesting access to participants, gaining their consent, maintaining privacy, confidentiality, and anonymity. Litchman (2013, p.56) states that ‘ethical behavior represents a set of moral principles, rules, or standards governing a person or a profession’, suggesting that researchers must treat individuals fairly by avoiding any form of harm. However, Cohen et al. (2011) build upon this point by adding that ethical issues can also emerge at the final stages of writing and disseminating the findings. Thus, when designing this research, the researcher followed and implemented ethical guidelines, to avert from any type of distress amongst the participants who kindly agreed to allocate their time in contributing valuable information to this research (McQueen and Knussen, 2008).
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The researcher followed a similar train of thought as Dawson (2009) who writes extensively about the code of conduct, outlining issues of data protection, respect, honesty, and the right to withdraw. The participants were emailed a Participant Information Sheet, which assured that their data is stored in a confidential manner (Cohen et al., 2018). A similar assertion emerges in the work of Kara (2012) who contends that participants must have the right to withdraw from the study at any given point in time. However, the current study clarified that participants could withdraw up to the point of data dissemination. Boodhoo (2017) instigates the importance of gaining potential participants’ trust to prevent instance of them withdrawing from the study, as it could disrupt the timeline of the study. This was expediated by simplifying the Participant Information sheet for it to be accessible.

Consent

All instructors and learners volunteered to participate in the research. They provided informed consent, whereby the respondents not only signed the consent form provided but were also completely informed of the research purpose and process, and understood the implications (Cohen et al., 2011). It is noteworthy that participants were given the option to withdraw at any stage of the research.

Confidentiality

The aforementioned information sheet provided an outline of the study and addressed potential issues of participants lacking understanding of the project. Any queries were swiftly responded to by an email explaining that all paper-based documents, including the questionnaires, and consent forms were securely locked into confidential files, to which only the researcher had access. In addition, all electronic data was stored on a password-protected
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computer file, as advised by multiple authors, for example, Kara (2012) and Flick (2018). In addition, confidentiality was facilitated by anonymizing all research participants to ensure that they were non-identifiable (Kaiser, 2012). This was accomplished by assigning each participant with numbers, rather than pseudonyms, which were assigned in the order of receiving each completed survey. This was particularly useful during data analysis for distinguishing between the two samples.

Although the researcher took several steps to assure participants of the research purpose, it took several weeks to receive a sufficient sample to confirm data saturation, a term used for this purpose by Fusch and Ness (2015). Surveys were not reached without completing a consent form. Delayed responses indicated that participants were not fully convinced of confidentiality, hence a follow-up email was sent to trigger further responses.

**Transparency**

The researcher was open to the respondents and fully explained the scope of the study. Since the study was clearly and comprehensively presented, it ensured transparency. Transparency of the research allowed it to be replicable, hence when the research is repeated with the same methodology, it is expected to produce similar results (Ball, 2009).

**Data analysis**

As each survey was received from the participant, data analysis began. This was presented as a descriptive analysis for each of the survey questions, as organized in the survey.
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To gain a clear picture of the results, the data was disaggregated by instructors’ level of qualification, teaching practice, level of education taught and whether they were familiar with the TPACK model, which aligns with the demographic questions in the survey (see Appendix 1).

Summary

Overall, this chapter has offered detailed insights into the expected journey of collecting and analyzing data. It commenced by portraying the researcher’s ontological and epistemological stance. This led to confirming the reflexive approach taken for the quantitative study, which is designed to capture the essence of Saudi instructor’s involvement with the TPACK model. The chapter presented a detailed account of the methodology adopted to facilitate the research, alongside a justification. In addition, the method of data preparation for data analysis are explicitly confirmed. The findings and analysis are presented in the proceeding chapters. These are presented in light of the emergent themes.
Chapter 4: Findings

Introduction

This chapter will present the key findings from the TPACK survey in light of the subsequent research questions. The graphical images of the data gathered is presented in Appendix 2.

1. What level of self-efficacy do instructors report in terms of their Technological Knowledge?
2. What level of self-efficacy do instructors report in terms of their Content Knowledge?
3. What level of self-efficacy do instructors report in terms of their Pedagogical Knowledge?
4. What level of self-efficacy do instructors report in terms of their Pedagogical Content Knowledge?
5. What level of self-efficacy do instructors report in terms of their Technological Content Knowledge?
6. What level of self-efficacy do instructors report in terms of their Technological Pedagogical Knowledge?
7. What level of self-efficacy do instructors report in terms of their Technology Pedagogy and Content Knowledge?

Demographics of sample
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Upon distributing the online survey, 56 respondents completed the survey. Most of the respondents were female (53.6%), whilst 46.4% were male. The data indicates that the majority of respondents achieved a Master’s degree (53.6%), though 25% reported a Bachelors’ as their highest level of qualification, and 21% acquired a PhD. Furthermore, a significant proportion of them confirmed limited teaching experience, with 69.6% who reported 5 years or less, 16.1% indicated 6-10 years’ experience and 14.3% had experience of 10+ years. Yet, a large proportion (71%) were involved in undergraduate teaching, as opposed to the minority (28.6%) who are currently teach postgraduate courses.

Data presentation by research question

The section will align each TPACK survey component with the corresponding research questions. To begin with, survey questions 1-6, that explore the facets of technological knowledge, will be unpacked in relation to research question 1.

Research Questions 1: What level of self-efficacy do instructors report in terms of their Technological Knowledge?

Aligned with Research Question 1, survey questions 1-6 explored Technological Knowledge of participants. Specifically, these questions examined the following concepts: solving own technical problems, easily learning how to use updated technology, keeping up with new technologies, frequently playing around with digital technologies, acquiring a broad understanding of diverse technologies and having sufficient technical skills to use technology.
The participants indicate a high level of self-efficacy in terms of their knowledge of technology across all six survey questions with most participants confirming that they agree and the second highest number individuals reporting strongly agreeing. In fact, at least 60% of respondents agreed or strongly agreed with all six questions. Of particular note, questions about learning new technology and having sufficient technical skills to use technology demonstrated the largest portion of agreement or strong agreement (84% and 82.2% respectively). The question regarding learning new technology had the greatest number of respondents reporting that they strongly agree (30.4%) indicating the highest level of self-efficacy with that area.

On the other hand, although not the majority, the greatest portion of respondents indicated that they disagreed or strongly disagreed with questions related to playing around with technology and having a broad understanding of diverse technologies (17.9% and 16.1 respectively). The disagreement in these areas indicate that those respondents are reporting low levels of self-efficacy.

Lastly, for all six questions there were respondents who reported that they neither agree nor disagree, indicating that they are unsure of their level of self-efficacy. The questions with the greatest percentages of respondents that neither agreed nor disagreed dealt with keeping up with new technologies, playing around with digital technologies, and acquiring a broad understanding of diverse technologies (16.1%, 16.1%, and 14.3%, respectively).

Research Question 2: What level of self-efficacy do instructors report in terms of their Content Knowledge?
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With reference to Research Question 2, survey questions 7-12 explored Content Knowledge of participants. Specifically, these questions examined the following concepts: using multiple technological representations when explaining the topic content, having sufficient knowledge of own field, explaining background details of concepts, formulas and definitions of own field, explaining the importance of specific topics, presenting the subject matter at different levels, and understanding the structure of topics taught.

The participants indicate a high level of self-efficacy in terms of their content knowledge across all six questions. In fact, at least 85.7% of respondents agreed or strongly agreed with all six questions. Particularly, both questions concerning having sufficient knowledge in the field and presenting the subject matter at different levels demonstrated the largest portion of agreement or strong agreement (85.7% and 85.7% respectively). The question regarding explaining why a specific topic is important had the greatest number of respondents reporting that they strongly agree (39.3%) indicating the highest level of self-efficacy with that area.

On the other hand, although not the majority, the greatest portion of respondents indicated that they disagreed or strongly disagreed with questions related to using multiple technological representations when explaining the topic content (12.5%). The disagreement in these areas indicate that those respondents are reporting low levels of self-efficacy.

Lastly, for all six questions there were respondents who reported that they neither agree nor disagree, indicating that they are unsure of their level of self-efficacy. The questions with the
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greatest percentages of respondents that neither agreed nor disagreed dealt with using multiple technological representations when explaining the topic content and explaining the background details of concepts, formulas and definitions in the field (26.8%, and 10.7%, respectively).

Research Question 3: What level of self-efficacy do instructors report in terms of their Pedagogical Knowledge?

