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Teacher Cognition about Technological Pedagogical Knowledge of a Teacher of English for ICT Integration in Secondary Schools in Nairobi County, Kenya

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Abstract:

English language teaching (ELT) is an area that has changed over the years from very teacher-centered approaches to learner-centered ones, and these changes have brought changes in materials and technology devices. This paper examined teacher cognition about technological pedagogical knowledge (TPK) of a teacher of English for ICT integration in secondary schools in Nairobi County, Kenya. The study was guided by the Teacher Cognition and TPACK frameworks viewed from two main landscapes. Teacher cognition included teachers' thoughts about instruction and beliefs about students, classrooms, learning, and their own teaching performances, contextual factors like attitudes, thoughts and beliefs of a teacher about ICT integration. While TPACK covered personal and professional constructs of teachers involving pedagogical technological and content knowledge (TPACK). The study was based on the pragmatic world view, and utilized the convergent parallel mixed methods design embedded within mixed methods approach. Both purposive and simple random sampling techniques were used to select the sample of 19 teachers of English selected from 10 secondary schools. Quantitative data were collected using the questionnaire whereas qualitative data were collected using in-depth interview. Data were sequentially analysed. Both descriptive statistics and factor analysis were used to analyse quantitative data. The descriptive statistics utilized were: frequencies and percentages that were derived using the statistical package for the social science (SPSS) software and data presented in tables, graphs and short descriptions.

The results of the study revealed that secondary school teachers of English in Nairobi County, Kenya lack professional and personal factors which include teachers' limited TPACK knowledge, lack of exposure to technology, lack of knowledge about ICT tools and their uses, resulting to limited knowledge and skills required to integrate ICT in instruction. The study concluded that whereas teachers of English appreciate the integration of ICT in the instructional process, did not integrate ICT in their instruction, hence recommends that teachers be provided with required support at different levels to enhance the application of ICT in language teaching; underscoring the importance of reflective practice for continued teacher development in ICT.

Keywords: Teacher cognition, Teacher of English, ICT integration, Technological Pedagogical Knowledge, Instructional Process

1. Introduction

The issue of Information and Communication Technology (ICT) in education is complex and, while it is accepted that ICT is not a 'silver bullet', it continues to play an important role in education (Underwood, 2014). The introduction of ICT in education is part of the more fundamental objectives to improve education globally and to make it accessible to everyone. Information and Communication Technology is a diverse set of technological tools and resources used to communicate, and to create, disseminate, store, and manage information (Blurton, 2002). Extended synonym for Information Technology (IT) include integration of technology as computers, the Internet, broadcasting technologies (radio and television), and telephone with various services and applications associated with them which enable users to access, store, transmit, and manipulate information (Buttner, 2014). The use of ICT in education has the potential to enhance the quality of teaching and learning, the research productivity of teachers and students, and the management and effectiveness of institutions (Kashorda et al. 2007). Lankshear & Knobel (2006) and de Winter et al (2010) state that ICT has enabled new and more efficient ways of doing things and provides new tools that facilitate students' construction of learning. Yet studies show that ICT use, particularly by teachers, remains limited (European Union, 2013), therefore

developing understanding of how and why ICT is used and not used continues to be of interest. Research has suggested that using ICT in education enables students to take a more active role in their learning rather than be a passive observers or listeners (Gao & Hargis, 2010; Saleh, 2008). Information and communication technology (ICT) is also perceived to have many advantages in education including, pursuing problem-solving skills, fostering collaborative learning, providing flexible learning opportunities and increasing productivity (Bitter & Legacy, 2008; Chambers, 2011). Furthermore, ICT is considered important for following the effectiveness of teaching and learning in schools (Lin, Wang & Lin, 2012). Consequently, with the potential that it offers, ICT has become an important part of educational reform efforts. Many countries have allocated substantial budgets for ICT implementation in education. Since the late 1990s, many governments have developed strategic plans to increase their investments in ICT in their education systems. In 2011, the Organisation for Economic Cooperation and Development found that many governments are making sizeable investments in ICT. Australian government estimated that about AUD \$8 billion was invested in ICT in education in 2008 (Lane, 2012). In 2006, the United States Department of Education reported spending more than USD \$9.5 billion for educational technology in public schools (Brunk, 2008). Like the Australia and United States, the United Kingdom has also made substantial investments in educational technology. The British Educational Communications and Technology Agency (BECTA, 2009) estimated that the overall figure for ICT investment in the United Kingdom between 2008 and 2009 WAS at GBP £880 million. The importance and benefits of ICT has also been recognised by many European countries. With the last decade, many school subjects have seen the implementation of ICT into the educational process (Balcon, 2003). Similarly, Saudi Arabia has realised that the use of computers and information technology tools in academic settings is very important (Almuqayteeb, 2009). In 2007, Saudi Arabia's King Abdullah began to pursue major reforms to the Saudi academic system. One of the most important of these reforms is King Abdullah's Public Education Development Project (Tatweer) which was seeking to equip classrooms with ICT equipment including laptop computers, projectors, and interactive whiteboards. In addition to the equipment, nearly 400,000 teachers in various subjects received the training necessary to use this equipment. This project was launched with a budget of SAR 9 billion over a six-year period (Ministry of Education, 2007). In 2005, Kenya began to pursue major reforms to the Kenya education system. One of the most important reforms was on the ICT master plan which was seeking to equip classrooms with ICT equipment including laptop computers, with the first phase of laptop computers supplied to some primary schools for standard one pupil (GoK 2016). The Government has put in place the National ICT Policy and E-Government Strategy that provides guidelines for transformation of the Kenyan into a digital society. In both documents the Government recognises that an ICT literate workforce is the foundation on which the nation would become a knowledge-based economy. With these considerable investments in ICT for education, it is prudent to question to what extent have Kenyan English language teachers integrated ICT into their classroom practices? Does the reality on the ground match the expectations? Although few studies have produced useful information, they do not provide a deep insight into how ICT is being used in the context of Kenyan secondary schools English classrooms and the rationale for not integrating ICT in the educational processes. The study thesis alternatively, and more comprehensively, considered the role of teachers' technological, pedagogical and content knowledge (TPACK) in the effective integration of ICT in teaching. To do this, the current research, adopted the TPACK model (Mishra & Koehler, 2008), an important theoretical framework, which considers a teacher's technological, pedagogical and content knowledge rather than simple measures of use and explored teachers' cognitions about integrating ICT in teaching. TPACK is described in greater detail later in the main research. As implementers of new innovations, teachers play an important role in the process of technology adoption (Dexter, et al. 1999). At the heart of what teachers do lay their cognitions. Therefore, the current study provided a better understanding of Kenya secondary school English language teachers' cognition about integrating ICT in their classroom practices

