

Integration of Information Communication Technology in Teaching: The Underpinning Factors among Kenya's Primary School Teachers

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Abstract: This study was carried out with 86 primary school teachers in Kenya's Narok County and explored factors affecting integration of ICT in teaching and learning. Multiple regression was used for data analysis. The results revealed that 32.5% of the variance was explained by the independent and extraneous variables ($R^2 = 0.325$, $P = 0.001$) and was statistically significant. Attitude was found to be a significant predictor of teachers' behavioural intention to use ICT in teaching and learning ($\beta = 0.259$, $p < 0.05$) while performance expectancy ($\beta = 0.148$, $p > 0.05$), effort expectancy ($\beta = -0.185$, $p > 0.05$), social influence ($\beta = 0.029$, $p > 0.05$), facilitating condition ($\beta = 0.194$, $p > 0.05$), self-efficacy ($\beta = 0.195$, $p > 0.05$) and anxiety ($\beta = 0.074$, $p > 0.05$) were not significant predictors. The study recommends training of teachers on subject-specific ICT technologies, that laptops and computers be availed for use by teachers and pupils, that School Heads be trained on how to monitor and support integration of ICT by teachers and that governments provide schools with requisite ICT infrastructure.

Keywords: performance expectancy, effort expectancy, social influence, facilitating condition, self-efficacy, attitude, anxiety and intention to use Information Communication Technology.

Introduction

The role of Information Communication Technologies (ICT) in education cannot be overemphasised. ICT refers to technologies that provide access to information through telecommunication (Ratheeswari, 2018). In modern societies, the economy is driven by information and knowledge and, hence, the need for a workforce with competencies in ICT. In education, Qualter (2011) opines that ICT has transformed the teaching landscape significantly where the teachers' roles have changed from what had always been assumed. Qualter notes that learners should embrace ICT as part of the digital age and use it to enhance their learning. ICT is associated with increasing learners' creativity, ability to reflect on what is learned and development of problem-solving skills. According to Higgins (2003), research studies have shown that ICT can facilitate pupils' learning and effective teaching. The Elimu Yetu Coalition (2013) further observes that ICTs provide opportunities for teachers to improve their teaching practices through improved educational content and better pedagogies and can improve learning processes by providing interactive educational materials.

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Teachers should embrace ICT in their teaching to take advantage of the gains associated with the effective use of ICT. Qualter (2011) concludes that integration of ICT provides learners with opportunities to explore ideas using ICT tools, and to relate their personal experiences with the world's big ideas enhancing their conceptualisation of ideas. Hence, ICT breaks learning barriers associated with the traditional classroom practices since abstract concepts can be simplified through simulation.

Despite the fact that use of ICT in teaching has been associated with some benefits, Chigona and Chigona (2010) argue that the benefits of using ICT in teaching are yet to be realised in developing countries. The study by Chigona and Chigona concluded that insufficient training on the use of ICT in teaching, inadequate ICT tools and inadequate technical support for teachers were some of the factors that limited teachers' integration of ICT in teaching and learning in South Africa. Another study, also conducted in South Africa (Balume, Edmor & Simbabrashe, 2018), found that poor training, negative attitudes, lack of Physical Education (PE) ICT training and lack of PE ICT software affected integration of ICT in the teaching of PE. In Kenya, a government project that provided ICT tablets to primary schools for teaching and learning failed at its infancy stage (Nyaundi, 2019). Some of the reasons that were given for the project failure include: poor training of teachers, lack of electrical power and power disconnections due to non-payment of electricity bills. Hence, teachers lacked ICT skills and ICT infrastructure to support the use of ICT tablets.

However, Chigona and Chigona (2010) argue that it is incorrect to link lack of ICT infrastructure and access to technologies with the limited use of ICT in pedagogy since, even in situations where the infrastructure was available, use of ICTs was still low. Balume, Edmor and Simbabrashe (2018) also indicate that in South Africa, teachers had adequate ICT hardware but there were other factors that affected teachers' integration of ICT. A study by Fumei, Rong-Jou, Hann-Jang and Hui-Mei (2018) found that teachers' intention to utilise multimedia teaching material was significantly influenced by teachers' attitude. These findings underscore the importance of teachers' attitude in integration of ICT in teaching and learning.

Palagolla and Wickramarachchi (2019) observe that in Kenya, even the schools that had ICT infrastructure were also not using the ICT tablets. These observations clearly show there are other underlying factors that underpin integration of ICT in teaching and learning that need to be investigated.

Leveraging the pedagogical benefits associated with use of ICT in teaching and learning, the government of Kenya acknowledges that ICT is a driver for knowledge, innovation and skills development and for solving educational challenges related to access, quality, relevance and equity (Ministry of Education, 2019). The Republic of Kenya [RoK], (2018) indicates that Kenya requires ICT-

literate teachers who can integrate ICT in teaching to enhance the quality of teaching and to enrich students' learning experiences, as well as equipping students with 21st-Century skills. Despite the potential presented by integration of ICT in teaching and learning, Ofsted (2011) indicated that use of ICT across the curriculum was in its infancy stage. RoK (2018) observes that teachers should have ICT competencies and pedagogical abilities to integrate ICT effectively in teaching and learning, while UNESCO (2011) concludes that successful integration of ICT in teaching and learning depends on teachers' ability to structure the learning environment in new ways, blend new technology with new pedagogy, develop socially active classrooms, and encourage co-operative interaction, collaborative learning and group work.