According to Research Question 3, survey questions 13-18 explored Pedagogical Knowledge of participants. These questions examined the following concepts: knowing how to assess student performance in the classroom, adapting teaching according to what students do and do not understand, adapting teaching style to different learners, assessing student learning in multiple ways, using a wide range of teaching approaches in a classroom setting, and being familiar with common student understandings and misconceptions.

The participants indicate a high level of self-efficacy in terms of their pedagogical knowledge across all six survey questions with most participants confirming that they agree and the second highest number individuals reporting strongly agreeing. In fact, at least 67% of respondents agreed or strongly agreed with all six questions. Of particular note, questions about adapting teaching according to what students do and do not understand and using a wide range of teaching approaches in a classroom setting demonstrated the largest portion of agreement or strong agreement (80.3% and 78.6% respectively). The question regarding knowing how to assess student performance in the classroom had the greatest number of respondents reporting that they strongly agree (23.2%) indicating the highest level of self-efficacy with that area.
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On the other hand, although not the majority, the greatest portion of respondents indicated that they disagreed or strongly disagreed with questions related to using a wide range of teaching approaches in a classroom setting (12.5%). The disagreement in these areas indicate that those respondents are reporting low levels of self-efficacy.

Lastly, for all six questions there were respondents who reported that they neither agree nor disagree, indicating that they are unsure of their level of self-efficacy. The questions with the greatest percentages of respondents that neither agreed nor disagreed dealt with knowing how to assess student performance in the classroom and being familiar with common student understandings and misconceptions (both 17.9% and 17.9% respectively).

Research Question 4: *What level of self-efficacy do instructors report in terms of their Pedagogical Content Knowledge?*

Aligned with Research Question 4, survey questions 19-24 explored Pedagogical Content Knowledge of participants. Particularly, these questions address the following concepts: selecting effective teaching approaches to guide student thinking and learning in the subject taught, using different methods and approaches to represent specific information, generating alternative teaching approaches according to students’ level, identifying different sides of the topic and finding/ thinking of ways to explain this, selecting teachable content of the subject matter appropriate to the students’ level, and effectively developing a plan for teaching a specific topic in own field.
The participants indicate a high level of self-efficacy in terms of their pedagogical content knowledge across all six survey questions with most participants confirming that they agree and the second highest number individuals reporting strongly agreeing. In fact, at least 80% of respondents agreed or strongly agreed with all six questions. Of particular note, questions about effectively developing a plan for teaching a specific topic in own field demonstrated the largest portion of agreement or strong agreement (83.9%). This question also had the greatest number of respondents reporting that they strongly agree (23.2%) indicating the highest level of self-efficacy in that area.

On the other hand, although not the majority, the greatest portion of respondents indicated that they disagreed or strongly disagreed with the question related to selecting effective teaching approaches to guide student thinking and learning in the subject taught (10.7%). The disagreement in these areas indicate that those respondents are reporting low levels of self-efficacy.

Lastly, for all six questions there were respondents who reported that they neither agree nor disagree, indicating that they are unsure of their level of self-efficacy. The questions with the greatest percentages of respondents that neither agreed nor disagreed dealt with generating alternative teaching approaches according to students’ level and identifying difficult sides of a topic and finding/thinking of ways to explain it (19.6% and 17.9 respectively).
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Research Question 5: What level of self-efficacy do instructors report in terms of their Technological Content Knowledge?

Aligned with Research Question 5, survey questions 25-30 explored Technological Content Knowledge of participants. These questions examined the following concepts: knowing about technologies used for understanding the topic taught, using technology to enrich the content, using technology to present the content in multiple ways, using technology to access additional resources for the topic which may otherwise be unavailable, use technology to support students in deeper inquiry about the content, concepts, and relationships with other subjects/topics, and use technology to provide students with opportunities to independently explore the content at their own pace.

The participants indicate a high level of self-efficacy in terms of their technological content knowledge across all six survey questions with most participants confirming that they agree and the second highest number individuals reporting strongly agreeing. In fact, at least 83% of respondents agreed or strongly agreed with all six questions. Particularly, questions about using technology to present the content in multiple ways and using technology to support students in deeper inquiry about the content, concepts, and relationships with other subjects/topics demonstrated the largest portion of agreement or strong agreement (87.5% and 85.7% respectively). The question regarding using technology to enrich the content had the greatest number of respondents reporting that they strongly agree (30.4%) indicating the highest level of self-efficacy with that area.
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On the other hand, although not the majority, the greatest portion of respondents indicated that they disagreed or strongly disagreed with the question related to knowing about technologies that they can use for understanding the topic taught (3.6%). The disagreement in these areas indicate that those respondents are reporting low levels of self-efficacy.

Lastly, for all six questions there were respondents who reported that they neither agree nor disagree, indicating that they are unsure of their level of self-efficacy. The questions with the greatest percentages of respondents that neither agreed nor disagreed dealt with knowing about technologies used for understanding the topic taught and using technology to access additional resources for the topic which may otherwise be unavailable (16.1% and 12.5%, respectively).

Research Question 6: What level of self-efficacy do instructors report in terms of their Technological Pedagogical Knowledge?

Aligned with Research Question 6, survey questions 31-36 explored Technological Pedagogical Knowledge of participants. Specifically, these questions examined the following concepts: choosing technologies that enhance teaching approaches for a lesson, choose technologies that enhance student’ learning for a lesson, critically reflect on how I use technology in the classroom, choose technologies that enhance the content for a lesson, select technologies to use in my classroom that enhance what I teach, how I teach and what students learn, and using strategies that combine content, technologies, and teaching approached in the classroom.
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The participants indicate a high level of self-efficacy in terms of their pedagogical content knowledge across all six survey questions with most participants confirming that they agree and the second highest number individuals reporting strongly agreeing. In fact, at least 68.6% of respondents agreed or strongly agreed with all six questions. Of particular note, questions about select technologies to use in my classroom that enhance what I teach, how I teach and what students learn and choosing technologies that enhance teaching approaches for a lesson (85.7% and 83.9% respectively). The question regarding choosing technologies that enhance teaching approaches for a lesson, choose technologies that enhance student’s learning for a lesson had the greatest number of respondents reporting that they strongly agree (19.6% and 19.6%) indicating the highest level of self-efficacy with that area.

On the other hand, although not the majority, the greatest portion of respondents indicated that they disagreed or strongly disagreed with questions related to choosing technologies that enhance teaching approaches for a lesson, critically reflect on how I use technology in the classroom, select technologies to use in my classroom that enhance what I teach, how I teach and what students learn, and using strategies that combine content, technologies, and teaching approached in the classroom (0% respectively). The disagreement in these areas indicate that those respondents are reporting no levels of self-efficacy.

Lastly, for all six questions there were respondents who reported that they neither agree nor disagree, indicating that they are unsure of their level of self-efficacy. The questions with the greatest percentages of respondents that neither agreed nor disagreed dealt with using strategies
that combine content, technologies, and teaching approached in the classroom and choosing technologies that enhance teaching approaches for a lesson (25% and 21.4% respectively).

Research Question 7: What level of self-efficacy do instructors report in terms of their Technology Pedagogy and Content Knowledge?

Aligned with Research Question 7, survey questions 37-42 explored Technological Pedagogical and Content Knowledge of participants. Specifically, these questions examined the following concepts: selecting specific technology for teaching specific content, using technology to organise my teaching and students’ learning content, using technologies to bring real-life experiences, examples and analogies about specific content, using technology to provide opportunities to each student in the classroom to contribute to subject-related activities, using technology to help students understand the value of technology in the learning environment, and using technology in teaching specific content within the defined pedagogical approach in a given context.

The participants indicate a high level of self-efficacy in terms of their Technological Pedagogical and Content Knowledge across all six survey questions with most participants confirming that they agree and the second highest number individuals reporting strongly agreeing. In fact, at least 70% of respondents agreed or strongly agreed with all six questions. Of particular note, questions about using technology to organise my teaching and students’ learning content, using technology to help students understand the value of technology in the learning environment, and using use technology in teaching specific content within the defined pedagogical
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approach in a given context (82.1% respectively). The question regarding using technology to organise my teaching and students’ learning content had the greatest number of respondents reporting that they strongly agree (26.8%) indicating the highest level of self-efficacy with that area.

On the other hand, although not the majority, the greatest portion of respondents indicated that they disagreed or strongly disagreed with the question related to using technology to provide opportunities to each student in the classroom to contribute to subject-related activities (8.9%). The disagreement in these areas indicate that those respondents are reporting low levels of self-efficacy.

Lastly, for all six questions there were respondents who reported that they neither agree nor disagree, indicating that they are unsure of their level of self-efficacy. The questions with the greatest percentages of respondents that neither agreed nor disagreed dealt with selecting specific technology for teaching specific content and using technologies to bring real-life experiences (19.6% and 17.9% respectively).

