

Attitude and Self-Efficacy as Determinants of ICT Integration in Implementing Competency-Based Education in Junior Schools, Rangwe Sub-County, Homa Bay County, Kenya

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Abstract

The new Competency-Based Education (CBE) has identified digital literacy as one of the core competencies. This is intended to prepare learners for 21st-century job-related tasks that demanded innovation and creativity. However, effectively integrating ICT in teaching and learning has been a daunting task. This study interrogated the integration of information communication technology for effective implementation of the competency-based curriculum. More precisely, the survey aimed to determine the degree to which attitude, and level of self-efficacy influenced effective implementation of CBE in junior schools in Rangwe Sub-County. The study was guided by Technology Acceptance Model. The research design adopted a mixed method approach. The target population comprised 101 head teachers, 205 junior school teachers, and 101 public junior schools in the Rangwe Sub-County. The study selected 30% of junior public secondary school heads of institutions and teachers using a stratified random sampling. The sample size was 101 respondents comprising 33 heads of institutions and 58 teachers. Instruments were questionnaires and interview schedules. Both descriptive and inferential statistics were used to analyse the quantitative data. The qualitative data was analysed thematically. Multiple regression analysis was used to examine the connection between independent and dependent variables. Notably, the study findings revealed that attitude and level of self-efficacy influenced effective implementation of CBE in junior schools. The study recommends prioritized investments in post-training mentorship, school-based coaching, peer-support systems to promote positive attitudes toward ICT, and empowering teachers with high ICT self-efficacy to act as digital champions or mentors within their schools. Significantly, the study influences junior school ICT integration policies with a view of better integration strategies.

Keywords: Attitude, Level of Self-Efficacy, Integration, Implementation, Competency-Based Education

Introduction

Information and communications technology (ICT) is widely regarded as a catalyst for improving teaching and learning and broadening access to education, particularly in rural regions. The rise of a knowledge-based economy has intensified global competitiveness, prompting governments worldwide to invest in education (UNESCO, 2013). Globalization and rapid technological advancement have spurred the integration of ICT into educational systems to equip learners with relevant 21st-century skills (Wambiri & Ndani, 2016). Countries such as South Korea, Finland, Singapore, and the Netherlands have achieved notable progress in educational outcomes by prioritizing ICT in their reforms (Sanchez et al., 2011; Kozma, 2003).

ICT is credited with numerous benefits, including enhanced engagement, accessibility, and learning quality. Kozma (1991, as cited in Karimi & Khawaja, 2023) highlights how audiovisual tools stimulate mental processing, enhancing meaning-making among learners. Similarly, Aktaruzzaman et al. (2011) argue that effective ICT use boosts both access and quality of education by fostering active student involvement. ICT also enables global knowledge exchange, giving learners opportunities to engage with international peers and experts (Omwenga et al., 2004; Redempta, 2012). It fosters lifelong learning (Hennessy et al., 2010) and has shifted pedagogy from teacher-centered to more learner-driven methods (Mingaine, 2013a; Mutua & Mwangi, 2014; Majumdar, 2005).

Kenya, like other Sub-Saharan African countries, has embraced ICT in its education sector (Muinde & Mbataru, 2019; Mariga et al., 2017). Though data on impact remains limited, the Education Sector Plan (2013–2018) emphasized ICT integration (Piper et al., 2015). Kenya's 2006 ICT policy supported affordable and reliable ICT access (Republic of Kenya, 2006). Under Vision 2030, the government aimed to equip all Grade 1 pupils with tablets, a move accompanied by curriculum reform to promote digital literacy and other 21st-century competencies (Langat, 2015; Maluei, 2019).

ICT tools such as online learning platforms, digital textbooks, and interactive whiteboards have transformed education, encouraging differentiated instruction, critical thinking, and problem-solving (Ghavifekr & Rosdy, 2015; Gomes, 2005). Teachers benefit through access to new pedagogical approaches and professional development (Hennessy, Harrison, & Wamakote, 2010). However, challenges such as digital inequality and weak infrastructure remain (UNESCO, 2011). While ICT helps make abstract concepts concrete (Kozma, 1991, as cited in Karimi & Khawaja, 2023), others argue its effectiveness depends on teacher pedagogy (Clarke, 1983, as cited in Kozma, 2001). Nevertheless, ICT investment in schools has grown, even in developing countries (Piper et al., 2015).

According to global innovation indices, Kenya ranks among the top three Sub-Saharan innovation hubs alongside Mauritius and South Africa. This highlights the need to explore how ICT is shaping education in these contexts. Kenyan policymakers view ICT as essential for knowledge acquisition, creativity, and skill development (Republic of Kenya, 2019). In line with Vision 2030, the Competency-Based Education (CBE) curriculum replaced the 8-4-4 system, embedding digital literacy as one of seven core competencies across all subjects (KICD, 2017). Previously, ICT was offered only as an elective in secondary schools.

Despite these strides, Kenya faces significant implementation hurdles. Barriers include limited teacher and administrative capacity, inadequate infrastructure, and negative attitudes toward ICT. The COVID-19

pandemic exposed these weaknesses, with nearly 20 million students out of school and many unprepared for the shift to online learning (Otieno & Brown, 2020). Studies like Karsenti et al. (2012) cite lack of equipment, technophobia, and inadequate teacher training as major impediments. In response, the government initiated a laptop project for first-graders in 2013, but by mid-2018, only a portion of schools had received devices and fewer than a quarter of teachers had been trained (Mbataru & Muinde, 2019; Wanzala & Nyamai, 2018).

A Teachers Service Commission (TSC) survey of 1,200 educators revealed that 84.2% lacked the skills needed to integrate ICT into teaching effectively (Oduor, 2018; Wanzala & Nyamai, 2018). In many cases, training was rushed and overly theoretical, especially in the context of implementing the CBE curriculum in places like Rangwe Sub-County, Homa Bay. Research also points to demographic factors like age and gender affecting ICT adoption among teachers (Mwangi & Khatete, 2017).

