

**THE EFFECTIVENESS OF ICT INTEGRATION TO STUDENTS'
LEARNING IN GOVERNMENT SECONDARY SCHOOLS DAR ES
SALAAM, TANZANIA**

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**A DISSERTATION SUBMITTED IN PARTIAL FULFILMENT OF THE
REQUIREMENTS FOR THE MASTER OF EDUCATION IN
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CERTIFICATION

The undersigned certifies that she has read and hereby recommends for acceptance by the Open University of Tanzania a dissertation entitled; “The Effectiveness Of ICT Integration to Students’ Learning in Government Secondary Schools Dar Es Salaam, Tanzania,” in fulfillment of the requirements for the Master Of Education In Administration, Planning And Policy Studies (Med Apps) of The Open University of Tanzania.

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Date

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DECLARATION

I, Pamela Geoffrey Mboya, do hereby declare to the SENATE of The Open University of Tanzania that, this dissertation is my own original work and that it has not been presented, and will not be presented to any other university, for a similar or any other degree award.

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Signature

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Date

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ABSTRACT

This study aimed at assessing on how integrating ICT into students' own learning could improve their performance. The study was guided by three specific objectives which were; to compare differences in learning effectiveness between traditional lecture method and simulation, to compare differences in learning effectiveness between traditional lecture method and internet search, and to investigate on the teachers' effectiveness in integrating ICT in secondary schools in Tanzania. The study employed quantitative approach and employed experimental design of which four learning groups with different learning methods were assessed so as to determine which would be a better learning method. These groups used lecture, handout, online search and simulation, the fourth one was the control group. Random sampling method was used to obtain the sample from the targeted population of more than 190,000 of which a total of 180 form two students were randomly selected. The data was collected using pre and post test questions and analyzed quantitatively by using samples t-test. Results showed that ICT enriched learning was more effective compared to lectures, Again simulation group performed better than lecture/audio group For the third objective it was revealed that, simulation Group was more effective for learning than lecture group. The study recommends that the teaching and learning process must be focused on students' constructing the knowledge and understanding the concepts taught. Also, whenever possible ICT should be integrated so as to enhance students learning.

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CHAPTER ONE

BACKGROUND AND STATEMENT OF THE PROBLEM

1.1 Introduction

This chapter presents the background to the problem and the effectiveness of ICT (Information and Communication Technology) integration in students' learning in government secondary schools in Dar es Salaam, Tanzania. As well as covering the statement of the problem, objective of the study, Research questions, significance of the study, scope of the study, limitations and delimitations and conceptual framework of the study.

1.2 Background to the Problem

Education either formal or informal system has major contribution to human development through knowledge and skills with which individuals IQ equipped to become effective members in the society (Ishumi, 2006). In developed countries ICT has been integrated in teaching and learning since the 1980s, yet in developing countries like Tanzania integration of ICT in teaching and learning process is skillfully planned on papers but not implemented, despite its benefits.

Integrating ICT in learning at secondary school level motivates students hence enable them collaborate, be responsible and personalize their own learning. It can also contribute into knowledge production, information and communication sharing among the learners, which will improve the outcome and make the students confident citizens. ICT integration includes multimedia delivery using CD-ROMS, web based courses, E-Books, Simulation and video clips as well as PowerPoint presentations.

Information and Communication Technology has been cited as encompassing potential innovations within organizations by enabling the use and sharing of information. The benefits of ICT in organizations include the potential to reshape and reformulate organizations internally and their interactions with other organizations and individuals within the networks in which they lay (Burt and Taylor, 2000). Networks also offer to corporations the opportunity to engage in organizational learning and knowledge management (Castells, 1996) due to the ability to store, retrieve, calculate, and reformulate information (McLoughlin, 1999).

The government of Tanzania under the ministry of education has developed an ICT-Information and Communication Technology policy for basic education of which incorporate the integration of ICT in pre-primary, primary, secondary and teacher education. Some schools across the country use ICT without a formal setting of the policy framework, even in these schools ICT is mostly used in the administration. The world today is in a dynamic information age where ICT impacts all areas of our lives be it, productivity and innovation, modernization of public services, database management leading to decision making and problem solving, approaches into teaching and learning, as well as globalization and communication. It was against this background that this study was conducted to establish “The Effectiveness of ICT Integration in Students’ Learning in Government Secondary School in Dar Es Salaam, Tanzania.”