Summary

This chapter has reported the level of self-efficacy for the 7 research questions. Respondents overall demonstrated high levels of self-efficacy in all areas. In terms of content knowledge, pedagogical knowledge, and pedagogical content knowledge, the majority of participants agreed or strongly agreed that they acquired sufficient knowledge and skills. Particularly notable was their confidence in having sufficient knowledge of their field and
presenting subject matter at different levels (85.7% agreement), and in developing effective teaching plans for specific topics in their fields (83.9% agreement). Furthermore, participants indicated high self-efficacy in using technology to enrich content (83% agreement) and support student inquiry (85.7% agreement). Additionally, they displayed strong confidence in using technology to organize teaching and student learning (82.1% agreement). However, several respondents indicated little confidence or uncertainty in specific areas, particularly around knowing about technologies for understanding the topic taught and providing opportunities for each student to contribute to subject-related activities drew a disagreement rate of 3.6% and 8.9% respectively. Nonetheless, the survey also identified areas of concern related to the adaptation of teaching approaches and strategies. Some instructors reported less certainty in using a wide range of teaching approaches in a classroom setting (12.5% disagreement) and in integrating technologies to enhance what they teach and how they teach it.
Chapter 5: Discussion

The chapter will interpret the findings of the study from the previous chapter, in the context of the seven research questions and the literature explored in chapter 2, to provide an analysis of instructors’ self-reported self-efficacy in various components of knowledge related to technology integration in education. The study aimed to explore the levels of self-efficacy reported by instructors in terms of their Technological Knowledge, Content Knowledge, Pedagogical Knowledge, Pedagogical Content Knowledge, Technological Content Knowledge, Technological Pedagogical Knowledge, and Technology Pedagogy and Content Knowledge.

The chapter begins with an analysis of the findings for each research question, highlighting areas of agreement, disagreement, and uncertainty among the participants. The results are then examined in relation to the earlier literature, exploring whether they align with or deviate from previous research findings. Additionally, the discussion examines any surprising or expected results and identifies patterns or trends across the different domains of knowledge. Incorporating the findings and relevant literature, this discussion chapter aims to shed light on the self-efficacy levels reported by instructors in each domain, providing insights into their confidence and competence in utilizing technology for teaching and learning. It also identifies areas where additional support, training, or professional development may be required to enhance instructors’ knowledge and skills in technology integration.

Research Question 1: What level of self-efficacy do instructors report in terms of their Technological Knowledge?
INSTRUCTORS’ LEVEL OF SELF-EFFICACY IN TERMS OF THE COMPONENTS OF THE TPACK MODEL

The data gathered from the surveys indicated that the participants reported a generally high level of self-efficacy in terms of their technological knowledge, which according to Vygotsky’s (1978) social-cultural theory may be shaping their behaviour towards learning and using technology in the teaching environment. The majority of participants agreed or strongly agreed with all six survey questions, with at least 60% of respondents expressing agreement or strong agreement across the board. Specifically, questions related to learning new technology and possessing sufficient technical skills received the highest levels of agreement or strong agreement, with 84% and 82.2% of participants, respectively, indicating their self-efficacy in these areas which echoes the work of Byker et al. (2018), Blonder et al. (2013) and George et al. (2018).

These findings corroborate with previous research highlighting the positive impact of teacher self-efficacy on technology integration. Studies have shown that teachers with high self-efficacy are more likely to adopt innovative teaching methods and be open to integrating new technologies into their instructional practices (Byker et al., 2018; Blonder et al., 2013; George et al., 2018). The participants in this study, who reported high levels of self-efficacy in their technological knowledge, are likely to demonstrate a greater willingness to embrace technology in their teaching.

Furthermore, the literature suggests that individual characteristics, such as age, gender, teaching experience, and education, can also influence teachers’ self-efficacy in using technology. For example, research has found that males and older teachers tend to have a greater level of self-efficacy (Gkolia et al., 2016). While this study did not specifically explore the impact of these characteristics on technological knowledge self-efficacy, it is important to consider them in
INSTRUCTORS’ LEVEL OF SELF-EFFICACY IN TERMS OF THE COMPONENTS OF THE TPACK MODEL

interpreting the results. Future research could delve into the role of individual characteristics in teachers’ self-efficacy in technological knowledge to gain a more comprehensive understanding (Gkolia et al., 2016).

It is noteworthy that some participants reported lower levels of self-efficacy in certain areas, particularly in terms of playing around with technology and having a broad understanding of diverse technologies. These areas of lower self-efficacy may indicate opportunities for professional development and support, as teachers may benefit from further exploration and experimentation with different technologies and expanding their knowledge in diverse areas (Byker et al., 2018; Blonder et al., 2013). The integration of digital technology into the education curriculum has been a significant area of research. The literature emphasizes the need to view technology as an integral part of instruction rather than as a separate entity (Okojie et al., 2006). The TPACK framework, developed by Mishra and Koehler (2006), provides a valuable conceptual framework for understanding the integration of technology into pedagogy. It highlights the complex interrelationships between technological knowledge, pedagogical knowledge, and content knowledge, and emphasizes the importance of aligning technology with instructional goals (Mishra & Koehler, 2006).

The TPACK framework has been widely applied and studied in various contexts, including teacher professional development and specific content areas. Research has shown that training and professional development based on the TPACK framework can enhance teachers’ knowledge and skills in integrating technology (Shin et al., 2009; Jimoyiannis, 2010). Additionally, the TPACK framework has been used to examine technology integration in
INSTRUCTORS’ LEVEL OF SELF-EFFICACY IN TERMS OF THE COMPONENTS OF THE TPACK MODEL

specific subjects, such as science (Jimoyiannis, 2010) and ecology (Walter et al., 2010). These studies have demonstrated the flexibility and applicability of the TPACK framework in different educational contexts.

The high level of self-efficacy reported by the participants in terms of their technological knowledge has implications for current and future professional development. These findings suggest that professional development programs should focus on enhancing instructors’ confidence and competence in learning new technologies and acquiring technical skills. Targeted training and support in these areas could assist instructors in further developing their self-efficacy and feel more empowered in integrating technology effectively into their teaching practices. The table below shows the demographics for participants who disagreed or strongly disagreed.

Table 2
Demographics of Participants who Disagreed or Strongly Disagreed

<table>
<thead>
<tr>
<th>Gender</th>
<th>Highest qualification</th>
<th>Teaching experience</th>
<th>Level of education currently teaching</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>Female</td>
<td>PhD</td>
<td>MA</td>
</tr>
<tr>
<td>60%</td>
<td>40%</td>
<td>10%</td>
<td>60%</td>
</tr>
</tbody>
</table>

The table indicates that most of the respondents who disagreed and strongly disagreed were male, 60% and 40%. Also, most instructors’ highest qualification was a MA, with only one PhD respondent. This suggest that instructors with MA mostly disagree or strongly disagree with playing around with technology. The instructors also mostly had 5 years or less teaching experience (80%) and the majority taught undergraduate.
INSTRUCTORS’ LEVEL OF SELF-EFFICACY IN TERMS OF THE COMPONENTS OF THE TPACK MODEL

Research Question 2: What level of self-efficacy do instructors report in terms of their Content Knowledge?

In discussing the findings related to Research Question 2, which explores the level of self-efficacy instructors report in terms of their Content Knowledge, it is evident that the participants generally reported a high level of self-efficacy in this domain. The survey results revealed that the majority of participants agreed or strongly agreed with all six questions pertaining to Content Knowledge. Specifically, at least 85.7% of respondents expressed agreement or strong agreement across the board, with the highest levels of agreement observed in questions related to having sufficient knowledge in their field and presenting the subject matter at different levels. Furthermore, a significant proportion of participants strongly agreed that they excel in explaining the importance of specific topics. In line with Vygotsky’s Social-Cultural theory (1978), the participants may agree to these concepts as they are highly supported in this area.

This data suggests that the instructors in the study perceive themselves to possess a strong level of self-efficacy in terms of their content knowledge. With reference to the literature sought, it is apparent that instructors’ content knowledge is crucial for effective teaching and student learning outcomes. The high level of self-efficacy reported by the participants aligns with previous research that emphasizes the importance of teachers’ strong content knowledge for successful instruction (Ball, Thames, & Phelps, 2008). Instructors who possess a deep understanding of the subject matter are better equipped to explain complex concepts, provide meaningful examples, and guide students’ learning effectively (Darling-Hammond, 2017).
INSTRUCTORS’ LEVEL OF SELF-EFFICACY IN TERMS OF THE COMPONENTS OF THE TPACK MODEL

However, the disparity between participants’ self-reported self-efficacy in using multiple technological representations when explaining the topic content raises concerns.