In conclusion, successful ICT integration in CBE implementation requires robust infrastructure, ongoing teacher training, and positive attitudes toward technology. School leaders play a critical role in ensuring readiness across these dimensions (Yoo & Murthi, 2021). Against this background, the current study aims to examine how ICT is being integrated into teaching and learning for effective CBE implementation in junior schools in Rangwe Sub-County, Homa Bay County.

Statement of the Problem

Based on the 2021 Homabay County School Census Report (MOE, 2021), Majority of public schools in Rangwe Central Sub County use minimal to no technology in their engagement in learning and teaching programs. Additionally, the majority of teachers use cyber services to complete ICT-related tasks including evaluating test data and submitting yearly online reports to the commission for teachers. The current implementation of CBE in junior schools is likely to be jeopardized by teachers' sluggish adoption and usage of ICT, given the background of crowded classrooms, inexperienced facilitators, and limited ICT facilities in Rangwe Sub County, among other associated obstacles. Furthermore, some research has looked into how teachers integrate ICT into teaching and learning, primarily in secondary schools (Mingaine, 2013). However minimal studies have investigated junior schools' integration of ICT for effective implementation of CBE. It was on this context that this study investigated integration of information communication technology for effective implementation of the Competency-Based Education in junior schools in Rangwe Sub-County Homa Bay County, Kenya.

Research Objectives

The specific objectives of the study were to:

- To examine the extent to which teachers' attitudes influence integration of ICT for effective implementation of CBE in junior schools in Rangwe Sub-County.
- To assess the extent to which teachers' levels of self-efficacy influence integration of ICT for effective implementation of CBE in junior schools in Rangwe Sub-County.

Theoretical Framework

The Technology Acceptance Model (TAM), developed by Davis in 1989 cited by Marangunić, N., and Granić, A. (2015), is a framework that explains and predicts user acceptance of new technology. TAM has become one of the most widely used models in understanding technology adoption and integration. TAM's main components are as follows: Perceived Usefulness (PU)- This is the degree to which an individual believes that using a particular technology will enhance their performance or productivity. The more useful a person perceives a technology to be, the more likely they are to adopt it; Perceived Ease of Use (PEOU)- This is the degree to which an individual believes that using the technology will be free of effort. If a technology is seen as user-friendly, it's more likely to be accepted; Attitude Toward Using (ATU)- In the original TAM, attitude refers to the user's overall feeling about using the technology, which is directly influenced by both PU and PEOU. A positive attitude generally leads to a higher likelihood of adoption; Behavioral Intention to Use (BI)-This is the extent to which a person plans to use the technology. BI is influenced directly by attitude and perceived usefulness. Higher behavioral intention typically leads to actual system use; Actual Use- The model's final outcome is the actual use of the technology, which is determined by the user's intention. Generally, TAM posits that user acceptance of technology is primarily determined by perceived usefulness and perceived ease of use. These factors influence the user's attitude towards technology, which subsequently affects their behavioral intention to use it. If an individual finds a system both easy to use and useful, they are more likely to develop a positive attitude towards it, which, in turn, increases their intention to use the technology, ultimately leading to actual usage thus self-efficacy.

Literature Review

Teacher Attitude on ICT Integration

Since teachers are the key players in the successful integration of ICT in schools, research indicates that administrators and their attitudes toward its use will shape how they teach with it. This attitude will then affect the implementation process, which will impact on how the curriculum is delivered and how well it performs (Teo,2006). For teachers to properly incorporate ICT into their teaching procedures, they must have a favourable attitude towards it (Woodrow,2010. Mingaine (2013) states that educators will use ICT if they believe it is a crucial teaching tool that will enhance both their pedagogy and students' academic achievement.

Teo (2006) study regarding ICT use in the classroom carried out in Germany revealed that teachers' attitudes towards ICT are the primary factor influencing their adoption and usage of the technology. The study suggests that as teachers' attitudes towards ICT will play a major role in how well the integration process goes, educators should be provided with opportunities to engage with technology and learn how to teach using it. While Teo study was carried out in Germany and was concerned with post-secondary students, the current study was carried out in Kenya among junior school learners hence filling contextual and geographical gap. Afshari (2009) asserts that teachers must be tech-savvy in order to foster positive attitudes among their students.

The study by Ayub, Bakar, and Ismail (2015) looked at variables that predicted teachers' opinions on using ICT in the classroom. A stratified cluster sample was used to randomly choose 187 maths teachers from the Malaysian state of Selangor. The outcome indicated a positive correlation between the facilitators' views

and the application of ICT to education. However, opinions regarding the adoption of ICT for instruction and learning were negatively correlated with years of teaching experience. Unlike Ayub, Bakar, and Ismail's study which was carried out in Malaysia and concerned with the use of ICT in mathematics, the current study was concerned with ICT integration in Junior schools in Kenya thus filling contextual and geographical gap.

The study conducted by Ndibalema (2014) investigated the attitudes of secondary school teachers in Tanzania's Kondo district towards the use of information and communication technology (ICT) as a teaching tool. The methods used to acquire the data were interviews and questionnaires. In the first phase of data collection for this project, a total of 80 teachers were selected at random from 10 schools, and in the second phase, 10 facilitators were selected at random from 2 schools using purposive sampling. It was discovered that although teachers had favourable opinions about using ICT as a teaching tool, they did not successfully incorporate it into their lessons. Ndibalema's study was carried out in Tanzania and relied on only qualitative data to analyze the opinions of facilitators while the current study utilized both qualitative and quantitative approaches and was carried out in Kenya's Junior schools with the concern on other variables other than perceptions thus filling methodological, contextual and geographical gap.