1.3 Statement of the Problem

With increasing global economic competition, education becomes an important source of competitive advantage. It is closely linked to economic growth and a way

for countries to attract jobs and investments. As the pace of technological change quickens, education offers a way to improve and update skills including the capabilities of the workforce.

Integrating ICT as a way of learning in government secondary schools in Dar es Salaam, Tanzania cannot be overlooked due to the fact that ICT has advantages associated with it including easy work presentations, easy information access and easy monitoring and evaluation among others (Mbatia, 2014). Lack of integrating ICT in students learning limit students from exploring their own learning by using variety of online resources as well as simulations of which equip students to be open minded, knowledgeable, creative, reflecting and lifelong learners.

While some countries have reported high use of ICT integration in learning at schools, the proportion remains substantially low in Tanzania despite the currently huge amounts invested in ICT (Nyirenda, 2013). Additionally, training programs in ICT for the education management sector have been necessary since the rapid change in ICT demands continuous professional training (MoEVT, 2010). Despite these facts, most secondary school have not yet integrated ICT into secondary school learning of which contributes into poor performance. The research sets to find out the effectiveness of ICT integration in students' learning in government secondary school in Dar es Salaam, Tanzania.

1.4 The Objective of the Study

1.4.1 Main Objective of the Study

The purpose of this study is to investigate the effectiveness in learning by integrating

ICT in students' learning in government secondary schools in Dar es Salaam, Tanzania.

1.4.2 Specific Objective of the Study

This study is guided by the following three objectives:

1. To compare differences in learning effectiveness between traditional lecture/audio method and Simulation.
2. To compare differences in learning effectiveness between traditional lecture/audio method and internet search.
3. To investigate on the teachers effectiveness in integrating ICT in secondary schools Tanzania.

1.5 Research Questions

1. What are the differences in learning effectiveness between traditional lecture/audio method and simulation ways that government secondary school students in Dar es Salaam could use to learn?
2. What are the differences in learning effectiveness between traditional lecture/audio method and internet search ways of learning for government secondary school students in Dar es Salaam?
3. To what extent is integrating ICT enriched in students learning in government secondary school in Dar es Salaam effective?

1.6 Hypotheses of the Study

In view of the above objectives, this study was guided by the following hypotheses regarding integration of ICT in students own learning.

1. There is a significant difference in learning effectiveness between traditional lecture/audio method and Simulation.
2. There is a significant difference in learning effectiveness between traditional lecture/audio method and internet search.
3. Pamphlets are more effective in learning than traditional lecture/audio method.
4. The effectiveness of integrating ICT enriched in students learning in government secondary schools, Tanzania.

1.7 Significance of the Study

The study intends to investigate the effectiveness of ICT integration in students' learning in government secondary school in Dar es Salaam, Tanzania. The findings may create awareness to education stake holders on the effectiveness of ICT integrating as a way of learning in government secondary schools in Dar es Salaam, Tanzania. Secondly, the findings obtained from this study will bring in some insight to the existing scholarly research and body of knowledge that researchers and students in related field may find useful. It will also enhance greater efficiency throughout the school by providing higher quality lessons through ICT integration and collaboration between learners and teachers in planning, preparing and designing teaching and learning material. Thirdly, study findings are of great importance to educational planners, policy makers and administrators towards improving education standards for the betterment of the socio economic development of the country.

1.8 Scope of the Study

Selected government secondary schools in Dar es Salaam formed the target population as: the area is easily accessible; it is an urban district; ICT facilities almost everywhere you go and of course being urban schools one would expect a great deal of ICT integration in students learning but technology is rarely used in these schools due to lack of infrastructure, learning knowledge, poor network connections and poor availability of stable electricity.

1.9 Limitations and Delimitations of the Study

This study was expected to cover fewer schools than planned due to limited time. In addition to that the study findings were different from one school to the other, as not all schools face the same problems related to ICT integration. However a study survey was used to describe the large population. Furthermore it was assumed that the large sample would make the results statistically significant.

1.10 Conceptual Framework for Investigating the Integration of ICT in Student Learning

A conceptual framework is the structure that can hold or support a theory of a research or study. The conceptual frame work for this study represents the context – input – processing – output model.