In Kenya, a government initiative provided schools with ICT tablets and teachers were trained on how to use them for teaching. To ensure schools are using ICT in teaching, efforts to create an enabling environment for ICT integration in schools has been ongoing and appropriate policies have been formulated, notably: Sessional Paper No. 1 (2019), the Basic Education Act (2013), Sessional Paper No.14 (2012), the National ICT Strategy for Education and Training (2006), the Teachers Service Commission Act (2012), the Kenya Institute of Curriculum Development Act (2012), the Kenya National Examination Council Act (2012) and the National Education Sector Support Programme (NESSP), 2013 (Elimu Yetu Coalition, 2013). Despite these efforts by the government towards integration of ICT, anecdotal evidence shows that uptake of ICT in teaching and learning by teachers has been at an all-time low. Nyaundi (2019) reports that despite the Kenya government supplying 95% of learners in Standard One with tablets, the tablets were not being used and remained locked in storage rooms. It is not clear why teachers were not using the tablets in teaching. Therefore, using the Unified Theory of Acceptance and Use of Technology (UTAUT) model, empirical data from teachers on factors that underpinned integration of ICT in teaching and learning was used to determine primary school teachers' behavioural intention to use ICT.

Statement of the Problem

Integration of ICT in many economic sectors came with effectiveness and efficiency in service delivery. Research reports have shown that ICT has pedagogical benefits that teachers should explore. The Republic of Kenya [RoK] (2018) asserts that ICT has the capacity to deal with the challenges of access, quality and relevance faced by Kenya's education system. Towards this end, the Kenya Basic Education Curriculum Framework (BECF) has identified ICT to be a key delivery tool for subject contents. This implies that teachers are expected to using ICT in curriculum delivery. According to the RoK (2018), all teachers were required to be ICT literate by 2015 to implement the policy, while pre-service teacher trainees were also expected to acquire ICT competencies within the same period. Despite the government directive that teachers should use ICT in teaching and learning, primary school teachers were slow to embrace ICT in their teaching, raising questions about teachers' acceptability of ICT for teaching. Adoption of any technology depends on its acceptability by the users (teachers). This study investigated factors that determined teachers' behavioural intention to use ICT in teaching and learning.

Objectives of the Study

Specifically, the study sought to identify factors that influenced primary school teachers' Behavioral Intension (BI) to integrate ICT in teaching and learning in Kenya's primary schools. Specifically, the study addressed the following two objectives:

1. To determine how primary school teachers were using the ICT tablets provided by the government.
2. To evaluate influence of Performance Expectancy, Effort Expectancy, Social Influence, Facilitating Conditions, Attitude, Self-efficacy and Anxiety on teachers' Behavioral Intentions to integrate ICT in teaching.

Research Hypotheses

The following hypotheses informed the research.

HO1: Performance Expectancy has no statistically significant influence on teachers' behavioural intention to integrate ICT in teaching.

HO2: Effort Expectancy has no statistically significant influence on teachers' behavioural intention to integrate ICT in teaching.

HO3: Social Influence has no statistically significant influence on teachers' behavioural intention to integrate ICT in teaching.

HO4: Facilitating Conditions have no statistically significant influence on teachers' behavioural intention to integrate ICT in teaching.

HO5: Attitude has no statistically significant influence on teachers' behavioural intention to integrate ICT in teaching.

HO6: Self-efficacy has no statistically significant influence on teachers' behavioural intention to integrate ICT in teaching.

HO7: Anxiety has no statistically significant influence on teachers' behavioural intention to integrate ICT in teaching.

Literature Review

Integration of ICT in Education, Training and Research

Research findings indicate that ICT can facilitate teaching and learning in diverse ways. UNESCO (2011) asserts that teachers should use ICT to help students become collaborative problem-solvers and creative learners so that they can become effective citizens and members of the workforce. Hence the benefits of integrating ICT in teaching and learning transcend academic performance in school examinations. UNESCO has gone further to identify three stages for teacher development relating to the use of ICT, which are Technology Literacy geared towards enabling students to use ICT in learning, Knowledge Deepening for enabling students to acquire in-depth knowledge of their school subjects and applying it in complex real-world situations; and Knowledge Creation which focuses on students' creation of new knowledge required for a more harmonious, fulfilling and prosperous life.

The three stages of teacher development aim at building teachers' capacity so that they can use ICT in teaching and learning.

UNESCO (2011) observe that teachers should go beyond acquisition of ICT competencies to being able to use ICT to enable students to become collaborative, creative and critical thinkers. It is mooted that such learners would become responsible members of society and an effective workforce for the country's national development later in life. In the same vein, the National Research Council (2000) observes that use of ICT in teaching and learning processes is necessary in refocusing teaching towards meaningful learning which is needed in current knowledge-based society.

Qualter (2011) argues that both teachers and learners can use ICT for communication, learning, information seeking and retrieval. To achieve these, both teachers and the learners should be grounded with ICT knowledge, skills and information literacy so that they can conceptualise and interrogate the veracity of the huge amount of information availed by ICT. Additionally, they should have language skills, critical thinking skills and be able to communicate both face-to-face and virtually.

Qualter (2011) has identified the role of teachers as ICT users to include: modeling effective use of ICT, accessing information, making use of information, communicating with others, preparing teaching and expanding their knowledge and skills on use of ICT. These are critical skills for effective utilisation of ICT in teaching and learning. Needham (2011) provides examples of ICT tools that could be used for teaching and learning and identified audios, websites, Location and Google Earth, wikis, weblogs (blogs) podcasting, video clips and social media among others. It is evident that the long list of ICT technologies is ever-growing, demonstrating the dynamic nature of ICT technologies. Teachers should, therefore, update themselves frequently on the emerging ICT tools for teaching and learning and acquaint themselves with their uses. This implies frequent professional development for teachers.