Research examining the ways in which perception influences the integration of ICT in education reveals that facilitators' attitudes towards technology influence their acceptance of it and how they utilise it in their classes (Wambiri & Ndani, 2016). They contend that if teachers' attitudes and beliefs are not addressed, the government's investment in the form of gadget distribution may not have the intended impact. Younger teachers showed a strong favorable attitude toward technology, according to Wambiri and Ndani (2016), who assessed teachers' beliefs, attitudes, self-efficacy, computer competency, and age. The fact that the younger teachers attended teacher training institutes and received technology training may account for this finding, they suggest. Wambiri and Ndani study was focused on primary school facilitators while the current study was centered on junior school heads of institutions and facilitators.

In their study on the laptop project's implementation in public elementary schools, Muinde and Mbataru (2019) found that 68.5% of the sampled teachers had a favourable opinion of using computers in their lessons. However, they did discover that the majority of the teachers' courses were spent assembling the gadgets, and 39% of the educators felt that there was not enough time set up for technological integration. Teachers are more likely to be against implementing ICTs in the classroom if they think it would take more time and effort on their part (Omwenga et al., 2004). The main concern of Muinde and Mbataru study was to determine the laptop project's implementation challenges in public primary schools in Kangundo sub-county while the current study was purposed to establish readiness in the integration of ICT in general in junior schools hence filling the contextual gap.

In a mixed-method study consisting of group discussions, key interviews for teachers, survey instruments for learners, and classroom observations, Heinrich et al. (2020) also addressed the perception of time and ICT integration in their investigation of the potential and requirements for successful tablet integration in rural Kenya. They discovered that teachers frequently excluded students who were thought to be slow learners during the technology integration process. A number of the teachers who participated in the interviews said that they were unable to help pupils who were struggling academically because of how little time classes took. The study recommends that greater professional development be given to facilitators in

order to give them the teaching abilities required to care for the majority of the learners, including those with impairments, in a classroom that integrates technology. Although the Kenyan government is dedicated to making sure that ICT is integrated into education by giving schools ICT equipment and infrastructure, little is known about teachers' perspectives on ICT use in the classroom. Therefore, in order to ensure that ICT is effectively integrated into the junior school curriculum, it is imperative to look into the attitudes of teachers towards ICT. It is for this reason that the current study was concerned with ICT integration in Junior schools in Kenya.

Teachers' Self-Efficacy and Integration of ICT in Teaching-Learning

Self-efficacy is the conviction that one can carry out actions that have the power to alter and improve one's life. It affects how an individual feels, thinks, acts, and finds motivation for oneself. The four main processes that self-efficacy can influence are the cognitive, motivational, emotional, and selecting processes. Reaching goals is made easier when one has a high feeling of self-efficacy. Someone who is highly confident in their abilities views challenging activities as opportunities to learn and grow rather than as dangers to be avoided. Deep commitment to tasks and intrinsic interest are enhanced by self-efficacy. Individuals engaged in task performance establish ambitious objectives and remain steadfastly dedicated to them (Woolfolk & Hoy, 1998 as cited by Zee, & Koomen, 2016).

Task-doers who possess self-efficacy as a competency will be able to cultivate intra-personal qualities and abilities like self-esteem, self-awareness, personal integrity, and confidence. These proficiencies will augment their capacity to intensify and maintain endeavours when confronted with setbacks and proficiently handle demanding circumstances. Task performers who possess a high sense of self-efficacy will have the guts and audacity to establish and follow their own community, career, family, entrepreneurial, educational goals, and profession in any field of work that will result in personal achievement (British Council, 2016). The resources at their disposal are always effective, and they will accept personal responsibility for their usage, maintenance, protection, and preservation.

Yamamoto and Yamaguchi (2016) carried out a study on teachers' self-efficacy in promoting integrated technology and education in Mongolian elementary schools. The information was supplied by 838 elementary school teachers throughout Mongolia. To evaluate the connections between two facets of education, teacher training activities, and real-world ICT experience at the school level, and three forms of perceived self-efficacy (competency, satisfaction, and confidence), the correlation coefficient was computed. The study discovered that among teacher training activities, the perceived impact of in-school instruction and self-efficacy had the highest correlation. Yamamoto and Yamaguchi study was carried in Mongolia elementary schools while the current study was based in Kenya's junior schools hence filling contextual and geographical gap.

A study on pre-service teachers' self-efficacy attitudes towards the incorporation of educational technology in Tanzania was carried out by Raphael and Mtebe (2017). Mkwawa University College of Education (MUCE) and University College offering Education in Dar es Salaam were the two university colleges where the research was conducted. A sample of 386 pre-service teachers participated in the study. The Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy was employed by the researchers to evaluate the efficacy of data sampling. Regression analysis was used to determine the variables affecting pre-service teachers' opinions about their own efficacy in incorporating technology into the classroom. These elements

included perceived ease of use, assistance, performance expectations, and social impact. Raphael and Mtebe study variables were different with only a similarity on self-efficacy and was based in Tanzania colleges while the current study was based in junior schools in Kenya thus filling contextual and geographical gap.

In their 2015 study, "The Case of Group-based Intervention," Kounenou, Roussos, Yotsidi, and Tountopoulou examined how trainee facilitators' intentions to use ICT in the classroom related to their levels of self-efficacy. A sample of 109 undergraduate trainee teachers was given access to an ICT for Education training programme, and they were then divided into both homogeneous and heterogeneous) experimental and control groups based on their psychological and personality traits. The study employed a pre- and post-intervention research design, and the results revealed that trainee facilitators' self-efficacy was low when it came to utilizing ICT in the classroom. Kounenou, Roussos, Yotsidi, and Tountopoulou study was in the context of Athens while the current was set in Kenya hence geographical and contextual gap filled.

In their study, "Matching Policy with Practice," Robertson and Al-Zahrani (2012) examined the relationship between ICT and self-efficacy in Saudi Arabia's initial teacher education programme. Participating in the programme made up of 325 Saudi teachers serving in reschools from the Faculty of Education at King Abdulaziz University. The findings indicate that participants generally have high levels of computing aptitude and that their perceptions of their own effectiveness as university facilitators increase with computer expertise and degree. These findings imply that improving pre-service teachers' motivation, self-efficacy, and computing habits in Saudi Arabia will be achieved through increasing their rate of acquiring experience as well as training with regard to using computerized systems. Unlike Robertson and Al-Zahrani study which was based in Saudi Arabia the present study was carried out in Kenya's junior schools and delves deeper beyond self-efficacy as it engages other aspects like training, infrastructure and attitude hence filling a contextual gap.