The data suggest that some instructors may have limited confidence or experience in utilizing various technological tools to enhance their content delivery. This is significant considering the growing emphasis on technology integration in education and the potential benefits it offers in promoting student engagement and understanding (Niess, 2005). It is important for instructors to develop their technological pedagogical content knowledge (TPACK) to effectively leverage technology in their teaching practices (Mishra & Koehler, 2006). Furthermore, the percentage of respondents who reported being unsure of their level of self-efficacy in using multiple technological representations and explaining the background details of concepts, formulas, and definitions indicates a need for further exploration and support in these areas. Professional development initiatives that focus on enhancing teachers’ technological skills and providing guidance on incorporating various technological representations into content delivery may be beneficial (Niess, 2005; Harris, Mishra, & Koehler, 2009). The table below shows the demographics of participants who reported agree or strongly agree.

**Table 3**

*Demographics of Participants who Agreed or Strongly Agreed*

<table>
<thead>
<tr>
<th>Gender</th>
<th>Highest qualification</th>
<th>Teaching experience</th>
<th>Level of education currently teaching</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>Female</td>
<td>PhD</td>
<td>MA</td>
</tr>
<tr>
<td>44%</td>
<td>56%</td>
<td>33%</td>
<td>41%</td>
</tr>
</tbody>
</table>
INSTRUCTORS’ LEVEL OF SELF-EFFICACY IN TERMS OF THE COMPONENTS OF THE TPACK MODEL

The demographic data shows who agreed and strongly agreed, most were female, most had a MA, the majority had 5 years or less teaching experience, and were mainly undergraduates.

Research Question 3: What level of self-efficacy do instructors report in terms of their Pedagogical Knowledge?

The concept of self-efficacy, which reflects teachers’ beliefs in their abilities to plan lessons and promote learning, has been widely acknowledged as having a positive impact on student achievement (Siwatu, 2007; Denham & Michael, 1981). Teachers with high self-efficacy are more likely to adopt innovative teaching methods and exhibit a willingness to explore creativity in the classroom (Gavora, 2010). They are also known to be committed to teaching, open to new ideas, and motivated to implement new technologies in their instructional practices (Tschannen-Moran & Hoy, 2001; George et al., 2018). In the context of technology integration, teachers’ self-efficacy in using specific technologies plays a crucial role in shaping their attitudes and approaches towards incorporating technology into the curriculum (Blonder et al., 2013). Furthermore, research has shown that teachers’ self-efficacy influences their instructional choices, effort, and persistence (Byker et al., 2018). With reference to Bandura’s theory of self-efficacy, instructors’ self-reflection may also shape these choices.

The Technological Pedagogical Content Knowledge (TPACK) framework, developed by Mishra and Koehler (2006), recognizes the interplay between technology, pedagogy, and content knowledge. Teachers’ self-efficacy in utilizing technology within the TPACK framework has implications for instructional quality, differentiated teaching practices, and student engagement.
INSTRUCTORS’ LEVEL OF SELF-EFFICACY IN TERMS OF THE COMPONENTS OF THE TPACK MODEL

(Choi et al., 2019; Künsting et al., 2016; Suprayogi et al., 2017). Limited computer self-efficacy among teachers has been found to significantly impact the level of technostress they experience when using technology (Dong et al., 2020).

It is noteworthy that individual characteristics, such as age, gender, teaching experience, and education, can also influence teachers’ self-efficacy levels. For instance, male and older teachers tend to exhibit higher levels of self-efficacy (Gkolia et al., 2016). However, while these characteristics may predict self-efficacy, it is important to consider their interaction with the TPACK framework. The integration of digital technology in education has gained significant attention in the literature, with a focus on effective technology integration into learning environments (Polly & Brantley-Dias, 2009). The TPACK framework provides a robust way of thinking about the effective integration of technology into teaching and learning, encompassing the complex relationships among technology, pedagogy, and content knowledge (Thompson & Mishra, 2007; Schmidt et al., 2009).

The evolution of the TPACK framework has led to a deeper understanding of the intricate relationships among its components. As teachers gain a better understanding of the interplay between technology, pedagogy, and content, they are better equipped to effectively integrate technology into their instructional practices (Shin et al., 2009). Studies have demonstrated that teacher professional development focused on TPACK can enhance teachers’ knowledge and understanding of the relationship between technology, pedagogy, and content (Shin et al., 2009). In light of this literature, the present study investigated instructors’ self-efficacy in terms of their Technological Pedagogical Content Knowledge (TPACK). By examining their reported self-
INSTRUCTORS’ LEVEL OF SELF-EFFICACY IN TERMS OF THE COMPONENTS OF THE TPACK MODEL

efficacy levels and comparing them to the existing literature, this study seeks to contribute to the understanding of instructors’ confidence and competence in integrating technology into their teaching practices. The findings from this research question will provide insights into the efficacy levels of instructors in utilizing technology within the TPACK framework and inform future efforts to enhance teachers’ technological knowledge and pedagogical practices. The below table shows the demographics for participants who agreed/strongly agreed.

Table 4

Demographics of Participants who Agreed or Strongly Agreed

<table>
<thead>
<tr>
<th>Gender</th>
<th>Highest qualification</th>
<th>Teaching experience</th>
<th>Level of education currently teaching</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
<td>PhD</td>
</tr>
<tr>
<td>Male</td>
<td>46%</td>
<td>54%</td>
<td>25%</td>
</tr>
</tbody>
</table>

According to the table, most of those that agreed/strongly agreed were female, had a bachelor’s degree, 5 years or less experience, and were undergrads.

Research Question 4: What level of self-efficacy do instructors report in terms of their Pedagogical Content Knowledge?

The findings related to Pedagogical Content Knowledge reveal a high level of self-efficacy among participants. This is consistent with previous research that emphasizes the importance of integrating pedagogy and content knowledge for effective teaching (Shulman, 1986; Thompson & Mishra, 2007). The high levels of agreement and strong agreement suggest that instructors feel confident in selecting effective teaching approaches, generating alternative
teaching approaches, and selecting teachable content appropriate to their students’ level. According to Bandura’s theory of self-efficacy, self-efficacy contributes to teachers’ high confidence and competence to implement through which they effectively integrate technology into the classroom.

However, it is worth noting that a small portion of participants expressed disagreement or strong disagreement with the question about selecting effective teaching approaches to guide student thinking and learning in the subject taught. This finding suggests that some instructors may face challenges in effectively choosing appropriate teaching approaches to enhance student engagement and understanding. It highlights the importance of ongoing professional development and support to help teachers expand their repertoire of effective pedagogical strategies and align them with the specific content they are teaching. According to Sujee et al. (2015) and Alzhrani, (2013), a lack of self-efficacy could be attributed to cultural influences that impact teachers’ cognitive development in relation to TPACK. Sujee et al. (2015) apply the TPACK theory to the lens of Saudi Arabian instructors and assert that they cannot isolate from their cultural context, which involves their cultural and societal connections and influences. However, Vygotsky’s (1978) theory of social capital explains that the instructors’ level of self-efficacy could be driven by their social and cultural environments. Thus, it is possible that the Saudi participants’ behaviour in selecting appropriate teaching approaches is shaped by these influences. The below table shows the demographics for participants who agreed/strongly agreed.

Table 5

Demographics of Participants who Agreed or Strongly Agreed
INSTRUCTORS’ LEVEL OF SELF-EFFICACY IN TERMS OF THE COMPONENTS OF THE TPACK MODEL

<table>
<thead>
<tr>
<th>Gender</th>
<th>Highest qualification</th>
<th>Teaching experience</th>
<th>Level of education currently teaching</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>Female</td>
<td>PhD, MA, BA</td>
<td>10+ years, 5 years or less, 6-10 years</td>
</tr>
<tr>
<td>38%</td>
<td>62%</td>
<td>35%, 51%, 14%</td>
<td>17%, 66%, 17%</td>
</tr>
</tbody>
</table>

Those that agreed/ strongly agreed were female, with a master’s, teaching experience of 5 years or less and postgraduates.

Research Question 5: What level of self-efficacy do instructors report in terms of their Technological Content Knowledge?

The findings related to Technological Content Knowledge indicate a high level of self-efficacy among participants. The high levels of agreement and strong agreement suggest that instructors feel confident in using technology to enrich content, present content in multiple ways, and support student inquiry and exploration. These findings align with previous research emphasizing the potential of technology to enhance content delivery and student engagement (Tamim et al., 2011; Suprayogi et al., 2017). This also aligns with Bandura’s theory of self-efficacy, as these teachers may have high cognitive capabilities to self-regulate, self-reflect and self-organize their learning of new technology and deliver it in various environments.