1.1. Teacher Cognition about ICT in Language Teaching

Teacher cognition has been labelled, conceptualised and defined in different ways. Borg (2003, 2006, 2015) defines teacher cognition as teachers' "beliefs, knowledge, theories, attitudes, images, assumptions, metaphors, conceptions, perspectives about teaching, about teachers, learning, students, subject matter, curricula, materials, instructional activities and self". In addition, there are various terms that have been used over past decades for teacher cognition: among them are 'teacher knowledge, 'teachers' beliefs', attitudes and knowledge', teachers' theories, and teachers' personal theories. These terms, including teacher beliefs, teacher knowledge, and teacher thinking, comprises the broader concept of teacher cognition, (Calderhead, 1996). Researchers in the field (Borg, 2003, 2006), Freeman, 2001 are interested in the thought processes of teachers, what teachers know, how they come to know, and how they draw on their knowledge in their classroom teaching. What language teachers think, know, believe, and do, is influenced by several areas of the teaching profession. Borg (2006) proposes a framework of schematic conceptualisation of teaching which shows that teachers' concepts about teaching and learning are established early on in schooling experiences. These early concepts may continue to be influential throughout their professional lives. Teachers' concepts about teaching and learning may be affected later by professional preparation programmes in which they receive training, teaching apprentices, and new pedagogical orientations. However, when teachers are at work, some contextual elements such as curriculum and teaching culture also influence their practices which may be more or less congruent with their underlying beliefs. Meanwhile, teachers' ongoing experiences in classrooms may simultaneously shape their cognition unconsciously or consciously through reflection. The current study focused mainly on what teachers know, think and believe about integrating ICT in English language teaching. The following section discusses these three components of teacher cognition in details.

1.2. Teacher Knowledge about use of ICT

Knowledge is a particularly important component of teachers' ICT attributes (Van Break, 2001). A lack of teacher knowledge or competencies related to the use of ICT for educational purposes has been identified as the major barrier to effective ICT implementation (Hew & Brush, 2007; Bingimlas, 2009; Chen, et al., 2009). Williams, et al., (2002) claimed that knowledge and competence were required for teachers at an early stage of ICT development. It is, however, important to note that focusing on teachers' technical competence alone is insufficient to achieve successful technology implementation (Lloyd, 2010). Similarly, according to the TPACK theory, teachers need more than just technical competence (Mishra & Koehler, 2006). Technological pedagogical and content knowledge (TPACK) was introduced in 2005 by Koehler and Mishra as a conceptual framework to describe the body of knowledge teachers need to effectively use technology in their teaching (Koehler, et al., 2007). This model suggests that relationships and competencies exist among the three main constructs of knowledge (technology, pedagogy, and content) (Mishra & Koehler, 2006; Koehler & Mishra, 2008). As these three components of Knowledge intersect, this will lead to an understanding of teaching content with appropriate technological methods and technologies. The intersection of all the components is the basis of the model which is the TPACK components (Mishra & Koehler (2006). Unwin (2007) and Voogt et al (2013) describe this model of teacher knowledge as including content, the subject specialist knowledge; pedagogy, knowledge of techniques of teaching and learning; and pedagogical content knowledge, based on Shulman's definition (Shulman, 1986). This definition sets out the knowledge used to make the subject comprehensible to others and the requirements for teacher knowledge. The TPACK component could be defined as "a teacher's knowledge of how to coordinate and combine the use of subject-specific activities using emerging technologies to facilitate student learning" (Cox & Graham, 2009). Teachers make use of a range of knowledge in order to effectively do their job and the integration of technology into teaching and learning involves a knowledge base for teachers that is new and therefore needs to be developed through appropriate professional development (Mishra & Koehler, 2006; Loveless, 2011). Mishra & Koehler (2006) explain this concept as the qualities of teacher knowledge required in order to integrate technology within pedagogy. For ICT to support teaching and learning, pedagogy and what teachers need to know to successfully incorporate the technology must be considered (Mishra & Koehler, 2006). This is referred to as Technological Pedagogical Content Knowledge (TPCK), The TPACK theory has been used to examine teachers' knowledge with regards to the use of educational technologies in more developed Western nations (Cox & Graham, 2009; Lee & Tsai, 2010; Chai et al., 2010; Archambault & Barnett, 2010). However, the applicability of this framework to Kenyan teachers who live in a different cultural and economic environment is not known. Since Kenya Government has taken major steps towards ICT integration in education, there is a strong need to establish teachers' cognition and integration of ICT in English language classroom practices. The theory assumes that teachers' use of ICT has a relationship with their TPACK that is, teachers having "strong" TPACK will be more successful with the integration of ICT in their classrooms. It therefore seemed reasonable to investigate the effectiveness of ICT integration from the perspective of TPACK theory. This study assumed that the more TPACK a teacher has, the more effectively ICT would be implemented in their classroom. This, in turn, is equivalent to progression into the more developed stages of LoTi Digital Age Framework, not part of the current study.

