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Technological Pedagogical Content Knowledge (Tpack) Effectiveness on English Teachers And Students in Saudi Arabia

Hamzah Hassan Alhababi
University of Northern Colorado

UNIVERSITY OF NORTHERN COLORADO

Greeley, Colorado

The Graduate School

TECHNOLOGICAL PEDAGOGICAL CONTENT KNOWLEDGE (TPACK) EFFECTIVENESS ON ENGLISH TEACHERS AND STUDENTS IN SAUDI ARABIA

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Hamzah Hassan Alhababi

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Accepted by the Doctoral Committee

_____
Mia Kim Williams, Ph.D., Research Advisor

_____
Christine Kyser, Ed.D., Committee Member

_____
Brian Rose, Ph.D., Committee Member

_____
Anna Ursyn, Ph.D., Faculty Representative

Date of Dissertation Defense _____.

Accepted by the Graduate School

_____
Linda L. Black, Ed.D.
Associate Provost and Dean
Graduate School and International Admissions

ABSTRACT

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The purpose of this study was to integrate technology into technology-rich, English language learning classrooms in Saudi Arabia. Technological, pedagogical, and content knowledge (TPACK) framework was used to design activities of technology integration for teachers' and students' achievement and effectiveness. This study used a mixed-method of quantitative and qualitative to collect data. All participants were male teachers who taught English language courses in public Saudi Arabian schools. Participants were gender specific because the school system in Saudi Arabia separates males and females. The researcher, who was also male, had access to the male portion of the education system and, thus, interviewed and observed only teachers and students. Two research-developed pre- and post-surveys were administered to participants digitally. The researcher conducted observations and in-depth, recorded interviews with each teacher ($n = 2$). Also, an in-depth recorded interview was conducted with students ($n = 2$) for data analysis to provide depth to the student perspective collected. The results showed that TPACK framework is an effective tool for both teachers and students to enhance teaching and learning if it is well implemented and used. Teachers in this study showed interest for a better future of education with technology being well integrated and used in the curriculum. Implications of this study are clear that teachers will be more

ready and productive with technology integration once technology is part of education laws and policy.

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CHAPTER I

INTRODUCTION

With today's technology advancements, educational contexts should take advantage of innovative pedagogy and digital-rich tools for deeper content exploration, ease of classroom management, engagement and motivation of students in learning contexts, and generally revolutionizing the learning spaces of old to meet the learning needs of today's students. It is logical to think that classrooms equipped with chalk and erasers, fixed rows of desks, and behavioral pedagogy would have yielded to changes caused by the technological advancements; however, despite the addition of digital tools, educational practices have changed little in the global context of educating youth.

Saudi Arabia has had challenges in terms of implementing technology in classrooms like any other developing countries as a result of sufficient resources (Alamoudi & Sulaymani, 2014). As in many countries, technology available in Saudi Arabian classrooms has increased. However, it is more likely integrated as a single subject than as an integrated learning system. This has resulted in lack of motivation (Alamoudi & Sulaymani, 2014) and lack of pedagogical change despite the addition of tools in learning contexts. Computer labs are still the dominant technology used by students for learning (Alamoudi & Sulaymani, 2014).

Generally speaking, digital technologies (e.g., computers, Internet, handheld devices, software, etc.) give power to the learning environment and student's experience as they provide wide opportunities for qualitative thinking (i.e., unstructured and help

students discover and explore knowledge; Papert, 1993b). Digital technologies have proven to be supportive tools for teaching instruction and learning utilizing directive and nondirective teaching methods (Mitra & Dangwal, 2010; Papert, 1993a) and to deepen the student-centered learning environment (SCLE), which gives learners the chance to explore their own needs for knowledge. Also, they get a chance to find their skills and give meanings to circumstances and contexts based on their prior knowledge and experiences (M. Liu, 2004; T. C. Liu, 2007; Lu, Ma, Turner, & Huang, 2007; Marupova, 2006; Papert, 1993a).

Additionally, digital technology can be supportive for students and lead to relational understanding by providing solution strategies, representations, models, contexts, applications, and interactions (e.g., sketchpad, online discussion board, educational games, classroom clickers, spreadsheets, etc.; Miller, 2012; Polly, 2011). According to Sharma and Hannafin (2007), digital technologies can support effective scaffolding for most subjects' learners and can accommodate the variations among the characteristics and the settings of those subjects.

Furthermore, digital technology cannot only help individuals to enhance their competency and explore their skills but also those technologies that are more reliable, affordable, and accessible, and usable can be supportive for equity in education once students and their teachers have access to high quality educational resources (Meyen, Poggio, Seok, & Smith, 2006). Digital technologies can also accommodate students' special needs, wherein students have particular learning disabilities that inhibit learning and understanding English language as a second language with a compensatory tool, e.g., an online digital dictionary to help pronunciation (Disabilities, Opportunities,

Internetworking, and Technology [DO-IT], 2011). In teaching English, this type of technology may impact what curriculum should be taught, how it can be taught (National Council of Teachers of English [NCTE], 2000), and what knowledge and experience teachers need to teach English along with the implementation of technology (Association of Mathematics Teacher Educators [AMTE], 2009). Teachers should consider whether or not there is an impact of digital technology on learning and teaching; this impact is classified as either a primary or secondary factor that can speed and quicken the quality of delivering instructions (Clark, 1994; Kozma, 1991).

This new era is assigned with new challenges and duties for the modern teacher. Teaching English in its new tradition has drastically changed with the remarkable entrance of technology (Shyamlee & Phil, 2012). One of the most significant drivers for both social and linguistic change is technology (Shyamlee & Phil, 2012). According to Graddol (1997), "Technology lies at the heart of the globalization process; affecting education work and culture" (p. 16). The use of English language increased rapidly after 1960 (Shyamlee & Phil, 2012).

Currently, the English language is the language of social context, business, education, media, is key in curriculum, and is the language imparting education (Shyamlee & Phil, 2012). It is also an important determining factor for university entrance and in well paid commercial sectors all over the world (Shyamlee & Phil, 2012).

Since there are more and more learners of English in Saudi Arabia, different teaching methods have been implemented to test the effectiveness of the teaching process (Alamoudi & Sulaymani, 2014). One method includes technology integration in order to create an English context using multimedia and digital literacy such as Photoshop and so

on (Alamoudi & Sulaymani, 2014). This way, students are involved in learning based on their interests. It has been examined effectively that the implementation of technology in teaching is widely accepted in the modern world (Shyamlee & Phil, 2012). Teachers and students in Saudi Arabia need to use technology for education purposes (Alamoudi & Sulaymani, 2014).

As we are in the age of globalization, it is important to grasp various foreign languages and English comes first all over the world (Shyamlee & Phil, 2012). Teaching English in Saudi Arabia has been with us for many years and its significance continues to grow, fueled in part by the Internet and technology (Alamoudi & Sulaymani, 2014). According to Graddol (1997), there were about a billion English learners in 2000 but a decade later, the numbers doubled. This is an indication for the significance of the English language.

The rapid development of science and technology and its application to teaching using emerging and developing multimedia and technology featuring audio, visual, animation effects come into full play in English classroom teaching and set a preferred platform for exploring an English language teaching model in the 21st century (Shyamlee & Phil, 2012).

It has been proven that multimedia and technology play a positive role in enhancing activities (Uzounboylu, Bicen, & Cavus, 2011) and in initiatives of student and teaching impacts in English classroom environments (Shyamlee & Phil, 2012). Through technological innovations, the English language has changed the way we communicate. The growth of the Internet has facilitated the growth of the English language and this has taken place at a time when computers are available and accessible

to many (Shyamlee & Phil, 2012). This being said, significant literature has been written about using technology in teaching English language; most of these writings accept the use of technology as an essential part in teaching (Shyamlee & Phil, 2012). There has been a very dominant emphasis on the inevitable role of technology in pedagogy and content knowledge to the extent of supplanting the teacher by implementing technology (Shyamlee & Phil, 2012). For this reason, it is crucial that English language teachers be aware of the latest and best equipment, keep up to date, and have full knowledge of what is available in any given situation. We cannot neglect or ignore the fact that technological developments will continue. Teachers can use technology and multimedia to give colorful, stimulating lectures about new horizons.

The National Council of Teachers of English (NCTM; 2000) recognized the integral role technology and multimedia in enhancing students' English challenges and competence. As a result, today's English teachers should be expected to implement digital technology effectively in their pedagogy (methods). These integration qualifications are addressed by the technological pedagogical content knowledge (TPACK) framework--the synthesized output or product of the three areas of knowledge: technology, pedagogy (teaching and student learning), and content (Mishra & Koehler, 2006; Niess, 2005). The TPACK framework can help design, develop, and evaluate the quality of technology integration (Bowers & Stephens, 2011; Chai, Koh, Tsai, & Tan, 2011; Harris, Grandgenett, & Hofer, 2010; Hofer, Grandgenett, Harris, & Swan, 2011; Hofer & Harris, 2010). Also, teacher development when integrating technology can be identified through TPACK development model before meeting the English teacher TPACK standards. This could provide English instructors and researchers with the

standards and guidelines required to implement technology in an effective way when teaching and learning English (Niess et al., 2009).

Statement of the Problem

Teachers are required to acquire knowledge of teaching and content to effectively design and demonstrate an English language lesson (Shulman, 1986, 1987). As digital technologies have become not only instructional tools but also thinking tools, the knowledge domain has expanded to include technology in it (Lee, 2010, 2011a, 2011b; National Research Council, Committee on Information Technology Literacy, 1999; Papert, 1993b). Educators need to use technological knowledge to encompass more than fluency with information technology; it also has to include pedagogy and content knowledge. Therefore, an emerging framework of technological pedagogical content knowledge gives a picture of how all three components of knowledge could be synthesized to effectively teach a subject matter using digital technology (Mishra & Koehler, 2006; Niess, 2005).

Nowadays, teachers of English language in Saudi Arabia lack knowledge and skills in digital technologies. This correlates with the limited experience they have with digital technology integration in English language teaching at all stages (Alamoudi & Sulaymani, 2014). The National Center for Education Statistics (Gray, Thomas, & Lewis, 2010) reported that only 25.0% of elementary and secondary school teachers in U.S. public schools indicated their undergraduate program prepared them to use technology effectively in their teaching. This indicator of low technology self-efficacy could be credited to what they perceived in their lack of learning when integrating technology,

which supports the environment of constructivist learning (Aust, Newberry, O'Brien, & Thomas, 2005; Watson, 2006).

Unlike their American counterparts, many Saudi English teachers barely use digital technologies in their pedagogy (teaching methods) or they integrate them with limitations. This could be due to either the lack of access or no access to digital technology (e.g., computer, Internet, smart boards,) inside the classroom or due to the lack of training they received in integrating technology into their English language classrooms (Al-Jarf, 2006; Alshumaim & Alhassan, 2010; Mullis, Martin, Foy, Olson, & International Association for the Evaluation of Education, 2008; Oyaid, 2010). Also, in-service teachers in Saudi reported they were lacking the training to integrate technology in teaching English in teacher educational and professional development programs (Albalawi, 2007; Albalawi & Ghaleb, 2011).

Nevertheless, some colleges and universities in Saudi do include educational technology and computer science and programming courses in teaching English language as a second language programs: Imam University, Teacher's College, and College of Arts at King Faisal University. Therefore, with the rapid accessibility and growth of such educational tools in public and private schools through public education development projects, lots of questions have arisen about English teachers' readiness for teaching using digital technologies:

- In Saudi Arabia, how much knowledge do English teachers have in technology integration, teaching pedagogy, and English content?
- Is there a correlation among teachers' perceived expertise in the three major components, the sub components of knowledge and their teaching effectiveness, and student's achievement?

- Is there a statistical correlation between teachers' technological pedagogical and content knowledge applied in a digitally rich English language classroom in Saudi Arabia and students' achievement in a vocabulary activity?
- What is the perceived experience of students in a digitally rich English language classroom in Saudi Arabia?
- How actively and effectively, if there is, do they integrate digital technology?
- How do English teachers relate their perceived knowledge of English content, teaching method (pedagogy, and technology integration to perceived perceptions of their teacher education program and professional training?

All these questions and many others have arisen due to growing concerns about the impact of the Saudi educational system and, more specifically, on English content, teaching, and learning. The low level of teacher's preparation for teaching English topics, a dearth of professional development programs, and lack of educational technology resources including hardware, software, and technical support (Dodeen, Abdelfattah, Shumrani, & Hilal, 2012) might result in failure to achieve the desired English achievement.

Purpose of the Study

The aim of this study was to investigate the relationship between teachers' technological, pedagogical, and content knowledge (TPCK) applied in a digitally rich English language classroom in Saudi Arabia and students' achievement. Also, this study

aimed to investigate the perceived experience of students in a digitally rich English language classroom in Saudi Arabia. It was important to understand the relationship and perceived experience of teachers and students to help support educational development strategies, enrich situated learning experience, and increase the continuous implementation of technologies. The major question that guided this study was: Is there a statistical correlation between teachers' TPCK applied in a digitally rich English language classroom in Saudi Arabia and students' achievement in a vocabulary activity?

Significance of the Study

There is a need for teacher education program to equip teachers with the knowledge and skills required to integrate technology into the classroom. Standards and qualification criteria have been developed to provide such knowledge. However, some standards are either too narrow or too broad to connect with other areas of knowledge content and pedagogy. As a result, the Association of Mathematics Teacher Educators (AMTE, 2006) adopted the English TPACK and is trying to form the borders of this knowledge, taking into consideration all three areas of knowledge and giving the educators as well as researchers clear guidelines to establish and evaluate the effectiveness of technology integration when teaching English. However, the research was limited about the standards and assessments of how effective digital technology integration was on students' performance and achievement.

In fact, a high percentage of technology integration literature has been generated by TPACK research studies (Ronau et al., 2010); however, the impact of English teachers' TPACK on their teaching has been less vigorously studied (Buckner, 2011; Foley, Strayer, & Regan, 2010; Lyublinskaya & Tournaki, 2012; Ronau & Rakes, 2012).

In this study, a descriptive overview of the current scope about the relationship between high school English teachers and TPACK teachers' impact was provided. English teachers gave a vision on how well they felt about implementing technology and the factors that might facilitate this readiness. The study also found there was a collection of new understandings on supportive conditions Saudi English teachers needed and the struggles they faced while developing their TPACK in public schools.

Finding in this study could augment the theoretical knowledge about English TPACK by giving suggestions and thoughts for developing in-service English teachers' TPACK as well as helping educational planners and lawmakers develop strategies to achieve the implementation of technology in successfully teaching English. It could also help test the quality of the English teacher and professional training programs and workshops in terms of equipping teachers with all the necessary technological and pedagogical content knowledge, resulting in smooth and effective technology integration into the English teaching process. Additionally, this study could facilitate the growth in teaching and learning English while there is a fast growing interest to establish a framework to effectively integrate technology. The growth of communities enthusiastic about English TPACK in Saudi Arabia could be increased and this framework could be improved when applied and evaluated.

Research Questions

The focus of this study is on the relationship between teachers' TPACK applied in a digitally rich English language classroom in Saudi Arabia, students' achievement in a vocabulary activity, as well as on students' and teachers' experience. The following research questions guided this study:

Q1 Is there a statistically significant difference between the mean scores of teachers' Technological Pedagogical and Content Knowledge before and after participation in a workshop about technology integration?

Q2 Is there a statistical correlation among teachers' technological, pedagogical, and content knowledge applied in a digitally rich English language classroom in Saudi Arabia, teacher effectiveness, and students' achievement?

Q3 What is the perceived experience of teachers and students in a digitally rich English language classroom in Saudi Arabia?

Definition of Terms

Digital technologies. All educational hardware and software educators can use to design, apply, and evaluate their instruction (e.g., computers, Internet, calculators, etc.).

English education. The journal of the Conference on English Education (CEE), a constituent organization of the National Council of Teachers of English (2000), serves teachers engaged in the preparation, support, and continuing education of teachers of English language arts/literacy at all levels of instruction.

English technological, pedagogical, and content knowledge (TPACK) standards. An extended framework of the work of Niess (2005), Mishra and Koehler (2006), and the National Educational Technology Standards for Teachers (International Society for Technology in Education [ISTE], 2009) focusing on English education and providing guidelines about the technological and pedagogical English knowledge needed for teachers to accomplish high quality integration of technology in teaching English (Niess et al., 2009).

Pedagogical content knowledge (PCK). The unique understanding of subject matter that allows teacher to design, apply, and evaluate appropriate instructional strategies and representations for particular topics that meet students' needs (Grossman,

1989, 1991; Shulman, 1986, 1987). This knowledge domain includes knowledge of content and students (KCS) and knowledge of content and teaching (KCT).

Pedagogical knowledge (PK). The knowledge of methods and strategies of teaching and learning including the ability to design, implement, and evaluate instructions that respond to students' needs.

Teacher effectiveness (TE). A teacher's ability to advance students' learning opportunities and meet their diverse needs within various learning environments.

Technological, pedagogical, and content knowledge (TPACK) developmental levels. Teachers' five levels of technology adaption model (recognizing, accepting, adapting, exploring, and advancing) that describe the stage of development teachers have approached toward effective integration of digital technologies (Niess, 2012).

Technological, pedagogical, and content knowledge (TPACK) framework. The synthesized product of the three areas of knowledge: technology, pedagogy (teaching and student learning), and content (Mishra & Koehler, 2006).

Technology content knowledge (TCK). The understanding for the reciprocal relationship between technology and content in the matter of affordances and constraints (Harris, Mishra, & Koehler, 2009). An English teacher who has a high level of TCK would integrate the technology tool that best represents his or her own English topic.

Technology knowledge (TK). The conceptual and practical understanding of information technology and how it can be applied correspondingly to various contexts (Harris et al., 2009).

Technology pedagogy knowledge (TPK). The understanding of the reciprocal relationship between technology and pedagogy (teaching and learning) in the matter of affordances and constraints (Harris et al., 2009). For example, some teaching methods (e.g., collaborative teaching and learning, mathematics discourse) are enhanced by the integration of digital technologies like Wiki, Edmodo, Skype, and other communication and social networking programs. However, one of them could be better than others based on its affordances and constraints toward the selected teaching strategy.

Summary

This chapter aimed to establish a framework and provide an overview of the structural development of technological, pedagogical, and content knowledge (TPCK) and its relationship to English subject instruction. This chapter included a statement of the problem, research questions, the significance of the study, and a definition of terms.