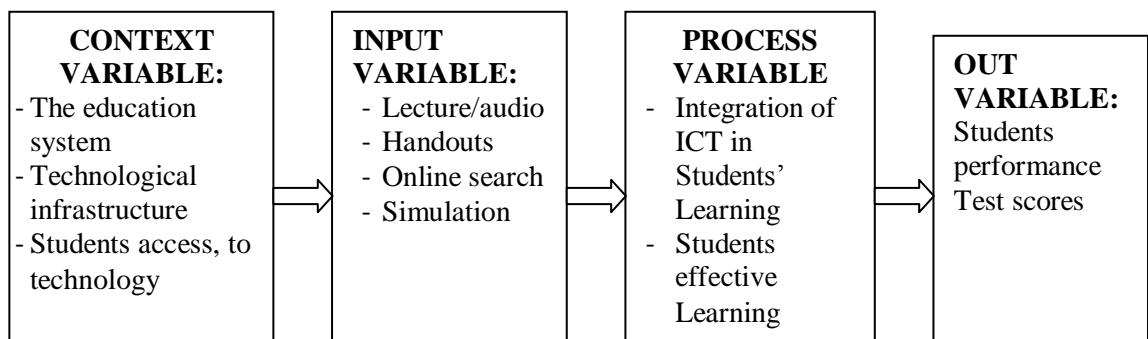


Figure 1.1: Conceptual Framework

Source: Designed by Researcher

1.10.1 Contextual Variables

Tanzanian government has policies and plans of integrating ICT in secondary schools pedagogy but the implementation is facing a lot of challenges. There is a socioeconomic variable which hinder the integration of ICT in government secondary schools in Dar es Salaam and Tanzania as a whole. Both the dependent as well as independent variables are affected by the contextual variables. For instance, Tanzania's National ICT Policy (2003) believes that information and communication technology (ICT) can offers new opportunities to enhance education and improve the quality of delivery of education in all areas.

In addition to that the Ministry of Education and Vocational Training (MoEVT), in collaboration with the Swedish International Development Cooperation (SIDA), and other stakeholders agrees that applying ICT to empower education, and learning about ICT in schools, is an asset to overcome the challenges facing the education sector (Secondary Education Development Plan (SEDP), 2009).

1.10.2 Input Variables

Input variables are the independent variables involved into enhancing student learning such as simulation, lecture or audio, handout and pamphlets and online search. Every person has a different way of which they learn better. Depending of

the input variable used, learning can be very effective. Students are highly motivated by simulation that is learning through multimedia a combination of text, graphics, sound, video and animation. Simulation imitates real life situation by using computer models of which make concepts easier to understand.

1.10.3 The Process Variables

The choice of learning style model and the availability of learning material in that form are the process variables as they can affect the connection between the independent and the dependent variables. The student might wish to use simulation in order to learn about moles and molecules in chemistry. For the student to be able to do this there must be a computer as well as the simulator, otherwise there will be no learning.

1.10.4. Output Variable

Output variables are the dependent variables. The output fully depend on the input and the process. In this study learning by using simulation turn to produce the best outcome followed by learning by using online search. If government schools are well equipped with the facilities required there would be good performance from the students.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter is organized into three Sections. Section one consists of theoretical review, section two consist of empirical literature and section 3 consist of synthesis and the gap.

2.1.1 Theoretical Review

This study was guided by the theory of Constructivism. The theory was propounded by Jean Piaget which states that learning is an active, contextualized process of constructing knowledge rather than acquiring it. Knowledge is constructed based on personal experiences and hypotheses of the environment. The objectives are: First to encourage knowledge formation. The second objective is to encourage metacognitive processes for judging, organizing and acquiring information. To be more technical constructivism believes that knowledge is viewed as symbolic mental constructs in the learner's mind and the learning process is the means by which these symbolic representations are stored as memory.

Constructivism suggests that learners create knowledge as they try to understand their experiences (Driscoll, 2000). They scrutiny knowledge as external to the learner and the learning process as the act of internalizing knowledge. While Constructivism assumes that learners are not empty vessels to be filled with

knowledge. Instead, learners are actively attempting to create meaning. Learners often select and pursue their own learning. Constructivist principles acknowledge that real-life learning is messy and complex. Classrooms which imitate the “uncertainty” of this learning will be more effective in preparing learners for life-long learning.

The assumptions and objectives are related to my study because integrating ICT in students learning encourages personal interest, it is an active learning, it encourages critical thinking and also stimulates background knowledge which leads into personal meaning. From Constructivism theory of learning it is evident that emphasis is placed on the learner rather than the teacher. The constructivist approach to teaching and learning is based on a combination of a subset of research within cognitive psychology and a subset of research within social psychology. Constructivism is a learning theory found in psychology which explains how people might acquire knowledge and learn. The theory suggests that humans construct knowledge and meaning from their experiences. This theory is direct related to my study as integrating ICT in student learning lead them into acquiring more knowledge hence improve their skills in that subject area.