1.3. Objective of the Study

The objective of the study was to investigate technological pedagogical knowledge (TPK) of a teacher of English for ICT integration

1.4. Theoretical Framework

This study utilised two teacher frameworks: TPACK theory and teacher cognition theory. The two theories were then triangulated in order to off-set the weakness of one theory with the strengths of another as a means of improving the reliability and validity of the two theories and to compare the results of this study. Teacher cognition postulates that teachers are active, thinking decision makers who make instructional choices by drawing on complex, practically-oriented, personalised, and context-sensitive networks of knowledge, thoughts, and beliefs. The TPACK framework postulates that teachers need technological pedagogical and content knowledge rather than simply technical competent. Based on these facts, a theoretical triangulation (methodological pluralism) was applied in an attempt to increase the confidence in the accuracy and truth of the research findings.

2. Related Literature Review

There are several values of related studies: It shares with the reader the results of other studies that are closely related to the one being undertaken, it relates a study to the larger ongoing dialogue in the literature, filling in gaps and extending prior studies (Cooper, 2010; Marshall & Rossman, 2011). It provides a framework for establishing the importance of the study as well as a benchmark for comparing the results with other findings. Review of related studies, thus helped the researcher to have a foundation for writing the scholarly literature on a topic, which generally shaped from the larger problem to the narrower issue that lead directly in the methods of study.

2.1. Teacher Cognition about Technological Pedagogical Knowledge

A question that is often posted is: Does pedagogy shape technology, or does technology shape pedagogy? The evidence available to us suggests a close relationship between teacher cognition on one hand and the role of ICT in teacher education on the other. Belland (2009) remarks that since prior learning experiences affect the way information is internalised, the absence of a technology element in schooling years might influence teachers' perceptions of the role of ICT in education, and cause them not to use it in their subsequent teaching. Belland (2009), Ertmer & Ottenbreit-Leftwich

(2010), affirm that teacher-candidates need to be placed in authentic educational settings where they witness technology being used, and get the chance to employ it in teaching. In other words, they need to “experience” teaching with technology in real contexts for more efficient technology integration afterwards. Pre-service teachers’ cognitions act as a filter through which they internalise their teacher education experiences, and without recognition of these established cognitions very little technology integration will take place (Ertmer, 2005; Tondeur, et al., 2008; Inan, et al., 2010). If we assume that learning occurs through constant interaction between established knowledge and new experiences, then addressing former beliefs and unpacking prior experiences become a priority for teacher educators (Borg, 2009). Researchers have argued that there is nothing inherent in technology that leads to reforms in pedagogy, and that as a tool; its value lies in how it is used by the teachers themselves (Ferding, 2006).

Maddux (1993) affirms that “nothing miraculous happens automatically as a result of putting a child and a computer in the same room” (p.14). In support of the same argument, Bruce (2002 p.17) states: Unfortunately, new technologies are no panacea for problems in education and by themselves they at most enable, rather than create, change. It is ironic that the research showing how powerful computers can be ultimately brings us back the idea that it is the teachers who make the difference. Research from different educational settings across the world supports this argument. It suggests that ICT does not embody any specific pedagogy, and that teachers use technology in accordance with their cognitions.

Niederhauser & Stddart (2001) conducted a US-based study on the relationship between teachers’ beliefs and their use of educational software. The researchers concluded that ICT itself does not represent a specific educational approach as teachers used computer-based material to support their own pedagogical beliefs, which were reflected in a wide array of educational approaches. Similarly, a study in a secondary school setting in Greece demonstrated that teachers integrated technological tools to support their traditional approaches of teaching, which placed great emphasis on the central role of the teacher and the test-driven curriculum (Demetriadis, et al., 2003). In the same vein, Zhong & Shen (2002) examined two technology-based secondary EFL classrooms in China. Their study revealed that innovations had no significant effect on the dynamics of teaching and learning. The teachers remained the centre of interaction within traditional settings. As ICT was used to support centuries-old educational practices, it only changed the physical look of classrooms.

The researchers underscored the importance of targeting teachers’ pedagogical beliefs as a necessary precondition for effective technology integration. Lam (2000) also emphasised teachers’ beliefs as key to integration. In her study of Canadian second language teachers, she demonstrated that those teachers who avoided using innovations, did so not because of technophobia, but because they were not convinced of the educational value of technology. Finally, based on research into the use of technology in Italian schools, Gobbo and Girardi (2001) stipulated that although most of the teachers held positive attitudes toward ICT, they were unwilling to replace their traditional teaching routines. The researchers explained that the findings of their study do not support the common view that introducing technology into classrooms changes teachers’ established approaches to teaching.

2.2. Teacher Cognition and Technology-Mediated Language Teaching

It is generally accepted that successful technology integration requires appropriate understanding of the role of technology and teachers in technology-mediated classrooms. According to Dias and Atkinson (2001), a current view of technology integration involves the practices of using technology in ways that are both curriculum-based and future oriented. Often researchers mention that technology-enhanced teaching works well when teachers’ teaching philosophy and methods focus on learner-centred teaching and constructivist teaching practices (Judson, 2006). Constructivist pedagogy has significant implications for the use of technology that promote meaningful learning, increase students’ motivation to learn, and facilitate thinking and knowledge construction. Thus, technology is used to mediate students’ exploratory learning and knowledge construction than for the transmission of knowledge, it is something that students learn ‘with’ not ‘from’. However, it is by no means certain that technology causes teachers to adopt constructivist beliefs. In their view, if teachers decide to use the computer in a constructivist manner, they do so, not because of features in the technology, but on the basis of their knowledge and expertise. Judson (2006) conducted a survey to measure 32 classroom teachers’ beliefs about instruction. The teachers were also directly observed and rated with the Focus on Integrated Technology: Classroom Observation Measurement (FIT: COM), which measures the degree to which technology-integrated lessons are aligned with constructivist principles. Results revealed no significant relationship between instructional practices and teachers’ stated beliefs. It was found that although most teachers identified strongly with constructivist convictions in the survey, they failed to exhibit these ideas in their practices. Tondeur et al., (2008) investigated the relationship between primary teachers’ educational beliefs and their typical approach to computer use in the classroom. The results pointed at a specific relationship between teachers’ belief profiles and how computers are used in the classroom.