CHAPTER II

LITERATURE REVIEW

This study examined the relationship of teachers' technological, pedagogical, and content knowledge (TPACK) applied in a digitally rich English language classroom in Saudi Arabia, students' achievement in a vocabulary activity, as well as the perceived experience of students in a digitally rich English language classroom in Saudi Arabia. It also examined the influence of English teachers' self-perceived TPACK on their teaching. This literature review includes the following: (a) a discussion of TPACK for English teachers in order to master effectiveness in teaching English; (b) definition, characteristics, and evaluation of teaching quality; (c) the history of and theoretical background of TPACK; and (d) assessment tools for evaluating TPACK and how this framework is implemented in English education.

Teacher Effectiveness

Teaching is necessary for learning as either a science or an art in order to achieve effectiveness in teaching and learning (Eisner, 2002; Lindley, 1970; Makedon, 1990). It is the teacher's role for how, what, and how much students acquire, learn, and interact with curriculum, peers, and surrounding environment (Darling-Hammond, 1997; Stronge, 2007). The main factor regarding students' achievement is measured on a teacher's effectiveness (Aaronson, Barrow, & Sander, 2003, 2007; Brophy & Good, 1984; Clotfelter, Ladd, & Vigdor, 2007; Darling-Hammond & Youngs, 2002; Drury & Doran, 2003; Greenberg, Rhodes, Ye, & Stancavage, 2004; Greenwald, Hedges, & Laine, 1996;

Hanushek, 1971; Harris & Sass, 2006; Hershberg, Simon, & Lea-Kruger, 2004; Nye, Konstantopoulos, & Hedges, 2004; Rivkin, Hanushek, & Kain, 2005; Rockoff, 2003; Sanders & Horn, 1998; Sanders & Rivers, 1996; The Teaching Commission, 2004; Wayne & Youngs, 2003). On the contrary, earlier research findings reported that teaching quality effectiveness as reflected by students' achievement was not unlike other school resources; this was based on the Coleman (1966) report and the Plowden study (Peaker, 1971).

Therefore, one significant predictor of students' achievement is teaching and teacher quality (e.g., English; Akiba, LeTendre, & Scribner, 2007). Various personal or professional characteristics are required for this role of influence on student's achievement and their learning success to take place (Stronge, 2007). Eisner (2002) defined two different standards of evaluating the quality of teaching: student's success or the teacher's effectiveness or performance. The teacher is viewed as a main source of knowledge and is accountable for students' achievement by administrators, parents, and policymakers at different levels (Stronge, 2007).

The influence of teachers' quality is still most often measured by students' achievement. Also, a teacher's influence or effectiveness exists in most educational policies. Educators have been researching the effectiveness of teachers on students' achievement for decades but there has been no agreement or settlement reached about the characteristics (Goe, 2007). Additionally, there has been no conclusive definition for the element of a teacher's effectiveness and its characteristics (Schrag, 2003).

The divergence among researchers and educators on the definition of teacher quality has led to another about evaluating teacher quality. So researchers, administrators,

and educators have used different and common characteristics about teacher quality or effectiveness such as certification (Darling-Hammond, Berry, & Thoreson, 2001; Rice, 2003; Wilson & Floden, 2003), level of education (Betts, Zau, & Rice, 2003; Goldhaber & Brewer, 1997), major (Goldhaber & Brewer, 2000; Rowan, Chiang, & Miller, 1997; Wenglinsky, 2000, 2002), and teaching experience (Cavalluzzo, 2004; Clotfelter, Ladd, & Vigdor, 2005; Darling-Hammond, 2000; Murnane & Phillips, 1981; Rowan, Correnti, & Miller, 2002). They used these characteristics as proxies and indicators to measure the effectiveness of teaching and teachers.

On the other hand, opponent researchers called such characteristics as prerequisites for high quality teaching (Stronge, 2007). According to Stronge (2007), the most important indicators for effective teachers than any other criterion are teacher's personality and teaching ethics, classroom management skills, preparation and execution of instruction and assessment, and evaluation of student's learning progress. Other researchers and educators considered different characteristics such as content, pedagogy, and pedagogical content knowledge (Ball, Thames, & Phelps, 2008; Delaney, Ball, Hill, Schilling, & Zopf, 2008; Grossman, 1990; Hill & Ball, 2004; Hill, Blunk, et al., 2008; Hill, Rowan, & Ball, 2005; Rowan et al., 1997; Shulman, 1986; Strong, 2011; Stronge, 2007). They considered these characteristics as fundamental requirements for teacher effectiveness. Also, knowledge has been expanded to include technologies as a growing and demanding role and tool in education. Therefore, it is important for educators to acquire the technological and pedagogical content knowledge to have effective teaching (Grandgenett, 2008; Mishra & Koehler, 2006; Niess et al., 2009), which results in different dimensions of knowledge teachers need to recognize. Teachers need to know

the context with all of those components of knowledge to reach successful teaching and learning results. Other variables are also required such as environment and how this knowledge connects to all of them (Ronau & Rakes, 2012; Ronau et al., 2010).

In sum, the argument about the different definitions of teacher quality or effectiveness can be tangled with differences that relate to philosophies and measurability around teaching performance and how it is related to student success.

Broadly, researchers and educators agree that having a positive impact on student's success is a characteristic of high quality teaching. On the other hand, many researchers, educators, parents, and policy makers do not agree on many qualities of effective teaching (Ronau & Rakes, 2012; Ronau et al., 2010). Some researchers support some characteristics theoretically and/or practically. For instance, content knowledge is given as the primary qualification for any person to teach content (Hill et al., 2005; Shulman, 1987). This knowledge proficiency may differ from one situation to another. However, the profession of teaching might consider it as a prequalification. Additionally, it is critical that teachers know how to teach (Darling-Hammond, 2005; Grossman, 1989; Shulman, 1986; Stronge & Hindman, 2006). Some researchers go beyond and state that pedagogy knowledge is more important than content knowledge (Blanton, Sindelar, & Correa, 2006; Torff & Sessions, 2005). However, the interactions in subdomains of knowledge for English teachers to comprehend are led by both pedagogy and content knowledge (Shulman, 1987; Stronge, 2007). Also, some characteristics are hard to measure while other characteristics are measurable and visible (Fenstermacher & Richardson, 2005; Polk, 2006), i.e., it is hard to evaluate personal attributes like motivation and attitudes. However, educational level or major can be easy to measure

with one simple question (Strong, 2011). In addition, some characteristics and indicators of teacher effectiveness can be measured in one set of questions while others need a period of time. For instance, in teaching English, technology integration needs more than one classroom observation to evaluate. However, content knowledge can be evaluated using an aptitude test in one set of observations. Some effective teachers' qualities are knowledge, abilities, and cognitive skills (Hill, Blunk, et al., 2008; Stronge, 2007). Others are morality, dispositions, and teaching ethics (Arroyo, Rhoad, & Drew, 1999; Corbett & Wilson, 2002). Some characteristics include internal or personal qualities while others are external or social qualities. For example, being patient and having wide interests are more significant personal qualities for teachers (Strong, 2011; Stronge, 2007). Also, having active and positive interactions with students, environment, peers, and administrators are important (Berry, 2001; Darling-Hammond, 2005). Some characteristics of teaching require one single method to evaluate while others can be evaluated using different methods (Strong, 2011). For example, English knowledge can be evaluated using different measurement methods such as standardized tests, classroom observations, and so on. On the other hand, psychological attributes such as honest, integrity, commitment, enthusiasm, positive self-esteem, personal presentation, motivation, etc. can only be measured by a subjective method.

As a result, educational agencies in different U.S. states have collected teacher characteristics to measure effectiveness (Bersin & Sandy, 2007; Chester & Zelman, 2007). Stronge (2007) categorized them into six domains (see Figure 1) as follows:

- Prerequisite features and skills.
- Teacher's personality features.

- Classroom management and organization skills.
- Instructional design skills.
- Instructional application skills.
- Educational assessment and evaluation skills

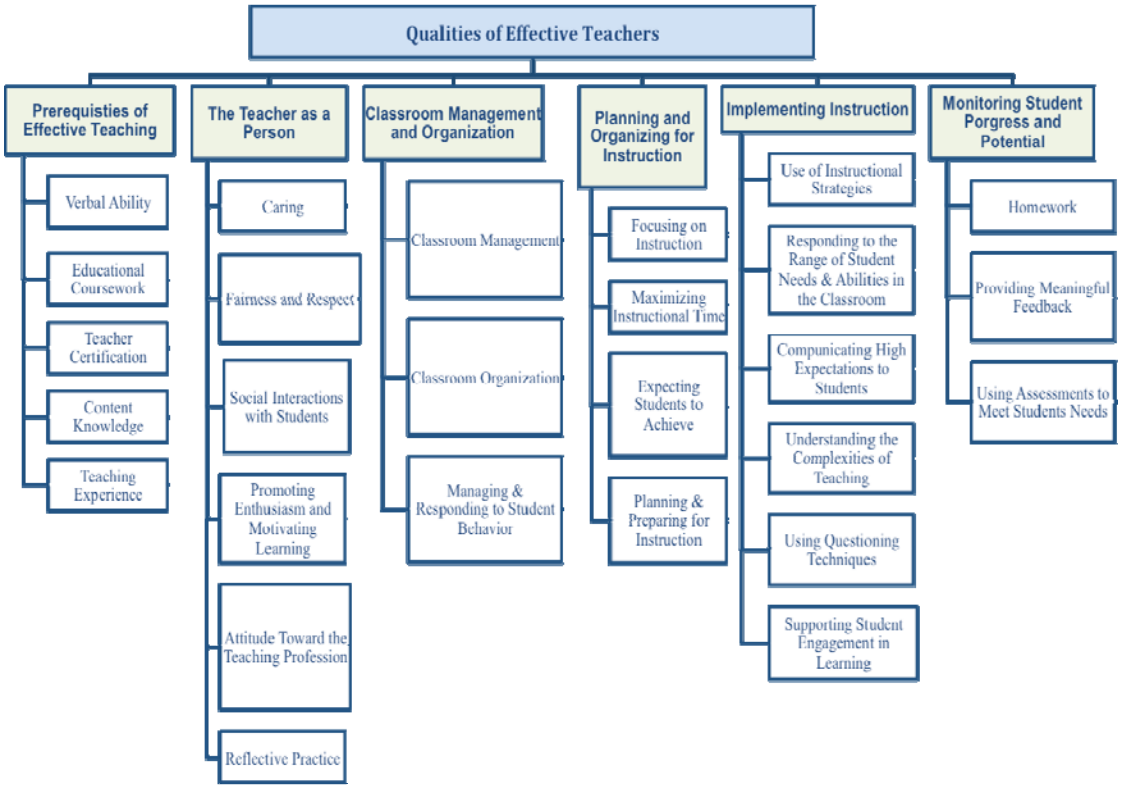

Figure 1. Six categories of teacher effectiveness (Stronge, 2007).

However, Strong (2011) classified them into four groups: competences, personal attributes, pedagogical skills and practices, and teacher effectiveness, thus providing another indication of how teacher education and evaluation can be complicated.

The following section explains the knowledge domain of technology, pedagogy, and English content and how they interact with the subdomains. Teacher effectiveness and quality and students' achievement are the focus of this research study.

Teacher Knowledge

English teachers and educators need to expand their knowledge in order to master knowledge. The foundations of effective teaching are subject matter knowledge and pedagogy knowledge (PK; Grossman, 1989, 1991; Shulman, 1986, 1987). First, there are three subdomains for English knowledge or any subject: common content knowledge (CKK), specialized content knowledge (SCK), and horizon content knowledge (SCK; Ball et al., 2008). According to Ball et al. (2008), common content knowledge is defined as general English knowledge, which is required across all English professions or occupations. They also described specialized knowledge as specific English content knowledge teachers need for teaching English. Additionally, they explained horizon content knowledge as a wide and broad range of English content understanding, which allows teachers to connect all English topics in a curriculum. Second, the picture of effective teaching practices is completed by pedagogy knowledge. Pedagogy knowledge (PK) is defined as the knowledge of methods and strategies of teaching and learning, which include the ability to design, implement, and evaluate instructions, which respond to students' needs (Grossman, 1989, 1991; Shulman, 1986, 1987). Third, the researchers guessed that teacher effectiveness in addition to their skills and interaction of content knowledge could advance student achievement through understanding the subject matter, thus allowing them (teachers) to design, apply, and evaluate proper instructional strategies and representations for specific topics that meet students' needs (Grossman,

1989, 1991; Shulman, 1986, 1987). Pedagogical content includes knowledge of content and students (KCS) and knowledge of content and teaching (KCT; see Figure 2).

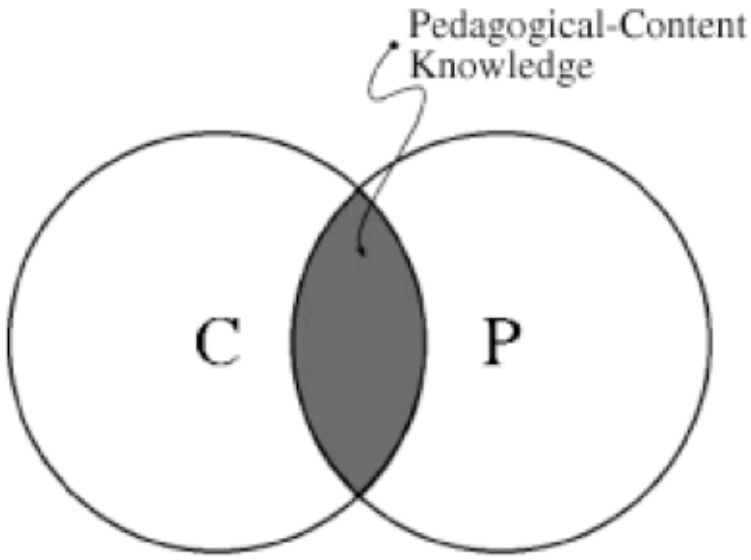

Figure 2. Model of pedagogical content knowledge (Mishra & Koehler, 2006, p. 1022).

Knowledge of content and students (KCS) is a mixed knowledge of English content and students' learning processes. Knowledge of content and teaching (KCT) combines knowledge of teaching and English content (Ball et al., 2008). Additionally, Grossman (1989, 1991) has four criteria to evaluate the development of a teacher's PCK:

1. The teacher has a comprehensive understanding of the purpose of teaching a certain subject matter.

2. The teacher has knowledge of instructional strategies and knows how to present particular topics.

3. The teacher has knowledge of students' understanding and misconceptions of the subject matter.

4. The teacher has knowledge of curriculum and curricular materials regarding subject matter.

In a recent response to knowledge of technology growing critical role, technology knowledge has been added as a needed knowledge domain for implementing technology in the teaching process. English and technology as subject areas seem to have strong relationships. Technology can offer English learners and teachers dynamic representations for abstract concepts of English. Technology can provide English learners and teachers with conceptual and procedural understanding of English. It also helps them connect those understandings. In addition, technology can enhance and facilitate the learning process by leveraging lower order thinking (LOTS) and higher order thinking HOTS) with new, technological, cognitive subjects, which are presented and elaborated using Bloom's taxonomy (see Figure 3; Churches, 2009). English teachers can support their students and help them achieve cognitive objectives once the teachers know how to use technology properly.

Furthermore, video podcasting technology (e.g., Khan Academy), which is affordable, can help digitize the teaching method (pedagogy) with new methods of teaching like "Flip Teaching" or "Flipping the Classroom" (Baker, 2000, p. 57). These offer more creative chances for the"4Cs" (critical thinking, communication, creativity, and collaboration; see Figure 4; Partnership for 21st Century Skills, 2003) rather than using traditional strategies. As a fact, collaboration is to be more important for 21st century skills than it used to be in the past. Churches (2009) added this element in his Bloom's taxonomy. There is an interaction between technology and teaching approaches

or methods, which indicates teacher technology knowledge needs to be deeply understood, not just know how to operate them.

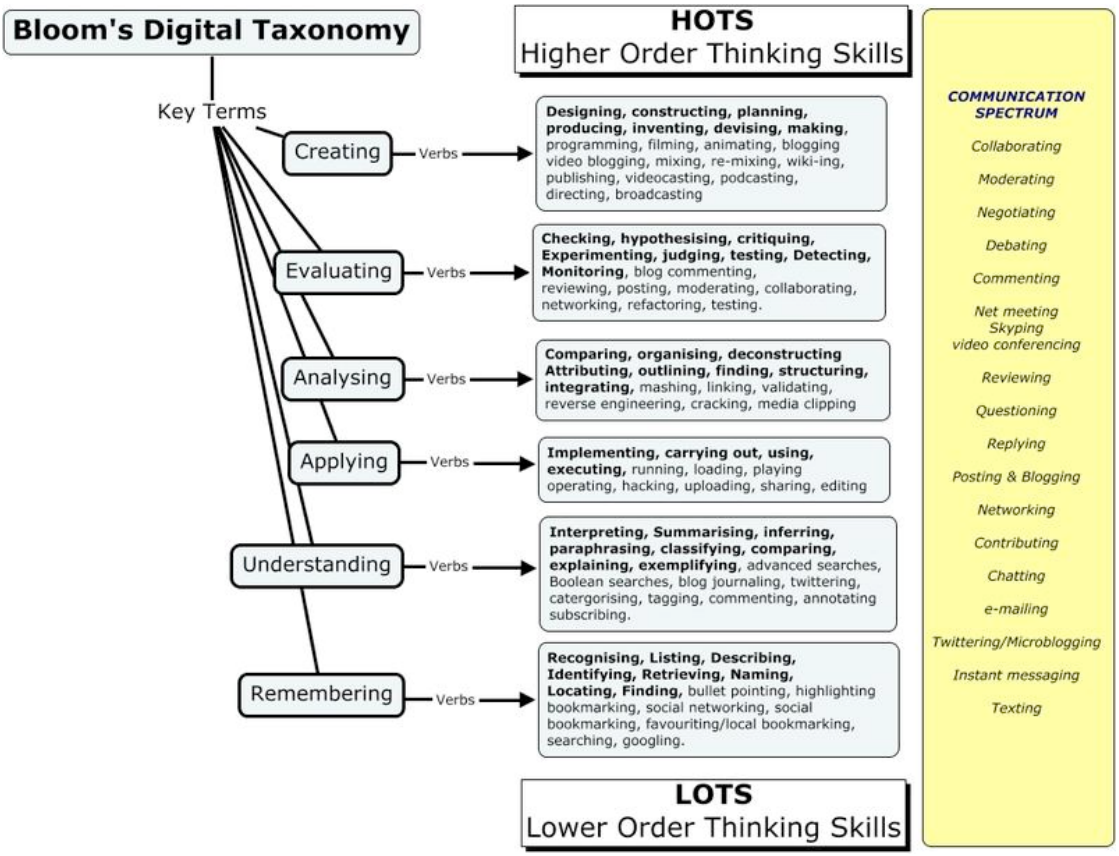

Figure 3. Bloom's digital taxonomy (source: http://edorigami.wikispaces.com/Bloom's+Digital+Taxonomy).