Qualter (2011) reiterates that despite the fact that ICT has huge potential in providing varied learning experiences to the learners, the role of the teacher as a facilitator of learning is still very critical. Morris (2018) asserts that the hype surrounding the use of ICT in teaching and learning should not be mistaken to imply replacement of teachers with ICT. The role of the teacher as a facilitator of learning still remains and, hence, teachers should align pedagogies with ICT technologies.

Kenya has singled out Information and Communication Technology (ICT) as a foundation for socio-economic transformation. The Ministry of Education (MoE) (2019) acknowledges that ICT is important in transforming education and addressing significant challenges of access, quality, relevance and equity in education. Kenya's Ministry of Education has leveraged government support to integrate ICT in curriculum delivery. Hence, teachers should have the capacity to integrate ICT in education provision. To ensure successful integration of ICT in education by the teachers, the Kenya government has committed itself to expanding ICT infrastructure, building teachers capacity, enhancing availability and utilisation of digital learning materials and open educational resource, and strengthening ICT-based curriculum delivery and assessment approaches.

The Impact of ICT in Teaching and Learning

The 21st Century has seen a proliferation of the use of ICT with many countries (Australia, New Zealand, USA, England [and Hong Kong], for example) availing ICT tools in classroom settings

(Eadie, 2011). According to Ofsted (2008), the United Kingdom had the highest number of classrooms embedded with ICT among the European Union countries. The technological changes in the classrooms are being driven by the anticipation that ICT would positively transform education. The 21st-Century knowledge-based society has been associated with increased academic content openly and freely available for students, which is transforming the role of the teacher from that of content delivery to a supporter of learners in helping them to make sense of the openly and freely available content (Bates, 2016).

In a knowledge-based society, greater focus is, therefore, more on teaching skills for a digital generation and less on subject content mastery. Hence, teachers need to be keen to use the existing ICT technologies that could make them meet the demands of the 21st-Century classrooms. To this end, the 21st-Century curriculum has emphasised changing from content-based to skill-based approaches, with many countries adopting competency-based curricula. The Kenya Institute of Curriculum Development [KICD] (2017) recommends that ICT should be the main content delivery tool in all the subjects under the new Basic Education Curriculum Framework.

Palagolla and Wickramarachchi (2019) opine that teachers' ICT competency, ICT infrastructure, leadership support and school planning are critical elements for effective integration of ICT in classrooms. Cleaves and Toplis (2012) further observe that teachers should be aware of the role of ICT in facilitating and motivating students' learning. According to Cleaves and Toplis, ICT can inspire students' conceptualisation, communication of ideas, information gathering and analysis. Crook, Farrington-Fleet, Tomacs and Underwood (2010) observe that video and mobile phones can be used for recording practical activities and field trips, photography for capturing important events for future discussions, blogs for student-student and teacher-student interactions, Internet for searching information, "clickers" for responding to questions in real time and wikis for collaborative learning. Integration of ICT in teaching and learning, therefore, provides teachers with opportunities for practising innovative learner-centered pedagogies in authentic learning environments.

Embedding ICT in Teaching and Learning

The Technological Pedagogical Content Knowledge (TPACK) model (TPACK.ORG, 2012) has explained the process of successful embedding of technology in teaching and learning. The framework guides teachers on how to effectively engage learners with technology (Koehler & Mishra, 2009). TPACK.ORG assert that for teachers to effectively embed technology in their teaching, they should possess Technological Content Knowledge (TCK) and Technological Pedagogical Knowledge (TPK).

TCK represents how technology is used in a specific subject area to facilitate deeper and lasting learning while TPK is about choosing and managing technology to facilitate learning. TPACK is therefore a framework to identify the knowledge that teachers should possess in order to teach with technology effectively. The framework acknowledges the fact that learners operate in different contexts in terms of grade-level, school-specific factors, demographics, culture, and other factors and, hence, no single combination of content, technology, and pedagogy can fit all the teaching and learning contexts. Hence, integration of ICT in teaching and learning should also focus on the learners' context in addition to technological and pedagogical knowledge.

Teachers should, therefore, use the TPACK model to structure and plan learning experiences in their subject areas based on the knowledge and skills they need to share with their learners, how learners would gain the knowledge and skills and the ideal technological tools that would enable effective learning and sharing of the knowledge and skills. Morris (2018) concludes that effective digital pedagogy goes beyond selecting tools and improving students' performance in examinations.

Theoretical Framework

The current study was guided by the Unified Theory of Acceptance and Use of Technology [UTAUT] model (Venkatesh, Morris, Davis & Davis, 2003). Venkatesh and team evaluated eight of the most common technology acceptance models and frameworks and used their salient features to form the UTAUT model. UTAUT is a more versatile technology acceptance model, which unifies all the existing theories regarding adoption of technology by users and it is postulated that UTAUT models can explain 70% of the variance in user intention. Empirical studies have demonstrated that the UTAUT model is the most effective model for analysing technology acceptance.