It was found that teachers with a traditional teaching profile are more likely to use computers in drill and-practice activities, while teachers with a constructivist profile are more likely to give students more freedom when the computer is used to research and process information. This means that teachers would show traditional or constructivist use of technology because they already hold these beliefs in their classroom practices. Several studies explain that teachers who use computers do so because their conceptions of using ICT fit into their existing teaching beliefs or belief system (Sugar et al., 2004). It is also found that teachers’ educational beliefs are indicators of their classroom behaviours and how they employ an instructional tool, including technology (Young & Bush, 2004; Tondeur et al., 2008). For instance, Cope and Ward (2002) interviewed a group of high school teachers to find out about their perceptions of learning technologies.

A phenomenological research approach was used to examine the importance of teacher perceptions on the integration of learning technology. They further noted that successful integration is more likely to occur when teachers

perceive technologies as tools which encourage students to use deep learning approaches which focus on interrelating aspects of the content being studied. This is supported by Egbert (2008) who indicates that effective technology-based learning tasks would take place when teachers focus on the following aspects: learning goals, training and support, times to learn relevant technologies, resources, and using technology only when appropriate. To conclude this section, effective technology practices can be established by teachers designing language instruction that provides opportunities for students to use technology to enhance their learning according to their abilities, skills, and learning objectives. As Felix (2003) states, "We interpret best practice to mean using the most appropriate tools to their best potential to achieve sound pedagogical processes and outcomes." Teachers should ensure that the use of technology involves the practice of using technology in ways that are both curriculum-based and meaningful for students' learning. In terms of best practice in using technology in language teaching, Hoopingarner (2009) proposes that technology should be used to "replace some aspects of teaching, augment aspects of teaching and learning, and transform the learning experiences" (p. 233). It can be posited that technology use in language classrooms can reach the maximum potential when teachers see technology as a tool that can enhance teaching and learning by providing additional opportunities for language practice, and serve as a platform for extended technology and relate it to their classroom practices is thus crucially important

2.3. Technological Pedagogical Knowledge (TPK)

Technological pedagogical knowledge (TPK) is how teaching and learning changes when particular technologies are used. It is knowledge of the pedagogical affordances and constraints of a range of technological tools as they relate to disciplinary and developmentally appropriate pedagogical designs and strategies. An important part of TPK is developing creative flexibility with available tools in order to re-purpose them for specific pedagogical purposes (example MS Office designed for English language environment, Web-based technologies such as blogs or podcasts are designed for purposes of communication and social networking. Teachers need to reject functional fixedness, develop skills to look beyond the immediate technology and "reconfigure it" for their own pedagogical purposes. Once again, here is the opportunity to "reconfigure" Web 2.0 tools for their use in the English language classroom.

The teacher's own pedagogical beliefs and values play an important part in shaping technology-mediated learning opportunities. It is not yet clear from the research literature whether this results in technology being used as a 'servant' to reinforce existing teaching approaches, or as a 'partner' to change the way teachers and pupils interact with each other and with the tasks. Teachers need extensive knowledge of ICT to be able to select the most appropriate resources. They also need to understand how to incorporate the use of ICT into their lessons; they may need to develop new pedagogies to achieve this. At the intersection of TK and PK is technological pedagogical knowledge (TPK). According to Koehler and Mishra (2009), TPK is "an understanding of how teaching and learning can change when particular technologies are used in particular ways" (p.65). Based on his study, Cox (2008) presented a comprehensive definition of TPK that is "a knowledge of the technologies that may be used in a generic pedagogical context, including the affordances and constraints of those technologies, and how those technologies influence or are influenced by the teacher's pedagogical strategies and student learning" (p. 76). It seems that TPK is the understanding of how to use technology to support general teaching strategies without reference to specific content. With this type of knowledge, teachers need to be flexible, creative, and open-minded in seeking technology to improve their students' learning and understanding. This is because most popular emerging technologies are not developed for educational purposes. Therefore, teachers need to have TPK that allows them to re-purpose these technologies for specific pedagogical applications. Teachers need to "look beyond the immediate technology and 'reconfigure' it their own pedagogical purposes" (Koehler & Mishra, 2008, p. 17)

Deshmukh (2013) conducted a study to examine a pedagogical approach to ICT integration in English language teaching. The purpose of the study was to examine the pedagogical approaches for English language teachers. She contended that teacher's own pedagogical beliefs and values play an important part in shaping technology-mediated learning opportunities. She concluded that the use of ICT will lead ELT to be interactive, flexible and innovative when English teachers spontaneously develop the link between their pedagogical knowledge and ICT literacy. Use of ICT across curriculum has constructed new beliefs that change the pedagogical reasoning in ELT.

She went on to say that English teachers need to only possess such basic ICT skills as word Processor, Power Point, video editor and access to the Internet, but also develop pedagogical knowledge to effectively integrate ICT into English curriculum, and that ICT demands the metamorphosis of a teacher from a traditional role to a facilitator. She also concluded that the integration of ICT would lead to diversification not only in English content, contexts and pedagogical methods, but also in teaching environment. ICT will extend the boundary of English teaching and characterise it as interactive, flexible and innovative, and that the efforts from educators, teachers as well as the power of technology will guarantee a brighter future for ELL students in their academic and professional life. The above study has provided useful information to the researcher on the technological pedagogical content knowledge as crucial in the integration of ICT in English language teaching. However, it has failed to highlight clearly methodology employed and how data were collected and analysed. Moreover, the study was more concerned with the product as opposed to the process. The current study attempted to establish teacher cognition about ICT integration in English language teaching in Kenyan context since the above study was carried out in India, a completely different environment. Suwannasom, (2010) conducted a study to investigate teacher cognition about technology-mediated EFL instruction in the Thai tertiary context. The main goal was to investigate technology-using teachers' personal principles and practices in their teaching contexts. A teacher cognition questionnaire was designed and administered to forty seven Thai EFL lecturers in seven public universities; and semi-structured interviews and scenario-based tasks were conducted with seven lecturers, unstructured interviews and observations were carried out with three teachers who used technology in their classroom teaching in order to gain a better understanding of their situated perceptions about the use of technology in particular teaching and learning

contexts. The results revealed that University EFL teachers' views of technology were highly shaped by both their teaching environment and individual beliefs about English language learning. When teachers apply technology in their instruction, they also apply their personal principles or maxims that guide their practices.