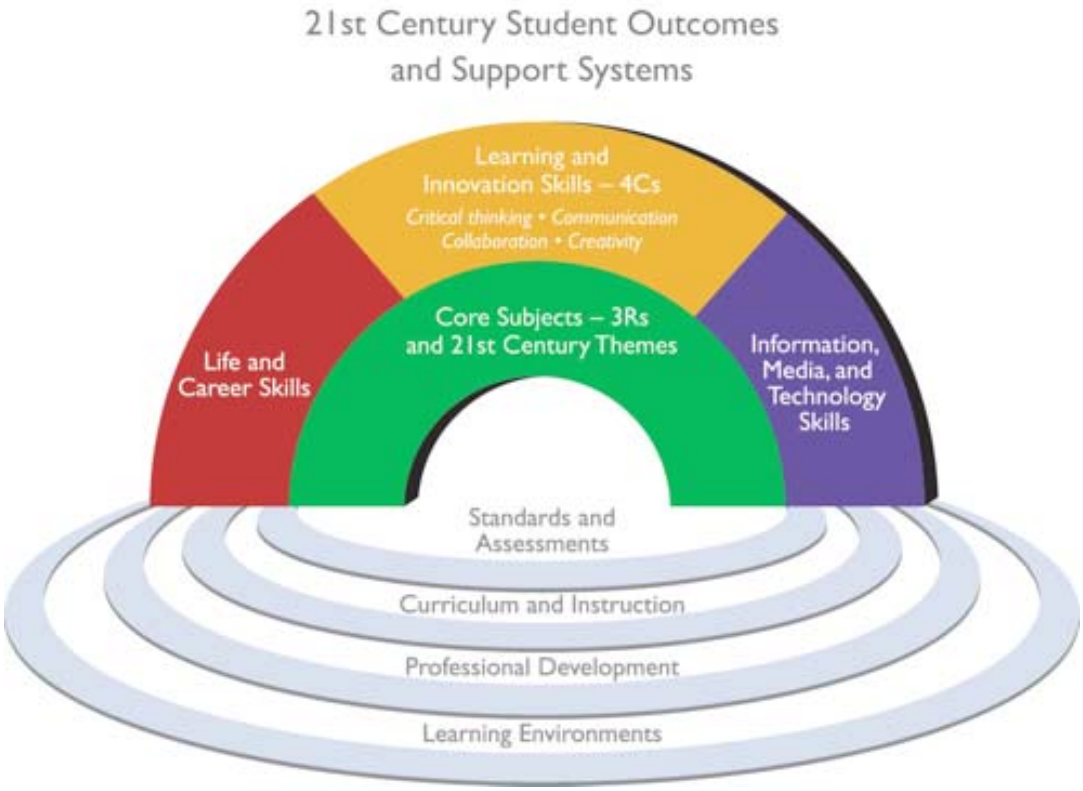

Figure 4. Twenty-first century learning skills (Partnership for 21st Century Skills, 2003).

The idea of 21st century learning skills is considered by educators as a necessary framework of skills students need to reach for success and accomplishment in real life work; it has grasped attention and criticism with its demanding role of technology in education (Boling & Beatty, 2012). Since there are common definitions of 21st century learning, Mishra and Kereluik (2011) synthesized 10 different main educational frameworks about the concept into three: (a) foundational knowledge, which includes content, information literacy, and cross-disciplinary knowledge; (b) meta knowledge, which includes problem solving/critical thinking, communication/collaboration, and

creativity; and (c) humanistic knowledge, which includes life/job skills, cultural competence, and ethical/emotional awareness (see Figure 5).

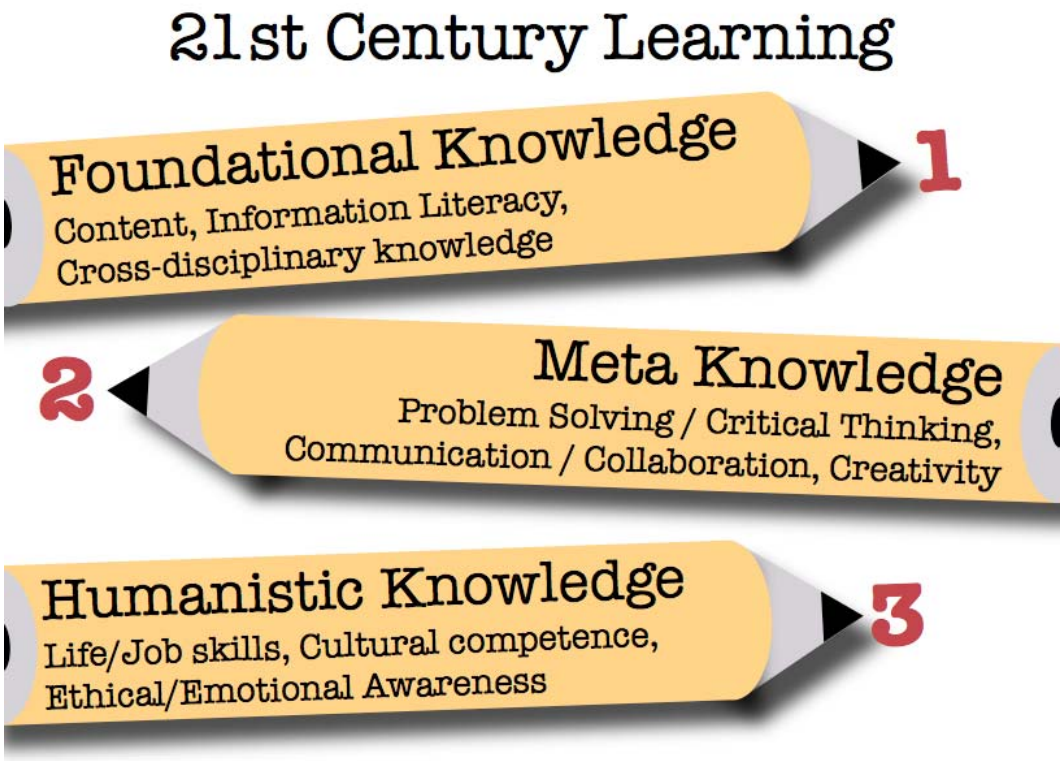

Figure 5. Three categories of 21st century learning skills (Mishra & Kereliuk, 2011).

On the other hand, Mishra and Kereluik (2011) argued that information literacy and cultural competence and awareness are the only skills considered to be 21st century learning skills. Consequently, the demand for English teachers to know in depth how to teach with technology has increased with the change in learning objectives.

Implementing technology in education (learning and teaching) is based on digitizing the curriculum and the environment. This emphasizes the importance of teachers having a holistic understanding of how to appropriately use technology in

teaching. Technology knowledge (TK) is to understand how to implement and use technology in general. However, teachers are required to deeply know how to effectively teach the subjects and topics of English to their students using technology (Mishra & Koehler, 2006; Niess, Kajder, & Lee, 2008). This is called technological, pedagogical, and content knowledge (TPACK). Knowing TPACK is the product to synthesizing the subject matter, pedagogy, and technology domains of knowledge results in utilizing this synthesis to recognize and identify the limitations of technology to teach the subject matter (see Figure 6; Harris et al., 2009; Mishra & Koehler, 2006; Niess, 2005).

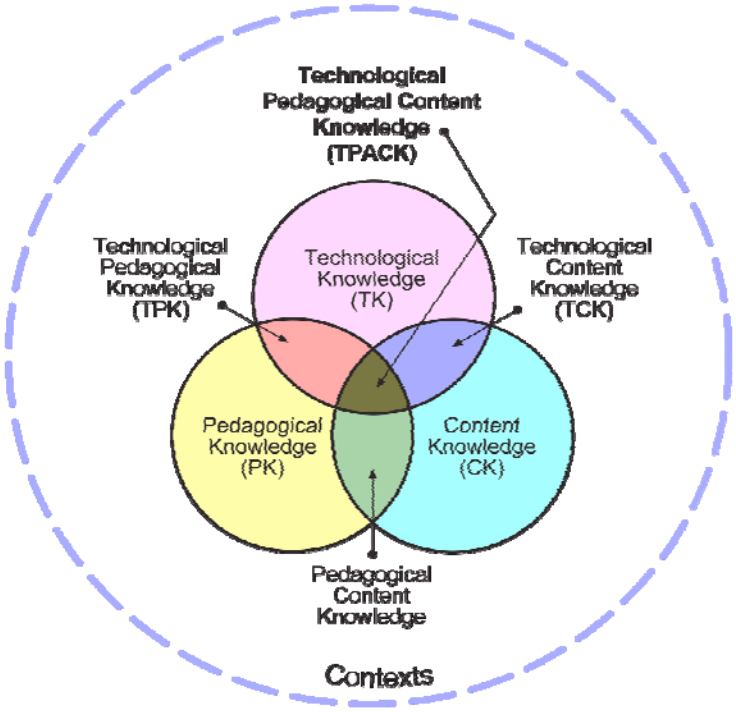

Figure 6. Technological, pedagogical, and content knowledge (TPACK).

Technology knowledge can also be defined as the acquisition of technological content knowledge (TCK) or technological pedagogical content (TPK). Technology

content knowledge (TCK) can be described as the understanding of the reciprocal relationship between technology and content in terms of affordance and constraints (Harris et al., 2009). As a result, English teachers could implement any technological tool that best describes and facilitates their own English subject. The TPK can be explained as the understanding of reciprocal relationship between technology and pedagogy in terms of affordance and constraints (Harris et al., 2009). For instance, integrating some technological tools such as Wiki, WebQuest, Skype, and Edmodo, educational games and many other social networking tools and communication tools can enhance some teaching methods like collaborative teaching and learning, English pronunciation, vocabulary, and so on. However, teachers need to consider differences among those tools--some might be better than the others depending on the affordances and constraints in terms of teaching strategy.

The framework of the TPACK was developed to have four different main components. Those components were used as criteria to evaluate a teacher's TPACK (Niess, 2005, 2012):

1. An overarching conception about the purposes for incorporating technology in teaching subject matter topics. This requires teachers to have a foundational understanding of what it means to teach a particular subject with digital technologies.

2. Knowledge of students' understandings, thinking, and learning in subject matter topics with technology. This requires teachers to have a comprehensive understanding of students' thinking and learning processes with the presence of digital technologies in their teaching for a particular subject matter.

3. Knowledge of curriculum and curricular materials that integrate technology in learning and teaching subject matter topics. This requires teachers to have a solid understanding

of curriculum, all teaching materials, and what affordances and constraints digital technologies will offer to their curriculum objectives.

4. Knowledge of instructional strategies and representations for teaching and learning subject matter topics with technologies. This requires teachers to understand how to build a reciprocal relationship between his or her teaching methods and the best match digital technology that provides the best representation for a specific topic.

Niess and her colleagues (2009) proposed four TPACK standards and associated them with a five-step process TPACK developmental model to meet the standards for mathematics. However, these four TPACK standards and the five steps can be used for English subject matter. These standards had indicators for evaluation:

1. Designing and developing digital-age learning environments and experiences. Teachers design and develop authentic learning environments and experiences incorporating appropriate digital-age tools and resources to maximize mathematical learning in context.

2. Teaching, learning, and the mathematics curriculum. Teachers implement curriculum plans that include methods and strategies for applying appropriate technologies to maximize student learning and creativity in mathematics.

3. Assessment and evaluation. Teachers apply technology to facilitate a variety of effective assessment and evaluation strategies.

4. Productivity and professional practice. Teachers use technology to enhance their productivity and professional practice (Niess et al., 2009).

These TPACK standards were later adopted by the Association of Mathematics Teacher Educator (AMTE; 2009), combined with the International Society for

Technology in Education (ISTE; 2008) teacher standards, and then published in their version of a mathematics TPACK framework (AMTE, 2009).

1. Design and develop technology-enhanced mathematics learning environments and experiences. Educators use their knowledge of technology, pedagogy, and content to design and develop learning environments and experiences to maximize mathematics learning.

2. Facilitate mathematics instruction with technology as an integrated tool.Educators implement curricular plans that integrate appropriate technology to maximize mathematical learning and creativity.

3. Assess and evaluate technology-enriched mathematics teaching and learning.Educators assess and evaluate mathematics teaching and learning using appropriate assessment tools and strategies.

4. Engage in ongoing professional development to enhance technological pedagogical content knowledge. Educators seek, identify, and use technology to enhance their knowledge, productivity, and professional practice.

The five levels of TPACK development were inspired by Rogers's (1995) five stages of the innovation-decision process model. Niess, Suharwoto, Lee, and Saddri (2006) defined each level as follows:

1. Recognizing (Knowledge): Teachers at this level can use a specific digital technology and judge its capabilities with a particular subject topic.

2. Accepting (Persuasion): Teachers at this level develop an attitude open to the integration of digital technology in their teaching but might not understand the potential role of technology in their teaching.

3. Adapting (Decision): Teachers at this level are capable, after an experience, of deciding whether to adopt a specific digital technology in their teaching for a particular subject topic.

4. Exploring (Implementation): Teachers at this level start to actively integrate digital technologies in their teaching practices for a particular subject topic.

5. Advancing (Confirmation): Teachers at this level are capable of evaluating the effectiveness of integrating a specific digital technology in their teaching for a particular subject topic.

These levels of TPACK can provide helpful guidelines for researchers and educators to create effective plans and examine, improve, and evaluate the process of technology integration in teaching (see Figure 7). These levels of TPACK also show how important it is for teachers of English or any other teachers to interact and engage as the teachers need to have all three domains of knowledge during the phase of integrating technology. These TPACK standards can also help teacher education professional development programs be designed, applied, and evaluated. Niess et al. (2006) also showed the importance of interaction and engagement mathematics teachers need to have with all three domains of knowledge during the integration of digital technologies. Thus, teacher education and professional development programs should be designed, applied, and evaluated according to these TPACK standards and developmental levels.

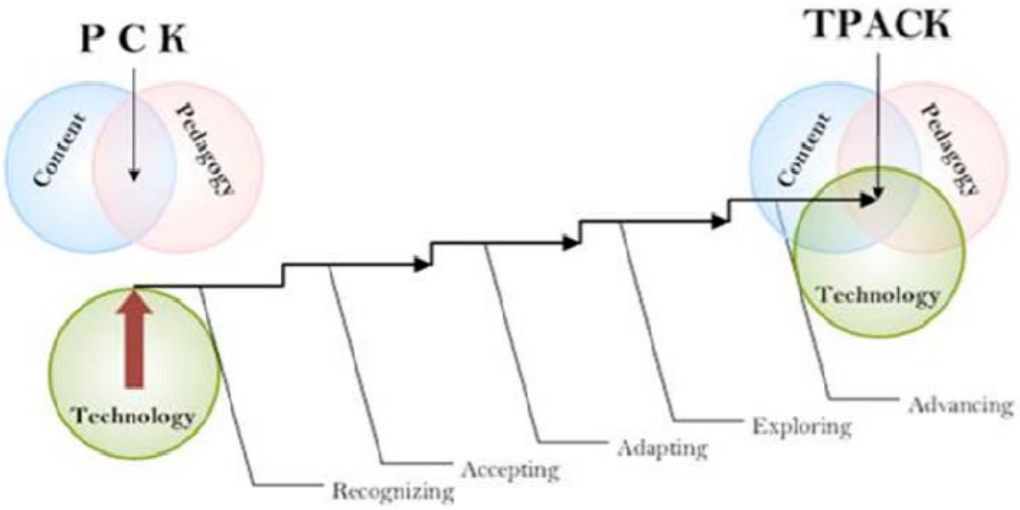

Figure 7. Five level model of technology, pedagogy, and cognitive knowledge (Niess et al., 2009).

The TPACK framework is wide enough to carry three domains of knowledge yet tight enough to be specific for specific topics, settings, grade levels, and students' needs (Niess, 2012). The three knowledge domains are required to be taken all together, not in separation of one another (Mishra & Koehler, 2006) by English teachers because they all interact with each other. Ronau et al. (2010) described teacher knowledge with a large circle of interactions between six components (individual, environment, orientation, discernment, subject matter, and pedagogy). These components of knowledge are connected with each other in three-dimensional structures. With wide interaction, the direct interaction between the teacher's knowledge of subject matter and pedagogy creates the first dimension (Field) and this construct produces pedagogical content. Mode is the second dimension and contains the interaction between orientation (knowledge of

understanding and managing impact of personality features on learning process) and discernment (knowledge of understanding the impact of cognitive domain on learning process). A dynamic knowledge base that can be used to control multiple internal impacts on students' learning is produced by the interaction of the Mode dimension. There are two aspects of the Context dimension: individual and environment. They both represent external factors on the teaching and learning process. The individual aspect describes the knowledge of individual factors like age, gender, socioeconomic status (SES), etc. This influences the learning case teachers have to understand and control in order to be effective teachers. The environment aspect explains the knowledge of environmental impact like classroom climate, school climate, school, and community factors on learning (see Figure 8).

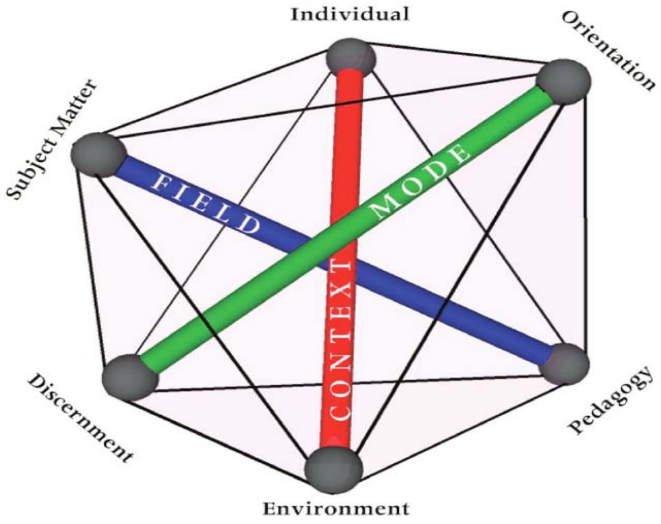

Figure 8. Comprehensive framework for teaching (Ronau & Rakes, 2012).