However, it is important to note that a small portion of participants expressed disagreement or strong disagreement with the question about knowing about technologies used for understanding the topic taught. This finding suggests that some instructors may lack knowledge of specific technologies that can enhance their understanding of the content they are
teaching. Addressing this gap through targeted professional development and training can empower teachers to leverage technology effectively in content delivery and deepen their own subject matter expertise. However, as noted by Graham et al. (2009), educators may be skilled in operating technology though they may not acquire the expertise to use it effectively to promote student learning, hence this recommendation should bridge this gap in their knowledge. According to Al Gamdi and Samarji (2016), instructors reporting disagreement may be allocated inadequate training, resources and technical support. Further barriers which may explain the strong disagreement include insufficient time to plan for the technology integrated into lessons, scheduling sufficient time for students to research on the internet, the availability of technology in the institution, administrative support for technology, and teacher anxiety about using technology (Demirbilek, 2010). The below table shows the demographics for participants who agreed/strongly agreed.

**Table 6**

*Demographics of Participants who Agreed or Strongly Agreed*

<table>
<thead>
<tr>
<th>Gender</th>
<th>Highest qualification</th>
<th>Teaching experience</th>
<th>Level of education currently teaching</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>10+ years</td>
<td>5 years or less</td>
</tr>
<tr>
<td>Male</td>
<td>Female</td>
<td>PhD</td>
<td>MA</td>
</tr>
<tr>
<td>49%</td>
<td>51%</td>
<td>32%</td>
<td>43%</td>
</tr>
</tbody>
</table>

However, of those that agreed/strongly agreed, most were female, with a master’s degree, 5 years or less teaching experience, and undergraduates.

Research Question 6: What level of self-efficacy do instructors report in terms of their Technological Pedagogical Knowledge?
The findings related to Technological Pedagogical Knowledge indicate a high level of self-efficacy among participants. The high levels of agreement and strong agreement suggest that instructors feel confident in choosing technologies that enhance teaching and learning, reflecting on their use of technology, and combining content, technologies, and teaching approaches. Reflection is emphasised in Bandura’s theory of self-efficacy, where self-efficacy is deemed as a form of self-reflective belief in individual’s ability to be successful. These findings align with previous research emphasizing the importance of integrating technology into pedagogical practices (Schmidt et al., 2009; Tondeur et al., 2017). Interestingly, none of the participants expressed disagreement or strong disagreement with the questions related to choosing technologies that enhance teaching approaches, critically reflecting on technology use, and selecting technologies that enhance what they teach and how they teach. This finding suggests a high level of self-perceived self-efficacy in these areas. This coincides with Al-Seghayer’s (2022) research conducted in Saudi Arabia which determines that teachers are more willing to implement innovative teaching practices when they acquire high levels of self-efficacy. Correspondingly, Choi and Lee’s (2017) research concludes that self-efficacy has a critical role in enabling teachers to integrate technology into their instructional practices with confidence and competence. The study entails that competence empowers instructors to engage in tasks that they feel capable of performing, while also avoiding those they perceive as challenging or unfamiliar (Choi and Lee, 2017). Baylor and Richie (2002) explain that this increased confidence and self-efficacy is achieved through a combination of personal technology improvement and professional development. The below table shows the demographics for participants who agreed/strongly agreed.
Participants who agreed/strongly agreed were mostly male, with an MA, 5 years or less teaching experience, and undergraduates.

Research Question 7: What level of self-efficacy do instructors report in terms of their Technology Pedagogy and Content Knowledge?

The participants in this study reported a high level of self-efficacy in terms of their content knowledge. Across all six survey questions, a majority of participants agreed or strongly agreed, with at least 85.7% expressing agreement or strong agreement. Specifically, questions related to having sufficient knowledge in their field and presenting the subject matter at different levels received the highest levels of agreement or strong agreement, with 85.7% of participants indicating their self-efficacy in these areas. Additionally, 39.3% of respondents strongly agreed that they excel in explaining why specific topics are important, highlighting a particularly high level of self-efficacy in this aspect (Byker et al., 2018; Blonder et al., 2013; George et al., 2018), indicating their high confidence, as noted by Vygotsky.

The data reflects previous research highlighting the importance of content knowledge in effective teaching. Teachers who possess a strong understanding of the subject matter are better equipped to explain concepts, provide background details, and convey the importance of specific
INSTRUCTORS’ LEVEL OF SELF-EFFICACY IN TERMS OF THE COMPONENTS OF THE TPACK MODEL

topics to their students (Byker et al., 2018; Blonder et al., 2013). This aligns with Shulman’s (1986) concept of content knowledge (CK) and its significance in teaching. The ability to effectively communicate and structure subject matter is essential for creating meaningful learning experiences for students (Shulman, 1986).

The literature also emphasizes the interconnectedness of content knowledge, pedagogical knowledge (PK), and technological knowledge (TK) within the TPACK framework. Mishra and Koehler (2006) introduced the TPACK framework, which integrates these three knowledge domains to guide effective technology integration in teaching. The TPACK framework recognizes that teachers need to possess not only content knowledge but also pedagogical strategies and technological skills to effectively integrate technology into their instructional practices (Mishra & Koehler, 2006). Moreover, research has shown that teacher self-efficacy plays a crucial role in content knowledge and instructional practices. Teachers with high self-efficacy are more likely to exhibit effective teaching behaviors, leading to improved student outcomes (George et al., 2018). Byker et al. (2018) highlight the powerful effect of self-efficacy on teachers’ instructional choices, effort, and persistence. Therefore, the high level of self-efficacy reported by the participants in this study suggests that they possess a strong belief in their content knowledge, which may positively impact their instructional practices and ultimately contribute to student learning outcomes.

While the majority of participants reported high levels of self-efficacy in content knowledge, it is important to note that some respondents indicated lower levels of self-efficacy in certain areas. Notably, there were participants who disagreed or strongly disagreed with the
INSTRUCTORS’ LEVEL OF SELF-EFFICACY IN TERMS OF THE COMPONENTS OF THE TPACK MODEL

question related to using multiple technological representations when explaining the topic content. This finding suggests that some instructors may face challenges in effectively incorporating technology to enhance content delivery (Byker et al., 2018). This highlights the need for targeted professional development and support to assist teachers in developing the skills and confidence to leverage technology for diverse representations of content. The below table shows the demographics for participants who agreed/strongly agreed.

Table 8

Demographics of Participants who Agreed or Strongly Agreed

<table>
<thead>
<tr>
<th>Gender</th>
<th>Highest qualification</th>
<th>Teaching experience</th>
<th>Level of education currently teaching</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>10 + years</td>
<td>5 years or less</td>
</tr>
<tr>
<td>Male</td>
<td>Male</td>
<td>Female</td>
<td>PhD</td>
</tr>
<tr>
<td>Female</td>
<td>52%</td>
<td>48%</td>
<td>39%</td>
</tr>
</tbody>
</table>

Those that agreed/ strongly agreed were mainly female, mostly with a MA, 5 years or less teaching experience, and mostly undergraduates.
INSTRUCTORS’ LEVEL OF SELF-EFFICACY IN TERMS OF THE COMPONENTS OF THE TPACK MODEL

Limitations

Several limitations pertain to this research which were beyond the scope of this study to address. Firstly, the literature sought was conducted across the globe, for example Spain (López-Pérez et al., 2011), Australia (Kennedy et al., 2008) and the United States (Mishra and Koehler, 2006). However, the current research this study only seeks the views of instructors in Saudi Arabia, which limits the generalizability of the findings to other regions or cultural contexts. The educational landscape, institutional practices, and socio-cultural factors in Saudi Arabia may differ from those in other geographical settings or educational systems. Furthermore, the cultural and societal norms in Saudi Arabia may influence the instructors’ views and experiences concerning technology integration in education. Factors such as gendered roles, cultural traditions, and educational policies specific to Saudi Arabia may shape instructors’ perspectives and practices.