In addition, a number of sociocultural aspects emerged in teachers' views about technology use in their EFL teaching contexts giving rise to theoretical implications about how teacher cognition is conceptualised. Some of the major implications for practice include: the need to encourage EFL teachers to reflect on their teaching principles relevant to their working contexts, the value of providing teachers with models of technology use in tertiary EFL teaching, and the maximisation of the use of available technology to support local practices. Implications for technology include the use of multiple context-specific instruments and methods to elicit teachers' underlying beliefs and perspectives about technology-mediated teaching. Similarly, Attia, (2011) conducted a study to investigate teacher cognition and technology use within a context of teaching Arabic to speakers of other language. Informed by the research questions, a qualitative research design was selected for this project. The study used a sample of thirty two full-time and thirty six part-time teachers to participate in the study. Data collection methods used in this study included a baseline questionnaire, semi-structured interviews, video recorded stimulation recall, classroom observation, and teacher reflective writing. Pilot work was conducted with part-time teachers in the language programme which allowed all methods to be trailed and refined before the beginning of the data collection period. Findings suggested that teachers' cognitions about teaching and learning and about themselves as Arabic language professionals, shaped technology use, determine reactions to perceived challenges, and illuminate differences between practitioners working within the same environment with regard to the integration of ICT into their practice. In terms of methodology, this study used qualitative research design. The current study used sequential mixed research design. The above study also used a number of tools in collecting data, including classroom observation. The current study only used questionnaire and in-depth interview schedule. The context of the above research was based on teaching of Arabic language to learners of other languages; the current study looked at teacher cognition for ICT integration in the teaching of English language.

Wanjala, (2016) also conducted a study on Information Communication Technology Pedagogical Integration in Mathematics Instruction among teachers in secondary schools in Kenya. The study sought to ascertain the extent of ICT pedagogical integration in Mathematics. The study was based on Roger's theory of Diffusion of Innovation. In the study the descriptive survey research design of exploratory nature was adopted and involved collection of quantitative and qualitative data. Data was collected using questionnaires, interview and observation schedules. Data was analysed using both descriptive and inferential statistics. Results revealed that support in professional development for ICT use has been the major issue in many teachers in schools. The data also showed that teachers who used ICT at an instance were more likely to acquire on-going support to use them in Mathematics. Results also showed that there was limited use of ICTs in Mathematics instruction which was attributed to low self-confidence and incompetence in use of ICT and inaccessibility to appropriate software material and technical support. The study recommended the need to equip schools with the necessary ICT information including content specific software and technical support. There was also need for professional development of teachers in ICT pedagogy as they required the knowledge and skills to put these tools in practice. The reviewed literature has shown that ICT integration has been used. Although its use has universal benefits, there is a difference in the rate of its application and in different context and contents. Literature indicates that many countries have stepped up initiatives geared towards promoting use of ICT in school curriculum. Nevertheless, a number of studies have revealed that there are challenges that have impacted negatively and slowed down implementation and use of ICT in secondary schools.

Several of the studies have focused extensively on use of ICT in teaching but there is need to understand teachers' cognition about integrating ICT in the area of English language teaching.

3. Research Design and Methodology

A descriptive survey research design was used to establish and understand the meaning teachers of English derive from their experiences of using or not using ICT in their English instructions. Descriptive survey research design is a scientific method which involves observing and describing the behaviour of a subject without influencing it in any way. Many scientific disciplines, especially social science and psychology, use this method to obtain a general overview of the subject. Descriptive survey research describes behaviours by gathering people's perceptions, opinions, attitudes, and beliefs about a current issue (For example educational issues). Descriptive survey research provides quantitative or numerical descriptions of trends, attitudes, or opinions of a population by studying a sample of that population. It includes cross-sectional and longitudinal studies using questionnaires or structured interviews for data collection-with the intent of generalising from a sample (Fowler, 2008). The descriptions are then summarized by reporting the number or percentage of persons reporting each response. The study sought to investigate teachers' attitudes about using technology in their English language classrooms. By conducting surveys and inquiring their comfortableness' using technology through in-depth face-to-face interview methods, the researcher could be able to gauge what helped understand if fully-fledged integration could face issues. This also helped the researcher in understanding if teachers of English are impacted in any way with this new innovation. The choice of this survey research design informed the research philosophical paradigm and the research methodology. Therefore, a descriptive survey study was the most appropriate research design. It was believed that the design would allow for a more rich description of the teachers' experiences of teaching with technology and their views on the contributions of ICT to the teaching and learning of English language. The study used a mixed research methods approach that combined quantitative (survey) and qualitative (in-depth interviews), which explored in-depth teachers' cognition about integrating ICT in teaching English, integrating the two, and then draws interpretations based on the combined strengths of both sets of data" (Creswell, 2015. P.2). Data collection was conducted

using in-depth interview and questionnaire. Data obtained from the study were analysed through the content and factor analyses. The study sampled 10 secondary schools in Nairobi County; a total of 19 secondary school English language teachers participated in the study. In the study, the techniques of purposive, stratified and systematic random sampling were used to get the sample size. . Data collection was conducted using in-depth interview and questionnaire. Data obtained from the study were analysed through the content and factor analyses. Data obtained from the study were analysed through the content and factor analyses. The results were analysed, discussed, interpreted, summarised, and conclusions and recommendations drawn.