The interaction among all three dimensions gives a clear image of teacher knowledge. English teachers are expected to reach ut a high level of effectiveness during the integration of technology TPACK once they have active and interactions among the all aspects in CFTK model (Ronau et al., 2010).

Effectiveness Evaluation

Teaching effectiveness evaluation can be done through either subjective or objective measurements. Instructional performance can be evaluated through seven popular approaches. The purpose of evaluation and the teacher effectiveness definition, whether it is specified by the teaching performance or student achievement, determine the variance between and among these methods of evaluation (Eisner, 2002; Little, Goe, & Bell, 2009; Strong, 2011). Examples of qualitative measures of such methods have restraints on their validity and reliability such as peer and principal classroom observations and self-principal and student evaluations. They evaluate morals and beliefs of teachers, behaviors, attitudes, and teaching ethics. These types of measures have some limitations on their validity and reliability because there could be biases of the observer and the cognition demands of the task (Strong, 2011). On the contrary, in quantitative measures such as value-added modeling, teacher portfolios, teaching artifacts, and teacher aptitude tests have less validity and reliability threats. Actually, rather than measuring a teacher's teaching effectiveness and performance or examining his/her knowledge, student's achievement is more way to evaluate teacher effectiveness. The next section explains in detail each evaluation method.

Self-Evaluation

There is a low cost for teachers to self-evaluate as a method once their intentions, beliefs, and knowledge about their teaching are measurement objectives. Teachers are encouraged in this model to report their practices and behaviors in classrooms using logs, questionnaires, interviews, or even diaries. The variety of focus (broad or specific) and the purpose of use (summative or formative) determine the variation in collection methods, and both quality and quantity of the data self-evaluation is meant to gather (Little et al., 2009; Mullens, 1995).

Depending on the use, teachers can include checklists, frequency of use measures, or rating scales. The validity of self-evaluation is limited by the bias of teachers' self-perceptions as it is a subjective performance assessment. However, logs are reliable and valid as are classroom observation (Camburn & Barnes, 2004; Rowan & Correnti, 2009). All types of self-evaluation give accurate, reliable, and valid data; however, potential problems can be caused by a teacher's inflated information (Strong, 2011). According to Blank, Porter, and Smithson (2001), some factors like time to respond to questions and a complex vocabulary could limit the quality of teacher responses.

Classroom Observations

Educators prefer classroom observation; they are considered credible because they are the most direct method to evaluate teacher effectiveness in context (Little et al., 2009). There are various observation protocols in terms of procedures, subject mater, objectives, grade level, and observed requirements like knowledge and training, duration, frequency, complexity, validity, and reliability (Little et al., 2009; Strong, 2011). Observation protocols can be researcher-made or published ones like Charlotte

Danielson's Framework for Teaching, The Classroom Assessment Scoring System (CLASS), The Protocol for Language Arts Teaching Observation (PLATO), Mathematical Quality of Instruction (MQI), and Teaching Standards and Performance Rubrics (Gallagher, 2004; Kimball, White, Milanowski, & Borman, 2004; Milanowski, 2004). Evidence suggests the validity and reliability for such measures in order to evaluate teacher quality and effectiveness. These researchers used evaluations for classroom observations as a predictor of student achievement and success. However, since an evaluator's training and inter-rater reliability are still questionable in terms of classroom observation to measure teacher effectiveness, more research is still needed.

Artifact Analyses

As a good source of information, an analysis of artifacts is always recommended to measure teacher effectiveness and quality since those artifacts provide reliable and valid information about teachers' methods of teaching (pedagogy) and instructional work. This measurement tool may require randomly selected teaching material such as students' homework, lesson plans, classroom activities, and assessment tasks. Then, a measurement of their relationship to student learning and success is needed (Little et al., 2009). Based on the purpose of the research study and evaluation, the criteria to evaluate each level of teaching artifact may vary from one research study to another (e.g., aligning with standards, supporting 21st century learning skills, integrating technologies; Strong, 2011). Thus, there are different protocols for teacher artifact evaluation and they differ depending upon their focus and how well structured they look (e.g., Scoop Notebook, Instructional Quality Assessment (IQA), Intellectual Demand Assignment Protocol [IDAP]; Little et al., 2009; Strong, 2011). This objective measure has limited validity and

reliability compared to subjective measures. This could negatively affect data quality regarding the rater's knowledge of the content, experience, and scoring criteria. However, analyzing artifacts is a practical and cost-efficient measure to conduct both summative and formative evaluations of teacher effectiveness; its accuracy and consistency of data quality are comparable to those obtained from classroom observations (Little et al., 2009; Strong, 2011).

Student Evaluation

Students interact with teachers every school day as recipients of instruction and they have the ability to judge their teachers' performance in terms of characteristics and ethics (Little et al., 2009; Strong, 2011). This type of teacher evaluation is where students can rate their teachers' teaching practices as well as their behavior on a Likert scale once the scale is well-developed and designed for its validity and reliability (Little et al., 2009). According to Follman (1992, 1995), some factors like students' personality may affect the rating bias (leniency and halo errors) when students lack knowledge of content and pedagogy, classroom management, and other qualities of teaching. Student evaluation can provide information about teacher practices and behavior as it is still considered non-time consuming and low cost (Follman, 1992, 1995).

English Technological, Pedagogical, and Content Knowledge in Research

A study was conducted by Polly (2011) on two teachers in terms of technology integration in their teaching. This study showed the teachers were trained for 30 hours on a TPACK, learner-centered professional development project. Following the training, they were interviewed and observed to investigate and measure how they implemented technology in their classrooms and how this integration was related to TPACK

development. The results of this study showed the trained teachers applied what they had learned in the TPACK development, thus affecting their students' development, thinking skills, and understanding of English concepts.

Polly (2011) suggested developing and designing a holistic TPACK professional training for in-service English teachers to create a conceptual and procedural understanding of English TPACK concepts in teaching. To reach these objectives, long and sufficient content-specific professional programs are needed.

Lyublinskaya and Tournaki (2012) conducted a study about how professional development of content authoring affected teachers' TPACK development and students' achievement scores. After one year of professional training to develop a curriculum that integrates technology, some teachers were evaluated in public high schools. The researchers developed a TPACK rubric to measure the teachers' effectiveness and artifacts. The results of their study showed it was important to have lesson plan preparation and teacher TPACK levels to affect teaching and students' achievement. The researchers also recommended teachers be provided with feedback and support to enhance their teaching lesson plans.

Another study was conducted by Jang and Tsai (2012) to investigate the integration of interactive whiteboards on in-service teachers of science and TPACK self-efficacy in Taiwan. They developed a TPACK questionnaire to analyze 614 responses from the teachers. The results showed elementary mathematics and science teachers who used interactive whiteboards had higher TPACK self-efficacy than others who did not use them. Also, factors such as teaching experience and knowledge of subject matter were significant in elaborating on the variance of teachers' TPACK.

Another study was conducted by Bos (2011) using a mixed method to investigate how learning about the use of TPACK and English subject matter would influence the knowledge of 30 teachers and help them design their lesson plans. The teachers were trained and TPACK was implemented to help them plan their lessons using Web 2.0 tools and English subjects. The study measured the relationship between teachers' TPACK and technology implementation. Peer evaluation on a 5-point scale took place regarding the growth of teachers' TPACK. The results showed most teachers disagreed about integrating technology into their teaching practices. The researcher indicated there was a lack of explanation and training concerning the TPACK construct related to their teaching practices.

Richardson (2009) investigated teachers' TPACK development. The experimental study included 20 teachers from three rural and three urban schools. Teachers spent 120 hours on professional development training to promote their TPACK. The results showed there was significance in evaluating TPACK as interacting domains of knowledge rather than isolated domains. The study also showed the importance of giving the teachers professional training, which helped them develop and enhance their technology implementation.

In a different study conducted by Mahdum (2015) about the TPACK of English Teachers in Pekanbaru, Riau, Indonesia, the research was aimed at examining how in-service teachers developed and applied TPACK throughout their teaching. Seventy-four senior high school in-service English teachers in Pekanbaru who were selected through simple random sampling participated in the study. The instrument consisted of 45 items that measured in-service English teachers' self-assessment of the 7 TPACK sub-domains.

The results showed the TPACK of English teachers in Pekanbaru was in the *good* category. It implied they had been able to integrate information and communication technology, content, and appropriate approaches in English language learning. Mean scores on technology-related sub-domains were lower than non- technology sub domains. Yet, it was still in the *good* category, which might indicate the teachers had not been really familiar with technology knowledge. Therefore, it is recommended that teachers continuously develop their TPACK, especially in technology-related sub domains in order to achieve better language teaching and learning.

Technological, Pedagogical, and Content Knowledge Assessment

As a new domain of knowledge, TPACK is still in its infancy in terms of evaluation and application but the main types of assessing the TPACK and its influence on teacher effectiveness are similar to those that measure teacher quality. There are many types of measuring teacher effectiveness: self-evaluation measures such as questionnaires (open-ended and close-ended) and interviews, logs, reflective journals, and diaries; classroom observations (standardized and unstandardized protocols and rubrics); and the evaluation of teaching artifacts (lesson plans, student work, classroom activities and teaching materials). It is hard to measure knowledge because it is invisible so we can only measure our behaviors and actions through our effects (Hunt, 2003).

These measurement types are used equally in experimental research studies but not open-ended surveys, which may be limited by challenges such as coding and analyzing (Koehler, Shin, & Mishra, 2012). It is hard to measure knowledge because it is invisible so we can only measure our behaviors and actions through our effects (Hunt, 2003). The TPACK measurement tools should evaluate the reflections of this knowledge

on teachers' actions (instruction design, lesson plans, classroom activities, assessment tasks) and correlate such knowledge with teaching effectiveness. The TPACK evaluation tool and its interpretation of data should respond to the definition of TPACK and its objectives and be consistent. Measuring such knowledge will give a rich foundation to make decisions about whether or not teachers acquired the TPACK framework.

There is a limited number of reliability and validity tests for TPACK measurement (Koehler et al., 2012). The lack of investigation and assessing of the TPACK framework is related to the complicated nature of TPACK, the multiple content areas that need to be included, different target groups such as experienced and prospective teachers, etc., and the fast development of technology (Koehler et al., 2012).

Seven subscales will evaluate the TPACK framework (TK, CK, PK, PCK, TCK, TPK, TPACK), which includes the full concept of TPACK (Archambault & Crippen, 2009; Koehler, Mishra, & Yahya, 2007; Schmidt et al., 2009). In these measures, participants will rate their agreements on each subscale; their rating will be calculated as a predictor of their TPACK self-efficacy but not their knowledge (Lawless, Kulikowich, & Smith, 2002; Lawless & Pellegrino, 2007). Some measures will focus on the TPACK intersection subdomains (TCK, TPK, TPACK). Harris et al. (2010) developed a rubric to assess the three subdomains (TCK, TPK, TPACK) by evaluating lesson plans of prospective teachers based on four levels of TPACK proficiency. They adopted the Technology Integration Assessment Instrument (TIAI; Britten & Cassady, 2006) and then tested and confirmed their rubric's validity and reliability. Another TPACK measurement was developed by Lyublinskaya and Tournaki (2012). Their TPACK rubric depended upon the four components of TPACK (Niess, 2010), the five levels of the TPACK

development model (recognizing, accepting, adapting, exploring, and advancing; Niess et al., 2009), and the Principles for a Practical Application of TI-Nspire technology (Dick & Burrill, 2009) since it is a content-specific form. The researchers analyzed the teacher artifacts using their rubric but it could be employed for direct evaluation and as an observation protocol as well. This rubric has a strong validity, but reliability and validity analyses are still in process for this newly developed rubric (Lyublinskaya & Tournaki, 2012).

Summary

This chapter provided a theoretical background of teacher quality in teaching and how well it is measured; explored teacher knowledge of technology, pedagogy and content, and how TPACK is measured; and reviewed English TPACK research.

CHAPTER III

METHOD

This chapter provided an overview of the research methodology. The purpose of this study was to explore technology integration in technology-rich, English language learning classrooms in Saudi Arabia. The following research questions guided this study:

Q1 Is there a statistically significant difference between the mean scores of teachers' Technological Pedagogical and Content Knowledge before and after participation in a workshop about technology integration?

Q2 Is there a statistical correlation among teachers' technological, pedagogical, and content knowledge applied in a digitally rich English language classroom in Saudi Arabia, teacher effectiveness, and students' achievement?

Q3 What is the perceived experience of teachers and students in a digitally rich English language classroom in Saudi Arabia?

This study included high school English teachers in Saudi Arabia. All participants were male teachers who teach English language courses in public Saudi Arabian schools. Participants were gender specific because the school system in Saudi Arabia separates males and females. The researcher, who is also male, accessed to the male portion of the education system and thus interviewed and observed only teachers and students. Two research-developed pre and post surveys were administered to participants digitally. The researcher conducted observations and, an in-depth, recorded interview with each teacher ($n = 2$). Also, an in-depth recorded interview was conducted with ($n = 2$) students for data analysis to provide depth to the student perspective collected.

To answer the first question, there were two workshops (treatment) for the teachers, theoretically and practically. Teachers were given pre survey (mean score 1) to measure the seven subscales of the TPACK (TK, CK, PK, TCK, TPK, PCK, and TPACK; see Appendix A). As the survey questionnaire was given to teachers and they filled it as per their own convenience, and the responses are, therefore, self-reported. This means that the responses of the teachers explain the perceived knowledge of themselves. The teachers then were given two workshops (treatment) by the researcher to infuse them with knowledge about the seven subscales of TPACK. After that, teachers were given a post survey (mean score 2). A paired-samples t test was used to see whether there was a statistically significant difference in mean scores for teacher's technological, pedagogical, and content knowledge about technology integration in an English rich English language classroom.

To answer the second research question, teachers' knowledge was measured using a self-report survey grounded on the technological, pedagogical, and content knowledge (TPACK) framework (Mishra & Kohler, 2006). Teacher's effectiveness was discussed as a result of a statistical correlation between a pre and post survey quantitatively measuring teachers' TPACK using a paired-samples t test and student's achievement using a statistical approach (Pearson Correlation Coefficient). Students' course grades were used as a measure of student achievement for the determination of correlation. To answer the third question, there was a follow up interview with two teachers ($n = 2$) and two students ($n = 2$) to explore the perceptions more deeply and support the results from the quantitative analysis.

Epistemology

According to Creswell (2014), epistemology was "what counts as knowledge and how knowledge claims are justified" (p. 20). The researcher applied a pragmatic perspective to this research. Pragmatism sees no truth in a dualism like independence of the mind or within the mind; pragmatism is seen as a paradigm that guides academic research (Johnson & Onwuegbuzie, 2004). However, knowledge is viewed as both constructed and taken from the reality of the world that people experience (Johnson & Onwuegbuzie, 2004). According to Creswell (2014), the truth was what worked at the time. So, pragmatists did not use single research methods but believed individual researchers were free to pick any suitable methods and techniques that best fit their needs and were based on the purpose of their research. The goal was to reach the best understanding of their research questions (Creswell, 2014). Pragmatic researchers usually used pluralistic methods to derive knowledge; thus, the mixed-method design of this study was in alignment with pragmatism (Creswell, 2014). The researcher used mixed-methods, collecting data quantitatively and qualitatively from multiple sources, to better understand the researched experience.

Researcher Stance

Students' learning could be affected drastically by the implication of technology. I grew up without technology until high school. I entered the world of technology and started owning mobile devices when I was in college. I loved dealing with technologies such as smartphones as I felt my cellphone was like my desktop where I could send email, file papers, read, and apply for governmental forms from my smartphone and

tablet. So then I felt like this is my path toward learning and implementing technology, applications, and online technological tools toward education.

We, the grown up generation at the start of the 21st century, were unable to use currently available technology gadgets until our high school graduation. After entering into college level studies, I found that use of these technologically empowered devices is essential and important, particularly for learning purposes because it saves time; reacts intelligently; takes most of personal burden in terms of reminders, schedules, write ups, and meetings; analysis; access to information, and, most importantly, communication. Teachers could teach more effectively if they implemented technology along with pedagogy and content knowledge. So I believe this research could find a way to use teacher TPACK to enhance English teaching and learning.

Since there is a lack of knowledge about using TPACK in teaching, the researcher will address three workshops in Saudi Arabia for the teachers. The workshops will cover information about TPACK, Technological Resources and applications to be used for teaching and learning, and practicing the use of TPACK and technology application in teaching. The workshops will take place in Alhassa, Saudi Arabia, at Omran Secondary School that is fully equipped with hi-tech tools to hold and teach. I am the researcher and will also be the instructor of the workshops. This design is necessary because TPACK is not well known to this population, and I have the needed background because I have specialized in educational technology and spent enough time in Master's and Ph.D studies on the field of technology and TPACK. The workshops aim to enable the participants to implement technology-rich teaching and learning in their classrooms with the aim to transform the environment of teaching and learning through a new approaches

by applying newly developed knowledge about how to teach with technology. Because the workshop teaches about technology integration and teacher knowledge, it prepares participants to engage in the research study. While it provides background information about TPACK and supports teachers' implementation of technology, it does not interfere with the research questions.

Research Design

Merriam (2009) defined research as a systematic process in which researchers know more about something than they did before engaging in the process. It is important to make a decision on planning for the research by choosing the best method that fits the research questions and leads to the best understanding of the problem and phenomenon (Cohen, Manion, & Morrison, 2007). This study sought where there was a statistically significant difference between the mean scores of teachers' Technological Pedagogical Content Knowledge before and after participation in a workshop about technology integration. This study also sought to determine if a correlation between teachers' TPACK applied in a digitally rich English language classroom in Saudi Arabia and students' achievement as measured by coursework performance existed with any statistical significance; it also explored the perceived experience of students in a digitally rich English language classroom in Saudi Arabia. A mixed-method research design including interviews, surveys, and artifacts collection met the purposes and goals of this study because in order to fully understand the experience and perceptions of the participants, in-depth information needed to be collected in the words of the participants.

These rich data and deep analysis led to a clearer understanding of the quantitative and qualitative data. According to Johnson and Onwuegbuzie (2004), mixed-

methods design research enables the researcher to combine quantitative and qualitative research techniques, methods, approaches, and concepts into one single study to attain a better understanding of the problem or phenomenon. According to Greene, Caracelli, and Graham (1989), there are five general reasons to use mixed-methods research design: triangulation, complementarity, development, initiation, and expansion. Also, some strategies for mixed-method research design depend on timing, weighting, and mixing of the quantitative and qualitative data collection and analysis (Creswell, 2014). This study built a foundation with correlation analysis and use qualitative analysis to describe perceived experiences for a deeper understanding. In sequential mixed-methods design, research was conducted in two or more phases. One type of data (quantitative) was collected first and used to inform the following phase(s) of the study (Creswell, 2014). This research used a paired-samples t test, a Pearson correlation coefficient, and interview to answer all the research questions.