Secondly, Shin et al.’s (2009) research adopts a mixed-method approach; however, the current research adopted a purely quantitative methodology to ensure objective analysis of numerical data, which has its limitations. For instance, quantitative data may overlook contextual information and nuanced insights which are captured in qualitative methodologies. Schmidt et al. (2009) tested and validated the survey and was proven to be a reliable instrument, however, had the current research included more than one data source, such as interviews or focus groups alongside the surveys, may have offered richer insights around instructors’ self-efficacy levels. Furthermore, multiple data collection methods would contribute to a more robust interpretation of the research findings.
INSTRUCTORS’ LEVEL OF SELF-EFFICACY IN TERMS OF THE COMPONENTS OF THE TPACK MODEL

Thirdly, Kennedy et al.’s (2008) data collection involved a sample of over 2,000 university students, yet the research included only 56 participants who provided their views and responses on a scale ranging from strongly agree to strongly disagree. While this small sample size may not be representative of the larger population of instructors in Saudi Arabia and fully reflect the diversity of opinions and experiences among all instructors to a broader population. In addition, since the participants self-reported the data, this could be subject to limitations such as recall bias, social desirability bias, or respondents providing answers they perceive as desirable. This raises concerns about the accuracy and reliability of the data collected, potentially impacting the interpretation of the findings. The absence of direct observations of instructors’ instructional practices is a limitation as it restricts the ability to assess instructional behaviors, classroom dynamics, or the actual integration of technology and content knowledge. Observational data could have complemented the self-reported data collected in this study. Byker et al. (2018, p. 19) proposes that self-efficacy has a powerful influence on teachers’ behaviour in relation to their ‘instructional choice, effort and persistence’.

Practice Implications and Recommendations

While the respondents reported a high level of self-efficacy in all 7 areas, there is scope for growth in where there are uncertainties around the TPACK components, especially around using multiple technological representations when explaining the topic content (26.8%). This indicates concerns around existing professional development and whether it is adequately enhancing instructors’ knowledge and skills in integrating technology effectively. The implications of this are whether there is robust understanding of Technological Pedagogical Content Knowledge (TPACK) in leveraging technology to support content delivery and promote
INSTRUCTORS’ LEVEL OF SELF-EFFICACY IN TERMS OF THE COMPONENTS OF THE TPACK MODEL

student engagement. This uncertainty could impact institutional policies in line with enhancing student learning experiences and outcomes.

According to Choi and Lee (2017), self-efficacy plays a crucial role in equipping teachers with the necessary confidence and competence to successfully integrate technology into their classroom practices. However, participants demonstrate lowest levels of self-efficacy around easily learning how to use updated technology (7.1%) and frequently playing around with digital technology (7.1%), which could imply that they do not feel knowledgeable or confident about bringing diverse technologies into the classroom suggesting, therefore students may not benefit from the use of updated technology and the teacher may not effectively deliver the content. This is concerning as it indicates a potential gap in instructors’ technological proficiency and comfort levels. When teachers are not sufficiently knowledgeable or confident in using diverse technologies, it can hinder their ability to effectively integrate technology into their instruction. This can limit learners’ exposure to modern tools and resources that could enhance their learning experience. In today’s digital age, where technology plays an increasingly important role, it is crucial for educators to be equipped with the necessary skills and confidence to incorporate technology effectively. Therefore, addressing these concerns through targeted professional development and support can ensure that teachers are prepared to meet the evolving needs of their students and provide them with high-quality, technology-enhanced education. Literature confirms that since technology is evolving, professional development targeting the dynamic association between content, pedagogy, and technology may consequent in more learners that are satisfied and an increased number of confident instructors (Ward and Benson, 2010).
Recommendations for future research

Based on the quantitative data gathered, there are several distinct recommendations for future research. Firstly, there is a need to address the areas of low self-efficacy or uncertainty identified among participants through targeted professional development programs concentrating on improving teachers’ knowledge and confidence in using diverse technologies in the classroom. Additionally, universities and educational institutions should integrate technology into their teacher education programs, ensuring that future instructors receive comprehensive training in educational technology. At the institutional level, there is a role for employers, such as universities, to provide ongoing support and resources for instructors to enhance their technological competence. Furthermore, ministries or government bodies responsible for education can play a significant role in promoting and supporting the integration of technology in teaching by providing guidelines, funding, and professional development opportunities. These recommendations should be informed by existing literature, particularly in relation to the TPACK model, which emphasizes the importance of utilizing diverse technologies based on instructional needs. By addressing the identified areas of low self-efficacy and uncertainty, educators can be better equipped to effectively integrate technology and enrich the learning experiences of their students.

In the attempt to develop more robust recommendations and strategies for enhancing technology integration in teaching practices globally, future research should engage in a mixed-methods approach that combines qualitative and quantitative data. This approach would provide a deeper understanding of instructors’ experiences, perspectives, and challenges related to
technology integration, while also allowing for the measurement of specific variables and outcomes. By integrating both qualitative and quantitative data, researchers can gain a more nuanced understanding of the factors influencing technology self-efficacy and adoption, thus enabling the formulation of evidence-based recommendations applicable to diverse educational contexts worldwide.

A further recommendation is a mentorship programme whereby more experienced instructors support other instructors. This would allow new instructors to gain more TPACK knowledge from their peers and enable a culture of sharing good practice. This view correlates with Marx’s (2005) who highlights that voluntary training through individual mentoring could entice faculties to discover innovative strategies of technology integration. However, beside professional development, alternative approaches to improve and maintain self-efficacy levels of instructors across the domains of technological and content knowledge, it is recommended that the government promotes the integration of teacher support networks and communities. This suggestion stems from the concept of social networking for life-long learning, as stated in Kukulska-Hulme’s (2012) research. Mumtaz (2000) notes that teachers’ willingness to incorporate technology into the curriculum is subject to sufficient time in the working day, therefore engaging in peer-to-peer learning, with some incentives provided by the government, may provide instructors with the opportunity to connect with educators beyond the context of their institution where they can broaden their perspectives, gain fresh insights, achieve professional growth and access a diverse range of expertise in the areas where they either report less self-efficacy or are uncertain. Online platforms and social media can function as powerful tools for building and sustaining these networks (Kukulska-Hulme, 2012). Platforms such as
INSTRUCTORS’ LEVEL OF SELF-EFFICACY IN TERMS OF THE COMPONENTS OF THE TPACK MODEL

Twitter, subject-specific forums, and online communities offer avenues for instructors to connect with like-minded professionals, participate in discussions, and access a wealth of resources and ideas. Engaging in these online networks can expand instructors’ professional learning opportunities, expose them to innovative practices, and provide ongoing support throughout their teaching journey.

Conclusion

To conclude, this chapter has examined the level of self-efficacy reported by instructors in terms of their technological, pedagogical and content knowledge. The findings indicate that the participants generally reported a high level of self-efficacy in all components. They demonstrated confidence in their technological knowledge, including learning new technology and possessing technical skills. Similarly, they expressed self-efficacy in their content knowledge, such as explaining concepts and understanding the structure of topics, which with previous research highlighting the significance of self-efficacy in influencing teachers’ instructional choices and attitudes towards technology integration. Yet, some participants reported lower levels of self-efficacy in some areas, especially in terms of playing around with technology and having a broad understanding of diverse technologies.

The literature review provided insights into the impact of self-efficacy on professional behaviour, work fulfilment, student engagement, and differentiated instructional practices. However, it is important to acknowledge the limitations of this study. The purely quantitative methodology used in this research, while providing statistical analysis of numerical data, may limit the exploration of contextual and nuanced information. Additionally, the reliance on self-
INSTRUCTORS’ LEVEL OF SELF-EFFICACY IN TERMS OF THE COMPONENTS OF THE TPACK MODEL

report measures introduces potential biases and subjectivity. To address these limitations and enhance future research, it is recommended to incorporate mixed-method approaches that combine quantitative and qualitative methods. This would provide a detailed picture of instructors’ self-efficacy, capturing both numerical measures and contextual insights. This research recommends that future studies explore the relationship between self-efficacy and other factors, such as student outcomes and instructional practices, to gain an in-depth understanding of the broader impact of self-efficacy on teaching and learning. The chapter contributes to the existing literature on instructor’s self-efficacy and its implications for technology integration and instructional practices, which is key to educators and policymakers for enhancing effective technology integration in educational settings.

Summary

This study investigated the level of self-efficacy among instructors regarding the various components of the TPACK model in their teaching within Saudi Arabia. Vygotsky’s theory of social capital compliments Bandura’s theory of self-efficacy in the context of Saudi Arabia instructors as their level of self-efficacy is driven by their traditional teaching styles. The study adopted a quantitative approach using a survey to gain insights into instructors’ self-efficacy and found that instructors have high levels of self-efficacy across all components of TPACK. As the research indicates, implications of using the TPACK model in the Kingdom of Saudi Arabia would be that TPACK supports content delivery and promote student engagement in most area, yet it recommends that educational institutions support instructors through professional development, mentoring programs, collaborative learning communities, and peer observations for areas with low efficacy.
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Appendices

Appendix 1: TPACK Survey adapted from Schmidt et al. (2009)

TPACK Survey

Thank you for taking the time to participate in this research by completing the survey below. Your thoughtfulness and candid responses will be greatly appreciated. Therefore, please answer all questions to the best of your knowledge. Please note that your responses will be kept completely confidential.