4. Study Findings

The study sought to examine teacher cognition about technological pedagogical knowledge (TPK) of a teacher of English for ICT integration in secondary schools in Nairobi County, Kenya. Teachers of English TPK knowledge levels were measured using the total score derived from the TPACK scale. The TPACK scale included 16 items after performing the factor analysis. Teachers answered the TPACK using a 5-point Likert-type scale ranging from Strongly Disagree=1, Disagree=2, Neutral=3, Agree=4, and Strongly Agree=5. From the results of CFA, the lowest possible to be calculated for this scale would be 26 and the highest would be 80. Thus, by adapting the scoring procedure illustrated by Kabakci Yurdakul, et al., (2012), total scores equal to 57 or under represent low TPACK, hence low TPK knowledge, scores between 58 and 78 represent average TPACK, average TPK knowledge, while those equal to 79 or above shows high level of TPACK, hence high TPK knowledge. In order to answer the first sub questions, descriptive analysis of means and standard deviation were used. As shown in table 4. 1a, the mean score of the total TPACK scale in the current study was 58.65 with a standard deviation of 16.647, which indicates that secondary school teachers of English in Nairobi County had between low and moderate levels of TPACK, with majority at low TPK. The results revealed that just very few teachers had an average TPK level, while majority (63%) of the teachers had low levels of PACK, hence low TPK knowledge. Table 1 , Table 2 gives a summary of this information.

	N	Minimum	Maximum	Mean	Std. Deviation
TPK-Total	19	7	32	20.57	7.317
Valid N (Listwise)	19				

Table 1: Means and Standard Deviations of English Language Teachers' TPK Levels in Integrating ICT

	N	Minimum	Maximum	Mean	Std. Deviation
TPACK_total	19	26	80	58.65	16.647
Valid N (Listwise)	18				

Table 2: Means and Standard Deviations of Nairobi Secondary school Teachers' level of TPACK Knowledge

Further analysis of the results revealed that teachers of English in Nairobi County lack training on technologically-enhanced language teaching. Teachers were further asked to respond to various items in the questionnaire regarding their technological pedagogical knowledge (TPK). Results were presented in frequencies, percentages and graphs. For example, teachers were asked to respond to a statement; “The computer helps students understand English concepts in more effective ways”. Majority (53%) strongly agreed with this statement, 32% of the teachers agreed, 5% of them were neutral, 5% disagreed with the statement while 5% strongly disagreed that computer can help students understand English concepts in a more effective way. The results show that 85% of the teachers supported the statement while 10% didn’t support the statement indicating a strong support of the integration of computers in teaching English. Figure 1 represents the information obtained from this data.

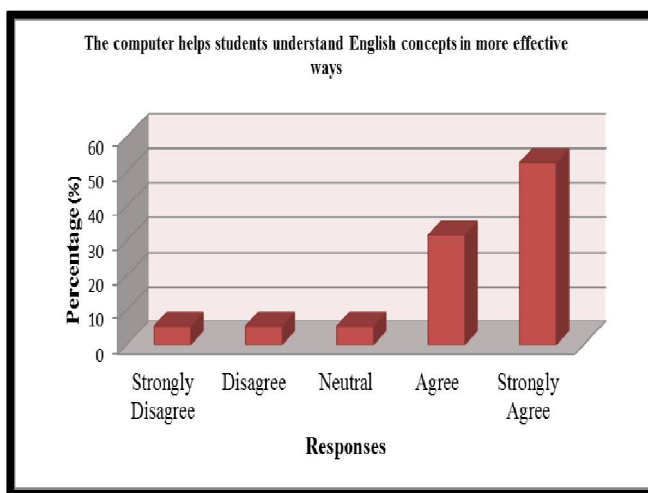


Figure 1: Computer and Understanding of English Concepts

In order to further examine teachers' TPK level, English teachers were asked to respond to the statement, "Technology is so important for English teachers to teach in a more effective way". The results show that majority (58%) strongly agreed with the statement, 37% of the teachers agreed, while 5% were neutral about the statement. This result shows that 95% agreed that technology is important while 5% did not agree. These results confirm that TPK plays a significant role in the effectiveness of integrating ICT in teaching English. This information is summarised in Figure 2

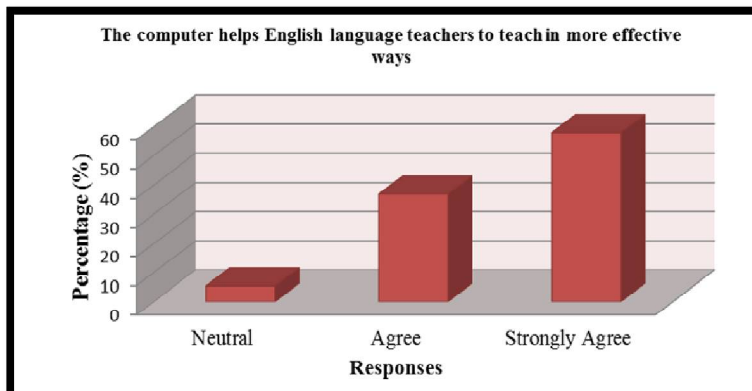


Figure 2: Computer and English Language Teachers

Further item on this research question required teachers of English to respond to the statement, "Technology is so important for teaching English and for supporting the learning process. The responses were represented using a bar graph. It revealed that majority of the teachers of English (47%) strongly agreed with the statement, 16% agreed, 16% of the teachers were non-committal, while 21% of the teachers strongly disagreed that technology is so important for teaching English and for supporting the learning process. This finding is linked to the findings on the findings that computers help English language teachers to teach in a more effective ways. Figure 3 gives a summary of this information.