Research indicates that teachers' low self-efficacy has a detrimental impact on the uptake and application of ICT in the classroom. Teachers' self-efficacy in the classroom has been connected to improved academic achievement and intrinsic motivation in students (Ecclesia & Feldlaufer, 2010). According to Koliadis (2020), the use of technology by teachers can be anticipated based on how self-sufficient they feel. Teo (2009) found that teachers' intentions to utilize technology in the classroom are influenced by their level of self-efficacy. This conclusion is consistent with Higgins' (2000) observation that facilitators who had higher Self-efficacy levels were associated with higher computer usage rates in the classroom than those who had lower levels.

Benson (2004) discovered a correlation between the advancement and incorporation of contemporary technology in educational practice and computer efficacy. On the other hand, most educators are not naturally acquainted with these tools. Heads of Institutions continue to face the problem of assisting facilitators in feeling comfortable using these new instructional resources in a way that enhances instruction effectiveness and maintains 21st-century students' total participation in the educational process. ICT Integration is still a relatively recent concept in primary education in Kenya, and research on teachers' self-efficacy in utilizing ICT is scanty. Since self-efficacy is a critical component in understanding the characteristics of teachers and how they relate to their ability to effectively use ICT in the classroom, it was vital to ascertain facilitators' degrees of confidence in their abilities to integrate ICT in junior schools.

Methodology

Research Design

Given the observational and survey-based nature of this research, a descriptive research design was employed.

Target Population, Sample Size and Sampling Techniques

Rangwe Sub County has 101 Junior secondary schools divided into 6 zones namely; Rangwe, Nyawita, Randung, Ndiru, East Kochia, and West Kochia. The target population was 306 respondents comprising of 101 heads of institutions and 205 Junior facilitators within the Sub-County as shown in table 1

Table 1: Target Population

S/N	Zone	Schools	Head Of Institution	Teachers	Population
1	Rangwe	21	21	58	79
2	Nyawita	14	14	29	43
3	Randung	13	13	26	39
4	Ndiru	18	18	33	51
5	East Kochia	17	17	31	48
6	West Kochia	18	18	28	46
Total		101	101	205	306

Source: Rangwe MoE 2024

Sample Size and Sampling Techniques

In this study, junior public secondary schools in Rangwe Sub County were divided into six strata using a stratified random sample technique. The institutions include; Rangwe, Nyawita, Randung, Ndiru, East Kochia, and West Kochia to guarantee that every school has an equal and independent chance of getting selected for the sample. Randomly chosen schools were chosen from each stratum. The heads of institutions and junior secondary school facilitators who took part in the study were chosen from the already sampled schools using a purposive sample technique.

Sample Size

Gay, Mills, and Airasian (2009) assert that having a sample of the population between 10 and 30 % is recommended for sufficient and dependable results. Thus, 30 junior schools, or 30% of the 101 schools total, were involved in the study's sample. Utilizing a simple random technique, 30 schools were selected at random from each stratum. Every head of an institution from the thirty chosen schools was directly joined in the study. Furthermore, a sample of 30% of the 205 facilitators in the sub-county were included in the research. As a result, 62 facilitators from each stratum of the six zones in 101 schools will be chosen proportionately using a simple random procedure. The sampling matrix entailed 30 heads of institutions, 58 facilitators.

Research Instruments

A questionnaire was administered to teachers and the interview schedule targeted school heads and the Sub-County Director of Education.

Pilot Study

This study piloted the instruments in two public junior schools from a neighboring sub-county. The aim was to test and adjust the research tools for accuracy and clarity. Based on Sahu's (2013) guideline, 10% of the main study's sample size was used: 10 teachers and 2 school heads. Teachers were selected using simple random sampling, while school heads were included automatically once their schools were chosen.

Validity of the Study Instruments

The Content Validity Index (CVI) was used to quantify the relevance of items, where items deemed valid by experts were retained. The process involved two stages: initially developing and organizing items based on objectives and then refining them through expert and supervisor feedback.

Reliability of the Data Collection Instruments

Reliability was tested using the test-retest method. The instruments were administered to two junior schools and repeated after two weeks with the same respondents. Cronbach's Alpha was calculated for both sets of responses. A reliability coefficient of 0.7, as recommended by Mugenda and Mugenda (2003), was obtained and deemed acceptable, confirming the tools' internal consistency.

Data Collection Procedures

The researcher first obtained an introductory letter from the Graduate School and ethical clearance from Kisii University's Institutional Science and Ethics Review Committee (ISERC). A research permit was secured from NACOSTI and presented to the Rangwe Sub-County Education Office. Upon approval, the researcher visited the selected schools to seek consent from heads of institutions.

Data Processing and Analysis

Collected data underwent cleaning and coding before analysis. Quantitative data was analyzed using descriptive. Inferential statistics were applied to explore relationships between variables. Qualitative responses from open-ended questions were analyzed using content analysis, to identify recurring themes and concepts. SPSS Version 26 was utilized due to its capacity to handle both small and large datasets (Greening, 2019). Findings were presented using tables, frequencies, and bar graphs for clarity and better comprehension.

Ethical and Logistical Considerations

Prior to data collection, the researcher secured necessary approvals from National Commission for Science, Technology and Innovation (NACOSTI), Institutional Scientific Research Committee (ISERC), and the Graduate School at Kisii University. Permission was also obtained from the Rangwe Sub-County Education Office. Informed consent was sought from all participants. Data confidentiality was strictly maintained, with respondents' identities protected and information used solely for academic purposes. The researcher

also ensured participants' rights and dignity were upheld throughout the study through following confidentiality and anonymity procedures.

