THE INFLUENCE OF TEACHER COMPETENCY ON ICT INTEGRATION IN LEARNING OF HOME SCIENCE IN HIGH SCHOOLS IN KIAMBU COUNTY; KENYA

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Abstract

Globally countries are transiting from normal classroom teaching methods to use of Information communication technology (ICT) in teaching and learning process. In Kenya, the integration of ICT in education has become a priority, and teacher competency in using technology is critical to its success. However, to effectively integrate ICT in education, teachers need adequate training and support. This study aimed to investigate the relationship between teacher competency in ICT and the integration of ICT in teaching in secondary schools in Kenya. The study was guided by the following objectives; to find out the effect of teachers training on use of ICT, to find out the effect of teacher experience on ICT and to find out the effect of teacher attitude on use of ICT. The study adopted descriptive research design because the study variables were qualitative in nature. Further, a descriptive study was in exploring the study topic in details and reveal the underlying factors in detail. Primary data was collected from 23 Principals, 30 Home science teachers and 480 students. This data was analyzed using SPSS version 20. The results indicated that teacher competency plays a key role in the efficiency of teaching using ICT as it boosts teacher confidence while integrating ICT. However, majority of

teachers were not well equipped with relevant ICT skills for use in teaching giving reasons as lack of computer proficiency, lack of digital content, lack of exposure to ICT facilities among others. The study is key in helping revamp the education sector policy in teacher training and adoption of modern and post-modern technology in classroom delivery that will improve the teaching and learning process for secondary schools in Kenya.

Keywords: Teacher Competency, Information Communication Technology (ICT), Learning, Teaching Skills, Home Science

INTRODUCTION

Globally countries are transiting from normal classroom teaching methods to use of Information Communication Technology (ICT) in teaching and learning process (Ndiritu, Mburu & Kimani 2013). Home science subject is one of the teaching and learning subjects offered in different institutions at different levels in the world which due to the nature of its practical it can utilize use of ICT for teaching and learning. For example, a concept that a learner didn't get well during the normal tradition method of teaching can be enhanced through ICT integration (Gichimu, 2016).

The influence of teacher competency in integrating Information and Communication Technology (ICT) into secondary school learning models in Kenya is crucial. Teachers play a vital role in the effective integration of ICT in the education system. They need to be knowledgeable and skilled in using ICT tools and resources to enhance students' learning and improve teaching practices (Chen & Liang, 2013). Teacher competency in ICT integration can be defined as a teacher's ability to use technology effectively in their teaching practices, create instructional materials, and assess student learning using technology (Papastergiou, 2009). This includes having the necessary knowledge and skills in using software, hardware, and other ICT tools and resources, as well as an understanding of how these tools can be used to support and enhance student learning.

The integration of ICT in the Kenyan education system has recently become one of the key highlights. One of the aspects that have been sited as key enablers of this development is teacher competency in the use of this technology to teach (KICD, 2017). Further, proficiency in the use of ICT system in classroom can help establish an interactive and engaging sessions with students, which in return enhances their learning experience. For teachers to better their knowledge and skills on the use of ICT in class, hey need to be trained and supported in sharpening these skills. To realize a more universal use of ICT in the Kenyan schools, educators need to be trained on the pertinent skills and how to best utilize this technology to

help learners have a better experience in learning home science. In partnership with the non-governmental, the Government of Kenya is trying to implement various initiatives in the education sector, which are aimed at equipping the teachers with the right skills on using ICT in class (KICD, 2017). However, there is still no clear effect on how ICT can impact the learning process in the country. This has necessitated this study which is aimed at finding out how the ICT competency by teachers impacts on the learning of home science in Secondary Schools in Kiambu county, Kenya.

Study Objective

The study aims at finding out the influence of ICT competency among teachers on the teaching and learning of Home Science in Secondary schools in Kiambu County, Kenya.

Specific Objectives of the Study

1. To determine the influence of the training of teachers on ICT use in the learning of home science among students in secondary schools in Kiambu County.
2. To determine the effect of the use of ICT by teachers on the learning experience of the Home Science by the students in secondary schools in Kiambu County.
3. To find out the effect of the attitude of teachers towards the use of ICT on the learning experience of home science among students in Kiambu County.