Workshop Design

Format

The workshop was in English because all teachers were of English subject and I found this opportunity as a practical way for teachers to work, communicate, listen, talk and understand in English. Their confidence was seen improving as even-though they have received many different trainings as part of their teaching employment, but I found that they were not fully in English. I also found that teachers were much excited to learn through this English language workshop. I also wanted them to communicate to students in English so that teachers interaction in the desired language can be established for this particular experiment.

Timeline

The workshop was comprised of two days, one being the theoretical and other being the practical. The theoretical one was based on the understanding of the key concepts, mainly TPACK and also technological framework was discussed with participants during the first day.

The other day was based on practical sessions with the agenda to apply some methods of teaching such as collaborative learning where teachers work together using Google Docs, for example, to make discussion, and do some activities such as vocabulary lessons. They also learned how to create portfolios and blogs for their lessons. Example of portfolios sites: weebley and wordpress. Also some games online, for vocabulary lessons such as Scratch.

Technological Pedagogical and Content Knowledge (TPACK)

Activities. Collaborative learning using Google Docs,

- Portfolio creation using Wordpress, Weebly, Blogs Sites, Video Edition Sites, Sounds Applications for Listening skills and vocabulary pronunciation.
- Online Games creation such as Scratch.

Rationale. All the work done in the workshop was to establish a foundation of teaching English using technology based on English content and technology content and knowledge. Showing the teachers some examples beside theoretical ideas was to prove the effectiveness of using technology in pedagogy and thus enhancing teaching and learning. The need to practice English for teaching and learning was much desired by the participants to start digging learning more and more about technology in education and this was what happened.

Participants

According to G-power software version 3.1, the recommended sample size was 66 teachers for both the pre and post survey. The participants number was (n = 56). The target population of this study was English teachers in Saudi Arabian public high schools and their students. In Saudi Arabia, English teachers are required to take some courses in educational technology such as computer in teaching--programming fundamental to help use technology in teaching. Educational training includes professional training programs every year in English content, English pedagogy, and English curriculum using technology integration to enhance students' critical thinking of problem solving skills as well as English assessment (Mullis et al., 2008). In the meantime, participation is voluntary for most of the teachers except beginners. The Ministry of Education always encourages principals to allow teachers to participate and gives extra credits for attendees by counting them toward promotion in their profession.

Sampling Methods

In this study, a convenience sampling method was used to select participants. Convenience sampling is a non-probability sampling technique by which subjects are selected because of their convenient accessibility (Cohen et al., 2007). A pre- and post-survey (see Appendix A) including components to collect data about teacher TPACK and its use in teaching English were sent to the participants. To answer the questions of the surveys, participants were contacted through emails obtained from professional listservs of English teachers in Saudi Arabia who are interested in using TPACK through the educational department in the Ministry of Education after receiving permission to conduct the research.

A purposeful sampling technique was employed to select the interviewees from those who participated in the surveys and were willing to participate in a follow-up interview to collect additional data. Purposeful sampling is often used when the researcher wants to select typical representatives (cases) for study in depth (Merriam, 2009). The criterion for selecting the teacher participants was convenience sampling where the accessibility to technology rich classrooms was more convenient. The students were selected by the teachers using provided criteria of purposeful sampling where their teachers knew them more in terms of English to help participate in the interviews.

Data Collection

The Procedure

In this study, multiple methods of data collection were used. The first was a pre- and post-survey (see Appendix A) to measure TPACK and the seven subscales; the survey was administered through a web-based (Qualtrics website). The pre post survey obtained information about the English teacher's TPACK and was analyzed using a paired-samples t test and see if there was a statistically significant difference in teacher's TPACK in an English classroom. The pre post survey also collected a teacher's demographic information. Additionally, student achievement data was collected from the teacher about the students' performance in the English language course. Qualitative data was collected through a semi-structured interview process with two of English teachers in order to better understand participants' perceptions (see Appendix B). Two students were interviewed in order to collect data about students' perceptions of using technology in learning English (see Appendix C). Interviews took place in a conference room in a public school in Saudi Arabia (Omran Secondary School in Alhassa). Interviewing is

necessary when the phenomenon of a study, such as feelings or how people interpret their experiences, cannot be directly observed (Merriam, 2009). This method will be employed to collect specific information from the participants with support from prewritten and developed questions, which will allow themes to occur (Merriam, 2009). Interviews were audio recorded and transcribed for analysis. Artifacts such as lesson plans, tools used for teaching, syllabi, and instructional materials were collected for the purpose of current and experienced pedagogy. Also, a triangulation of interview and survey results took place through the artifacts.

Instruments

All data collected in this study from the survey were considered self-reported as all responses in the survey were telling about their perceived knowledge. The survey developed in this study consisted of seven subscales that formed the TPACK model developed by Hervey (2011). TPACK model: 1) TK, 2) PK, 3) CK, 4) TPK, 5) TCK, 6) PCK, and 7) TPACK. Theoretical framework and related literature were used to develop the survey and form 28 items for seven subscales of the TPACK model (TK, PK, CK, TPK, TCK, PCK, and TPACK). The survey items were answered by means of a Likert-type scale with four response choices, including (1 = *Strongly Agree*, 2 = *Agree*, 3 = *Strongly Disagree*, 4 = *Disagree*),

The Technology Pedagogy Content Knowledge (TPACK) is widely utilized in the field of education. In this study, however, the TPACK modified version by Hervey (2011) was modified and adopted. The internal consistency reliability and the coefficient alphas of the seven subscales of the TPACK modified by Hervey (2011) were as follows: TK = .79; CK = .66; PK = .85; TCK = .80; TPK = .81; PCK = .85; and TPACK = .86. .

Participants received a consent form attached to the survey to sign (see Appendix D); they were also informed about the purpose of this study as well as informed that it was confidential and voluntary. Participants were asked to provide their contact information at the end of the survey once they agree to participate in a follow-up interview.

For the qualitative part of data collection, the interviews (see Appendices B and C) were employed after collecting data through the surveys. In the interview, two participants from the teachers were given warm-up questions so they feel comfortable. Then, questions about their experience of using TPACK, pedagogy, perceived experience, and impact of integrating technology on their pedagogy and content knowledge on their students' achievement were asked. The participants were chosen after agreeing to participate in an interview. Also, two students were interviewed and given questions about their experience and perceptions about the use of technology in classrooms to achieve better success.

Data Analysis

According to Merriam (2009), data analysis is the process of testing data to answer the research questions. This study used both quantitative and qualitative methods to collect and analyze data. In the quantitative method, numeric data from the survey responses as well as students' grades was collected and imported into SPSS and examined before analysis. Graphs were employed to check normality of the data. A paired-samples t test was used to analyze the statistical data in order to see if there was a statistically significant difference between mean scores of teachers' Technological Pedagogical Content Knowledge before and after participation in a workshop about

technology integration. Since there was a matched pairs (the teachers), t test was used to let the researcher know whether there was a statistically significant difference in the mean scores before and after giving the participants the treatment (workshops). Then, A Pearson Correlation Coefficient was used to analyze the relationship between teachers' TPACK effectiveness and student's achievement in English classroom

In the qualitative data collection, data were analyzed after each interview had been recorded and transcribed as well as coded immediately following the interview. I developed a matrix of all verbatim responses in an excel sheet by question and by respondent. After thoroughly analysis of all the text, I found the common themes and coded them in the same excel sheet. After the codes were finalized, I analyzed their intensity and explained the results under specific sections. Themes were identified through the interview-coding phase. Finding similarities in topics helped identify themes. Information was triangulated through artifact analysis from the interview. The matrix of data analysis is presented in Table 1.

Table 1

Matrix of Data Analysis

	Research Question	Data to be collected	Analysis Methods
Q1	Is there a statistically significant difference between the mean scores of teachers' Technological Pedagogical and Content Knowledge before and after participation in a workshop about technology integration?	Pre-post survey: • Likert Scale Questions	- A paired-samples *t*-test
Q2	Is there a statistical correlation among teachers' technological, pedagogical, and content knowledge applied in a digitally rich English language classroom in Saudi Arabia, teacher effectiveness, and students' achievement?	• Pre/post-survey: - Likert Scale Questions • Students' Grades • Workshops	- Pearson Correlation Coefficient
Q3	What is the perceived experience of teachers and students in a digitally rich English language classroom in Saudi Arabia?	Interviews: Open-ended Questions • Observation	- Open coding - Axial coding

Study Rigor

This study used the following procedures to assure validity and reliability for both the quantitative and qualitative data collection process and analysis. According to Merriam (2009), "All research is concerned with producing valid and reliable knowledge in an ethical manner" (p. 39).

Survey Validity and Reliability

An instrument's validity and reliability is a major threat when using surveys in research (Ary, Jacobs, Sorenson, & Razavieh, 2010). The validity of an instrument refers

to the extent to which it measures what it is supposed to measure (Thorndike & Thorndike-Christ, 2009). The reliability of an instrument refers to the stableness of the instrument (i.e., how consistent the questionnaire is in measuring what it is supposed to measure; Thorndike & Thorndike-Chris, 2009). The quality of any instrument is known through its validity and reliability once they are examined prior to data collection.

The survey in this study was adapted and modified from Hervey (2011), who measured the internal consistency reliability of the seven subscales (TK, CK, PK, TCK, TPK, PCK, and TPACK) and obtained coefficients alphas of .79, .66, .85, .80, .81, .85, and .86, respectively. Hervey used *Teachers' Knowledge of Teaching and Technology Survey* by Schmidt et al. (2009) and modified it to increase its validity. So, this survey was a fit for this study to measure high school English teachers' TPACK in Saudi Arabia and its effectiveness in the classroom. Also, experts from educational technology (faculty members at the University of Northern Colorado [UNC]), English education (faculty member at UNC), and a research methodology specialist (statistics lab consultant at UNC) evaluated the survey for content validity to increase its validity. The experts were contacted via email to proofread and review. Participants were also informed of the voluntary nature and confidentiality of their participation so truthfulness in the responses was increased.

Interview Trustworthiness

To enhance research trustworthiness, high levels of objectivity and credibility were maintained throughout the process of undertaking the research. This was achieved through enhancing applicability, neutrality, and consistency.

When conducting research, the researcher made sure to interview people who were responsible and had valuable information after asking them to voluntary participate in the research. Participants were from the field of education so valuable information was based on participants' experience and knowledge.

The researcher made sure biases did not affect the interviews as participation was done voluntarily without any obligation. By doing a face-to-face interview, the researcher was able to see facial expressions of the interviewee, thus creating a more authentic interview. To increase trustworthiness, this research needed to ensure credibility of the research. "To a large extent, the validity and reliability of a study depend on the ethnics of the investigator." (Merriam, 2009, p. 228). For this case study research, the researcher, as the primary instrument of data collection and analysis, followed strict ethnical principles of research. Research permission from UNC's Institutional Review Board was obtained (see Appendix E) and consent forms from the participants were collected (see Appendix D). All digital data was stored in a password-protected folder on the researcher's personal computer and paper data were in a locked cabinet in his home office. The researcher used reflection journals and an audit trail to keep track of his research process so he made sure his own personal biases and opinions did not get in the way of the research. To enhance the trustworthiness of this research, I, as the researcher, used validation methods including member checks (UNC faculty and peer reviews from fellow students and lab consultants at UNC) to assess ethicalness of the study.

Also, participants were informed of final results used in this paper to assure the validation of what they mentioned. Also, reliability for this study depended on detailed notes and how accurately the recordings were transcribed. To insure reliability, the

researcher used more than one method of recording the interview and reviewing the transcription of the recordings, which were done professionally, thus creating reliability of the coding and themes.

Research Permission and Ethical Considerations

Permission to conduct this research was obtained from UNC's Institutional Review Board (IRB). Consent forms provided for all participants addressed the research purpose, procedures, and their rights as a participant. Participation in the study was voluntary. Participants remained anonymous during the survey phase. Personal information was collected from participants who agreed to accept the follow-up interview. Confidentiality was addressed by storing all digital data in a password-protected folder on the researcher's personal computer and paper data in a locked cabinet at the researcher's home. Only the researcher has access to the data. A pseudonym was used for the interview participant when the results were reported.

Limitations

One potential limitation was identified for this study--convenience sampling might have limited the generalizability of the results of this study. Variation in the sample may not reflect the real merits of the target population if participants are selected based on a voluntary nature (Ary et al., 2010).

Summary

This chapter discussed the methodology and procedures that were used to investigate the relationship between English teachers TPACK and teacher effectiveness on students' achievement. It included research design, research questions, data collection

procedures, target population, instrumentation, validity and reliability, trustworthiness, limitations, and data analysis

CHAPTER IV

RESULTS

Introduction

This was a mixed-method design that employed both quantitative and qualitative methods of data collection, data analysis, and data interpretation to answer three main research questions. This chapter presents the research results that investigated the relationship between teachers' technological, pedagogical, and content knowledge (TPCK) applied in a digitally rich English language classroom in Saudi Arabia and students' achievement in English language classroom. Also, the chapter presents the results for the perceived experience of students in a digitally rich English language classroom in Saudi Arabia.

For the quantitative part, the researcher surveyed English teachers in Saudi Arabia digitally (Pre-Post Surveys.). After the pre-survey, the researcher presented workshops explaining the TPACK framework in 2 days theoretically and practically using a well-equipped technological classroom in Alhassa, Saudi Arabia, at Al Mubarraz Training Center, as a treatment before the post-survey. For the qualitative part, the researcher interviewed two teachers and two students to investigate the perceived experience in a digitally rich English language classroom. This research investigated to answers to the following research questions:

Q1 Is there a statistically significant difference between the mean scores of teachers' Technological Pedagogical and Content Knowledge before and after participation in a workshop about technology integration?

Q2 Is there a statistical correlation among teachers' technological, pedagogical, and content knowledge applied in a digitally rich English language classroom in Saudi Arabia, teacher effectiveness, and students' achievement?

Q3 What is the perceived experience of teachers and students in a digitally rich English language classroom in Saudi Arabia?

Using TPACK pre-post surveys helped the researcher grasp an understanding to answer the first research question on teachers knowledge about the integration of TPACK in their teaching and see the difference in the mean scores of TPACK before and after teachers participated in workshops about technology integration. The researcher used the survey results to see if there was a correlation between teachers' technological, pedagogical, and content knowledge applied in a digitally rich English language classroom in Saudi Arabia and students' achievement using their final grades to correlate them with teachers' TPACK use. Using open-ended questions helped the research to collect data in order to answer the qualitative part of this research that investigated students' perception about using TPACK in English classroom. The next sections provide complete report of data analysis and results.

Demographic Analysis of the Respondents

This section pinpoints the different demographic indicators like age and education of the respondents. This study had a purposeful sample of (n = 56) to answer the pre- and post-survey questions. All of the participants were given workshops explaining the framework of TPACK to help find the context in response to Research Questions 1 and 2. For the qualitative part, the sample was teachers (n = 2) selected voluntarily and

randomly from the same participants of the pre-post survey, and students (n = 2) selected purposefully by their teachers. A total of four participants (n = 4) answered open-ended questions to collect data qualitatively.

The population sample was all current teachers of English language for high school students in Alhassa, Saudi Arabia. All the participants received emails to participate in the pre-post survey, workshops, and the interviews after obtaining permission from the educational administration in Alhassa (English Department).

Age

As Table 2 highlights, the age was collected in age-brackets of 10 years starting from 25 to 54 years. There were two participants who denied sharing details about their age and highest proportion of the respondents fell under the age of 45 (about 96%).

Table 2

Age of the Respondents

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	25 - 34	47	43.5	44.3	44.3
	35 - 44	55	50.9	51.9	96.2
	45 - 54	4	3.7	3.8	100.0
	Total	106	98.1	100.0	
Missing	System	2	1.9		
Total		108	100.0		

Educational Level

Table 3 shows the educational levels of the respondents. As can be seen from the results, the highest proportion of the respondents were those who had a 4-year educational degree. Very few had doctorate and less had educational levels less than 4-year degree programs. In this table, there was also participants who reported some college degree as well as the 4-year degree program which was being reflected from the total participants that were 111 instead of 108.

Table 3

Educational Levels of the Respondents

		Responses		Percentage of Participants
		N	Percentage	
Educational Levels of the Respondents[a]	Some college	10	9.0	9.6
	2-year degree	2	1.8	1.9
	4-year degree	82	73.9	78.8
	Professional degree	13	11.7	12.5
	Doctorate	4	3.6	3.8
Total		111	100.0	106.7

[a] Dichotomy group tabulated at value 1.

Level of English Taught

Table 4 shows the teachers' experience for their level of teaching English as a course. As can be seen in the table, the highest (about 64%) proportion of the teachers had experience of teaching English at the secondary level. This meant that more teachers with good English skills participated in the study.

Table 4

Level of English Taught

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Elementary	8	7.4	7.6	7.6
	Intermediate	28	25.9	26.7	34.3
	Secondary	69	63.9	65.7	100.0
	Total	105	97.2	100.0	
Missing	System	3	2.8		
Total		108	100.0		

Teaching Experience

Regarding teachers' experience, Table 5 provides details about years of experience in teaching. As was obvious from the data, 86.1% had more than 4 years of experience. This made the study more mature in that most respondents were more highly educated, had higher number of years on experience of teaching English to secondary level of schooling.

Table 5

Teaching Experience--Selected Choice

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 year	1	.9	.9	.9
	2 years	3	2.8	2.8	3.7
	3 years	4	3.7	3.7	7.5
	4 years	6	5.6	5.6	13.1
	More than 4 years	93	86.1	86.9	100.0
	Total	107	99.1	100.0	
Missing	System	1	.9		
Total		108	100.0		

Use of Digital Technologies

Use of digital technologies was reported here because the research questions and hypothesis were linked with use of digital technologies for educational purposes. More than 93% of the respondents reported to agree that they were able to use digital technologies for different purposes. This provided a great assistance in understanding the fact that teachers were well aware of the digital technologies (see Table 6).

