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Opportunities and Challenges of Integrating ICT in the Teaching and Learning of Environmental Education in Primary Schools

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Abstract: *Recent development in Information and Communication Technology (ICT) has brought remarkable changes in teaching-learning process. However, studies show that effective integration of ICT in teaching Environmental Education (EE) is still a challenge to teachers and learners, especially in developing countries like Tanzania. This paper investigated the available opportunities but also the challenges that prevent primary school teachers from integrating ICTs in teaching EE. The study adopted both qualitative and quantitative research approaches that are in line with case study research design to acquire knowledge from participants through interviews, classroom observations and questionnaires. The participants of this study were 36 teachers and 240 learners from 12 selected primary schools in Musoma district. The findings revealed that there are limited opportunities to teachers that included availability of ICT facilities in few schools and availability of limited pre-service and in-service training programmes. The findings revealed a number of challenges such as inadequate ICT training programmes, insufficient ICT facilities in primary schools, scarcity of ICT support services to teachers in schools and limited allocated classroom schedule. The paper suggested that there is a need for well-planned ICT teachers' pre-service and in-service training programmes to enhance teaching of EE. In addition, ICT facilities should be sufficient in schools as well as the improvement of ICT support services to teachers.*

Keywords: ICT, EE, Tanzania, Education, Pre-service, In-service, Training programme

1. Introduction

Integration of Information and Communication Technology (ICT) in classrooms creates conducive teaching and learning environment (Hasan, 2012). ICT transforms the teaching and learning process in which learners deal with knowledge in an active, self-directed and constructive way. In addition, ICT can facilitate learner centered learning process if used innovatively (Drent, 2005) as well as facilitating course delivery and learners' support. Apart from its opportunities, ICTs in education call upon educationists to identify the challenges to the integration of ICTs into teaching and learning in order to improve the quality of teaching and learning . BECTA (2005) notes that literature abounds with information on barriers to ICT integration in general but limited studies look at ICT challenges that exist in specific subject areas. Investigating the opportunities and challenges that educationists encounter in specific situations is essential as it assists them to overcome these challenges and integrate the ICTs into their teaching and learning. In ensuring that ICT is adequately implemented in schools , the Tanzanian government formulated the ICT policy for basic education in 2007 (URT, 2007). Awareness of environmental issues enhanced with ICT knowledge in this error of globalization and digital world is of necessity, particularly in primary education, which is considered to be the basic education in the country with

every citizen having the right to get it (MoEVT, 2005). This paper therefore investigated the available ICT opportunities and challenges that are being encountered by primary school teachers in enhancing the teaching of EE in Musoma urban primary schools. The paper addresses four important questions 1) What are the current practice of integrating ICT in EE teaching and learning process? 2) What are the available ICT opportunities in primary schools? 3) What are the teachers and learners' challenges in integrating ICT in EE teaching and learning process? 4) What are the teachers ' and learners ' suggestions for effective integration of ICT in EE teaching and learning process?

2. Literature Review

This section presents reviewed literature regarding the opportunities and challenges of integrating ICT in teaching EE

2.1 Theoretical Perspectives for the Study

The study selected the learner centred theories (constructivism model) because educationist such as Ausubel, Piaget, Montessori, Bruner and Gagne argue that learners actively process information and learning takes place through the efforts of the learners as they organise, store and find relationships between information while linking new knowledge to old knowledge (FISTE, 2011). Constructivism considers learning to be an individual and personal event. It argues that learners construct, reconstruct and deconstruct their own understanding and knowledge of the world through experiencing things and reflecting on those experiences (ibid).