The UTAUT model consists of four main determinants, namely, Performance Expectancy (PE), Effort Expectancy (EE), Social Influence (SI), and Facilitating Conditions (FC). The four determinants influence the Behavioural Intention (BI) to use technology, which, in turn, influences the actual usage behaviour. UTAUT also has four moderators (gender, age, experience, and willingness to use). Venkatesh et al, (2003) conclude that the four moderators affect usage of technology. The UTAUT model is represented diagrammatically in Figure 1.

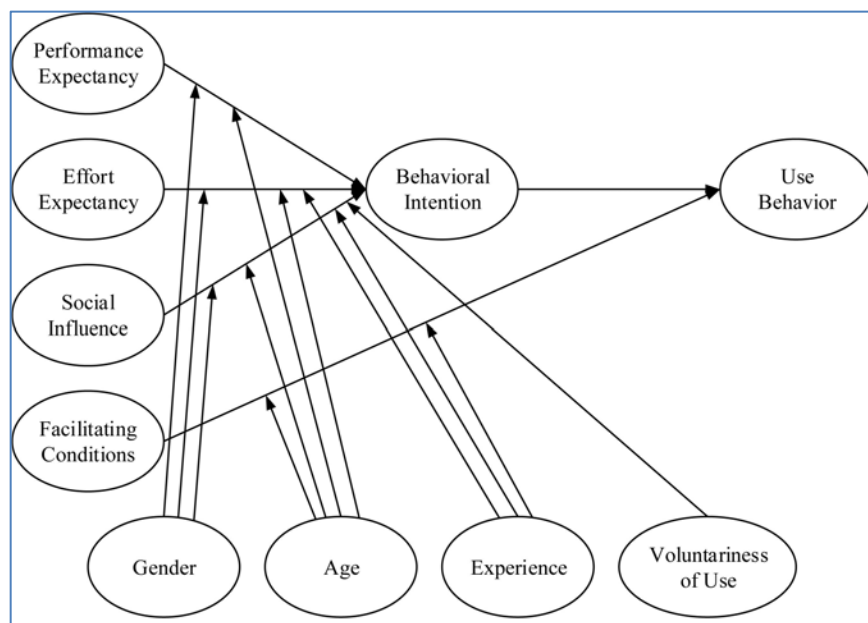


Figure 1: The Unified Theory of Acceptance and Use of Technology (UTAUT) Model. Source: Chao (2019)

Evans (2009) explains the four determinants/predictors of technology acceptance as follows:

- Performance Expectancy is the degree to which an individual believes that using a specific technology will help in achieving gains in job performance such as job improvement, enhanced productivity, positive impact on performance and usefulness of the technology to the organisation and employees. The argument by Evans (2009) alludes to perceived usefulness of a technology by users (Educenter, 2019) and, hence, perceptions of teachers towards the usefulness of integrating ICT in teaching to determine its adoption or non-adoption.
- On the other hand, Evans (2009) and Venkatesh et al, (2003) observe that EE has to do with the perceived ease of use linked with the use of a given technology. According to Educenter (2019), these perceptions can be gauged by evaluating the level of training that would be required before people can comfortably use a given technology. A technology that is perceived to be “hard to use” stands a higher chance of being rejected than one that is easy to use. Educenter suggest that ease of use influences perceived usefulness because something that is hard to use influences people’s understanding of its utility.
- Teachers should be assisted by school management to appreciate the fact that integration of ICT in teaching is both possible and useful. Therefore, training teachers on integration of ICT in their teaching would go a long way in changing their perception of the effort expectancy required to integrate ICT in teaching.
- Social Influence is concerned with the people championing the adoption of a given technology (Venkatesh et al, 2003) and is defined as the degree to which one believes there are other players who think that an individual should use the new technology. Evans (2009) asserts that this will depend on whether the technology is useful for teamwork in the organisation, whether there are coworkers using the technology and whether there is encouragement by management to use the technology. Educenter (2019) concludes that use of technology is given a boost when there are famous people encouraging people to use a given technology, leveraging its positive aspects as opposed to when someone popular is trashing the use of the technology. Towards this end, education managers should play a leading role in supporting teachers to use ICT technology in teaching.
- The fourth predictor of acceptance of technology is Facilitating Conditions. According to Venkatesh et al, (2003), the antecedents of FC are the existence of organisation and technical infrastructure for supporting the use of a given technology. This has to do with the availability of the technology, knowledge to operate the technology and alignment of the technology within the institutional culture (Evans, 2009). It is imperative that this role is acknowledged by governments and to some extent the school administrators who are expected to provide the facilitating conditions for integration of ICT. This will include provision of ICT resources, electricity, Internet infrastructure and training of teachers.

Evans (2009) explains how the four moderating influences work as follows: Gender affects PE, EE and SI, while age affects PE, EE, SI and FC. Experience influences EE, SI and FC and Voluntary (Self-efficacy) use affect SI.

The present study hypothesised that PE, EE, SI, FC, self-efficacy, attitude and anxiety all influence teachers' Behavioural Intentions (BI) to integrate ICT in their teaching. Evans (2009) asserts that BI measures the intention to use the technology and assumes people can access the technology. Educenter (2019) observes that BI as an attitude can either be positive or negative. A study by Mwunda and Ogutu, (2018) found that teachers' ICT competency was a significant determinant of behavioural intention to integrate ICTs in teaching and learning. Teachers with a positive attitude, who are competent in use of ICT and perceive technology as useful are more likely to use ICT in teaching and learning.