Table 6

Technology Use

		Frequency	Percent	Valid Percent	Cumulative Percent
I know how to use different digital technologies					
Valid	Strongly Agree	46	42.6	42.6	42.6
	Agree	55	50.9	50.9	93.5
	Neither Agree Nor Disagree	7	6.5	6.5	100.0
	Total	108	100.0	100.0	

Table 7 highlights whether different digital technologies could be used to solve problems for teaching purposes. The response rate was a bit different as only 6.5% were reported in Table 6 for no agreement and disagreement on ability to use digital technologies; the ones who were unable to use these technologies for solving problems were 14.8%. This meant that teachers who could use technologies but there were some who were not able to use them for specific purpose of solving problems. Both Tables 7 and 8 found nothing in terms of disagreement (i.e., responses for *Disagree* and *Strongly Disagree*; see Table 7).

Table 7

Ability to Solve Technical Problems With Digital Technology

		Frequency	Percent	Valid Percent	Cumulative Percent
I know how to solve my own technical problems with digital technologies					
Valid	Strongly Agree	39	36.1	36.1	36.1
	Agree	53	49.1	49.1	85.2
	Neither Agree Nor Disagree	16	14.8	14.8	100.0
	Total	108	100.0	100.0	

Table 8 is another source of information regarding use of digital technologies for the general purposes. There were only two participants who reported disagreeing that they frequently played with the digital technologies, while most of them were agreeing (90.7%). This implied that use of digital technologies was common and teachers were well-connected to it.

Table 8

Getting Familiar With Digital Technology

		Frequency	Percent	Valid Percent	Cumulative Percent
I frequently play around with digital technologies					
Valid	Strongly Agree	36	33.3	33.3	33.3
	Agree	62	57.4	57.4	90.7
	Neither Agree Nor Disagree	8	7.4	7.4	98.1
	Disagree	1	.9	.9	99.1
	Strongly Disagree	1	.9	.9	100.0
	Total	108	100.0	100.0	

According to Table 9, there was not a single respondent who reported to not being in agreement with the statement that they remained updated with the new digital technologies. Technologies could become obsolete and, therefore, it was quite essential to keep up the running to catch up the latest updates that sometime were essential in order to effectively utilize the digital technologies, particularly when they were used in a specific field like education.

Table 9

Current Digital Technology

		Frequency	Percent	Valid Percent	Cumulative Percent
I keep up with important new digital technologies					
Valid	Strongly Agree	45	41.7	41.7	41.7
	Agree	52	48.1	48.1	89.8
	Neither Agree Nor disagree	11	10.2	10.2	100.0
	Total	108	100.0	100.0	

As is evident from the statistics in the Table 10 given below, none of the teachers were disagreeing with the statement and 87.0% were agreeing that they used English while they solved problems and communicated in the daily life.

Table 10

Using English for Problem Solving and Communication

		Frequency	Percent	Valid Percent	Cumulative Percent
I use English when I solve problems, and communicate in my daily life					
Valid	Strongly Agree	44	40.7	40.7	40.7
	Agree	50	46.3	46.3	87.0
	Neither Agree Nor Disagree	14	13.0	13.0	100.0
	Total	108	100.0	100.0	

Table 11 provides statistics on teachers' agreement levels with the statement that they could make English connections with situations outside of the classroom. This was further confidence as described by teachers that they were capable to use English language effectively. Again for this statement, there was no one who reported any disagreement with the statement. Highest percentage (93.5%) was either *Strongly Agree* or *Disagree* with the statement, providing higher levels of English language usage by teachers.

Table 11

Using English outside the classroom

		Frequency	Percent	Valid Percent	Cumulative Percent
I can make English connections with the situations outside of classroom					
Valid	Strongly Agree	50	46.3	46.3	46.3
	Agree	51	47.2	47.2	93.5
	Neither Agree Nor Disagree	7	6.5	6.5	100.0
	Total	108	100.0	100.0	

Table 12 has another statement by which teachers were either agreeing or disagreeing with different levels of agreement on statements that they were able to communicate by using English. Majority of participants (94.4%) agreed with the statement. This was confirmed on the self-claim ability of the teachers on the use of English as means of communication.

Table 12

Communicating Through English

		Frequency	Percent	Valid Percent	Cumulative Percent
I am able to communicate using English					
Valid	Strongly Agree	62	57.4	57.4	57.4
	Agree	40	37.0	37.0	94.4
	Neither Agree Nor Disagree	6	5.6	5.6	100.0
	Total	108	100.0	100.0	

Table 13 shows another agreement status of teachers on their English use. This was more about speaking because, when someone spoke English, the language representation meant one had better command on the language and, therefore, it enabled the speakers to effectively communicate in the language. Majority of participants (88.9%) agreed that they used multiple English representations when they explained English.

Table 13

Using Multiple English for Lessons

		Frequency	Percent	Valid Percent	Cumulative Percent
I use multiple English representations when I explain English					
Valid	Strongly Agree	49	45.4	45.4	45.4
	Agree	47	43.5	43.5	88.9
	Neither Agree Nor Disagree	12	11.1	11.1	100.0
	Total	108	100.0	100.0	

The above discussed questions were some of the individual variables that were discussed in terms of their importance and they were all reported for post-workshop scenario because data provided a great change and impact of the workshop. Table 14 below further integrates them into different components with pre- and post-means calculated, compared, and tested via *t*-test.

Table 14

Teachers' Pre- and Post-workshop Performance Mean Scores on Different Components

		M	*SD*	*t* value
Technology Knowledge (TK)	Pre	1.5	0.04	514
	Post	4.3	0.04	
Content Knowledge (CK)	Pre	1.5	0.05	466
	Post	4.4	0.041	
Pedagogical Knowledge (PK)	Pre	1.5	0.073	384
	Post	4.3	0.02	
Pedagogical Content Knowledge (PCK)	Pre	1.5	0.05	441
	Post	4.3	0.04	
Technology Content Knowledge (TCK)	Pre	1.6	0.01	2000
	Post	4.3	0.01	
Technological Pedagogical Knowledge (TPK)	Pre	1.4	0.008	1300
	Post	4.3	0.021	
Technological Pedagogical and Content Knowledge (TPACK)	Pre	1.4	0.012	566
	Post	4.2	0.05	

Research Question 1

Q1 Is there a statistically significant difference between the mean scores of teachers' Technological Pedagogical and Content Knowledge before and after participation in a workshop about technology integration?

As the researcher has determined that teachers' Technological Pedagogical Content Knowledge TPACK is as measure through the indicators that are given in annexure as questionnaire. The first four questions of the survey determine Technology Knowledge (TK) component, next four variables determine Content Knowledge-English (CK), next four determine Pedagogical Knowledge (PK), next four determine

Pedagogical Content Knowledge (PCK), next four determine Technological Pedagogical Knowledge (TPK), next four determine Technological Content Knowledge (TCK), and last four determine Technological Pedagogical and Content Knowledge (TPACK).

All seven components were measured through component-specific variables that are measured on 5-scale Likert scale where 5 was *Strong Agree* while 1 was *Strongly Disagree*. While considering each Likert variable as continuous, the mean score on each variable for pre and post was calculated and cumulative mean was calculated which is given in the table below with a sample of participants ($n = 56$):

As different components were represented by four specific questions on Likert scale, their mean score was calculated before the workshop was imparted and after the workshop was completed. There was an obvious difference in teachers' responses after they had participated in the workshop. The last column has other important statistics on *t*-test that provides information on whether these differences were statistically significant or not. The results showed that each component's means were statistically different at *p* value of $p < 0.001$ as this is obvious by high values of *t*.

According to the results in Table 14, it was quite evident that our first research question was answered and was found that there was a statistically significant difference between the mean scores of teachers' Technological Pedagogical and Content Knowledge before and after participation in a workshop about technology integration.

Research Question 2

Q2 Is there a statistical correlation among teachers' technological, pedagogical, and content knowledge applied in a digitally rich English language classroom in Saudi Arabia, teacher effectiveness, and students' achievement?

In order to answer this question, it was important that we determined the correlation between the different variables that defined different components like TK, PK, etc. and the scores gained by the students after the teachers delivered lessons post-workshop. The scores gained by the students were defined as their pre-workshop score minus post-workshop score.

According to this table, the results were obvious in terms of their significant correlation with the score gained by the students. These results showed that students' score gain was positively correlated with the TK components or factors and this correlation was statistical significant at $p < 0.001$ level. This meant that students' gain in score was significantly associated with the improvement in the TK components. These TK components were those that were post-workshop reported (see Table 15).

Table 15

Technology Knowledge (TK) Component and Their Correlation With Students' Achievements

		TK Components				
		qp1_1	qp2_1	qp3_1	qp4_1	Gain Score
TK Components	qp1_1	1				
	qp2_1	0.54	1			
		0.00				
	qp3_1	0.44	0.37	1		
		0.00	0.00			
	qp4_1	0.49	0.41	0.51	1	
		0.00	0.00	0.00		
Gain Scores		0.57	0.54	0.53	0.69	1
		0.00	0.00	0.00	0.00	

Note. Student gain score = Pre-workshop score - Post-workshop score

Content Knowledge (CK) and Students' Achievements

Teachers' Content knowledge was another important component that was being sought for their association with the students' gain in score. Teachers' performance might have been enhance provided they had a good understanding of the subject and a good understanding that came through subject-wise accumulation.

The results in Table 16 are almost that same those in Table 15. All factors of CK had positive and significant correlation with the students' gain in scores that showed Content Knowledge also played an important role in positive increase in students' gains.

Table 16

Teachers' Content Knowledge (CK) Components and Their Association With Students' Achievements

		CK Components				
		qp5_1	qp6_1	qp7_1	qp8_1	Gain Score
CK Components	qp5_1	1				
	qp6_1	0.32	1			
		0.00				
	qp7_1	0.46	0.47	1		
		0.00	0.00			
	qp8_1	0.44	0.33	0.48	1	
		0.00	0.00	0.00		
Gain Scores		0.55	0.56	0.55	0.60	1
		0.00	0.00	0.00	0	

Pedagogical Knowledge (PK) and Students' Achievements

Like TK and CK, PK component was also measured with the help of four factors that are given in Table 17 below. According to this table, the correlation between each of the PK factors and students' score gain was measured along with statistical significance.

The most important finding from Table 17 was that the strength of the correlation between different factors for PK and students' gain in score was higher and this association was significant at 0.001 level. This also showed that Pedagogical Knowledge had a more positive effect on the students' gain in scores.

Table 17

Teachers' Pedagogical Knowledge (PK) Components and Their Association With Students' Achievements

		PK Components				
		qp9_1	qp10_1	qp11_1	qp12_1	Gain Score
PK Components	qp9_1	1				
	qp10_1	0.55	1			
		0.00				
	qp11_1	0.46	0.41	1		
		0.00	0.00			
	qp12_1	0.50	0.46	0.58	1	
		0.00	0.00	0.00		
Gain Scores		0.71	0.65	0.63	0.67	1
		0.00	0.00	0.00	0.00	

Pedagogical Content Knowledge (PCK) and Students' Score Gain

Pedagogical Content Knowledge (PCK) was another type of component that was determined with four factors and their association or effect on the students' gain in score was determined. The strength of the correlation in this case was also more positive and more close to 1 leading to the finding that PCK had also contributed substantially helping teachers to better deliver lessons and, hence, it was reflected in the higher gain in final scores of the students (see Table 18).

Table 18

Teachers' Pedagogical Content Knowledge (PCK) Components and Their Association With Students' Achievements

		PCK Components				
		qp13_1	qp14_1	qp15_1	qp16_1	Gain Score
PCK Components	qp13_1	1				
	qp14_1	0.49	1			
		0.00				
	qp15_1	0.48	0.57	1		
		0.00	0.00			
	qp16_1	0.50	0.38	0.54	1	
		0.00	0.00	0.00		
		0.68	0.67	0.58	0.63	1
Gain Scores		0.00	0.00	0.00	0.00	

Technology Content Knowledge (TCK) and Students' Achievements

Technology Knowledge and Technology Content Knowledge were different in the way that TCK was more knowledge about different technological perspectives because TCK requires teachers to have skills to use different technologies and the ability to transfer that content knowledge to students in order to enable them to effectively use technologies. According to Table 19, the correlation was positive and, as can be seen, all factors were significantly correlated with each other. All factors were inter-correlated also, like in previous cases, but a notable point in this table and in all previous tables was

that who gained in score was correlated with other factors that defined their respective components like Technology Content Knowledge.

Table 19

Teachers' Technological Content Knowledge (TCK) Components and Their Association With Students' Achievements

		TCK Components				
		qp17_1	qp18_1	qp19_1	qp20_1	Gain Scores
TCK Components	qp17_1	1				
	qp18_1	0.6287*	1			
	qp19_1	0.5561*	0.6200*	1		
	qp20_1	0.6150*	0.5628*	0.6499*	1	
Gain Scores		0.6863*	0.7084*	0.6575*	0.6480*	1

***** shows the significance level at 0.05

Technological Pedagogical Knowledge (TPK) and Students' Achievements

Table 20 shows the correlation coefficients for TPK component and gain in scores. It was found that all results were statistically significant at 0.05 level of significance. The correlation was tilted towards +1, which showed that the gain in score was affected positively by TKP factors. This meant that, if teachers had better Technological Pedagogical Knowledge, it would positively affect the gain in the students' scores.

Table 20

Teachers' Technological Pedagogical Knowledge (TPK) Components and Their Association With Students' Achievements

		TPK Components				
		qp21_1	qp22_1	qp23_1	qp24_1	Gain Scores
TPK Factors	qp21_1	1				
	qp22_1	0.6129*	1			
	qp23_1	0.5882*	0.5428*	1		
	qp24_1	0.4433*	0.4920*	0.5941*	1	
Gain Scores		0.6984*	0.7247*	0.6098*	0.6495*	1

***** shows the significance level at 0.05

Technological Pedagogical and Content Knowledge and Students' Achievements

According to Table 21, the TPACK factors were highly correlated with the students' gain in scores. All correlations were statistically significant and, therefore, provided strong evidence that increase in knowledge of TPACK in teachers could boost the performance of the students in a positive way. This section was a direct answer to Research Question 2 that there was a statistical correlation between teachers' use and knowledge of TPACK and students' achievement.

Table 21

Teachers' Technological Pedagogical and Content Knowledge (TPACK) Components and Their Association With Students' Achievements

		TPACK Components				
		qp25_1	qp26_1	qp27_1	qp28_1	Gain Scores
TPACK Factors	qp25_1	1				
	qp26_1	0.5875*	1			
	qp27_1	0.5090*	0.6458*	1		
	qp28_1	0.4573*	0.5748*	0.5848*	1	
Gain Scores		0.6230*	0.7147*	0.7625*	0.6314*	1

Research Question 3

Q3 What is the perceived experience of teachers and students in a digitally rich English language classroom in Saudi Arabia?

This research question was answered with the help of the open-ended discussion with teachers and students. This was much like a study based on Focus Group Discussion methodology. The discussion was guided with a set of questions that were discussed with the participants in order to focus on the discussion. The discussion was mainly focused on how teachers and students explained or perceived the experience of students in an environment where classrooms were well-equipped with technology where all content was in English. The English language is important for both teachers and students; therefore, both teachers and students were covered. Two teachers and two students were interviewed.

Teachers' Knowledge, Proficiency, and Self-Efficacy

Findings were mostly consistent with the quantitative data in terms of the teachers' perspective towards use of English language specific to technological instructions. Teachers reported that their perspective on use of the digitally rich English classrooms was limited in terms of their perception that students might not be able to perform well due to their language ability. As the observation was also done, the study found that students were inquiring and asking questions most of the time when they interacted with knowledge in a digitally rich English classrooms. This interaction was focused on learning from each other and, during the practical sessions, it was found that teachers tried to explain different perspective on the use of digital technologies in a classroom both in local and in English. One of the students described his experience in the following words,

> We need sometime instruction in local language in order to get acquainted with the digital technology and once we started using it, it becomes easy for us to use it more proficiently while in totally English language environment.

Also, the researcher found that the more knowledgeable the teacher was about using the technological tools in English, the more the students wanted to learn and engage. The researcher did the observation in well-equipped technology classrooms where they used all necessary digital tools for teaching and learning such as white board, high speed internet, brand new and high quality computers, sound systems, microphones, and so on. In other words, students suggested that teachers needed to be more professional not only in using the technological tools but also more deeply in the way they used it in English and know the vocabulary. Some applications were intense with

vocabulary and teachers needed to be familiar and professional with everything because students were curious about everything. One student reported the following:

> We as students would love to know everything about the educational applications used to learn English, but teachers do not use all the features due to the difficult vocabulary used or it sometimes we feel that teachers are not well prepared about everything in the applications in English.

One of the teachers described his experience in the following words. He explained how technologies used helped him and his classmates understand better through technologies.

> Students are already excited to learn new digital technologies and we found them more inquisitive in order to grab full spectrum of the technology in a shorter period of time. This helped whole classes and teachers are able to get desired results of transferring knowledge more rapidly mainly due to interest of the students.

Students Engagement and Collaborative Learning

From the observation done, there were some collaborative activities that engaged students in the lesson about vocabulary remembering and understanding. The teacher assigned his students to work in groups and used games to deliver the meaning of some vocabulary. Based on the observation, students showed willingness and eagerness to speak up and participate in front of everybody because they understood the lesson objectives very well after working collaboratively and using technology such as computers. Students showed their interest to engage in English lesson if they were given the chance to learn from each other collaboratively to help each other. They shared in the discussion that sometimes they did not have the nerve to ask the teacher or speak aloud because they did not feel confident. However, they felt more confident when they spoke with each other in groups and showed their knowledge to each other as well as they used the time to teach each other about technology. One of the students reported the following:

> We feel very excited when the teacher assigns us to work in groups using the computer to solve a problem or to compete among groups because we learn from each others, as there is no barriers to speak freely and learn.

According to discussion with the students, they highlighted that knowledge level mattered about digital technologies in terms of its use. Sometimes, students felt awkward if they asked a question about digital functions where there was no answer. During the observation, the teacher was very proficient about the use of technologies he used in classroom and trained his students how to use the technologies properly before teaching the lesson. According to a student interviewee, "All students seek the section where the teacher is capable and proficient about the use of technological applications and tools."

Different features, applications, contents, and its use in an educational environment do matter as well. If teachers were more proficient in the use of digital technologies, they would be more able to train students. They also highlighted that some teachers were more technology inclined than others and this inclination was totally dependent on their own use and understanding of the technology.