2.2 The Potential of ICT in Enhancing Teaching and Learning of EE

Recent studies indicate that ICT improves teaching and learning processes (Hasan, 2012; Lim, et al. 2012; Nihuka, 2010), permits the move from reproductive model of teaching and learning to an independent, autonomous learning model that promotes initiation, creativity and critical thinking with independent research. On the other hand, studies show that introduction of computers and the internet in classroom teaching impacts positively on the learning process (Houcine, 2011). However, in most of the developing countries, the use of ICT in primary schools' environmental studies lessons is not encouraging due to, among other challenges, lack of competence in technology amongst teachers (Abdelwahed, 2016; Houcine, 2011; Lin, 2011). Technology is currently given priority because it is considered as the solution for searching information since pupils and instructors get lots of environmental topics and information through e-learning (Lin, 2011). ICT should help teachers and students to communicate and collaborate without boundaries, make students autonomous and allow teachers to bring the whole world into classroom activities. ICT should contribute to creating powerful learning environments of EE in numerous ways. ICT should provide opportunities to access an abundance of EE information using multiple information resources and viewing information from multiple perspectives, thus fostering the authenticity of learning environments. ICT may also make complex processes easier to understand, may serve as a tool to curriculum differentiation, may provide opportunities for adapting the learning content and tasks to the needs and capabilities of each individual learner (Smeets&Mooij, 2001). Critically arguing, ICT use serves to broaden reference, reduce laboriousness and increase efficiency, improve students' motivation and the quality of work, and facilitate learning. Interactivity, flexibility and convenience have become the order of the day in the ICT supported environment. ICT opens up opportunities for EE learning because it enables students to access, extend, transform and share EE information and ideas in multi-modal communication styles and format. According to Phalen, (2004) appropriate use of technology in teaching extends, enriches, conducts, individualises, differs and broadens the entire curriculum.

However, a mere learning of ICT skills is not sufficing, but using ICT to improve EE teaching and learning is the key for pedagogy-technology integration. When delivering the class lectures for instance, any innovative teacher needs to draw diagrams, show pictures, animate some objects to explain critical concepts, even play some video clipping of real time operation. All these multimedia applications can assure very productive, interesting, motivating, interactive and quality delivery of classroom instruction. Presentation of teaching using ICT software like computers, power point, audio and video programmes to mention a few can be a good choice for EE teachers for performing EE teaching tasks.

2.3 Challenges Encountered in Using ICT for EE Teaching and Learning

Numerous scholars have highlighted various challenges for effective integration of ICT in teaching and learning processes. Most of the identified challenges hinder effective pedagogical practices of ICT in the classroom. The identified challenges are categorised as either external or internal challenges. External challenges include inadequate access to the technologies, lack of funding, lack of digital resources and infrastructure, inadequate training, and staff support (Hasan and Clement, 2012, Lim and Pannen 2012, Yan, Xiao and Wang, 2012 and Dionys,

2012). With availability of ICT challenges, ICT integration would not be possible hence removal of these challenges is essential to facilitate effective ICT integration into teaching and learning. However, it has been noted that the removal of the external challenges does not necessarily mean successful classroom integration as internal challenges come into play to stall ICT integration by teachers (Sang et al., 2010). Internal challenges include teacher related factors such as teachers' beliefs, teacher self- efficacy and teachers' attitudes and willingness to teach using ICT facilities as well as school- level factors, such as organizational culture (Keengwe et al, 2008). A review by Bingimlas (2009) on the challenges to successful integration of ICT into classroom learning environments identified teacher level and school level challenges as hindering the successful integration of ICT into teaching and learning. Teacher level challenges include lack of teacher confidence, lack of teacher competence, resistance to change and negative attitudes , while school level challenges include lack of time , lack of effective training , lack of accessibility to ICT - based resources and lack of technical support in classroom (Unal and Ozturk, 2012).

Another study that was conducted in Turkish to the pre-service teachers revealed that while access to computers and internet were very high to the teachers in schools, some of the teachers indicated that they are not confident in using ICT in classroom teaching and learning activities. The survey also indicated low competence in web page development and multimedia authoring among pre-service teachers (Banas, 2010). Further it was found out that only 13% of the teachers were facilitating students learning with technology whereas the majority of teachers were getting students to learn from technology. On the other hand, Greenhow et al. (2008) compared the differences between in-service and pre-service teachers' thinking about ICT integration problem elicited through online multimedia problem solving scenarios. As expected, in-service and pre-service teachers were different with regards to the process and the content of their instructional decision. The pre-service teachers were more superficial and uncritical as compared to their counterparts. However, both groups were lacking consideration about the relative advantages and disadvantages between different options of ICT tools.