Results and Discussion

Descriptive Statistics

Teachers' Attitudes on ICT In Junior Schools in Rangwe Sub-County

This section presents the findings on teachers' attitudes toward the use of ICT in Junior Secondary Schools in Rangwe Sub-County. Data was gathered using a 5-point Likert scale: Strongly Disagree (SDA), Disagree (DA), Neutral (N), Agree (A), and Strongly Agree (SA). The statements in this section were designed to capture teachers' perceptions, openness, and willingness to adopt and integrate ICT in their teaching practices. The results provide insights into the general disposition of teachers toward technology in education, which is a critical factor in the successful implementation of ICT-based instructional strategies. The study results are described and presented in table 2.

Table 2: Teachers' attitudes toward the use of ICT in Junior Secondary

	SDA	DA	N	A	SA	MEAN	SD
The lessons are more participatory because of the ICT utilization	11	11	9	13	14	3.000	1.463
When I use the computer, I feel at ease	7	12	12	15	12	3.224	1.325
Teachers' jobs will be easier when they use ICT	11	9	13	11	14	3.138	1.444
It is simpler to respond to the demands of the students when ICT is used	15	10	14	12	7	2.759	1.368
Using ICT encourages students to study more	10	16	15	9	8	2.810	1.290
ICT tools are challenging to utilize	11	15	11	8	13	2.948	1.444
Learning becomes more facilitator-centered when ICT is used, with the facilitator as the guide	11	11	9	13	14	3.138	1.468
Using ICT may make complex subjects easier to understand	14	9	12	6	17	3.052	1.561
I urge my pupils to make advantage of ICT resources	12	14	13	9	1	2.845	1.387
Using ICT improves my effectiveness as a teacher	7	9	13	15	14	3.345	1.332
In ICT, male teachers outperform female teachers	10	6	12	15	15	3.328	1.419
With ICT tools, I think I could be a better teacher	10	8	11	15	14	3.259	1.421
ICT resources are highly pertinent to education	17	7	10	12	12	2.914	1.537
I can use ICT technologies to boost my students' performance	9	10	11	19	9	3.155	1.322

Only graduated facilitators should utilize ICT	15	12	13	9	9	2.741	1.409
If given the chance, I'll try to improve my ICT abilities	8	15	13	11	11	3.034	1.337
It is quite annoying when ICT	10	16	10	9	13	2.983	1.433
I don't believe I can use the ICT resources for instruction	17	9	7	11	14	2.931	1.588

The results of the survey on teachers' attitudes toward ICT integration in schools reveal a generally positive perspective with many teachers recognizing the potential of ICT to enhance their teaching, although certain areas indicate mixed feelings and some underlying concerns. A number of statements received above-average mean scores, indicating strong support for the use of ICT in teaching. For instance, the statement *"Using ICT improves my effectiveness as a teacher"* had the highest mean (3.345), suggesting that many teachers believe ICT enhances their instructional effectiveness. Similarly, teachers agreed that *"With ICT tools, I think I could be a better teacher"* (Mean = 3.259) and that *"When I use the computer, I feel at ease"* (Mean = 3.224). These responses reflect a fair level of confidence and competence in using ICT for educational purposes. Teachers also acknowledged the practical advantages of ICT. The belief that *"Teachers' jobs will be easier when they use ICT"* (Mean = 3.138) and that ICT supports a *facilitator-centered approach to learning* (Mean = 3.138) illustrates a perception that ICT can both simplify teaching tasks and support modern pedagogical approaches. Furthermore, the idea that *"ICT makes complex subjects easier to understand"* (Mean = 3.052) highlights the perceived pedagogical value of these tools.

The generally positive attitudes of teachers in Rangwe Sub-County toward ICT integration mirror findings from recent research, which shows that educators increasingly recognize the value of ICT in enhancing teaching effectiveness, simplifying instructional tasks, and supporting learner-centered approaches. Bariu and Chun (2022) found that teachers' positive attitudes significantly influenced the successful implementation of ICT in Kenyan educational institutions, particularly when they felt confident and supported in using digital tools.

However, several responses indicated mixed or uncertain attitudes. For example, the statement *"ICT tools are challenging to utilize"* received a mean of 2.948, suggesting that while some teachers find ICT manageable, others face difficulties. Similarly, responses to *"Lessons are more participatory because of ICT utilization"* (Mean = 3.000) reflect a divide in perceptions about the impact of ICT on student engagement. Other items showed lower levels of agreement, pointing to areas of concern. Teachers expressed skepticism about ICT's effectiveness in responding to student needs (Mean = 2.759) and in motivating students to study more (Mean = 2.810). Such responses may be attributed to insufficient training, limited access to ICT resources, or a lack of evidence linking ICT use with improved student outcomes. Notably, the statement *"In ICT, male teachers outperform female teachers"* (Mean = 3.328) suggests a perception of gender disparity in ICT competence. This reflects either real or perceived inequalities that need to be addressed through inclusive capacity-building initiatives and equal access to ICT training for all teachers.

The study results demonstrated a clear willingness among teachers to improve their Self efficacy. The statement *"If given the chance, I'll try to improve my ICT abilities"* scored a mean of 3.034, highlighting a

proactive attitude toward professional development. This willingness provides a strong foundation for targeted training and support to further integrate ICT into teaching and learning.