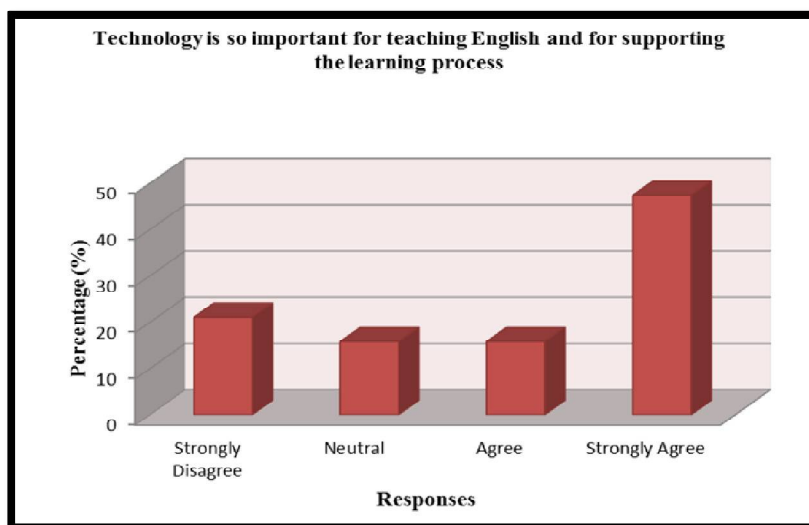


Figure 3: Support of Technology in English Teaching and Learning Processes

A further analysis revealed that majority of the teachers of English in secondary schools in Nairobi County lack technological, pedagogical knowledge (TPK). Majority of the teachers interviewed indicated that they were not satisfied with their technological pedagogical knowledge necessary for the integration of ICT in teaching English. They emphasised that they lacked the necessary technological knowledge in order to effectively integrate it into their classroom practices.

One of the most important components of teachers' ICT knowledge is their ICT skills, what is known as "Technological Knowledge" (TK). For example Teacher 2 expressed how limited her ICT knowledge was by explaining that she only had basic computer skills and knew only very basic things about laptop, Microsoft Office and Word. Something of interest, Teacher 2 stated that she did certificate course in ICT. The findings showed that teachers had low to average ICT skills which could be considered as an influencing factor for the limited use of ICT in their English teaching. Some teachers described themselves as having a moderate level of ICT skills. They all indicated that they had knowledge on using the available presentation devices, searching the Internet for resources related to their lesson content, and using e-mail and some Microsoft Office software applications, such as Word and PowerPoint. Teacher (3) similarly indicated that he had the knowledge of MS Words, PowerPoint and Excel and only knew how to operate PowerPoint and CDs in the computer. Teacher 4 had greater skills in that she knew how to operate and plug in her laptop to the classroom and mount a projector to present some of the PowerPoint presentations that she had prepared on some English topics. The results, however, did not indicate any instance of a teacher at an average stage of ICT implementation while having a low level of technological knowledge. The findings, however, indicated that some of the lowest stage of ICT implementation teachers

had an average level of technological knowledge. For instance, Teacher 2 who was at the Inaction stage of ICT implementation, indicated that she held a certificate in computer skills.

According to her, these skills certify what are considered essential skills, such as computer essentials skills, information searching, online communication and emailing, word processing and excel. However, in terms of ICT integration, she was at the level of inaction, which is the lowest level in the Teacher Professional ICT Attributes Framework (Newhouse, et al., 2002). From the interviews, many English teachers had no involvement with the integration of ICT and had no plans to use it in future for their classrooms unless a concrete policy of implementation was put in place. Moreover, Teacher 9, who was also at the Inaction level, mentioned that she had done a general computer course. This points out that having technological knowledge alone was not sufficient for the teachers of English to achieve effective ICT integration. Further differences were noted among teachers of English in terms of their TPK. While Teacher 16 and Teacher 17 described themselves as having acquired general ICT skills, they indicated a lack of TPK knowledge. The reality is, all the teachers who were at the Inaction stage admitted that they had little or no TPK. Generally, quantitative results of the current study were supported by the qualitative interviews data. Qualitative results suggested that all the participants were at the first three stages of ICT implementation of Teacher Professional ICT Attributes Framework namely: Inaction, Investigation and Application, whereas, those teachers who were at Investigation and Application stages indicated having low and average levels of TPK and level of ICT use effectiveness. Therefore, these findings support the TPACK theory in which the greater TPACK a teacher has, the more effective ICT integration is demonstrated by the teacher. The results also reveal that teachers of English level knowledge on ICT was either low or moderate as they were only able to use very limited applications such as MS Word (word processing), PowerPoint, and e-mailing as these are the main applications which are commonly and often used in the teaching profession. These results are in consistent with research done by Rosnaini & Mohd Arif (2010) who found that majority group of teachers were only knowledgeable on certain applications such as word processing and internet browsing.

5. Discussion of Findings

This study adopted a mixed methods design incorporating both quantitative and qualitative approaches, which offered more confidence in the validity and reliability of the study findings. According to Tashakkori & Teddlie, (2003), the review of literature showed that mixed approaches can minimise errors that may arise from a single approach and confirms data accuracy. Research objective aimed to investigate technological pedagogical knowledge (TPK) of a teacher of English for ICT integration. Data relating to Nairobi County secondary school English teachers' levels of technological pedagogical knowledge (TPK) were collected and analysed descriptively by used of statistical packages for social sciences (SPSS) through content and factor analyses, where qualitative data were reported through narration. English teachers' knowledge levels were measured using the total score derived from the TPACK scale. The TPACK scale included 16 items after performing the factor analysis. Teachers answered the TPACK using a 5-point Likert-type scale ranging from Strongly Disagree=1, Disagree=2, Neutral=3, Agree=4, and Strongly Agree=5. The lowest possible score to be calculated for this scale would be 26 and the highest would be 80. Thus, by adapting the scoring procedure illustrated by Kabakci Yurdakul, et al., (2012), total scores equal to **57** or under represent low TPACK knowledge, scores between **58** and **78** represent average TPACK knowledge, while those equal to **79** or above show high level of TPACK knowledge. In order to answer this question, descriptive analysis of means and standard deviations of the TPACK scale were used. The overall mean score of the total TPACK scale in the current study was 58.65 with a standard deviation of 16.647, which indicates that Nairobi County secondary school English teachers had between low to moderate level of TPACK knowledge. These findings are in congruent with the findings of Harbi, (2013) However, a closer look of the results revealed that just very few of the participants had an average level, while majority of the participant teachers had low levels of TPACK knowledge. This finding is supported by that of Harbi (2014) which indicated that most of the participants, more than three-quarters were at the first three levels of ICT implementation. Generally, secondary school teacher of English in Nairobi County demonstrated low levels of ICT integration.