Based on the extensive literature undertaken by the researcher, it can, therefore, be concluded that the potential of ICT in transforming education by supporting teaching and learning is not in doubt. Teachers should use ICT to help students become collaborative, problem-solvers and creative learners. ICT enables learners to communicate, learn, seek and retrieve information more effectively. In all these processes, the role of the teacher as a facilitator of learning is critical. Kenya acknowledges that ICT is a crucial driver for transforming education and providing solutions to challenges of access, quality, relevance and equity in education. It also concludes that effective embedding of ICT in teaching and learning requires teachers' Technology Content Knowledge (TCK) and Technological Pedagogical Knowledge (TPK). The literature review finally, concludes that studies have shown that even in situations where ICT infrastructure exists, integration of ICT in teaching and learning was still limited. Hence, this study used the UTAUT framework to investigate the factors that influence teachers' behavioural intention to use ICT in teaching and learning.

Research Framework

In this research ICT integration factors include: Attitude, Effort expectancy, Performance expectancy, Social influence, Facilitating conditions, Self-efficacy and Anxiety. These factors are conceptualised to influence Behavioural intention to use ICT as shown in Figure 2.

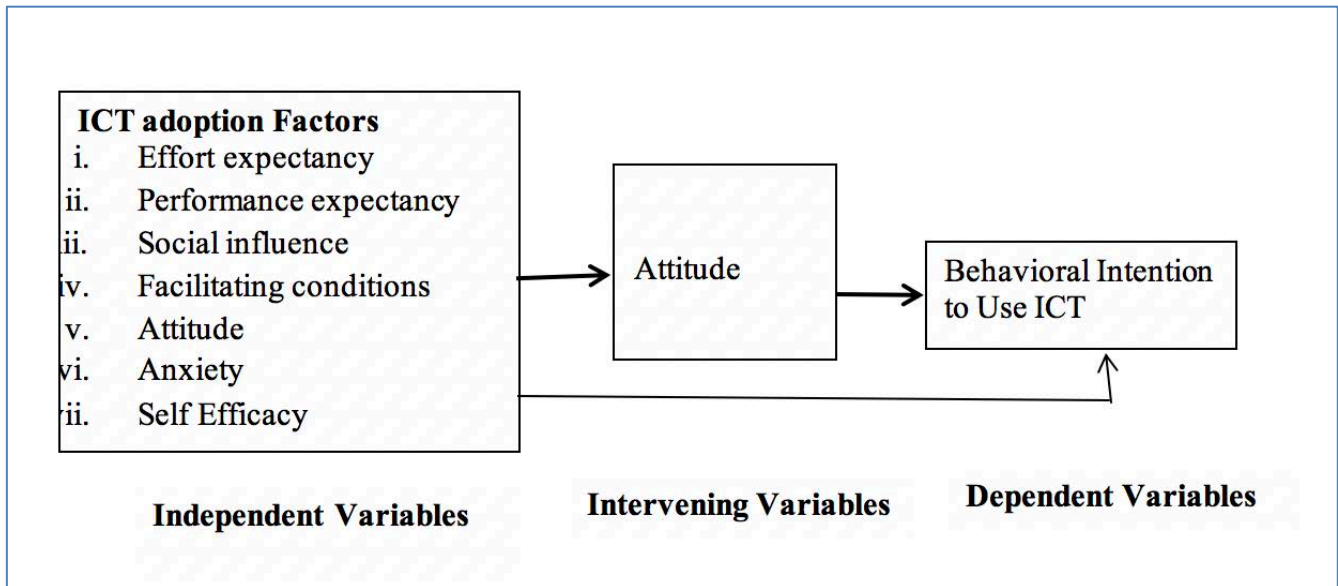


Figure 2: Research Framework. Source: Researcher

The research framework postulates that teachers form attitudes and intentions towards using ICT based on their perceptions of the ICT technology in regard to performance expectancy, effort expectancy, social influence, facilitating condition, self-efficacy and anxiety. The perceptions influence directly teachers' Behavioural intention to use ICT or indirectly by influencing teachers' attitudes towards the ICT technology which, in turn, influences their cognitive decision on whether to use the ICT technology or not. Hence, favourable teachers' perceptions of a given ICT technology based on the independent variables would predict if teachers would use a given ICT technology or not.

Methods

Research Design

Descriptive survey research design, which does not manipulate variables or arrange for events to happen was used in this study, using both qualitative and quantitative methods (Orodho, 2003). The design was used to determine how primary school teachers were using ICT tablets provided by the government and factors that influenced teachers' behavioural intention to use ICT.

Sampling and Sampling Techniques

Simple random sampling procedure was used to select 86 (40 from rural schools and 46 from urban schools) primary school teachers and 10 primary school head teachers in Kenya's Narok County. According to Mugenda and Mugenda (2012), simple random sampling is a procedure for selecting representative subjects from a given population, especially when the researcher is dealing with a small sampling frame and the population is well defined as was the case with the current study.

Data Collection Instruments

An interview schedule for head teachers that collected qualitative data and a Teachers' Technology Acceptance Questionnaire (TTAQ) that collected quantitative data was used to collect data from head

teachers and primary school teachers, respectively. According to Mungenada and Mugenda (2012), an interview schedule is a research tool for collecting qualitative data using open-ended questions while a questionnaire uses either open-ended or closed questions. In this study the interview schedule was used to ask questions on how primary school teachers were using tablets that were provided by the government for teaching and learning in Standard One.