LITERATURE REVIEW

This study was guided by the Technology Acceptance Model (TAM). This framework is commonly used to predict and understand how different users accept and use different technologies. The model suggests that a person's attitude towards a given technology is determined by the perceived usefulness and the perceived ease of use (Davis, Baggozi & Warshaw, 1989). Perceived usefulness of a technology points to the belief and feeling that a given technology will ease the work at hand and cause the user to achieve the set goals. The perceived ease of use points to the belief that the technology is simple to use and navigate to produce the desired results (Davis, 1993). In the context of teacher competency and ICT integration in teaching, perceived usefulness would be influenced by the teachers' beliefs about the benefits of using ICT in teaching, such as increased student engagement and improved learning outcomes. Perceived ease of use would be influenced by the teachers' perceptions of their own ICT skills and the availability of resources and support for ICT integration (Ajzen, 2011).

Several studies have been conducted in Kenya to assess the level of ICT competency among secondary school teachers. Blömeke, Gustafsson & Shavelson (2015) state that teacher

competency points to a diverse and dynamic aspect in the teaching field, which is characterized by a deeper knowledge and skills of the subject area. This, therefore means that competency can be improved by acquiring more knowledge and practicing to horn the skills in teaching.

The findings from the conducted studies indicate that while many teachers are aware of the importance of ICT in teaching, they often lack the skills and confidence to effectively integrate ICT in their teaching practices. A study by Kimani (2017) found that only 30% of secondary school teachers in Kenya had adequate ICT skills for teaching. The study also revealed that teachers' ICT competency was significantly influenced by their age, level of education, and exposure to ICT training. Another study by Kim (2015) found that teachers who had received ICT training were more confident and competent in using technology in their teaching, resulting in improved student learning outcomes. Mishra & Koehler (2006) noted that teachers who were well versed with the use of technology in the class room could give significant support to their students in using ICT to learn. This was significant in helping the students integrate ICT use into their daily learning. This therefore means that teachers competent in the use of ICT will quickly adopt and use better and advanced strategies to improve the learning process for their students.

On the other hand, Lee and Tsai (2010) found that many teachers in developing countries, including Kenya, lacked access to adequate ICT resources and training programs, making it difficult for them to integrate ICT in their teaching. Moreover, a study by Mugenda and Mugenda (2003) found that the lack of access to ICT resources and inadequate training opportunities were the major challenges facing secondary school teachers in Kenya in their efforts to integrate ICT in teaching. These studies noted the need for a proper investment in ICT infrastructure and training. This will help the teachers to enhance their skills, and knowledge, and consequently, their competency in the use of ICT in a classroom (Kaiser et al., 2017).

The teacher ICT competency forms the basis for any successful use of ICT in the school learning system (Archibong, Ogbiji, & Anijaobi-Idem, 2010). Teachers that consider themselves incompetent in the use of ICT tend to be resistant to its use. Conducted studies have revealed a significant relationship between ICT competency levels among teachers and the acceptance and use of the ICT in classroom (Buabeng-Andoh, 2012b; Chai, 2010; Hsu, 2010; Lau & Sim, 2008; Sor go et al., 2010; Ting, 2007). Further, Ghavifekr & Rosdy (2015) affirms that well prepared teachers and trained teachers on the use of ICT become successful in using it in classroom.

In conclusion, the literature on teacher competency and ICT integration in teaching in secondary schools in Kenya suggests that while many teachers are aware of the importance of ICT in teaching, they often lack the necessary skills and confidence to effectively

integrate ICT in their teaching practices. Sustained investment in ICT infrastructure and training programs for teachers is needed to enhance their competency in using ICT for teaching and learning.

METHODOLOGY

The study used a descriptive research design and was conducted in Kiambu county, Kenya. This study adopted a multi-stage sampling technique and utilized a combination of research instruments such as interviews and questionnaires to gather in-depth information on the use of ICT in teaching Home Science as well as available resources for ICT.

The sample population included 23 principals, 30 home science teachers and 480 students sampled through cluster sampling. The validity and reliability of the research instruments were established through content and face validity. Test-retest reliability was used was used to calculate correlation of the responses after a repeated test. The items were considered reliable since they yielded a reliability coefficient of above 0.7 (Heale & Twycross, 2015).