Effective use of ICT for teaching and learning in schools and universities is not widespread, even though the technology is now almost ubiquitous. Some teachers and lectures have been able to integrate ICT use into their teaching, and more importantly engage students in making use of ICT as part of the process of learning.

However there are still many barriers and impediments in the way of ICT becoming an integral part of teaching and learning.

Most classroom teachers are interested to know what and how their students learn. In pre-service teacher education programs students study philosophical and psychological issues relating to knowledge and learning. In general none of these theories and the educational issues they raise are discussed by students in the context of learning technologies in the classroom. Over the three decades computers have been entering classrooms, educational theories have moved from behaviourism to cognitivism and then to constructivism. Underlying many of the theories is the concept of learners as individuals who have specific personal needs while at the same time requiring social contact with peers and others.

In much of his work Papert (1980, 1993) argued for the dual concepts of exploratory learning together with appropriate computer software and of learners being epistemologists that are being aware of their personal learning preferences and idiosyncrasies. Reports arising from the early Logo research encouraged teachers to explore a wide range of interactions between themselves, their students, and computers. Piagetian theories of developmental stages in children, and constructivism have been major influences on teachers using Logo and other exploratory or conjectural software. Often the alternative educational pathways sought by these teachers and researchers have led to learning environments that are more informal than traditional classrooms. Developing ICT applications for classroom use has given teachers a motive for focusing on issues such as whether

children are novice learners, developing adults who just perform less ably than adults, or effective learners who have informally learned a natural language, a collection of motor and social skills, and a range of concepts about the world around them.

Wolf (1988) writes that the core of Piagetian theories of cognitive development is a view of knowledge constructed through interaction (Wolf, 1988). There are two aspects of Piagetian interaction. The first relates to domain knowledge, and concerns the acquisition of knowledge through a simultaneous combination of actions and experiments with concrete materials and thinking about those materials. The other aspect of Piagetian interaction is characterized by its social nature. It arises from a trading of thoughts, feelings and strategies between groups of learners, between teachers and learners, and through a process of self reflection. Learning in a computer-based medium requires both "provocative encounters" with the basic structure of particular knowledge (domain knowledge), and equally stimulating encounters with the thoughts of others (social interchanges).

For many years teachers have used parts of Bloom's Taxonomy of Educational Objectives as a guide to asking questions that are cognitively challenging. Recently the taxonomy has been revised in the light of current educational thinking. Pohl (2000) is one of many educators who have applied the revised taxonomy to educational uses of ICT. Beginning teachers have always had trouble asking questions and setting tasks at appropriate levels for students.

Gardner's theory of multiple intelligences is used in many schools to cater for intellectual areas of strength and to bolster any less developed areas. By allowing students to use content-free software (for example word processors, spreadsheets, draw and paint programs, e-mail, Hyper Studio, Micro Worlds, Inspiration, PowerPoint) teachers can develop activities to enrich many of the multiple intelligences. However some of the intelligences, such as musical and bodily-kinesthetic, might require some additional hardware software for learners who have skills in these areas.

Problem solving strategies and systematic methods for thinking are also used in primary and secondary schools. Many schools make effective use of models such as De Bono's "thinking hats" and "lateral thinking", and have integrated them into classroom ICT use. In a technology context, all of the software types mentioned offer opportunities for problem solving. Some are better than others in specific subject areas, for example spreadsheets and Microsoft word have many applications in mathematics classes.

2.2 Styles of Learning

There are several learning style models that can be used in secondary schools. There are those who learn by visualizing (spacial) they prefer using pictures, images and special understanding. There are those who learn by listening Aural (auditory – musical) they prefer using sound and music. There are those who learn by doing physical (kinesthetic) activities, they prefer using their body, hands and sense of touch. And there are those who are verbal (linguistic) who prefer using words, both

in speech and writing. For students to perform better educators must be able to guide individual students into identifying the learning style model that suit them the best. Educators have identified seven different styles of learning which include visual, verbal, aural, physical, logical, solitary and social. Research has shown that the most effective study comes from blending different learning style models together.

2.3 Instructional Materials

There are several types of learning materials which include lecture/audios, handouts, online research/resources and simulation that could be used by secondary school students so as to improve the understanding of the content and hence improve their performance.