The reviewed studies point to the need of helping pre- and in-service teachers to build their deeper understanding about Technological Pedagogical Content Knowledge (TPACK), especially for constructivist-oriented learner centred learning where technologies are employed to scaffold sense making. This is especially so for the faculties in higher education as they are likely to be the most important people to help form the pre-service teachers' TPACK (Thompson & Mishra, 2007). Due to scarcity of studies with regard to opportunities and challenges of using ICT in teaching EE, this study attempts to fill the gap by investigating the available opportunities and challenges of employing ICT in teaching EE in primary schools.

3. Methodology

The study employed mixed methods approach with qualitative approach leading the study. A mixed approach was selected because it is believed that a study that contains only qualitative data will miss the rich texture of interpretation that an integrated approach makes possible. Also multi-research approaches complemented each other, enabling validation of data through triangulation of data from interviews, questionnaires and observations (Cresswell, 2018). An integrated approach was selected because it is believed that a study that contains either qualitative data or quantitative data only will miss the rich texture of interpretation that an integrated approach entails (Yin, 2009). Qualitative research leads the study because the researcher considered it as the type of research which uses natural settings to explore the people's experiences and report by narrating the process of the phenomenon (Creswell, 2018; Denzin & Lincoln, 2005).

The target population included primary school teachers and learners in 12 selected government primary schools from 16 wards of Musoma municipality. The sample included 36 teachers (3 teachers in each of the 12 sampled school) and 240 learners (20 learners in each sampled school). The aim was to select at least one primary school from three quarter of the 16 wards available in Musoma district. Musoma district was purposively selected as teachers from this district have attended various ICT training programmes (Table 1) whereas the area is also affected by a number of environmental issues ranging from water pollution, poor fishing techniques and poor environmental management in mining sites (WWF, 2014). The schools were chosen from different localities although they were similar in some aspects like class size, availability of teaching and learning resources, and they followed a centralized curriculum. The sampled teachers' computer literacy levels were from advanced, average to low level as shown in table 1.

Table 1: Computer Literacy Level of the Sampled Teachers

Profile	Frequency	Percent
Advanced	04	11.1
Average	20	55.6
Low	12	33.3
Total	**36**	**100.0**

The data collection instruments included interview guides for ICT or EE subject teachers, questionnaires for teachers and learners as well as observation to the actual classroom teaching and learning sessions. These instruments were used concurrently in order to increase the researcher's confidence and the validity of the research outcome. This is in line with Cohen *et al* (2007) contention that if two or more different data collection instruments are used, then the validity of the research results is not only increased but also assured. The instruments were administered by the researcher after the pilot study in one of the primary schools in Musoma municipality.

The data obtained in this paper were scored, coded and analysed to include frequencies of responses, percentages and wherever necessary tabulation and graphics were employed for easy interpretation and analysis. According to Adèr et al., (2008), the research should consider what data are relevant to collect and how to analyze the results from the collected data. The information from questionnaires was subjected to Statistical Package for the Social Sciences (SPSS version 23). SPSS is a software package used for statistical data analysis hence suitable for this study.

Validity is defined as the trustworthiness and accuracy of instruments, data and the findings in research (Babbie, 2010). In this study validity were considered by pilot testing the instruments of data collection before administering them in the actual study and through the use of multiple methods of data collection. The use of multiple methods was useful in enriching each other, thereby supplementing the drawbacks of one another. On the other hand, reliability refers to the quality part of the instruments use that makes it possible to yield similar results every time the instrument is used in different measurements of the same phenomenon (ibid). Reliability was ensured through the accuracy and precision of a measurement procedure which indicates the degree to which an instrument measures what it is supposed to measure (Kothari, 2004).

Ethical issues were also taken into considerations by involving the informed consent of the respondents', individuals' freedom to decline from participation, assurance of maximum confidentiality and protection from physical and mental discomfort, assurance of anonymity and on what should be disclosed out of the collected data.