The study adopted a thematic analysis approach to determine the interaction of the independent study variables; teacher training on ICT, use of ICT by teachers, and the attitude of teachers on use of ICT in class, with the dependent variable, learning experience among students. A regression analysis on the collected data helped determine the extent of interaction between variables.

RESULTS AND DISCUSSIONS

The Effect of The Teachers' Training on ICT on the use Of ICT in Learning Home Science in Kiambu County

Teachers' training in use of ICT in classroom is a key aspect in the enhancement of ICT use in teaching in the Secondary Schools in Kiambu County. The training is assumed to cause a significant positive effect on the classroom use of ICT on Home Science. Table 1 below shows the results obtained from the study that had 29 participants.

Table 1: Effect of Teachers' Training on ICT on use of ICT in Learning Home Science

		Teachers' training on ICT	Use of ICT in learning home science	R-Squared
Spearman's rho	R-value	1.000	.377[**]	
	P-value	.	.000	.634
	N	29	29	

**. Correlation is significant at the 0.01 level (2-tailed).

A regression analysis was carried and the resulted indicated a significant correlation between teacher training on ICT and use of ICT in teaching Home Science at 0.01 critical level and a correlations coefficient of 0.377. This coefficient shows a moderate positive correlation between teacher training on ICT and the use of ICT in teaching Home Science. Further, the regression model had an R^2 value = 0.634, which means that the teacher training on ICT explains 63.4% on the use of ICT in home science learning. Overall, these findings suggest that the training of teachers on ICT has a notable positive impact on the use of ICT in teaching students home science.

Similar studies have also reached similar findings as this study. Wei, Piaw, & Kannan (2016) examined the relationship between teacher ICT competency and the level of acceptance of use of ICT by teachers in secondary schools in Malaysia. Using a quantitative technique, the study results indicated that an existence of a strong positive correlation between teacher competency on ICT and use of it in classroom. Another study by Lin, Huang, & Chen (2014) looked at the barriers to the adoption of ICT in teaching Chinese as a foreign language in US universities.

The findings from the study showed that an insufficient support and time for the teachers to develop ICT-driven pedagogy and activities barred teachers from having an effective use of ICT to teach English in the class. These means that there was a significant positive correlation between the teachers' ICT competency and their use of ICT in teaching English as a foreign language to Chenes students. Tamim et al. (2011), also, conducted a meta-analysis on ICT training programs for teachers and the effect they had on their use of ICT in the classroom. The findings from the analysis revealed that ICT training programs for teachers have a significant positive impact on the use of ICT by teachers in class, as well as on the learning experience of the students.

The effect of the use of ICT by teachers on the learning experience of home science among students

Teachers' use of ICT in teaching home science in secondary schools is said to have a significant effect on the learning experience of students. This is because the use of ICT excites the learners and helps in demonstrating knowledge through videos and charts. The use of the visuals motivates and reinforce the lessons taught to the learners. Table 2 below shows the findings from the study that had 29 respondents.

Table 2: Effect of the use of ICT by Teachers to Teach on the
Learning Experience of Home Science among Students

		Use of ICT by teachers to teach	Learning experience of home science	R-Square
Spearman's Rho	R-value	1.000	.582[**]	
	P-value	.	.000	.643
	N	29	29	

**. Correlation is significant at the 0.01 level (2-tailed).

A regression analysis was carried out. The obtained correlation coefficient for the relationship between the use of ICT by teachers and the students' learning experience was 0.582, p>0.01. This meant that the relationship between use of ICT and the learner's experience was strongly positive and significant. The R-square was 0.643, which meant that teacher use of ICT explains 64.3% of the variance in the learners' experience in learning home science. This finding indicates how important the use of ICT by teachers in class is key in enhancing the learning experience of learners.

Lee et al. (2011) conducted a similar study in South Korea and found out that the use of ICT in elementary schools had a significant positive correlation with the student experience in learning, which was also manifest in the student achievements in class. Tondeur et al. (207) also, arrived at similar findings in Netherlands; the use of ICT and digital tools in classroom had a significant positive effect on the learning experience of students in mathematics and languages. Another review by Higgins et al. (2012) found out that ICT use by teachers has a notable positive effect on the student learning experience and achievement of different age groups and across different subjects in both primary and secondary schools. In conclusion, these studies suggest that the constant use of ICT in the classroom by teachers can lead to a significant improvement in the learning experience and achievement of the learners in Home Science, as well as in other subjects.