TTAQ used closed questions and was based on the Venkatesh, et al (2003) UTAUT model that was adopted and used for data collection. TTAQ was a 7-point matrix Likert scale questionnaire that measured teachers' Performance Expectancy, Effort Expectancy, Attitude, Social Influence, Facilitating Conditions, Self-Efficacy, Anxiety and Behavioural Intention to use ICT. A Likert scale is a procedure used to measure concepts like attitudes, perceptions and satisfaction (Mugenda & Mungenada, 2012).

Data Collection Procedures

The researcher visited the sampled schools and interviewed head teachers in their school settings and self-administered the questionnaires to the sampled teachers in the same schools. This increased the return rate of the completed research instruments and the researcher was able to compare information given and, at the same time, make observations on ICT infrastructure within the school.

Data Analysis and Results

Multiple regression was used for data analysis. According to Mugenda and Mugenda (2012), regression analysis is a statistical procedure for predicting a dependent variable using one or more independent variables. In the current study, primary school teachers' behavioural intention to use ICT in teaching and learning (dependent variable) was predicted using performance expectancy, effort expectancy, attitude, social influence, facilitating condition, self-efficacy and anxiety (independent variable). Multiple regression, therefore, enables one to predict and weigh the relationship between two or more explanatory variables (independent variable) and an explained (dependent) variable (Louis, Lawrence & Keith, 2007).

Use of Government Sponsored Tablets for Teaching by Teachers

Primary school head teachers were requested to give their views on whether teachers were using the tablets provided by the government. The qualitative data given by the head teachers revealed that, despite the schools nominating champion teachers to be trained on the use of the tablets so that they could also train their colleagues, the champion teachers did not train their colleagues upon returning. The reasons cited by the head teachers as to why teachers were not using the tablets include inadequate training, teachers' negative attitude, lack of self-initiative and lack of source of power to charge the tablets.

Factors Influencing Primary School Teachers Behavioural Intention to Integrate ICT in Teaching

A multiple regression analysis was carried out to investigate whether Performance expectancy, Effort expectancy, Attitude, Social influence, Facilitating conditions, Self-Efficacy and Anxiety significantly influenced primary school teachers' behavioural intention to integrate ICT in teaching and learning. The results of the regression are presented in Table 1.

Table 1: Model Summary

Multiple Regression Beta Coefficient on Factors Influencing Teachers' Intension to Use Determinants of Intension to use Technology	Unstandardised coefficient		Standardised coefficient	t-ratio	P - Values
	B	Std. Error	Beta		
(Constant)	2.397	1.815		1.320	.191
Performance expectancy	.090	.078	.148	1.154	.252
Effort Expectancy	-.098	.080	-.185	-1.213	.229
Attitude	.299	.147	.259	2.034	.045
Social Influence	.068	.071	.129	.950	.345
Facilitating Condition	.070	.055	.184	1.268	.208
Self-Efficacy	.074	.055	.194	1.341	.184
Anxiety	.038	.053	.074	.728	.469
R ² = .325					
F-ratio = 5.358 P < 0.001					
n = 86					

a) Dependent Variable

b) Predictors: performance expectancy, effort expectancy, attitude, social influence, facilitating condition, self-efficacy and anxiety

Results indicated that the seven variables explained 32.5% of the variance and that the variables were significant predictors of primary school teachers' behavioural intention to integrate ICT in teaching and learning, $F(7, 78) = 5,36, p = .001$). The test of the hypotheses revealed the following:

HO1: Performance Expectancy has no statistically significant influence on primary school teachers' BI to integrate ICT in teaching. Regression analysis for this hypothesis (Table 1) shows $\beta = 0.148, p > 0.05$, hence, the **HO1** was retained, i.e., Performance expectancy has no significant influence on primary school teachers' BI to integrate ICT in teaching.

HO2: Effort Expectancy has no statistically significant influence on primary school teachers' BI to integrate ICT in teaching. Regression analysis for this hypothesis (Table 1) shows $\beta = -0.185, p > 0.05$ hence the **HO2** was retained, i.e., Effort Expectancy has no significant influence on primary school teachers' BI to integrate ICT in teaching.

HO3: Social Influence has no statistically significant influence on primary school teachers' BI to integrate ICT in teaching. Regression analysis for this hypothesis (Table 1) shows $\beta = -\beta = 0.029, p >$

0.05, hence, the **HO3** was retained, i.e., Social influence has no significant influence on primary school teachers' BI to integrate ICT in teaching.

HO4: Facilitating conditions have no statistically significant influence on primary school teachers' BI to integrate ICT in teaching. Regression analysis for this hypothesis (Table 1) shows $\beta = 0.194$, $p > 0.05$, hence, the **HO4** was retained, i.e., Facilitating conditions has no significant influence on primary school teachers' BI to integrate ICT in teaching.

HO5: Attitude has no statistically significant influence on primary school teachers' BI to integrate ICT in teaching. Regression analysis for this hypothesis (Table 1) shows $\beta = 0.259$, $p < 0.05$, hence, the **HO5** was rejected, i.e., Attitude has significant influence on primary school teachers' BI to integrate ICT in teaching.

HO6: Self-efficacy has no statistically significant influence on primary school teachers' BI to integrate ICT in teaching. Regression analysis for this hypothesis (Table 1) shows $\beta = 0.194$, $p > 0.05$, hence, the **HO6** was retained, i.e., Self-efficacy has no significant influence on primary school teachers' BI to integrate ICT in teaching.

HO7: Anxiety has no statistically significant influence on primary school teachers' BI to integrate ICT in teaching. Regression analysis for this hypothesis (Table 1) shows $\beta = 0.074$, $p > 0.05$ hence the **HO7** was retained, i.e., Attitude has significant influence on primary school teachers' BI to integrate ICT in teaching.