4. Results and Discussion

This section was guided by four research questions which were analyzed using content analysis as well as SPSS to generate results for the study as follows:

4.1 The Current Practice of Integrating ICT in Teaching EE in Schools

The findings revealed that EE is well integrated in primary school syllabus although it is seldom taught using the ICT facilities. Teachers' responses indicated that EE can be identified more clearly in subjects such as Geography, Science, History and Civics as compared to Mathematics, Languages and Vocational Skills. However, findings indicated that the integration of ICT in EE teaching and learning process was less practiced in the sampled schools. Only four (33.3%) out of twelve sampled schools were found to have computer laboratories that were facilitated through Tanzania Education Authority (TEA). The observation revealed that the use of ICT in EE teaching and learning process was minimal. The findings are similar to García *et al.*, (2012) who found that the ICT practice in schools is very low and not significant. In addition, it was observed that teachers with less teaching experience seem to have more self-efficacy in using ICT as compared to teachers with much experience. However, the findings suggest that, effective teaching of EE through the use of ICT facilities depends very much on teachers' understanding of ICT and their ability to use ICT in teaching subjects containing EE. Nevertheless, the researcher identified few available opportunities which were the availability of TEA in-service ICT training programmes, availability of computer laboratories in four schools as well as personal initiatives of few teachers to be trained and then utilize their own ICT facilities in teaching and learning process. In addition, few teachers had the opportunity of being trained through the pre-service ICT training programmes recently introduced in Tanzania Teachers Colleges (TTCs).

4.2 Available ICT Opportunities in Primary Schools

In the context of this paper, the available ICT facilities' opportunities that were expected to be found at primary schools are in line with those identified by MOEVT (2007) to include all forms of technology that are used for communication and to transmit, store, create, share or exchange information. This broad definition of ICT includes technologies such as: radio, television, video, telephone (both fixed line and mobile), computer and network hardware and software; as well as the equipment and services associated with these technologies, such as electronic mail, text messaging and radio broadcasts. In this paper, few opportunities were observed to be available in sampled schools. They included the ICT training programmes in TTCs (pre-service training), in-service training and availability of computer labs in four (33.3%) among the twelve sampled schools. In addition, twelve (33.3%) of the thirty-six interviewed teachers who appeared to attend the ICT training programmes either coordinated by TEA in Musoma district or through the private ICT institutions; commented that the programmes were very useful to teachers. The ICT training programmes availed the rare opportunity among the teachers of Musoma municipality. Teachers on the other side argued that in order for teachers to be able to use ICT facilities to teach EE they need to have expertise in ICT knowledge and skills that will facilitate their confidence in teaching using ICT.

The findings above highlight several issues that need further attention. Foremost, the training of ICT should focus on teachers with more experience because teachers with less teaching experience seem to have more self-efficacy in using ICT as compared to teachers with much experience. Teachers' computer self-efficacy influences the less experienced teachers to use ICT in teaching and learning of EE. This is because the less experienced teachers were considered to have more current knowledge from the colleges where they have recently graduated as compared to teachers with many years of teaching in schools. On the other hand, the findings suggest that failure of the teachers to prepare or repair damaged ICT facilities such as computers is because they did not get sufficient knowledge about basic technical skills during the ICT training. The findings are similar to the study that was conducted in Turkey which indicated that while access to computers and internet were very high to the teachers in schools, some of the teachers indicated that they are not confident in using ICT facilities due to among other reasons lack of expertise to use the ICT facilities in teaching and learning process (Banas, 2010). Therefore, lack of expertise due to limited ICT training was a major challenge that was facing teachers in the study as it was indicated by interview and questionnaires' respondents. Teachers' professional development is a key factor towards a successful integration of ICT into classroom teaching. This study revealed that all the teachers who got the opportunity to attend the ICT training programmes whether beginners or experienced, developed competence in the use of technology. It is envisaged that teachers who integrate technology in their teaching practices can transform the performance of the learners as well as improvement of environmental knowledge to assist in environmental conservation.

The results also indicated that, radio programmes were expected to be broadcasted through programmes facilitated by radio stations or recorded from other radio devices such as audio tape, online computer sources such as Google and electronic mail. Teachers were therefore expected to facilitate the teaching of EE using the ICT facilities that are found within their context. Also, teachers were expected to facilitate the teaching of EE through broadcast television programmes and television devices via recorded media for example DVD, CD, VHS tape, floppy disk, player, DVD, VHS deck, flash disk and other external computer devices. The use of telephones to download EE teaching materials was also expected. However, limited ICT facilities were found to be available in the sampled schools.