2.3.1 Audio Style of Learning

This is one of the common methods of passing information to learners in most education institutions in Tanzania including secondary school where a teacher or a lecturer will narrate a topic by speaking and the learners have to effectively use their ears to listen to the lecture/audio. This could be by either listening to audio or a person speaking.

2.3.2 Handouts

Can also be referred to as printed material of which learners could get its information by reading. This is also a very common way of transmitting information between teachers and students and is widely used in most schools in Tanzania from primary level all the way to college level.

2.3.3 Online Search

This is not a very common way of learning. It enables the learner to possess their own learning by searching for materials from the internet. The material obtained in the search is basically multimedia as it includes text, images, sound, video and animations. People learn better from words and descriptive pictures of which online search provides all these and more. Very few Tanzanian secondary school learners use this style as one requires to have the infrastructure that would enable them learn.

2.3.4 Simulation

Simulation is an imitation of a situation or process. Computer simulations give the user an experience of a real life situation by combining computer models of the universe with realistic input and output devices with realistic graphics including videos. It is generating a system similar to the one that exists on earth for the purpose of studying or learning its behavior. People tend to learn better from animation, narration and participation than from animation and on-screen text only.

2.3.5 Videos

Videos are recorded images in motion usually demonstrating something. Videos can cooperate narrative and captions that contribute a lot into easy learning. A good thing with videos is that you can replay as many times as you want so as to learn a concept.

2.4 The Concept of Integrating ICT in Students Learning

Education systems can not overlook the importance of Information and Communication technology (ICT) for improved teaching, learning and performance.

In this technology era the world is interconnected providing communication, knowledge and information of which has become the most important aspect for the development of any society. Learners can prosper through the integration and implementation of ICT into their learning process.

2.4.1 Integrating ICT in Students Learning in the Global Context

Globally integrating ICT in teaching and learning is mandatory. There are so many online resources for example that students can learn from. Pedagogically ICT can contribute a great deal to improve the quality of education by providing rich, exciting and motivating and new environments for learning. Some research finding by (Mikre, 2011) shows that students who use computer tutorials in mathematics, natural science and social science score significantly higher on tests in these subjects. He further says Students who used simulation software in science also scored higher.

2.4.2 Integrating ICT in Student Learning in African Countries

There is no doubt that technology ICT has brought with it significant positive changes in all areas of our lives be it communication, education, business, agriculture, transportation, medical health and other governmental institutions. Integrating ICT in students learning will equip them with the knowledge required for them to confidently succeed. African countries wish to implement and integrate ICT into students' learning but they face various challenges such as economical, social constrains as well as lack of knowledge leading to poor infrastructure.

2.4.3 Integrating ICT in Students Learning in Tanzania

In 1996 the government of Tanzania developed the Educational Sector Development Programme (ESDP) to address existing problems and new challenges. One of the ESDP objectives was to improve professional development through online tools and resources, provide teaching and learning materials in multimedia format, share information among student – teachers and tutors, facilitate collaborative learning individualization of learning.

2.5 Empirical Literature

2.5.1 Learning Effectiveness in Traditional Lecture/ Method and Simulation

At many large colleges and Universities the lecture still seems to be the centrepiece of instruction, where students passively absorb pre-processed information. Such an environment provides incentives to learn only at the surface (passive) level rather than at the deep (active) level (Marton & Saljo, 1976). According to Jaques (1992), the traditional format encourages students to concentrate on superficial indicators rather than on fundamental underlying principles, thus neglecting deep (active) learning. Active learning refers to "experiences in which students are thinking about the subject matter" as they interact with the instructor and each other (McKeachie, 1999, p. 44; Gamson, 1991).

The effectiveness of active learning which included simulation versus traditional learning which included lecture and audio method implied that simulation was more superior to lecture/audio method. It was suggested that a variety of collaborative classroom activities, ranging from long-term simulations to five-minute cooperative problem solving exercises (Bonwell & Eison, 1991; Sutherland & Bonwell, 1996). Rather than facilitating the memorization of large quantities of information, activities

like these stimulate inquiry and interest as students acquire knowledge and skills (Sheckley, 1989, p. 278, cited in Montgomery, Brown, & Deery, 1997, p. 219). Active learning techniques yield many benefits—they are student-centred; they maximize participation; they are highly motivational; and they give life and immediacy to the subject matter by encouraging students to move beyond a superficial, fact-based approach to the material (Bonwell & Eison, 1991; Ladousse, 1987; McKeachie, 1999; Schaftel & Schaftel, 1976; Van Ments, 1994).