An aggregate Attitude Index (ATT_Index) was computed by summing the individual Likert-scale responses across all attitude-related items. Each item was rated on a 5-point scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). The resulting ATT Index provides a composite measure of each teacher's overall attitude toward ICT integration and ranged from 18 to 90, with higher scores indicating more positive attitudes. The descriptive statistics for ATT Index are provided in Table 3:

Table 3: Aggregate Values for Teachers' Attitude

	N	Min	Max	Mean	Std. Dev	Skewness	Kurtosis
ATT_index	58	44.00	73.00	55.552	5.626	.507	.661
Valid N (listwise)	58						

The results show that the scores ranged from a minimum of 44.00 to a maximum of 73.00, out of a possible total score of 80. The mean ATT_index is 55.552 with values deviating from this mean to the extent of 5.626. This indicated a moderately positive overall attitude toward ICT integration. This suggests that, on average, teachers leaned toward agreement with positive statements about ICT, although not strongly. The skewness value of 0.507 indicated a slight positive skew in the distribution of the index scores with a greater number of teachers registering scores below the mean. Though the distribution is still fairly symmetrical. The kurtosis value of 0.661 suggests that the distribution of ATT_Index was slightly more peaked thus indicating a moderate concentration of scores around the mean, with fewer extreme values than would be expected in a flat distribution.

The moderately positive attitude toward ICT integration among teachers in Rangwe Sub-County aligns with recent findings that suggest educators in similar Kenyan contexts generally support the use of digital tools, though their enthusiasm may be tempered by infrastructural and pedagogical constraints. Kisulu, Simatwa, and Ndolo (2023) observed that while teachers acknowledged the value of ICT in enhancing learning outcomes, their attitudes were shaped by both personal confidence and the availability of supportive resources.

Self-Efficacy Levels for Teachers in Junior Secondary Schools in Rangwe Sub-County

This section presents the findings on the ICT skill levels of teachers in Junior Secondary Schools within Rangwe Sub-County. The data was collected through a series of statements rated on a 5-point Likert scale: Strongly Disagree (SDA), Disagree (DA), Neutral (N), Agree (A), and Strongly Agree (SA). These items assessed teachers' self-reported proficiency in performing various ICT-related tasks, such as using educational software, managing digital content, and operating devices relevant to teaching and learning. The analysis aims to determine the digital competency among teachers, which is essential for the effective integration of technology into classroom instruction. The results are shown in Table 4.

Table 4: ICT Skill Level for Teachers in Junior Secondary Schools

SKILLS	SDA	DA	N	A	SA	MEAN	STD DEV
I can prepare lessons manage records, and plot using word processors like Microsoft Word	5	3	21	10	19	3.6034	1.24167
I am capable of facilitating class lessons using presentation tools, such as PowerPoint	6	9	14	14	15	3.3966	1.31041
I can look for instructional resources online	2	1	22	16	17	3.7759	1.00948
I can message facilitators through WhatsApp	4	1	22	16	15	3.6379	1.10340
I am able to debug or do virus scans	9	5	19	11	14	3.2759	1.34807
I can create a video for use in the classroom	4	5	18	11	20	3.6552	1.23618
I can open, close, save and rename files on a computer	2	3	24	13	16	3.6552	1.05218
I can keep the performance and personal records of learners using database like Access	3	1	26	17	11	3.5517	0.994214
I am able to turn computers on and off and connect computer wires to electricity	1	1	24	15	17	3.7931	0.95069

The results on the level of Self efficacy among teachers indicate a generally competent and positive self-assessment, with teachers reporting moderate to high levels of proficiency across a range of digital tasks relevant to educational settings.

The highest-rated skill was “*I am able to turn computers on and off and connect computer wires to electricity,*” with a mean score of 3.79 and a relatively low standard deviation of 0.95, suggesting that most teachers feel confident performing basic computer operations. Similarly, the statement “*I can look for instructional resources online*” received a high mean score of 3.78, indicating that internet browsing and digital content retrieval are common and well-understood skills among the respondents. Teachers also rated themselves relatively high in their ability to use Microsoft Word for lesson preparation, record management, and plotting (Mean = 3.60), as well as their ability to send messages via WhatsApp (Mean = 3.64). These findings suggest that many teachers are comfortable with everyday productivity tools and communication platforms, which are essential for modern teaching. Skills involving slightly more advanced digital tasks, such as creating classroom videos (Mean = 3.66) and opening, saving, and renaming files (Mean = 3.66), were also rated positively, indicating a fair degree of digital literacy beyond basic operations.

However, certain areas showed more variability and slightly lower mean scores. For example, “*I am able to debug or do virus scans*” received a lower mean of 3.28 and a higher standard deviation of 1.35, suggesting this is a more challenging area for many teachers, with varying levels of confidence and competence. Similarly, using presentation tools like PowerPoint (Mean = 3.40) and databases such as Microsoft Access to manage learner records (Mean = 3.55) received modest scores, pointing to intermediate-level familiarity but also room for growth, especially in tasks that require structured digital organization or more specialized software knowledge.

The results show that most teachers have solid foundational Self efficacy, particularly in basic operations, internet use, and common software tools. However, skills related to troubleshooting, data management, and advanced presentation tools appear less developed and more variable. These findings underscore the

importance of targeted ICT capacity-building programs to enhance competencies in more technical areas, ensuring teachers can fully leverage digital tools for effective teaching and learning.

The findings on teachers' ICT skill levels in junior secondary schools are consistent with recent research showing that while many educators demonstrate confidence in basic digital tasks, proficiency in more technical areas like troubleshooting and data management remains limited. A study by Akaadom and Gorni (2023) found that although teachers were generally comfortable with tools like Microsoft Word and online browsing, they struggled with advanced applications and lacked confidence in using databases and multimedia tools for instruction.

An aggregate value for the Self-efficacy levels (Self-Efficacy) for the teachers was computed by summing the individual Likert-scale responses across all ICT skills-related items. The resulting values provided a composite measure of each teacher's overall level of Self efficacy and ranged from 9 to 45, with higher scores indicating higher ICT skill levels held by a teacher. The descriptive statistics for Self-Efficacy are provided in Table 5:

Table 5: Aggregated Self-Efficacy Descriptive Statistics

	N	Min	Max	Mean	Std. Dev	Skewness	Kurtosis
Self-Efficacy	58	28.00	41.00	37.603	2.622	-1.473	4.522
Valid N (listwise)	58						

The ICT skill index ranged from 28.00 to 41.00, suggesting some variability in skill levels amongst the teachers. The mean score of 37.603 with values deviating from this mean to the extent of 2.622 indicates that most teachers possess high levels of Self efficacy, with the average respondent scoring well above the midpoint of the scale. The skewness value of -1.473 indicates a negatively skewed distribution, meaning that a majority of the teachers' Self-Efficacy indices were above the mean. The kurtosis value of 4.522 indicates a leptokurtic distribution, which is sharply peaked with heavier tails than a normal distribution. This suggests that many teachers scored very close to the high end, with a small number scoring significantly lower.