Therefore, availability of ICT infrastructure and resources in schools is a necessary condition to the integration of ICT in teaching and learning of EE. Effective adoption and integration of ICT into the teaching of EE in schools depends mainly on the availability and accessibility of ICT resources both hardware and software. However, the study revealed that teachers who have a high level of expertise tend to use computer related tools in the classroom more frequently than their counterparts. The findings are similar to Gulbahar and Guven (2008) who made a survey on ICT Usage and the Perceptions of Social Studies Teachers in Turkey and found that the groups that sometimes and frequently use computer related tools in the classroom have a higher level of expertise than the groups that never use them.

4.3 Teachers and Learners' Challenges of Integrating ICT in EE Teaching and Learning Process

The following were some of the challenges that were identified to be encountered by teachers in teaching EE using ICT facilities. First, inadequate ICT training where twenty-seven teachers (75%) out of the thirty-six interviewed teachers stated to feel uneasy to teach EE using ICT facilities among other reasons due to limited ICT training. One teacher commented: "*Not all the teachers who are now teaching EE in the schools got the opportunity of ICT training when attending training in teachers' colleges. There are teachers who are in schools*

but have no idea of ICT." However, even the teachers who managed to attend the ICT trainings complained that the trainings were not effectively covered especially on practical parts. The second challenge identified by teachers was insufficient knowledge particularly technical knowledge to prepare and use the ICT facilities before and during the teaching session. The major concern of teachers was the failure to repair the computers and other ICT facilities, especially when they get damaged. Results from the teachers' questionnaires revealed that 04 respondents (11.1%), to great extent, had limited knowledge to use ICT facilities in teaching process whereas 18 respondents (50.0%) had ICT knowledge. Therefore, about 61.1% of the respondents indicated to have limited knowledge to use ICT materials during teaching and learning process. The findings are consistent with the study conducted by Shadreck (2009), who pointed out that the successful integration of ICTs requires teachers who are technologically competent, well trained and supported technically.

The above results of the teachers' respondents are summarized by table 2 hereunder.

Table 2: I have limited knowledge to use ICT facilities in the teaching process

Profile	Frequency	Percent
Not at all	2	5.6
To less extent	12	33.3
To some extent	18	50.0
To a great extent	4	11.1
Total	**36**	**100.0**

Other challenges included limited access to ICT teaching and learning facilities where thirty-two (88.9%) out of thirty-six interviewed teachers stated that in teaching and learning, one of the critical challenges they face is inadequate ICT teaching and learning facilities. Some teachers pointed out that one of the challenges of teaching EE through the use of ICT facilities is limited pedagogical support from the administration and sometimes from their colleagues. When they were asked as to what extent the school administration supports the use of ICT in the teaching of EE, 5.6% of the teachers agreed that the support was to the great extent where as 47.2% stated that it was only to some extent, 19.4% stated that it was to less extent and 27.8% stated that the school didn't support them at all. The findings relate to the findings of the studies conducted in Tehran, Hong Kong and Singapore which revealed that transformational leadership, leadership promotion of collaboration and teachers' dedication to learner-centred learning influence effective ICT transformation (Afshari, 2009; Wong & Li, 2008). Figure 1 here under summarizes the results of the teachers' respondents.