Similarly, teachers reported that they were not integrating ICT in the English classroom, either they lacked the access to ICT tools or due to their perception of ICT as inappropriate for students' learning. Majority (41%) of the teachers on average agreed with the items on teachers' perceived self-confidence in integrating ICT in English teaching. 22% strongly agreed, 18% remained neutral, 13% disagreed, and 5% strongly disagreed. On the other hand, teachers disagreed with statements in two items: "I feel confident that I can teach my students to select appropriate software and have students work collaboratively on an online English language project" and "I feel confident that I can teach my students how to create their own Web Pages or Weblogs to post their assignments", showing that teachers in Nairobi County lack confidence in integrating ICT in teaching English language, indicating that teachers' levels of knowledge on ICT is low as they were only good at certain applications which are commonly said in teaching and learning. The result is supported by Kandasamy & Mohd Shah (2013). The results seem similar to research done by Rosnaini & Mohd Arif (2010) where few teachers were knowledgeable on ICT. The development of techno-pedagogical skills in teachers has been discussed in details in many literatures. Beaudin & Hadden (2004) explain that critical reflection on the use of ICT tools in teaching and learning would help the teachers to improve their pedagogical skills. Similar revelation is that majority teachers of English in secondary schools in Nairobi County lack technological, pedagogical knowledge (TPK). Majority of the teachers of English interviewed reported that they were not satisfied with their technological pedagogical knowledge necessary for the integration of ICT in teaching English.

They emphasised that they lacked the necessary technological knowledge in order to effectively integrate it into their classroom practices. One of the most important components of teachers' ICT knowledge is their ICT skills, what is known as "Technological Knowledge" (TK). The findings found that teachers had low to average ICT skills which could be

considered as an influencing factor for the limited use of ICT in their English teaching. Some teachers described themselves as having a moderate level of ICT skills. They all indicated that they had knowledge on using the available presentation devices, searching the Internet for resources related to their lesson content, and using e-mail and some Microsoft Office software applications, such as Word and PowerPoint. On the other hand, Teacher 3 indicated that he had the knowledge of MS Words, PowerPoint and Excel and only knew how to operate PowerPoint and CDs in the computer while Teacher 4 had greater skills in that she knew how to operate and plug in her laptop to the classroom and mount a projector to present some of the PowerPoint presentations that she had prepared. The results, however, did not indicate any instance of a teacher at an average stage of ICT implementation while having a low level of technological knowledge. The findings, however, indicated that some of the lowest stage of ICT implementation teachers had an average level of technological knowledge. For instance, Teacher 2 who was at the Inaction stage of ICT implementation, indicated that she held a certificate in computer skills. According to her, these skills certify what are considered essential skills, such as computer essentials skills, information searching, online communication and emailing, word processing and excel.

However, in terms of ICT integration, she was at the level of inaction, which is the lowest level in the Teacher Professional ICT Attributes Framework (Newhouse, et al., 2002). As seen earlier, many teachers of English in the current study were not integration of ICT and had no plans to use it in future for their classrooms unless a concrete policy of implementation is put in place. Moreover, Teacher 9, who was also at the Inaction level, mentioned that she had done a general computer course. It shows that having technological knowledge alone was not sufficient for the teachers of English to achieve effective ICT integration. On the other hand, differences were noted among teachers of English in terms of their TPK. While as Teacher 16 and Teacher 17 described themselves as having acquired general ICT skills, they indicated a lack of TPK knowledge. The reality is, all the teachers who were at the Inaction stage admitted that they had little or no TPK. Whereas, those teachers who were at Investigation and Application stages indicated having low and average levels of TPK and level of ICT use effectiveness. Therefore, these findings support the TPACK theory in which the greater TPACK a teacher has, the more effective ICT integration is demonstrated by the teacher. The results reveal that English teachers' level knowledge on ICT was either low or moderate as they were only able to use very limited applications such as MS Word (word processing), PowerPoint, and e-mailing as these are the main applications which are commonly and often used in the teaching profession. These results are in consistent with research done by Rosnaini & Mohd Arif (2010) who found that majority group of teachers were only knowledgeable on certain applications such as word processing and internet browsing. Therefore, the findings of the current study showed that teachers' TPK knowledge level had a direct relation with the integration of ICT in teaching English. The correlations findings indicated that there was a significant positive correlation between teachers of English level of TPK and ICT use

6. Summary and Conclusion

The analysis of the multiple regression from the correlation matrix revealed that there was a strong correlation between independent variables (IVs) and dependent variables (DVs), indicating the effects of IVs on DVs. It showed that the TPACK knowledge constructs were a major independent variable that could significantly contribute to English language teachers' levels of ICT integration. The results also showed that the TPACK constructs exhibit a strong influence on the effective ICT integration among teachers of English in secondary schools in Nairobi County, Kenya. The following conclusions are made: The TPACK knowledge constructs was found to be the main determiner of English language teachers' levels of ICT integration. Insufficient technological pedagogical knowledge and low ICT skills hindered teachers of English in Nairobi County from integrating ICT in their classroom practicum. Therefore, the study concluded that secondary school teachers in Nairobi County, Kenya did not integrate ICT in teaching English. Underscoring the importance of reflective practice for continued teacher development in ICT, the researcher concluded that the model of Technological Pedagogical Content Knowledge (TPACK) defined by Mishra and Koehler (2006) is a promising framework which describes the knowledge required by teachers of English to effectively integrate ICT in their practicum. The researcher, therefore make the following recommendation: Professional and pre-service teacher development programmes should focus on coupling changes in teachers' pedagogical skills and philosophies for teaching and learning with their training on how to appropriately and effectively integrate ICT tools with their studies. Consequently, this will improve technological pedagogical knowledge (TPK) of a teacher of English for integrating ICT

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