The distribution of ICT skill levels among teachers in junior secondary schools in Rangwe Sub-County reflects broader trends observed in recent studies, which show that while many educators demonstrate high proficiency in basic and intermediate digital tasks, there remains a small cohort with significantly lower competencies. According to Regañon (2024), teachers generally report strong skills in common applications like word processing and internet use, but disparities persist, particularly in more advanced or specialized ICT functions.

Teachers' Effectiveness in ICT Integration for CBE Implementation

This section presents the findings on teachers' levels of effectiveness in integrating ICT into teaching and learning in Junior Secondary Schools within Rangwe Sub-County. Responses were obtained using a 5-point Likert scale: Strongly Disagree (SDA), Disagree (DA), Neutral (N), Agree (A), and Strongly Agree (SA). The items in this section focused on teachers' confidence in their ability to effectively use ICT tools and resources to support instructional delivery and enhance student learning outcomes. The analysis in Table 6 highlights the degree to which teachers believe in their own competence to plan, implement, and manage ICT-based instruction.

Table 6: Teachers' levels of effectiveness in ICT Integration

STATEMENT	S	A	U	D	SD	MEAN	STD DEV
Confident that with the use of ICT in my classroom, I can help students grasp challenging concepts	26	27	2	2	1	4.2931	0.71941
I am sure that ICT will improve students conceptual understanding	26	27	1	3	1	4.2758	0.76376
I am confident in my capacity to create enriched my pupil's learning experience with technology	29	20	6	1	2	4.2586	0.75227
I am confident in my capacity to connect with other educators and parents via WhatsApp	31	20	3	3	1	4.3275	0.81841
I am confident in my capacity to choose the right teaching software	23	26	4	4	1	4.1379	0.85437
I am confident in my capacity to use the internet to find educational resources	33	21	1	1	2	4.4137	0.63027
I am sure i can use ICT to introduce different teaching methods to my students	32	23	1	1	1	4.4482	0.63027
I am confident in my ability to communicate with parents and other teachers via email	32	18	2	4	2	4.2758	0.9697

The results in table 6 indicate that teachers in Junior Secondary Schools in Rangwe Sub-County generally have high levels of effectiveness in integrating ICT into their teaching. Across all the statements, the mean scores are above 4.0, suggesting strong agreement with the positive assertions about their ICT-related capabilities. For instance, the highest level of confidence was observed in the ability to use ICT to introduce different teaching methods ($M = 4.45$, $SD = 0.63$) and to find educational resources online ($M = 4.41$, $SD = 0.63$), reflecting teachers' strong belief in leveraging technology to diversify instruction and access information. Similarly, high confidence was reported in using WhatsApp to connect with colleagues and parents ($M = 4.33$, $SD = 0.82$), indicating comfort with common digital communication tools. Although slightly lower, confidence in selecting appropriate teaching software ($M = 4.14$, $SD = 0.85$) and using email for professional communication ($M = 4.28$, $SD = 0.97$) still remains strong. The standard deviations, mostly under 1, show relatively low variability in responses, meaning most teachers shared similar views. Overall, the data suggests that teachers feel well-prepared and capable of integrating ICT into various aspects of their teaching and professional interactions.

The high levels of self-efficacy reported by teachers in Rangwe Sub-County align with recent findings that emphasize the growing confidence among educators in using ICT to enhance instruction and communication. A study by Koross (2024) found that secondary school teachers in Turkana County demonstrated strong self-efficacy in applying ICT tools for lesson delivery, resource access, and professional collaboration, particularly when supported by leadership and peer networks.

An aggregate value for the effectiveness of ICT integration amongst the teachers were computed by summing the individual Likert-scale responses across all ICT Integration-related items. The resulting values provided a composite measure of each teacher's overall level of effectiveness in ICT integration and ranged from 8 to 40, with higher scores indicating more effectiveness of the teacher to integrate ICT. The descriptive statistics are provided in Table 7:

Table 7: Aggregate value for the effectiveness of ICT integration

	N	Min	Max	Mean	Std. Dev	Skewness	Kurtosis
ICT_Integration	58	25.00	37.00	31.328	2.357	-.075	.227
Valid N (listwise)	58						

The descriptive statistics for the ICT Integration index as a measure of the level of effectiveness of teachers in integrating ICT into their teaching reveal a moderately strong capacity among the teachers. The index ranged from 25.00 to 37.00, out of a possible 40. The mean score of 31.328 with a standard deviation of 2.357 suggests that, on average, teachers demonstrate a moderate to high level of effectiveness in ICT integration. This indicates that most teachers are able to use ICT in ways that enhance their instructional delivery, classroom management, and student engagement. The skewness value of -0.075 is very close to zero, indicating a nearly symmetrical distribution. This means that the scores are evenly distributed around the mean, with no significant lean toward either high or low ends of the scale. The kurtosis value of 0.227 suggests a distribution that is slightly more peaked than normal (leptokurtic), but still within acceptable bounds hence the teachers' effectiveness scores are concentrated around the mean.

The moderately strong ICT integration capacity demonstrated by teachers in Rangwe Sub-County aligns with recent findings that suggest educators are increasingly effective in applying digital tools to enhance instruction, manage classrooms, and engage learners. According to Afari et al. (2023), teachers with higher levels of computer self-efficacy tend to integrate ICT more effectively into their teaching practices, with their confidence translating into more dynamic and student-centered learning environments.