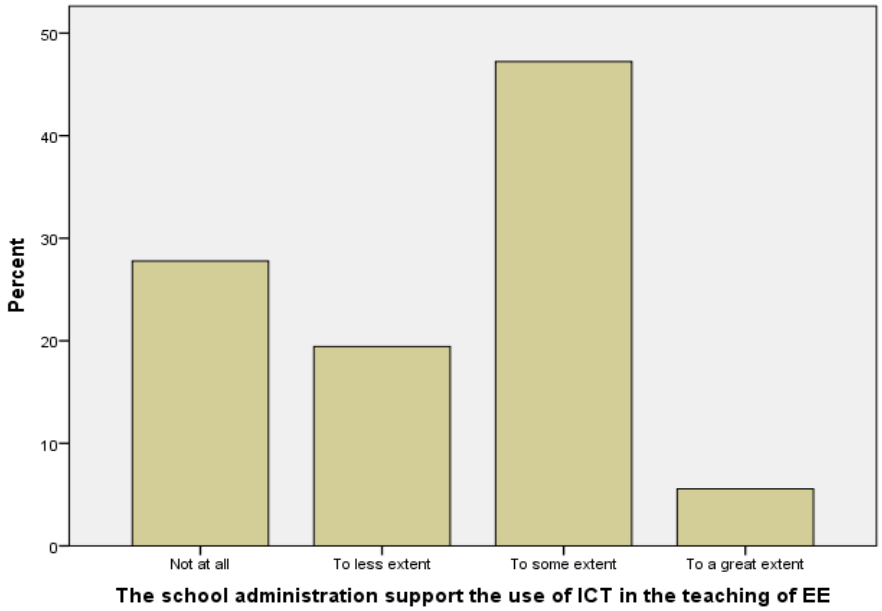

Figure 1: ICT Support from School Administration

Also learners had the following to respond to with regard to ICT support in teaching and learning process. The questionnaires were administered to 240 learners to find out their opinion about their ICT knowledge (Table 3) as well as the support received from the school management.

Table 3: I have limited knowledge to use ICT facilities in my learning

Profile	Frequency	Percent
Not at all	16	6.7
To less extent	66	27.5
To some extent	114	47.5
To a great extent	44	18.3
Total	**240**	**100.0**

In addition, the other challenge was reported where all teachers (100%) stated that the time allocated for lessons' periods are not sufficient as there is also a time needed for preparations of ICT facilities before the commencement of EE subject.

The above findings revealed that the use of ICT facilities in sampled schools was very minimal due to among other reasons inaccessibility of ICT resources. The findings are similar to that of Cavas (2009) who found that if teachers cannot access ICT resources such as computers, then they will not use them in teaching and learning process. However, most teachers reported that even when the computers are available, teachers lack the technical knowledge to use and repair the computers when they get damaged because they did not receive adequate ICT technical training. The findings are similar to Jones (2004) who reported that the breakdown of a computer causes interruptions and if there is lack of technical assistance, it is likely that the regular repairs of the computer will not be carried out resulting in teachers not using computers in teaching. The effect is that teachers will be discouraged from using computers because of fear of equipment failure since no one would give them technical support in case there is technical problem. ICT technical support influence teachers to apply ICT in the classroom as teachers will not waste time in troubleshooting hardware and software problems. It is envisaged that the teaching of EE with the

use of ICT facilities encourages active learning because learners are able to learn by doing.

School leadership support is also crucial in enabling smooth integration of ICT in teaching and learning process. Research shows that a school leader who implements technology plans and share a common vision with the teachers stimulate them to use technology in their lessons (Lai & Pratt, 2004). Although ICT opportunities are provided by the classroom teachers, the quality of leadership and management of ICT in a school is crucial to the provision of good ICT learning opportunities. As the quality of ICT leadership improves, so does the percentage of schools providing good quality ICT learning opportunities. The study revealed that leadership promotion of collaboration among the teachers, regular practice of using ICT facilities and teachers' dedication to student-centred learning influenced effective ICT integration in EE teaching and learning. However, from the teachers' utterances, it is revealed that there is very limited administration and collegial support among the teachers in the primary schools as far as the use of ICT facilities in teaching of EE is concerned. The findings are similar to Nihuka (2013) who found that for the effective integration of ICT in teaching and learning process, the school management needs to be receptive and supportive not only to the idea of application of e-learning but also supportive to instructors and learners in different ways.

However, the most common challenge which the teachers were concerned with was the large number of learners in the classrooms and insufficient ICT teaching and learning resources to cater for the number of learners in the classrooms. The fact that learners need resources and social structures to enable them to participate in communities of practice from an early stage in their learning process cannot be denied (Koskinen, 2010). Therefore, inadequate ICT teaching and learning facilities in schools is a critical issue which needs immediate attention.