The effect of teachers' attitudes towards the use of ICT on the learning experience of home science among students

Teacher attitudes towards the ICT use in classroom is said to have a notable impact on the learners given that teachers determine how students and enjoy the learning process. It affects the willingness of students to use and integrate into their learning experience new methods of teaching. Further, a positive attitude by teachers on using ICT is likely to elicit

also positive thoughts among students in learning through ICT and hence having a better experience. The research conducted a correlation analysis on the effect of teacher attitude on ICT use on the students' learning experience. The findings are presented in table 3 below.

Table 3: The effect of teachers' attitudes towards the use of ICT
on learning experience of home science

		Teachers' attitudes on the use of ICT	learning experience of home science	R-Square
Spearman's rho	R-value	1.000	.546[**]	
	P-value	.	.000	.551
	N	279	279	

**. Correlation is significant at the 0.01 level (2-tailed).

The model found the relationship between teacher ICT use attitudes and students learning experience to be significant the 0.01 critical level. The correlation coefficient was 0.546, which indicated a positive strong influence of teacher's attitude on the use of ICT and the learners experience in learning home science through ICT. This means that when the attitude of teachers is good, the learning experience also improves making the learning for the students better. The R-square showed that the teacher's attitude on ICT use in class accounts for 55.1% of change in the learning experience of students on home science.

Similar studies like that Teo (2011) found out that teachers' attitudes towards the ICT use in classroom had a significant positive impact on student engagement and the learning experience of student learning experiences in Singapore. Also, Guo et al. (2019) found out in their study in China that teachers' attitudes had a positive correlation with the student experience and motivation in the lessons taught using ICT. Through a meta-analysis, Ertmer et al. (2012) found out that the attitude of teachers towards the use of ICT in class had a notable positive impact on the student learning experience. The positive attitudes by teachers helps the learners also develop a positive attitude in receiving the lessons taught using ICT and makes them more curious to want to know more how it works and thus, enhancing the learning experience.

In conclusion, these findings agree that teachers attitude on the uses of ICT in classroom have a direct positive correlation to the learning experience of students.

CONCLUSION

Teacher competency in ICT skills played a vital role in the efficiency of teaching using ICT as it boosts teacher confidence while integrating ICT.

i. The study revealed that the teacher's training on ICT has a positive impact on the learning of home science by students. This was supported by the fact that, teachers who were trained in ICT had the confidence to use of ICT as compared to those without. This therefore means that there is a need for the government and schools to encourage and offer support to teachers in getting trained. This will in return cause them to better their delivery and use of ICT in teaching.

ii. On the use of ICT by teachers, the study found out that the use of ICT by teachers has a positive impact on student learning outcomes, such as achievement and engagement, across different subject areas and countries. Therefore, the government and school administration should endeavor to provide the needed ICT infrastructure as a way of facilitating and enhancing the student's learning experience, which will in the end be reflected in a better performance of the school.

iii. Also, the study found out a positive correlation between the teachers' attitudes and the experience of students in the learning process. This means that, when teachers have a positive attitude on the use of ICT, they will quickly influence the attitude of the students in a positive way and cause them to enjoy the learning process. These attitudes can be achieved if the schools offer support to the teachers to acquire the right skills and knowledge on using the technology in the classrooms.

RECOMMENDATIONS

i. There is need teachers to upgrade their skills and knowledge on the use of ICT in class and help the learners have a better learning experience. A well-equipped teacher will be confident in engaging the students while using ICT platforms. Further, when well trained, a teacher will not struggle delivering their lessons but improve the learning process and cause their students to enjoy the process as well as grasp the lessons taught.

ii. Teachers should consider using ICT more in class to teach their lesson to the learners in all subjects. Once they are well trained, the teachers should apply ICT techniques as often as possible and in a manner that will arouse the learning curiosity of the students. This will help the learners create memorable moments and lessons, thus, causing them to retain the taught knowledge. This will in return help them perform well.

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