Correlation Analysis Results

Effect Of Teachers' Attitudes on the Integration of ICT for Effective Implementation of CBE in Junior Schools in Rangwe Sub-County

This section examines how teachers' attitudes toward ICT influence ICT integration in junior schools across Rangwe Sub-County on the effective implementation of CBE. Results are shown in Table 8.

Table 8: Regression analysis results for the relationship between Teachers' Attitude and integration of ICT

Model Summary		ANOVA				
R	0.673	Source	SS	df	MS	F
R Square	0.452	Regression	143.315	1	143.315	46.268
Adjusted R Square	0.443	Residual	173.461	56	3.098	(.000)
Std. Error of the Estimate	1.760	Total	316.776	57		
Coefficients		Unstandardized B	Std. Error	Standardized Beta		t
(Constant)		15.671	2.313			6.775
ATT_index		.282	.041	.673		6.802
						.000

The model summary indicates a moderate to strong positive relationship between the teachers' attitude and ICT integration, with a correlation coefficient (R) of 0.673. The R Square value of 0.452 suggests that approximately 45.2% of the variance in ICT integration can be explained by teachers' attitudes. The adjusted R Square (0.443) confirms that the model retains substantial explanatory power after adjusting for the number of predictors. The ANOVA results show that the overall regression model is statistically

significant ($F_{(1,56)} = 46.268, p < .05$), indicating that the teachers' attitude towards ICT is a significant predictor of ICT integration.

The unstandardized coefficient (B) for ATT index (0.282, $t=6.802, p=0.000$) showed a positive statistically significant relationship between teachers' attitude and ICT integration. It shows that for every one-unit increase in the teachers' attitude index, the level of ICT integration is expected to increase by 0.282 units, holding other factors constant. The standardized beta coefficient is 0.673, reinforces that teachers' attitudes have a strong positive effect on ICT integration. The corresponding regression equation is:

$$ICT_{Integration} = 15.761 + 0.282 ATTITUDE_Index \dots \dots \dots (3)$$

The findings demonstrate that teachers' attitudes significantly influence the integration of ICT in junior secondary schools. Enhancing positive attitudes toward technology among teachers could therefore be a critical lever for successful ICT integration in the implementation of the Competency-Based Curriculum. The strong positive relationship between teachers' attitudes and ICT integration for CBE implementation in Rangwe Sub-County is supported by recent research. Kisulu, Simatwa, and Ndolo (2023) found that teacher perceptions significantly influenced the implementation of the Competency-Based Curriculum, accounting for a substantial portion of the variance in integration outcomes, particularly in rural Kenyan contexts like Rangwe Sub-County.

Effect of Teachers' Self Efficacy Levels on the Integration of ICT for Effective Implementation of CBE in Junior Schools in Rangwe Sub-County

This section explores the effect of teachers' ICT competencies on their ability to integrate technology in junior schools in Rangwe Sub-County, highlighting the role of digital proficiency in supporting successful curriculum delivery. Results are shown in Table 9.

Table 9: Regression analysis results for the relationship between Teachers' Self efficacy and integration of ICT

Model Summary		ANOVA				
R	0.427	Source	SS	df	MS	F
R Square	0.183	Regression	57.826	1	57.826	12.505
Adjusted R Square	0.168	Residual	258.950	56	4.624	
Std. Error of the Estimate	2.150	Total	316.776	57		
Coefficients	Unstandardized B	Std. Error	Standardized Beta		t	Sig.
(Constant)	16.883	4.094	–		4.123	0.000
Self-Efficacy	0.384	0.109	0.427		3.536	0.001

The regression analysis investigated how teachers' Self-Efficacy or competency influence the effectiveness of ICT integration for implementing the Competency-Based Curriculum (CBE) in junior schools in Rangwe Sub-County. The regression analysis returned an R Square value of 0.183 indicating that approximately 18.3% of the variance in the effectiveness of ICT integration can be explained by teachers' Self-Efficacy. The ANOVA results indicate that the model is statistically significant ($F_{(1,56)} = 12.505, p = 0.001$), indicating that ICT skill levels of the teachers will significantly predict the teachers' effectiveness of ICT integration for CBE implementation.

The regression coefficient for Self-Efficacy is 0.384 and indicated that there was a positive statistically significant relationship between the Self-efficacy levels of the teachers and their effectiveness in ICT integration for CBE implementation ($t=3.536$, $p=0.001$). This implies that when ICT skill levels goes up by 1, effectiveness of ICT integration in implementing CBE goes up by 0.384 units. The standardized coefficient (Beta = 0.427) further emphasizes the moderate strength of this relationship. The results suggest that teachers' ICT competence has a positive and significant influence on the successful integration of ICT in implementing CBE. This finding underscores the importance of professional development and ICT training for educators in junior schools. The positive and statistically significant relationship between teachers' ICT skill levels and the effectiveness of ICT integration for CBE implementation in Rangwe Sub-County is supported by recent research. Kisulu, Simatwa, and Ndolo (2023) found that teacher technical skills were a key determinant in the successful implementation of the Competency-Based Education, particularly in rural Kenyan contexts like Rangwe, where digital proficiency directly influenced instructional innovation and learner engagement.

Conclusions

- The study concludes that while positivity for ICT integration is evident, especially in terms of instructional support and teacher development, practical concerns remain around usability, impact on student motivation, and perceived disparities in competence.
- These insights offer a solid foundation for shaping ICT-related policies, training programs, and support systems aimed at strengthening digital integration in schools.
- Finally, the study concludes that a solid foundation in digital competence is likely to enhance levels of self-efficacy for effective implementation of Competency-Based Education (CBE)

Recommendations

- There is need to foster a culture of digital confidence and inclusion: Launch awareness campaigns and peer-support systems to promote positive attitudes toward ICT, while actively addressing perceived gender disparities through gender-sensitive policies and inclusive participation in ICT programs.
- Leverage Teacher Self-Efficacy to Drive Innovation: Empower teachers with high ICT self-efficacy to act as digital champions or mentors within their schools, fostering a culture of peer-led ICT integration.

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