4.4 Teachers and Learners' Suggestions for Effective Integration of ICT in EE Teaching and Learning Process

Teachers suggested for the implementation of the ICT training programmes that concentrate on pedagogical training as well as technical issues. The training should facilitate the ICT expertise to teachers in order to overcome the challenges that hinder the use of ICT to teach EE. Teachers also requested the trainings to go hand in hand with the availability of ICT facilities in schools. Only four (33.3) out of the twelve sampled schools were identified to have the computer laboratories with minimal number of computers compared to the needs of learners. Eighty-five percent (85%) of the teachers suggested for the ICT training programmes that embrace educational practices, strategies, skills and knowledge in relation to transformations in classroom activities (Fig. 02). The issue of pedagogical knowledge is of great importance as it blends content and knowledge, hence distinguishing teachers from other specialists (Tambya, 2008). In addition, follow up trainings were suggested to be available in order to assist teachers whenever they get stuck in the use of technology.

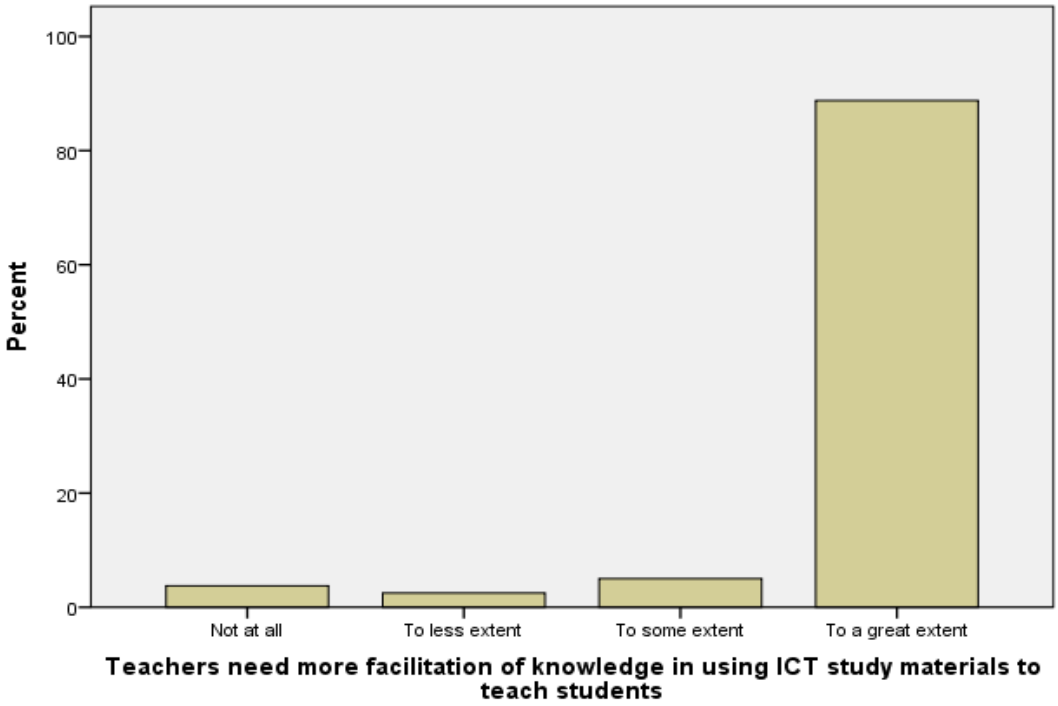

Figure 2: The Need for More Facilitation of ICT Knowledge

Also, teachers suggested that schools' management should make sure that they support teachers in the use of ICT facilities, particularly when the ICT facilities such as computers get faulty. Collegial support was also emphasized to equip teachers with the expertise to prepare ICT facilities during EE lesson preparations. Teachers reported that although they are willing to teach EE using ICT facilities, they do not get assistance from their colleagues who have ICT knowledge. Since ICT is considered to be a new subject, some teachers may genuinely not be knowledgeable so they cannot help their colleagues but others were considered to lack confidence since their trainings concentrated on theoretical parts rather than practical parts. The results support the view that teachers' limited knowledge base is a result of inadequate training particularly in their initial training as teachers (Spiropoulou, 2007). Teachers also indicated that government primary schools are not allocated adequate funds to run most of the extra classroom activities rather than depending on learners' contributions. The results from this study are similar to findings from the study done in the USA on middle school teachers where among the challenges which teachers face in teaching EE are lack of administrative support and funding (Ernst, 2009). Hence funding, collegial and administrative support are needed if teachers are to be assisted to grasp well the issue of teaching EE effectively using the ICT facilities.