Mobile Learning Integration

Another important factor that was under discussion pointed to the use of mobile phones for everyday communication. Most of the new mobile phones were called smart-phones which meant they enabled users to engage in different technology intensive applications to communicate, link, and browse knowledge and almost all students along with teachers were using this kind of mobile phones. Since, by default, the language in such kind of digital devices was English, it helped users to at least understand basics of digital devices in English with understandings. One student reported:

> I learned a lot of vocabulary from my cell phone when I have to open Class DO Jo to see what's happening. This application forces me to look words up and be happy to respond using those words I learned. Since all students have smartphones and computer, teachers should be required to communicate with us through technologies so we are forced to open up learn.

Another factor that students highlighted in the interview was changing the environment of teaching and learning such as the computer lab and library. Students pointed out that they loved and sought for the teachers who used the computer lab. Mostly, English teachers used the lab for learning purposes and that made the students feel happy when they dealt and interacted with computers instead of just sitting on a chair for the entire lesson. The students compared those teachers who used the lab to the others who did not and felt very excited when it came to interacting with computers and changing the environment. They felt more engaged when they used the computers to type, answer question, draw, play games, and so on. A student described the following:

> Learning from computers is not only fun, but it adds up lots of knowledge because most of the tools and applications are in English and that makes it more challenging to learn and understand how to deal with the application. As students, we are curious and would love to learn all stuff in English inside the applications.

From the teacher's perspective, they believed that students were more engaged and excited in learning English when teachers showed their proficiency of using technology and its features, applications, and content. Also, allowing students to be part of the teaching and learning job made students more responsible and engaged. When students were asked to work collaboratively, they shared enthusiasm finding their group partners to work hard and compete. One teacher stated the following.

> My students love my class not because I am kind to them, but because I allow them to be part of my teaching job by making them work together using technologies, and solve problems, as well as train each other in some technological applications. Sometimes, I intentionally train one student and ask

him to train the rest of class and learn from each other. This way, I felt that students show more interest in learning English and be engaging in classroom.

Students are very smart and can be creative once they are shown and engaged. Many of my students discuss with me about current applications that I just know from them. They go outside and discover by themselves to bring new things to teach in classroom.

Summary

This chapter presents data analysis and interpretation of teachers' TPACK effectiveness and its correlation to students' achievement in high school English language classes in Saudi Arabia. Results in this chapter showed that the TPACK factors were highly correlated with the students' gain in scores. All correlations were statistically significant and, therefore, provided strong evidence that increased in knowledge of TPACK in teachers could boost the performance of the students in a positive way.

CHAPTER V

DISCUSSION

This purpose of this study was to investigate the relationship between teachers' technological, pedagogical, and content knowledge (TPCK) applied in a digitally rich English language classroom in Saudi Arabia and students' achievement in English language classroom. Also, the chapter presents the results for the perceived experience of students in a digitally rich English language classroom in Saudi Arabia. This chapter, therefore, provides a summary of the study, interpretation of findings, implications, limitations of the study and suggestions for future research.

Review of the Findings

It is important to efficiently design the research methodology in order to best enable the output to meet the desired outcomes in terms of adequate information to answer all aspects of a research question. Mixed-method approach was the best option in terms of comprehensive approach towards applied research. Since this design is also based on mix-research method, therefore, the information collected has provided enough insight to answer relevant research questions.

This research study focused on teachers' ability to integrate technology in a teaching environment where English language was used. Since both technology and language were essential to make it sure that teachers could integrate 21st century learning communities based on collaboration and constructivist perspectives. Technological,

Pedagogical, Content, knowledge (TPACK) is a new term and, therefore, requires lot of knowledge acquisition and transfer of that knowledge to students to make 21st century learning communities. In Saudi Arabia, the latest education policy has required a major shift that focuses on preparing highly trained and qualified individuals to transform towards knowledge economy.

English language teachers in the Kingdom of Saudi Arabia have lacked experience and knowledge of the use of digital technologies and there are lot of reasons behind it as key identified reasons were identified in the literature review above and in the statement of the problem. The main point to note was that, without proper integration of digital technologies in the English classrooms, it was not possible to developed technology intensive modern learning communities.

As the results show, the intervention of doing workshop for teachers to enhance their knowledge proved very positive. Technological, Pedagogical, Content, knowledge (TPACK) has different dimensions and each dimension is equally important because there is no any other opportunities that currently focuses on teachers' enhancement of knowledge in terms of digitally enriched classrooms where medium of instructions is English. Also, there are a lot of challenges that teachers are given in order to streamline educational policies that are designed at national level. However, their trickle-down effect needs time and dedicated effort at policy makers level to ensure that new educational features are well transferred to grassroots level teaching staff in order to ensure that inclusive and uniform level of knowledge is transferred to students enrolled across the nation schools. Alqallaf (2016) has used the same TPACK methodology to study the possibility of developing constructivism, collaborative cloud computing, mobile

learning, and barriers as well as preferences for each of these by offering a perspective of how these elements come together for teaching and learning in mathematics classrooms in Kuwait.

The education in KSA has been at top of development agenda and, as discussed by Grandgenett, (2008), intellectual capital was more important than hard assets of the institutes, it is quite understandable that how important the use of digital technology in the 21st century classrooms is because the future development is totally dependent on ability of teachers to integrate digital technology in the classroom environment and this is very much linked with overall use of digital. For xample, mobile technology is in use for other purposes than education and this does not only provide a way to integrate it into education, but it also provides opportunities to use digital technology for constructive purposes.

Grandgenett, (2008) argued that digital technologies that were considered parallel to e-learning, was essential to be developed for developing countries because it had benefits for such societies in a way that provided accessibility and affordability of the education and it also accommodated cultural issues.

Research Question 1

Q1 Is there a statistically significant difference between the mean scores of teachers' Technological Pedagogical and Content Knowledge before and after participation in a workshop about technology integration?

The purpose of the first research question was to know what the situation of teachers was in terms of their TPACK knowledge because teachers' knowledge must influence the knowledge in students. A complete pre-survey was already done and results were totally different from that of post-survey on the same questions. When results were

compared by component-to-component of TPACK, all results showed a great positive change.

It was quite worthy to mention here that digital technology integration in KSA has been highly debated and it has been accepted that modern education was only possible when modern technology has been incorporated in education through policy level commitments. Inclusive education has been another challenge that many countries including KSA's education policy has been facing because it was not possible to construct, equip, and function high tech universities in every village or locality that was far from the main urban areas. Notwithstanding, it was quite important to note that education policy has responded to this challenge by focusing on digital technologies being part of the education system so that students could receive quality education while being at far from the educational institutions.

Fulfilling the promise of digitizing the education with modern technology equipment could not solve the problem unless people attached with education, either as teachers or students, could use that digital technology. Most important was the teachers' ability to use that technology. This was important because technology use and integration has been helpful to the teachers. From the responses in both surveys, teachers showed that not only having technology would promote teaching and learning but also being experts in terms of how to use them as well as using the proper and current educational tools and equipment would engage students and help them achieve the acquisition of the language. Even if it was mandatory to use that technology but there was a lack of content knowledge and other issues of motivation, confidence, and commitment, teachers could not inflict knowledge upon students and a culture of relying on modern digital

technologies at campuses would not be a tradition. Once teachers were ready to accept how important technology integration was in an effective way using the TPACK model, then, it would possible that technology integrated in the 21st century classrooms could be established taking into consideration the importance of how to use and obtain enough knowledge to use digital technology for educational purposes.

To make it sure that whether all components or just some of them were important for overall TPACK methodology and which components were more important, the analysis was implemented in a way that each component, explained by four factors, was tested with their mean scores and *t* values were calculated. The findings showed (see Table 14) that all means were statistically different from their respective pre-test values. These results were linked with the teachers' workshop and, after attending the workshop, the overall knowledge level, behavior, and overall understanding of the use of the digital technologies. Motlik (2008) had identified many different factors that were responsible for Asian countries for being fraught with problems for their progress in digital education. One of these factors was "poor training for instructors." This meant that training for instructors was an extremely important factor that translated into the knowledge transferred to students resulting into digitally integrated classrooms. This factor was also discussed with the teachers that they always showed interest in using technologies. However, one of their complaints was lack of training. The ministry provided equipment, tools, and everything; however, the teachers were expected to learn on their own. Teachers have urged the ministry to create a technology development department only for teaching and learning, not for maintenance.

The mobile learning, as part of the digital technology component, has extended challenges that have spared over different levels. These challenges were different by other countries, and most importantly by education system.

Capacity building was found to be highly significant for the teachers' requirements. The research provided a very strong finding that supported dedicated capacity building measures for teachers in order to reflect on the better achievements of education policy objectives. In the first half of the findings chapter, 12 different individual variables that were representing post-workshop teachers' response on a Likert scale and astonishingly the results that were compared in the next sections for pre-training were totally different. Post-workshop scenario was much more optimistic in terms of teachers' performance. There were two factors that mattered in this research study. First was the ability of both teachers and students to use digital technologies and second was their ability to communicate and learn by English language as this language was new for students in KSA. As mentioned before, the importance of using technology lied on both teachers' and students' interest of using it in their environment of teaching and learning that resulted in high scores of teaching and learning. The ability of the teachers to communicate and teach students in English was envisioned in the education policy of KSA that focused on creating new generations of highly skilled manpower that could communicate with the world in order to streamline the economy of the country based on principles of knowledge economy. Knowledge economies could not survive if they were not able to communicate with the external world. With English being the international language, the ability of manpower to communicate in English has been very rudimentary for KSA to reflect on its education policy. Since the vision of KSA's future

students has been high of using English and technology and, based on results from pre- and post-survey, technology integration was highly recommended for both teachers and students to achieve the desired output.

For educational purposes, the use of language was different than for the public communication. However, teachers who could publically communicate via English were more helpful for students than others because this meant that teachers were well-equipped with the language abilities. Language that was not natively spoken would need to have many factors working for a speaker. First, users would have to understand the meaning of foreign language in the local language and then there were three different skills that were based on cognitive understanding that reflect both in local and foreign language. These three skills (Listening, Speaking, and Writing) were different from each other and not everybody has a full grip on these three. Some have a grip on one, some have a grip on two, and some also have grip on all three skills, which would make them proficient in that language. From the discussion with the participants, technology helped a lot of them to grasp the skills of English when proper applications were used effectively, which sent a message to all students that all skills were important and, therefore, they engaged in all lessons of all skills.

Workshops that enable teachers to better understand how they could use English for digital educational purposes were found to be highly significant in terms of increasing their confidence and perception that they could teach with great success in a digital English classroom. All 28 factors that defined 7 different components, including TPACK, were found to be statistically better with significance at least at the 95% confidence level. After the workshop, the perception of teachers changed in a way that their overall

structure was changed. There were responses that changed from lower level to higher level on a Likert scale after the workshop. This happened because having given them the right training enabled them to review what they had before technology and reconsider using it the right way to deliver high expectations of understanding of the language.

The mean score that was skewed towards bottom end (1 being the *Strongly Disagree* and 5 being the *Strongly Agree*) and after the workshop, this score became skewed towards the top. There was no mean score higher than 1.6 for pre-workshop cases and no mean score less than 4.4 for post-workshop cases. These findings strongly supported the notion that workshops like technology integration should be a regular process in order to facilitate teachers to enhance their content knowledge and to better transfer the acquired knowledge to students. So, the case here was not only about using the technology when I spoke about the importance of workshops or training but also to enhance and enrich content knowledge and pedagogy about the language along with technology content.

West (2013) discussed the relationship between digital technology like mobile technology and education in the context of the U.S. economy. West (2013) was even claiming that American students were falling behind the international aptitude due to lack of access to mobile learning or, in other words, the use of digital technologies for learning purposes. America has been one of the developed countries and was one of the English speaking countries, however, situation of use of digital technologies in KSA definitely required lot of effort when English was a foreign language and use of digital technologies in a classroom environment was a new phenomenon, This intervention of informing teachers about use of digital technologies and its different aspects,

components, and factors related to content and knowledge were tested and results were obviously encouraging. The teachers' orientation and training could prove to be the sole intervention that could help policy makers to achieve 21st century technology integrated schools. This was for the same reason as mentioned above that the big interest in technology, high demand of training on how to effectively use technology for designing a well-deliverable lesson were all factors of learning and teaching development.

Teachers and students all found to have accounts on social media. These social media accounts were part of the digital technology because smart mobiles made it possible for people-to-people engagements in real time and to access information also in real time. Since the main marketing strategy of mobile selling companies has been based on different models of interaction for people-to-people communication, there was a lack of specific notion or themes by which mobiles could be effectively utilized for educational purposes. Therefore, it has become the responsibility on the education system and teachers to mobilize not only resources, but also the development of a mechanism to integrate technology into classes and make sure that students' learning outcomes were being reflected in the results.

Teachers' role is just like a policy that first paves the way towards digital technologies. The role of teachers should be the basis for achievement of policy objectives; otherwise no policy objectives could be achieved.

This research, therefore, informed the policy makers that digital technologies could only be integrated if there was a policy intended to enable teachers to use it effectively first. This research has proven that once teachers were given orientation through a technical skilled workshop, their knowledge, aptitude, confidence, and

behavior could change. This resulted in the overall score change of the students and the results are more discussed in the next section.

Research Question 2

Q2 Is there a statistical correlation among teachers' technological, pedagogical, and content knowledge applied in a digitally rich English language classroom in Saudi Arabia, teacher effectiveness, and students' achievement?

The first purpose of this research question was to see if there was any improvement in students' scores after they were taught by teachers who were given technical workshop on TPACK. The second purpose was to see if the change in students' score had any correlation with the TPACK and its different components. Therefore, all seven components were tested for their statistical significant correlation.

According to results, the discussion could be very straightforwardly concluded that teachers' TPACK had a very strong positive correlation with the students' positive achievements. The raise in students' scores was correlated with each of the 28 factors and it was found that none of the factors were weakly and negatively correlated. This determined that different factors that define each component of technological, pedagogical, and content knowledge of teachers about digital technologies and their integration in English rich classrooms was highly important. In addition, since workshops focused on very key factors leading to enhanced knowledge of the teachers, the need to specify different interventions that demonstrated the need to fill the knowledge gap of teachers should be addressed at policy level. Since educational science has already been enriched with literature, the need of the knowledge that specifically explains the domain under consideration should be developed with the help of experimental research work and it should also be reflected at policy level.

This work not only provided the answer to the research question but also highlighted the fact there was a high need for dedicated teacher specific training programs that ultimately resulted in a trickle-down effect leading to better education policy objective achievements. These research results of surveys and interviews have proven that teachers and students could highly achieve the expected goals and objectives of English language acquisition using technology if they were well-included in the education law, otherwise, traditional way of teaching was not much of interest for either teachers and students.

It was also found that Content Knowledge was more important than other factors but the difference appeared very small. For example, the factors that determined Technology Knowledge had different magnitude of correlation with the students' gain in scores but Technology Content Knowledge had more positive correlation. This had two different meanings. So, the Technology Content Knowledge meant a meaningful understanding of technological tools and equipment. When it came to Technology Content Knowledge, effort would need to be included like any other knowledge to reach the maximum objectives.

The issues that were highlighted by teachers for effective integrative approach towards digital technology for students' performance was also linked with the fundamental requirements and conditions that would assist them to effectively utilize the digital technology in classrooms. The very first approach came from the fact that educational curriculum should be reflective of the overall long-term strategy focusing on technology integration. Second most important was availability and sustainable schedule of workshops that focused on teachers' training and all other personnel involved in the

learning environment. Third most important was availability, functionality, with updated software, the devices,s and equipments that were available at respective class disposal. Schools normally had IT laboratories that were common for all classes for a particular level of studies but had limitations as not all the time a single class could use the digital technologies. Hence this could result in low level of digital technology integration at class level.

Digital technologies were not a one-time investment because these required regular updates both on hardware and software level and as more advanced technologies emerged with the passage of time, it also required the management of schools to update the existing infrastructure and nomenclature of the digital technologies being used at school level. This might be called a technology supportive environment and enabling factors that should be used existing in order to achieve education policy objectives.

At first perspective, it was quite important for teachers not to just have an overview of the digital technologies, but also they should be familiar with the content of the digital technologies. This content knowledge would provide them the ability to answer different recurring questions by students and would enable them to demonstrate practically to the students, hence, enabling the learning environment to be more efficient. Also, teachers' self-efficacy and educational needs were important to be taken into consideration because that would diminish some of the barriers related to technology.

Ability of the teachers to explore themselves different aspects of the digital technologies in English rich classrooms actually was a sign that students would be performing better. There was a continuous nature process of evolution and knowledge evolved regularly. The teachers who were students some years ago, might be in a difficult

situation when they found that many modern lessons and contents were those that were not part of their studentship.

The regular updates of the knowledge were only possible when there were signs of technology integration and since technology was mostly a speedy field of knowledge that evolved and old versions of different technologies became obsolete. In all these scenarios, there should be a system that regularly keeps teachers updated so that they could develop their abilities to teach new generations with updated knowledge that spread at the contemporary times.

The correlations found between different factors of TPACK and the students' achievements were strong. Students' achievements were the difference between their post-test scores and pre-test scores. The scores were found to be all positive and, therefore, every student achieved good scores. The correlation was also tested for its statistical significance and was found that all correlations were significant at the 95% confidence level. Talking with students also revealed that they were very much feeling the difference between teachers' ability and improvement in background knowledge of digital technology that resulted in better knowledge transfer.

Research Question 3

Q3 What is the perceived experience of teachers and students in a digitally rich English language classroom in Saudi Arabia?

Discussion on Research Question 3 was linked with the qualitative part of this research. Both teachers and students were part of this portion of the study. There were 11 different questions for teachers and 9 different questions for students. All teachers were very much in support of the use of the digital technology in the classrooms and were encouraging students to use laptops, mobiles, and other products like iPads, etc. for

learning purposes. They, however, pointed out that educational institutes in KSA were not fully optimized and well-equipped for mobile learning and there would be more time required to make sure that both teachers and students were relying on digital technologies for their lessons and knowledge transfer.

Teachers' Knowledge, Proficiency, and Self-Efficacy

Since English language was another factor that was linked with digital technologies because all available technologies were in English language, particularly those that were not well-customized. All teachers were of the view that mobile used for educational purposes would help improve English language skills for students because they would have to learn language to effectively use mobile phones. Since mobile phones were used to communicate and to access information that was available online, the use for education purposes simply needs a guideline resulting in understanding of the language with broader vocabulary.