Section 1: Demographics

Please select the options applicable to you

1. Gender
   - Female
   - Male

2. Highest Qualification Achieved
   - BA
   - MA
   - PhD

3. Teaching experience
   - 5 Years or less
   - 6-10 years
   - 10+ years

4. Level of education currently teaching
   - Undergraduate
   - Postgraduate

Adapted from Schmidt et al. (2009)
INSTRUCTORS’ LEVEL OF SELF-EFFICACY IN TERMS OF THE COMPONENTS OF THE TPACK MODEL

Section 2

This section will measure teacher’s level of efficacy in content, pedagogy, and technology in the classroom.

The term TPACK is defined as teachers’ knowledge of using integrated technology in their teaching. Additionally, for the purpose of this research, technology refers to digital tools and resources: laptops, iPods, tablets, Smartphones, interactive whiteboards, video games, applications, software programs, etc.

Please answer all of the questions and if you are uncertain of or neutral about your response you may always select “Neither Agree nor Disagree”

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neither Agree nor Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
</table>
| 1. TK (Technology Knowledge)  
Knowledge of nature and teaching and learning, including teaching methods, classroom management, instructional planning, assessment of student learning etc.  
1. I know how to solve my own technical problems.  
2. I can easily learn how to use updated technology.  
3. I keep up with important new technologies.  
4. I frequently play around with digital technology.  
5. I have a broad understanding of diverse technologies.  
6. I have sufficient technical skills to use technology.  
|  |  |  |  |  |
| 2. CK (Content Knowledge)  
Knowledge of the subject matter to be taught (e.g., earth science, mathematics, language arts, etc.)  
7. I use multiple technological representations when I explain the topic content.  
8. I have sufficient knowledge in my field  
9. I can explain the background details of concepts, formulas and definitions in my field.  
10. I can explain why a specific topic is important.  
11. I can present the same subject matter at different levels.  
12. I understand the structure of topics I teach.  
|  |  |  |  |  |
| 3. PK (Pedagogical Knowledge)  
13. I know how to assess student performance in a classroom.  
14. I can adapt my teaching based upon what students currently understand or do not understand.  
15. I can adapt my teaching style to different learners.  
16. I can assess student learning in multiple ways.  
17. I can use a wide range of teaching approaches in a classroom setting.  
18. I am familiar with common student understandings and misconceptions.  
|  |  |  |  |  |
| 4. Pedagogical Content (PCK)  
Continually changing and evolving knowledge base that includes knowledge technology for information processing, communications, and problem solving and focuses on the productive applications of technology in both work and daily life.  
19. I can select effective teaching approaches to guide student thinking and learning in the subject taught.  
20. I can use different methods and approaches to  
|  |  |  |  |  |

Adapted from Schmidt et al. (2009)
INSTRUCTORS’ LEVEL OF SELF-EFFICACY IN TERMS OF THE COMPONENTS OF THE TPACK MODEL

Note. Survey adapted from Schmidt et al. (2009)
Appendix 2: Survey Results

Demographic data

Responses to question 1-4
INSTRUCTORS’ LEVEL OF SELF-EFFICACY IN TERMS OF THE COMPONENTS OF THE TPACK MODEL

Teaching experience
56 responses

- 5 Years or less: 69.6%
- 6-10 years: 14.3%
- 10+ years: 16.1%

Level of education currently teaching
56 responses

- Undergraduate: 71.4%
- Postgraduate: 28.6%

Responses to TPACK questions

1. I know how to solve my own technical problems.
56 responses

- Strongly disagree: 14.3%
- Disagree: 23.2%
- Neither agree nor disagree: 57.1%
INSTRUCTORS’ LEVEL OF SELF-EFFICACY IN TERMS OF THE COMPONENTS OF THE TPACK MODEL

2. I can easily learn how to use updated technology.
   56 responses
   - Strongly disagree
   - Disagree
   - Neither agree nor disagree
   - Agree
   - Strongly Agree
   53.6% Agree, 30.4% Neither agree nor disagree, 7.1% Disagree, 16.1% Strongly Agree

3. I keep up with important new technologies.
   56 responses
   - Strongly disagree
   - Disagree
   - Neither agree nor disagree
   - Agree
   - Strongly Agree
   46.4% Agree, 25% Neither agree nor disagree, 16.1% Disagree, 7.1% Strongly Agree

4. I frequently play around with digital technology.
   56 responses
   - Strongly disagree
   - Disagree
   - Neither agree nor disagree
   - Agree
   - Strongly Agree
   46.4% Agree, 19.6% Neither agree nor disagree, 16.1% Disagree, 7.1% Strongly Agree
INSTRUCTORS’ LEVEL OF SELF-EFFICACY IN TERMS OF THE COMPONENTS OF THE TPACK MODEL

5. I have a broad understanding of diverse technologies.
56 responses

6. I have sufficient technical skills to use technology.
56 responses

7. I use multiple technological representations when I explain the topic content.
56 responses
INSTRUCTORS’ LEVEL OF SELF-EFFICACY IN TERMS OF THE COMPONENTS OF THE TPACK MODEL

8. I have sufficient knowledge in my field.
56 responses

9. I can explain the background details of concepts, formulas and definitions in my field.
56 responses

10. I can explain why a specific topic is important.
56 responses
11. I can present the same subject matter at different levels.
56 responses

12. I understand the structure of topics I teach.
56 responses

13. I know how to assess student performance in a classroom.
56 responses
INSTRUCTORS' LEVEL OF SELF-EFFICACY IN TERMS OF THE COMPONENTS OF THE TPACK MODEL

14. I can adapt my teaching based-upon what students currently understand or do not understand.
56 responses

15. I can adapt my teaching style to different learners.
56 responses

16. I can assess student learning in multiple ways.
56 responses
INSTRUCTORS’ LEVEL OF SELF-EFFICACY IN TERMS OF THE COMPONENTS OF THE TPACK MODEL

17. I can use a wide range of teaching approaches in a classroom setting.
56 responses

![Pie chart for question 17]

18. I am familiar with common student understandings and misconceptions.
56 responses

![Pie chart for question 18]

19. I can select effective teaching approaches to guide student thinking and learning in the subject taught.
56 responses

![Pie chart for question 19]
INSTRUCTORS’ LEVEL OF SELF-EFFICACY IN TERMS OF THE COMPONENTS OF THE TPACK MODEL

20. I can use different methods and approaches to represent specific information.
56 responses

21. I can generate alternative teaching approaches according to students’ level.
56 responses

22. I can identify difficult sides of the topic and find/ think of ways to explain it.
56 responses
INSTRUCTORS’ LEVEL OF SELF-EFFICACY IN TERMS OF THE COMPONENTS OF THE TPACK MODEL

23. I can select teachable content of the subject matter appropriate to the students’ level.
56 responses

24. I can effectively develop a plan of teaching a specific topic in my field.
56 responses

25. I know about technologies that I can use for understanding the topic taught.
56 responses
INSTRUCTORS’ LEVEL OF SELF-EFFICACY IN TERMS OF THE COMPONENTS OF THE TPACK MODEL

26. I can use technology to enrich the content.
56 responses

27. I can use technology to present the content in multiple ways.
56 responses

28. I can use technology to access additional resources for the topic, which may otherwise be available.
56 responses
29. I can use technology to support students in deeper inquiry about the content, concepts and relationships with other subjects/topics.