It is therefore recommended that teachers should be equipped with pedagogical knowledge and skills on how to use technology into their daily teaching practices. The findings are consistent with the study conducted by Guma, (2013) who pointed out that the training of teaching staff in the pedagogical issues should be increased if teachers and administrators are to be convinced of the value of using ICT in their teaching-learning process. However, the teaching of EE through the use of ICT facilities depends very much on the teachers' understanding of the ICT and their ability to use ICT facilities in teaching of the subjects containing EE.

Embedded in the teachers' responses are views that ICT teaching and learning materials are ready-made ones provided by the government or bought from shops. However, apart from being provided by the government, ICT teaching and learning materials can be developed by teachers from their own initiatives as few teachers were observed to be volunteering. However, the issue of ICT teaching and learning facilities is acute because teachers lack the knowledge, skills and commitment to look for or develop or search for their own ICT teaching facilities using their own initiatives. Therefore, teachers need to be well trained to enable them use their own initiatives to develop the ICT teaching and learning materials from the ICT facilities that are available in their surrounding environment. However, it was encouraging learning that few teachers were using their own laptops, smartphones, televisions and radios to facilitate the EE teaching and learning process.

5. Conclusion and Recommendations

5.1 Conclusion

In responding to the first question, this paper show that EE is well integrated in primary school curriculum although teachers are not facilitated with the use of ICT facilities in teaching and learning process. The study recommends teachers to be well equipped with ICT knowledge. In the second question the researcher identified few available opportunities which were the availability of TEA in-service ICT training programmes, availability of computer laboratories in four schools as well as personal initiatives of few teachers to be trained and then utilize their own ICT facilities in teaching and learning process. In addition, few teachers had the opportunity of being trained through the pre-service ICT training programmes recently introduced in TTCs. In responding to the third question, respondents (teachers) showed their dissatisfaction with regard to ineffective ICT training programmes, insufficient ICT facilities, limited support from the school management to mention a few. In the fourth question teachers suggested that ICT training, availability of ICT facilities, collegial and administration support is needed if teachers are to be assisted to grasp well the issue of teaching EE effectively using the ICT facilities. In addition, teachers need to be well trained in order to be able to use their own initiatives to develop ICT teaching and learning facilities from the ICT resources that are available in their surrounding environment.

5.2 Recommendations

Since the introduction of ICT in education sector, effective integration of technology into classroom practices poses a challenge to educational planners, administrators, teachers and learners. The findings of this study indicate that educational stakeholders have strong desire for the integration of ICT into education but they encounter many challenges to it. These findings therefore have implications for more efforts towards training of teachers to become regular users of ICT focusing on acquiring basic ICT skills. For successful integration of ICT into EE teaching-learning process, the opportunities that positively influence teachers' to use ICT in education include teachers' positive attitudes towards the available ICT training, ICT competence after the training, accessibility of ICT facilities in schools, teaching experience, colleague support, technical support and leadership support. The presence of all ICT opportunities was found to increase the probability of excellent integration of ICT in EE teaching-learning process. However, advancing towards an effective use of ICT in class cannot only rely on traditional teacher training courses but on the eligibility and exhaustive organization of many ICT teaching programmes, such as the one shown in this study that was coordinated by TEA. In addition, it is crucial to know to what extent the knowledge learnt is likely to have impact in governing actions in the classroom and tell what to do in specific situations. Consequently, the study suggest that effective use of ICT would depend on in-practice mentoring (guided practice) and peer collaboration that responds to specific real situations and not just be grounded in general non-contextualized teaching. Therefore, ICT training programmes as an opportunity to teachers in the ICT pedagogical issues should be increased if teachers are to be convinced of the value of using ICT in their teaching-learning process.

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