Students Engagement and Collaborative Learning

On a question that focused on readiness of students for mobile use, the teachers prompted that they were already using it and once they were guided to use it for educational purposes, they would be very happy to use it and get the benefit from it. On a question that related to the support teachers were getting in terms of integration of digital technologies, teachers were of a mixed view. Some teachers were saying that there was more room available and teachers needed more interventions in order to create an environment that would focus on digital technologies as a means to deliver lessons and monitor curriculum. The support that teachers were looking for was about integration of

digital technology at curriculum level, the perspective of elementary, secondary, and tertiary teachers was not the same but they all were focusing that, if digital technologies were integrated successfully at elementary level, it would help both teachers and students to easily integrate it at the secondary.

Mobile Learning Engagement

Students were all using digital technologies in their everyday lives. However, they were unaware of the potential digital technologies had for educational purposes.

They reported using their mobiles for research work and to better understand their key lessons but they had not been using it for interaction between teachers. The main reasons they identified were lack of technology infrastructure at the educational institute level because, if they had no platform developed for students to engage through their mobiles or laptops, how could they use technology effectively for learning purposes.

A discussion was carried out during the debate on question of learning English through the use of mobile phones and it was found that most students were basically using mobile phones as tools to learn new words and to Google most of the stuff related to their studies. This proved that mobile phones were helping students to learn English language and teachers also supported this argument. On enhancement of the technology at the classroom level, the students were very happy to hear if that could happen in the near future as it would enable them to effectively manage their classwork and to timely submit the work to the teachers.

Recommendations

Based on the findings, the following recommendations are suggested for leaders and policy makers for consideration. These recommendations could help achieve the

KSA education policy objectives that have been linked with the overall developments in the education sector in KSA. The recommendations are:

1. Teachers are an important part of the overall strategy to integrate digital technology for 21st century classrooms but, because there was a lack of any specific objective approach to train teachers with updated education-specific digital technologies, they did not engage in technology integration at a high level. The creation and implementation of specific professional development that addresses technology integration into pedagogical practices with a constructivist philosophy would enable teachers to meet the 21st century needs of their students and best integrate technology as a meaningful teaching and learning too.

2. Students should use technologies within an elementary context in order to build knowledge and future ready capacity. This would allow students to develop fundamental skills early on and be able to embrace advanced skills in secondary contexts to complement the complexity of the content they learn at this level.

3. Need for support staff and support staff training would be essential and it should be a part of strategy being developed for educational systems development. This type of support would best allow teachers to integrate technology in meaningful ways at the classroom level.

4. Since both teachers and students were familiar with digital technologies, technical workshops for English teachers would increase teachers' confidence, content knowledge, and ability to use content/tool-specific affordances in an English classroom more effectively.

5. Technology infrastructure at the classroom level would be needed in order to support teachers' integration of technology and student use of tools in the classroom context. This would include regular updates in the digital technologies in order to make sure that existing technologies, devices, other equipment were not out of date or inefficient for the learning objectives.

Future Research

From the findings of this research, delivery of key concepts, procedures, and knowledge to teachers was one of the most effective methods to enable teachers to show results in terms of high scores of students; but there were many other factors that needed to be incorporated in order to make a comprehensive policy towards technology integration at classroom level. This study was limited in terms of schools that had appropriate participants for the study because not all schools were at same level of technology acquisition. Therefore, there is a need to draw a random sample from all schools, based on their localities, gender, and current level of technology availability to design a study to provide generalized results. This research could be used as a reference guideline and as a source on methods and tools that were used as they were used at international level and have high reliability. The tools that are used could be translated into local language in order to make sure that at least discussion with the respondents was well-directed and well-understood. Additionally, this research leads toward exploration of the ongoing PD. Because the length of the workshop in this study was brief, it is important to explore what impact it has on teaching and learning after time. A study that also explores what influence continued PD would have on teachers' TPACK and technology integration practices would contribute to the literature. A qualitative study

about the lived experience of teachers and students in the classroom of the workshop participants would also be interesting an informative.

Summary

It was clear from the participants' perspectives and the information that was discussed above, both from qualitative and quantitative findings, integration of digital technology has often been a topic of debate and its key users, the students and teachers, were ready to use it for their everyday classwork and to learn English as a language of instructions. However, there were some points that needed policy level attention to enable easy integration, such as, there should be a curriculum level approach towards digital technology integration. Also, there should be content and technical workshops focused on updating teachers about latest mobile technology trends, new approaches in mobile learning, or learning through mobiles. Information technology infrastructure should be enhanced at school level and dedicated programs specifically designed both for students, teachers, and support staff as part of the overall integrated technology program of the school environment because, unless there was a trained technical support staff available, there was no viable way to sustain teachers' development of their technological, pedagogical and content knowledge.

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APPENDIX A

PRE-POST SURVEY

PRE-POST SURVEY

Demographics

Education
- BS
- MA
- Ph.D

Teaching experience
- 1 year
- 2 years
- 3 years
- 4 years
- Other (specify)
-

Age group
- 24-30
- 31-40
- 41-50
- 51-60

Level of English taught
- Elementary
- Intermediate
- Secondary

Your self-perceived knowledge of content, pedagogy, and technology in your English class this section will measure. Digital technology term is utilized to represent to digital tools and resource such as laptops, iPods, tablets, Smartphones, interactive whiteboards, video games, English application, software programs, etc. Please answer all of the questions as best as possible.

Please note that all following questions are related to integrating technology in your English classroom.

Question Number	Statement	Strongly Agree	Agree	Strongly Disagree	Disagree
1	I know how to use different digital technologies.				
2	I know how to solve my own technical problems with digital technologies				
3	I frequently play around with digital technologies.				
4	I keep up with important new digital technologies.				
5	I reason mathematically when I solve problems in my daily life.				
6	I can make English connections with the situations outside of classroom.				
7	I am able to communicate using English.				
8	I use multiple English representations when I explain English.				
9	I know how to adapt lessons to improve student learning.				
10	I know how to implement a wide range of instructional approaches.				
11	I know how to organize a classroom environment for learning.				
12	I know how to assess student performance in a classroom				
13	I have a good understanding of teaching English so that students are able to learn.				

Question Number	Statement	Strongly Agree	Agree	Strongly Disagree	Disagree
14	I have a good understanding of instructional strategies that best represent English topics.				
15	I have a good understanding of students' conceptual and practical understanding of English concepts.				
16	I have a good understanding of the English curriculum that meets students' needs for learning English.				
17	I know how to use digital technologies to represent English ideas.				
18	I am able to select certain digital technologies to communicate English processes.				
19	I am able to use digital technologies to teach English.				
20	I am able to use digital technologies to explore English ideas.				
21	I am able to identify digital technologies to enhance the teaching approaches for a lesson.				
22	I can implement specific digital technologies to support students' learning for a lesson.				
23	I think deeply about how digital technologies influence teaching approaches I use in my classroom.				
24	I can adapt digital technologies to support learning in my classroom				
25	I know specific topics in English are better learned when taught through an integration of digital technologies with my instructional approaches.				

Question Number	Statement	Strongly Agree	Agree	Strongly Disagree	Disagree
26	I can identify specific topics in the English curriculum where specific digital technologies are helpful in guiding student learning in the classroom.				
27	I can use strategies that combine English content, digital technologies and teaching approaches to support students' understandings and thinking as they are learning English.				
28	I can select digital technologies to use with specific instructional strategies as I guide students in learning English.				

APPENDIX B

TEACHERS' INTERVIEW QUESTIONS

TEACHERS' INTERVIEW QUESTIONS

1. What do you understand by the term technology integration?

2. What are some of the challenges you face effectively implementing of educational technologies?

3. Did you face challenges adopting TPACK in your teaching? Elaborate.

4. Do you think mobile technology is useful in education (e.g., English classroom)? Why?

5. Do you think integrating M-learning (e.g., students using iPad inside and outside the English classroom for educational tasks) will benefit students to improve their English ability? Explain?

6. Do you think the students are ready to interact right away with the devices in educational setting? Explain.

7. Describe how your students have used technology to raise awareness, start conversations, change minds, drive change, or make a difference?

8. What types of support should be provided to help you integrate technology?

9. After we finished the workshops, what have you used in your teaching? What will you use in your teaching? Why did you make these decisions?

10. What type of support has the school provided to help you integrate technology? What support do you need from your school to successfully use technology?

11. What else do I need to know to understand what you feel is important to help you integrate technology into teaching English more efficiently?

APPENDIX C

STUDENTS' INTERVIEW QUESTIONS

STUDENTS' INTERVIEW QUESTIONS

1. How do you use technology on a regular basis? Do you use it in school? do you use it to learn things? tell me about that
2. What is your experience with using technology in English class?
3. How comfortable were you using technology for learning.
4. Do you think technology should be integrated to enhance learning? Explain.
5. Do you think technology is useful in education (e.g., English classroom)? Why.
6. Did you think using the technology helped you learn English? tell me about it.
7. What do you think teachers could do differently with technology to teach English better?
8. What are some benefits you have experienced from using technology in English classroom?
9. What struggles have you experienced?

APPENDIX D

CONSENT FORMS

UNIVERSITY of NORTHERN COLORADO

CONSENT FORM FOR HUMAN PARTICIPANTS IN RESEARCH
(Pre-Post Survey Instructor Consent Form)
(Click-through Consent Form)

Project Title:	**TPACK Effectiveness on English Teachers and Students in Saudi Arabia**
Researcher:	Hamzah Alhababi (Research Adviser: Mia Williams)
	Hamzah Alhababi:
Phone Number:	(xxx) xxx-xxxx
	e-mail: alha0535@bears.unco.edu
Research Advisor:	Dr. Mia Williams
Phone:	(970) 351-1603
e-mail:	mia.williams@unco.edu

With the help from a University of Northern Colorado doctoral student, we are researching *TPACK Effectiveness on English Teachers and Students in Saudi Arabia*. As a participant in this research, you will be asked to answer pre and post survey questions to help collect and analyze data about technological, pedagogical content knowledge (TPACK) for teaching English in Saudi Arabia for high school level.

You will be asked to provide some demographic information such as your age, degree level, and experience of teaching. Data collected will be securely stored for three years in the on-campus office of the research advisor, and then destroyed. The researcher will strive to make all participation confidential.

Participation is voluntary. You may decide not to participate in this study and if you begin participation you may still decide to stop and withdraw at any time. Your decision will be respected and will not result in loss of benefits to which you are otherwise entitled. Having read the above and having had an opportunity to ask any questions. Please click on Yes button below if you wish to participate in this study. By completing the survey, you will give us permission for your participation. The decision to participate will not affect your employment status. If you have any concerns about your selection or treatment as a research participant, please contact the Office of Sponsored Programs, Sherry May, IRB Administrator, Office of Sponsored Programs, 25 Kepner Hall, University of Northern Colorado, Greeley, CO, 80639, 970-351-1910.

(electronic survey action buttons)I give my consent to participate in this research. I understand that I can withdraw at any time throughout the research process.

Yes (continues to survey questions) No (continue to thank you screen)

UNIVERSITY of NORTHERN COLORADO

CONSENT FORM FOR HUMAN PARTICIPANTS IN RESEARCH
(Instructor Consent form for the Interview)

Project Title:	TPACK Effectiveness on English Teachers and Students in Saudi Arabia
Researcher:	Hamzah Alhababi (Research Adviser: Mia Williams)
	Hamzah Alhababi:
Phone Number:	(303) 883-4526(xxx) xxx-xxxx
	e-mail: alha0535@bears.unco.edu
Research Advisor:	Dr. Mia Williams
Phone:	(970) 351-1603
e-mail:	mia.williams@unco.edu

With the help from a University of Northern Colorado doctoral student, we are researching *TPACK Effectiveness on English Teachers and Students in Saudi Arabia*. As a participant in this research, you will be asked to an interview with the researcher to help collect and analyze data about technological, pedagogical content knowledge (TPACK) for teaching English in Saudi Arabia for high school level. This interview will take approximately less than 60 minutes of your time. The interview will consist of open-ended questions and will help us analyze the data. The interview will require you to assess your attitude about *TPACK Effectiveness on English Teachers and Students in Saudi Arabia*. You will be asked to provide some feedback about the topic. You may be interviewed at Omran Secondary School in Alhassa and time will be arranged at participants' convenience. Interviews will be audio recorded for accuracy during analysis. Signed Consent Forms will be securely stored for three years in the on-campus office of the research advisor, and then destroyed. Also add that any remaining identifying data, such as the audio recordings, the key that matches identity, artifacts, etc. will be destroyed after three years. The researcher will strive to make all participation confidential. All data and recordings will be kept secured on the researcher's computer. Recordings will be erased three years after the study is complete. There is no risk for you to do the interview or write your responses except for you will sit for the interview for a while. You will comfortably give your feedback to the researcher.

Participation is voluntary. You may decide not to participate in this study and if you begin participation you may still decide to stop and withdraw at any time. Your

decision will be respected and will not result in loss of benefits to which you are otherwise entitled. Having read the above and having had an opportunity to ask any questions. Please sign below if you wish to participate in this study. By completing the questionnaire, you will give us permission for your participation. You will receive a copy of this form for future reference. The decision to participate will not affect your employment status. If you have any concerns about your selection or treatment as a research participant, please contact the Office of Sponsored Programs, Sherry May, IRB Administrator, Office of Sponsored Programs, 25 Kepner Hall, University of Northern Colorado, Greeley, CO, 80639, 970-351-1910.

Instructor's Signature	Date
Researcher's Signature	Date

UNIVERSITY of NORTHERN COLORADO

CONSENT FORM FOR HUMAN PARTICIPANTS IN RESEARCH
(Parents & Students)

Project Title:	TPACK Effectiveness on English Teachers and Students in Saudi Arabia
Researcher:	Hamzah Alhababi (Research Adviser: Mia Williams)
	Hamzah Alhababi:
Phone Number:	(303) 883-4526(xxx) xxx-xxxx
	e-mail: alha0535@bears.unco.edu
Research Advisor:	Dr. Mia Williams
Phone:	(970) 351-1603
e-mail:	mia.williams@unco.edu

My name is Hamzah Alhababi and I am undertaking a research in your child's school to investigate *TPACK Effectiveness on English Teachers and Students in Saudi Arabia.*

Project Description--Activities and Time Commitment:

If your child participates in the research, they will be required to answer my interview questions that will take approximately between 20 – 30 minutes to be completely filled.

Benefits and Risks:

There are minimal risks, no greater than those inherent in a typical school day and direct benefits associated with your child participating in the research process. However, the results obtained will be of benefit to teachers, curriculum developers in developing and implementing technologies that enhance teaching and learning. The decision to participate will not affect the student's status or grades at school.

Participation is voluntary. You may decide not to allow your child to participate in this study and if (s)he begins participation you may still decide to stop and withdraw at any time. Your decision will be respected and will not result in loss of benefits to which you

are otherwise entitled. Having read the above and having had an opportunity to ask any questions, please sign below if you wish to participate in this research. A copy of this form will be given to you to retain for future reference. If you have any concerns about your selection or treatment as a research participant, please contact Sherry May, IRB Administrator, Office of Sponsored Programs, 25 Kepner Hall, University of Northern Colorado, Greeley, CO, 80639, 970-351-1910.

Confidentiality and Privacy

Data collected from the research process will be solely used for the purposes it is intended to, and will not be used for any other purposes.

Voluntary Participation

Participation of your child in the research process will be voluntary and your child can choose to either participate or not participate in the research. At any point during the research process, your child can opt to withdraw their participation without any penalty.

INFORMED SIGNATURE(S) FOR CONSENT
Signature(s) for Consent:

I give permission for my child to participate in the research project *TPACK Effectiveness on English Teachers and Students in Saudi Arabia.* I understand that, in order to participate in this project, my child must also agree to participate. I also understand that, in order for my child to participate in the research, they should also give their consent. Also, I do understand that, at any point of the research paper, my child and I can change our minds.

Name of Child (Print): _____

Age: _____

Name of Parent/Guardian (Print): _____

Parent/Guardian's Signature: _____

Date: _____

AN ASSENT FORM FOR THE CHILDREN WHO
ARE INTERVIEWED TO SIGN

I am doing a study to learn about the effects of learning technologies on English teachers and students in learning and teaching.

If you agree to be in our study, I am going to ask you some questions about your experience of using technology in English classroom and in learning. I want to know if you think technology can help you and other students to enhance your learning.
You can ask questions about this study at any time. If you decide at any time not to finish, you can ask us to stop.

The questions I will ask are only about what you think. There are no right or wrong answers because this is not a test.

If you sign this paper, it means that you have read this and that you want to be in the study. This study will take approximately 20 to 30 minutes of your time. If you don't want to be in the study, don't sign this paper. Being in the study is up to you, and no one will be upset if you don't sign this paper or if you change your mind later.

Your signature: _____ Date _____

Your printed name: _____ Date _____

Signature of person obtaining consent_____ Date _____

APPENDIX E

INSTITUTIONAL REVIEW BOARD APPROVAL

UNIVERSITY OF
NORTHERN COLORADO

Institutional Review Board

DATE:	October 11, 2016
TO:	Hamzah Alhababi
FROM:	University of Northern Colorado (UNCO) IRB
PROJECT TITLE:	[940116-4] TPACK Effectiveness on English Teachers and Students in Saudi Arabia
SUBMISSION TYPE:	Amendment/Modification
ACTION:	APPROVED
APPROVAL DATE:	October 11, 2016
EXPIRATION DATE:	October 11, 2017
REVIEW TYPE:	Expedited Review

Thank you for your submission of Amendment/Modification materials for this project. The University of Northern Colorado (UNCO) IRB has APPROVED your submission. All research must be conducted in accordance with this approved submission.

This submission has received Expedited Review based on applicable federal regulations.

Please remember that informed consent is a process beginning with a description of the project and insurance of participant understanding. Informed consent must continue throughout the project via a dialogue between the researcher and research participant. Federal regulations require that each participant receives a copy of the consent document.

Please note that any revision to previously approved materials must be approved by this committee prior to initiation. Please use the appropriate revision forms for this procedure.

All UNANTICIPATED PROBLEMS involving risks to subjects or others and SERIOUS and UNEXPECTED adverse events must be reported promptly to this office.

All NON-COMPLIANCE issues or COMPLAINTS regarding this project must be reported promptly to this office.

Based on the risks, this project requires continuing review by this committee on an annual basis. Please use the appropriate forms for this procedure. Your documentation for continuing review must be received with sufficient time for review and continued approval before the expiration date of October 11, 2017.

Please note that all research records must be retained for a minimum of three years after the completion of the project.

If you have any questions, please contact Sherry May at 970-351-1910 or Sherry.May@unco.edu. Please include your project title and reference number in all correspondence with this committee.

This letter has been electronically signed in accordance with all applicable regulations, and a copy is retained within University of Northern Colorado (UNCO) IRB's records.