Discussion of Results

The results collected from primary school headteachers in Narok County of Kenya shows that teachers were not using the tablet provided by the government in teaching. The reasons advanced for the non-use of the tablets were:

- Inadequate training
- Teachers had negative attitude towards use of ICT
- Lack of source of power to charge the tablets.

The result of Hypotheses (HO1, HO2, HO3, HO4, HO6 and HO7) further shows that performance expectancy ($\beta = 0.148$, $p > 0.05$), Effort expectancy ($\beta = -0.185$, $p > 0.05$), Social influence ($\beta = 0.029$, $p > 0.05$), Facilitating condition ($\beta = 0.194$, $p > 0.05$), Self-efficacy ($\beta = 0.195$, $p > 0.05$) and Anxiety ($\beta = 0.074$, $p > 0.05$) were not statistically significant and hence the null hypotheses were retained.

On the other hand, the results of Hypothesis 5 (HO5) was statistically significant and HO5 was not retained. Hence, of the seven variables, teachers' attitude was a significant predictor of teachers' behavioral intention to integrate ICT in teaching and learning. These finding are in agreement with head teachers' views that identified teachers' attitude as one of the reasons for teachers' failure to use the ICT tablets provided by the government.

The results posted here re-emphasise the need to empower primary school teachers to adopt ICT in teaching and learning as a driver for a modern economy. Qualter (2011) observed that use of ICT by teachers would significantly transform the teaching landscape. Qualter notes that teachers should embrace use of ICT as part of the digital age and use it to enhance their teaching. Kenya's Basic Education framework has identified ICT as a tool for curriculum delivery (KICD, 2017). This demands

that teachers embrace the use of ICT for successful teaching and learning. As noted earlier, globally, teachers are expected to start using ICT as a way of increasing collaboration through student-student and student-teacher engagements (Tomacs & Underwood, 2010). Similarly, a study carried out by Balume, Edmor and Simbabrashe (2018) indicated that teachers' negative attitudes affected integration of ICT in the teaching of PE. These findings are also resonating with findings by Fumei, Rong-Jou, Hann-Jang and Hui-Mei (2018), which indicated that teachers' intention to utilise multimedia teaching material was significantly influenced by teachers' attitude towards the multimedia teaching material. This implies teachers' attitude towards use of ICT in teaching and learning plays a critical role in determining teachers' behavioural intention to use ICT. To this end, elaborate and regular training of teachers on the use of ICT in teaching and learning would go a long way in improving teachers' attitudes.

Conclusion and Recommendations

Based on the literature review and the findings of this study, it is concluded that use of ICT in teaching and learning can transform education by supporting teaching and learning and helping students to become collaborative problem-solvers and creative learners. ICT can further enable learners to communicate, learn, seek and retrieve information more effectively. However, the current study has revealed that the negative attitude of some teachers is an impediment to the gains associated with use of ICT in teaching, and attitude predicted teachers' behavioural intention to integrate ICT in teaching and learning.

In light of the findings, the study recommends training and ongoing support of teachers on subject-specific ICT technologies and their use in teaching and learning in order to influence their attitude to use them more positively. Secondly, laptops and computers should be availed for use by both teachers and pupils. Thirdly, School Heads should be trained on how to monitor and support integration of ICT in teaching and learning and, finally, the government should provide schools with requisite ICT infrastructures.

References

- Bates, A. W. (2016). *Teaching in a digital age: Guidelines for designing teaching and learning*. Retrieved from https://teachonline.ca/sites/default/files/pdfs/teaching-in-a-digital-age_2016.pdf
- Balume, A., Edmor, N., & Simbabrashe, M. (2018). Teaching and learning of physical education in South Africa: A case of Johannesburg East Cluster Primary Schools in Gauteng Province. *International Journal of Sports, Exercise and Health Research*, 2(1), 88-92. Retrieved from http://www.sportscienceresearch.com/IJSEHR_201821_03.pdf
- Cleaves, A., & Toplis, R. (2012). Teaching in ICT-rich environments. In *ASE Guide to Research in Science Education* (Eds.), (pp. 148-155). Hampshire: Ashford Colour Press Ltd.
- Chao, C-M. (2019). Factors Determining the Behavioral Intention to Use Mobile Learning: An Application and Extension of the UTAUT Model. *Front. Psychol.* 10:1652. Retrieved from <https://doi.10.3389/fpsyg.2019.01652>.
- Chigona, A., & Chigona, W. (2010). An investigation of factors affecting the use of ICT for teaching in the Western Cape Schools. *18th European Conference on Information Systems, ECIS 2010*. Retrieved from <https://pdfs.semanticscholar.org/131a/bdf5dc3f41cde28d8361ccb07d0286ada8cc.pdf>
- Crook C., Farrington-Fleet, L., Tomacs, C., & Underwood, J. (2010). *The impact of technology: Value-added classroom practice. Final report*. BECTA. Retrieved from <https://core.ac.uk/download/pdf/30681896.pdf>