56 responses

30. I can use technology to provide students with opportunities to independently explore the content to their own pace.

56 responses

31. I can choose technologies that enhance the teaching approaches for a lesson.

56 responses
INSTRUCTORS’ LEVEL OF SELF-EFFICACY IN TERMS OF THE COMPONENTS OF THE TPACK MODEL

32. I can choose technologies that enhance students’ learning for a lesson.
56 responses

33. I can critically reflect on how I use technology in the classroom.
56 responses

34. I can choose technologies that enhance the content for a lesson.
56 responses
INSTRUCTORS’ LEVEL OF SELF-EFFICACY IN TERMS OF THE COMPONENTS OF THE TPACK MODEL

35. I can select technologies to use in my classroom that enhance what I teach, how I teach and what students learn.
56 responses

36. I can use strategies that combine content, technologies and teaching approaches in the classroom.
56 responses

37. I can select specific technology for teaching specific content.
56 responses
INSTRUCTORS’ LEVEL OF SELF-EFFICACY IN TERMS OF THE COMPONENTS OF THE TPACK MODEL

38. I can use technology to organize my teaching and student’ learning content.
56 responses

39. I can use technology to bring real-life experiences, examples, and analogies about specific content.
56 responses

40. I can use technology to provide opportunities to each student in the classroom to contribute to subject-related activities.
56 responses
INSTRUCTORS’ LEVEL OF SELF-EFFICACY IN TERMS OF THE COMPONENTS OF THE TPACK MODEL

41. I can use technology to help student understand the value of technology in the learning environment.
56 responses

42. I can use technology in teaching specific content within the defined pedagogical approach in a given context.
56 responses
Appendix 3: Gender of respondents that who reported agree or strongly agree

Research Question 1

![Gender Distribution for Research Question 1](image1.png)

Research Question 2

![Gender Distribution for Research Question 2](image2.png)
INSTRUCTORS’ LEVEL OF SELF-EFFICACY IN TERMS OF THE COMPONENTS OF THE TPACK MODEL

Research Question 3

Research Question 4
INSTRUCTORS’ LEVEL OF SELF-EFFICACY IN TERMS OF THE COMPONENTS OF THE TPACK MODEL

Research Question 5

Research Question 6
INSTRUCTORS’ LEVEL OF SELF-EFFICACY IN TERMS OF THE COMPONENTS OF THE TPACK MODEL

Research Question 7

[Bar chart showing gender distribution]

Male: 47%
Female: 53%
Exemption Notification IRB

Attachments:

• 2023-02-23 Consent Stamped.pdf
• Exemption Notification - IRB ID: 2023/02/23.pdf

Duquesne University IRB

To: Nouf Alghamdi
From: David Delmonico, IRB Chair

Subject: Protocol #2023/02/23 Date: 04/05/2023

Protocol Exemption Notification

The protocol 2023/02/23. INVESTIGATING SAUDI ARABIA UNIVERSITY TEACHERS’ LEVEL OF SELF-EFFICACY IN THE COMPONENTS OF THE TPACK MODEL has been verified by the Institutional Review Board as Exempt according to 45CFR46.101(b)(2): (2) Tests, Surveys, Interviews on 04/05/2023.

If applicable, the consent form and/or recruitment flier have been stamped and are attached to this email or are accessible via Mentor. Please use these stamped versions to distribute or display.

Exempt status means there is no specific expiration date, and you are not required to file annual reviews or termination reports. However, any unanticipated problems, adverse effects on subjects, or protocol deviations must be immediately reported to the IRB Chair before proceeding with the study.

Further, any changes to your study requires the filing of an amendment and is subject to the approval of the IRB Chair. You must wait for approval before implementing any changes to the original protocol. Changes to your protocol may affect the exempt status of your research.

Please contact me if you have any questions regarding this study. Best wishes in your research,

David Delmonico, Ph.D. Institutional Review Board, Chair irb@duq.edu
INSTRUCTORS’ LEVEL OF SELF-EFFICACY IN TERMS OF THE COMPONENTS OF THE TPACK MODEL

CONSENT TO PARTICIPATE IN A RESEARCH STUDY

Duquesne University
Institutional Review Board
Protocol #: 
Verified On: 
Expires: 

TITLE:

DUQUESNE UNIVERSITY PITTSBURGH, PENNSYLVANIA

CONSENT TO PARTICIPATE IN A RESEARCH STUDY

[INVESTIGATING SAUDI ARABIA UNIVERSITY TEACHERS’ LEVEL OF SELF-EFFICACY IN THE COMPONENTS OF THE TPACK MODEL]

INVESTIGATOR:

[Nouf Alghamdi: alghamdin1@duq.edu] ADVISOR: (if applicable)

[Dr Franny Jo Serenka, Clinical Associate Professor- Education, tel: 4123966116, serenkaf@duq.edu]

SOURCE OF SUPPORT:

This study is being performed as partial fulfillment of the requirements for the [doctoral degree in [Education] at Duquesne University, AND This study is supported by a grant from [Saudi Arabia].

STUDY OVERVIEW:

[This study aims to investigate instructors’ level of efficacy in the various components of the TPACK model in their teaching in Saudi Arabia. TPACK represent a viable nexus between technology and educational content. It is defined is a technology integration framework which identifies three types of knowledge instructors must acquire to successful teaching: technology, content, and pedagogy. Collectively, these create successful educational technology integration. Existing research demonstrates a need to study TPACK further in the context of instructors’ level of self-efficacy in the components of the TPACK model. However, this dissertation will investigate instructors’ level of efficacy towards utilizing technology in their classrooms. In doing so, the study will adopt a quantitative approach using surveys to gain insights into instructors’ self-efficacy. This study is significant because TPACK is a critical part of the Saudi Arabian education system. It integrates the increasing need to use technology in teaching and learning, the focus of deep and explicit content, and the various methods of instruction all]
TO STUDENTS' LEVEL OF SELF-EFFICACY IN TERMS OF THE COMPONENTS OF THE TPACK MODEL

necessary for student success. The instructor’s level of self-efficacy is essential as they shape not only the future of educational delivery, but also the future of each learner. Moreover, the growing implementation of TPACK in universities in Saudi Arabia are exclusively dependent upon the instructors’ performance with this model.

2023/02/23 04/05/2023
No Expiration Date

Duquesne University
Institutional Review Board
Protocol #:
Verified On:
Expires:

On average, 50 subjects in total are expected.

PURPOSE:
You are being asked to participate in a research project that is investigating [Saudi Arabian university instructors’ level of self-efficacy in the components of the TPACK model].

In order to qualify for participation, you must:

• [be a Saudi Arabian university instructors at the Education College Department of King Khalid University]

PARTICIPANT PROCEDURES:

TPACK surveys will be posted on an online platform for potential participants to access. The consent form and the link of the survey will be emailed to Saudi Arabian university. The Director of faculty will email the consent form and survey to instructors at the Education College Department of King Khalid University. Potential research participants will complete the consent form and the survey (the email will explicitly state this). The survey only needs to be completed once. All completed surveys will be sent to me.

The survey consists of three A4 pages, with the first page for collecting demographic information. Page 2 and 3 consists of a table including a Likert Scale with 4 options. The survey is expected to take approximately 5 minutes to complete.

RISKS AND BENEFITS:
[There are minimal risks associated with participating in this study, but no greater than those encountered in everyday life.]

COMPENSATION:
INSTRUCTORS’ LEVEL OF SELF-EFFICACY IN TERMS OF THE COMPONENTS OF THE TPACK MODEL

[There will be no compensation for participating in this study]. There is no cost for you to participate in this research project. CONFIDENTIALITY:

Your participation in this study, and any identifiable personal information you provide, will be kept confidential to every extent possible, and will be destroyed 3 years after the data collection is completed. [Your name will never appear on any survey or research instruments.] All written and electronic forms and study materials will be kept secure. [all paper-based documents, including the questionnaires, and consent forms will be securely locked into confidential files, to which only the researcher will have access. In addition, all electronic data will be stored on a password-protected computer file, as advised by multiple authors. Confidentiality will be facilitated by anonymizing all research participants to ensure that they are non-identifiable.

In addition, any publications or presentations about this research will only use data that is combined together with all subjects; therefore, no one will be able to determine how you responded.

RIGHT TO WITHDRAW:

You are under no obligation to start or continue this study. You can withdraw at any time without penalty or consequence by [sending an email to me at the given email address at this point, data already collected will be safely destroyed]

SUMMARY OF RESULTS:

A summary of the results of this study will be provided to at no cost. You may request this summary by contacting the researchers and requesting it. The information provided to you will not be your individual responses, but rather a summary of what was discovered during the research project as a whole.

FUTURE USE OF DATA:
INSTRUCTORS’ LEVEL OF SELF-EFFICACY IN TERMS OF THE COMPONENTS OF THE TPACK MODEL

Any information collected that can identify you will not be used for future research studies, nor will it be provided to other researchers.

VOLUNTARY CONSENT:

I have read this informed consent form and understand what is being requested of me. I also understand that my participation is voluntary and that I am free to withdraw at any time, for any reason without any consequences. Based on this, I certify I am willing to participate in this research project.

I understand that if I have any questions about my participation in this study, I may contact [Nouf Alghamdi (4125840361/ alghamdin1@duq.edu]. If I have any questions regarding my rights and protections as a subject in this study, I can contact Dr. David Delmonico, Chair of the Duquesne University Institutional Review Board for the Protection of Human Subjects at 412.396.1886 or at irb@duq.edu.

This project has been approved/verified by

Duquesne University
Institutional Review Board
Protocol #:
Verified On:
Expires:

Duquesne University’s Institutional Review Board.

Proceeding to the next page indicates your voluntary consent to participate in this project.