- Eadie, G. M. (2011). *The impact of ICT on schools: Classroom design and curriculum delivery. A report for the Winston Churchill Memorial Fellowship, 2000*. New Zealand. Retrieved from [http://www.cetpo.upol.cz/files/lib/28/818/eadie2001churchillreport\[1\].pdf](http://www.cetpo.upol.cz/files/lib/28/818/eadie2001churchillreport[1].pdf)
- Educenter. (Producer). (2019, September 23). *Technology acceptance model overview and use for evaluation* [Video file]. Retrieved from https://www.youtube.com/watch?v=W_FNlzeYhao
- Elimu Yetu Coalition. (2013). Gains and challenges in the implementation of EFA in Kenya and its implication for the improving education and quality through integration of ICT in education and training. *ICT Equalizing Education for All in Kenya*, 2, 10-13. Retrieved from <http://www.elimuyetu.net/2015-09-16-12-13-34/downloads?download=15:eyc-newsletter>
- Evans, T. S. (2009). Understanding technology adoption: Theory and future direction for informal learning. *Review of Evaluation Research*, 79(2), 625-649. Retrieved from https://pdfs.semanticscholar.org/6214/0a124e5ef6b04746b64d9428822d18192486.pdf?_ga=2.74654106.982382056.1588444493-934417806.1551710944
- Fumei, W., Rong-Jou, Y., Hann-Jang, H., & Hui-Mei, S. (2018). A TAM-Based study of the attitude towards use intention of multimedia among school teachers. Retrieved from https://www.researchgate.net/publication/327610979_A_TAM-Based_Study_of_the_Attitude_towards_Use_Intention_of_Multimedia_among_School_Teachers
- Higgins, S. (2003). *Does ICT improve learning and teaching in schools?* Nottingham: British Educational Research Association.
- Koehler, M. J., & Mishra, P. (2009). What is technological pedagogical content knowledge? *Contemporary Issues in Technology and Teacher Education*, 9(1), 60-70. Retrieved from https://tecfalabs.unige.ch/mitic/articles/koehler_mishra_2009_what_is_technological_pedagogical_content_knowledge.pdf
- Louis, C., Lawrence, M., & Keith, M. (2007). *Research methods in education* (6th ed.). London and New York: Routledge, Taylor & Francis Group.
- Ministry of Education (MoE). (2019). *A policy framework for reforming education and training for sustainable development in Kenya. Towards realizing quality, relevant and inclusive education and training for sustainable development*. Nairobi: Government Printers.
- Morris, S. (2018). Critical instructional design. In S. Morris & J. Stommel (Eds.), *An urgency of teachers: The work of critical digital pedagogy* [Online]. Pressbooks. Retrieved from <https://criticaldigitalpedagogy.pressbooks.com/chapter/critical-pedagogy-and-learning-online/>
- Mugenda, A. & Mugenda, O. (2012). *Research methods dictionary*. Nairobi: Kijabe Printing Press.
- Mwunda, N., & Ogutu, J. (2018). An investigation of the factors influencing the integration of ICT in teaching and learning process in public secondary schools in Machakos County, Kenya. *International Journal of Economics, Commerce and Management*, VI(4), 418-441. Retrieved from <http://ijecm.co.uk/wp-content/uploads/2018/04/6429.pdf>
- National Research Council. (2000). *How people learn: Brain, mind, experience, and school* (Expanded ed.). Washington, DC: The National Academies Press. Retrieved from <https://doi.org/10.17226/9853>
- Needham, R. (2011). Enhancing science learning with ICT. In M. Hollins (Ed.), *Association of Science Education: ASE Guide to Secondary Science Education* (pp. 66-77). Hampshire: Ashford Colour Press Ltd.
- Nyaundi, L. (2019, March 22). *Why Uhuru's flagship laptop project crashed*. Retrieved from <https://www.the-star.co.ke/news/2019-03-22-why-uhurus-flagship-laptop-project-crashed/>
- Office of Standards in Education (OFSTED) (2011). *Successful science: An evaluation of science education in England 2007-2019*. Retrieved from <http://www.ofsted.gov.uk/resources/successful-science>

- Orodho, A. J. (2003). *Essentials of education and social science research methods*. Nairobi, Kenya: Pauline Publishers.
- Palagolla, W., & Wickramarachchi, R. (2019). *Effective integration of ICT to facilitate the secondary education in Sri Lanka*. Retrieved from https://www.researchgate.net/publication/330101963_Effective_integration_of_ICT_to_facilitate_the_secondary_education_in_Sri_Lanka
- Qualter, A. (2011). Using ICT in teaching and learning science. In W. Harlan (Ed.), *Association of Science Education: ASE Guide to Primary Science Education*. (pp. 61-68). Hampshire: Ashford Colour Press Ltd.
- Ratheeswari, K. (2018). Information Communication Technology in education. *Journal of Applied and Advanced Research*, 3, 45-47. Retrieved from <http://dx.doi.org/10.21839/jaar.2018.v3iS1.169>.
- Republic of Kenya (2019). *Ministry of Education: Sessional Paper of 2019, No. 1*. Nairobi: Government Press.
- Republic of Kenya (2018). *Ministry of Education: Sessional Paper of 2018 on Reforming Education and Training for Sustainable Development*. Nairobi: Government Press.
- Republic of Kenya (2012). *Ministry of Education and Ministry of Higher Education, Science and Technology: Sessional Paper No. 14 of 2012 on Reforming Education and Training Sectors in Kenya*. Nairobi: Government Press.
- TPACK.ORG. (2012). TPACK explained. Retrieved from <http://matt-koehler.com/tpack2/tpack-explained/>
- United Nations Educational, Scientific and Cultural Organisation (UNESCO) (2011). *UNESCO ICT Competency Framework for teachers*. Paris: UNESCO.
- Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of Information Technology: Toward a unified view. *MIS Quarterly*, 27, 425-478.

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