2.5.2 Learning Effectiveness in Traditional Lecture/Audio Method Versus Online Search

For many years, educators have been exploring ways to combine theories of differing learning styles and student-constructed knowledge with the theory of practice-centered learning. Instead of being passive recipients of knowledge, they now consider students capable of constructing their own knowledge with guidance from the teacher. Online resources offer tutorial guidance by setting up an environment that provides the students with the resources necessary for independent exploration. In using emerging computer-based technology as a resource, students are encouraged to explore their own interests and to become active educational workers, with opportunities to solve some authentic problem (Berge, 1993).

2.5.3 Learning Effectiveness in Traditional Lecture/Audio Method versus Handouts

A research was done at the University of California in stress management course classes. It was an experimental research with two study groups which were Hybrid and Online sections. Students enrolled in hybrid sections were (n=94), they received

face-to-face interaction lecture with the instructor, audio/visual recordings, and text-based recordings. Students in the fully online sections (n=339) received lectures via audio/visual recordings and text-based recordings. The same instructor taught both sections. Students were asked to rate lecture quality for all formats in which they received them, and were asked which lecture format they liked best.

Results revealed that significant differences were found among both students' perception and preference for lecture format. Online students rated the quality of the audio/visual recorded lectures the best and they preferred the audio/visual recorded lectures more than the text-based lectures. Hybrid students rated the quality of the classroom lectures the best but preferred the audio/visual recorded lectures. (Gabe, 2008)

The use of ICT in the classroom is very important for providing opportunities for students to learn to operate in an information age. Studying the integration of ICT in students' learning may assist educators to equip learners with technological skills so as to enable them personalize their own learning. Since confidence, competence and accessibility have been found to be the critical components of technology integration in schools, ICT resources including software and hardware, effective professional development, sufficient time, and technical support need to be provided to teachers. No one component in itself is sufficient to provide good teaching. However, the presence of all components increases the possibility of excellent integration of ICT in learning and teaching opportunities. (Bingimlas, 2009)

Dawes (2001) is of the view that new technologies have the potential to support education across the curriculum and provide opportunities for effective communication between teachers and students in ways that have not been possible before. ICT in education has the potential to be influential in bringing about changes in ways of teaching as well as learning. However, this potential may not easily be realised, as (L. Dawes, 2001) underlined when he stated that “problems arise when teachers are expected to implement changes in what may well be adverse circumstances” (p. 61). Due to ICT’s importance in society and possibly in the future of education, identifying the possible obstacles to the integration of these technologies in schools would be an important step in improving the quality of teaching and learning.

While new technologies can help teachers enhance their pedagogical practice, they can also assist students in their learning. According to (Grabe, 2007), technologies can play a role in student skills, motivation, and knowledge. They claim that ICT can be used to present information to students and help them complete learning tasks. According to Becta (2003) five factors influence the likelihood that good ICT learning opportunities will develop in schools: ICT resourcing, ICT leadership, ICT teaching, school leadership, and general teaching. Also indicated that the success of the integration of new technology into education varies from curriculum to curriculum, place to place, and class to class, depending on the ways in which it is applied (Becta , 2003).

Although ICT has several definitions depending on the nature of its use, in this case ICT is used as an umbrella term that includes any communication device or

application, encompassing: radio, television, mobile phones, computer network hardware and software, satellite systems, as well as the various services and applications associated with them, such as videoconferencing and distance learning (Becta , 2003). We refer to ICT in the particular context of ICT provision, policy and teacher factors that variously support teaching, learning and a range of activities in education.

It has been argued that ICT is a principal driver of economic development and social change worldwide (Kozma, 2005) and (Leach, 2008). In many countries, the need for economic and social development is used to justify investments in educational reform and in educational ICT. Another notable argument to this effect is by (Kelles-Viitanen, 2003) who referring to developing countries in general, commented that ICT plays a major role in all aspects of national life: in politics, in economic life, as well as in social and cultural development. She further argued that ICT is rapidly transforming the way people do business, access information and services, communicate with each other and even entertain themselves. The UN ECOSOC Ministerial Declaration (2000) provided special attention to the application of ICT for development, for which urgent and concerted actions at the national, regional and international levels have been suggested. A Microsoft Corporation (2007) report on its ICT initiatives in Africa acknowledged that technology alone does not drive development but enables it. In the report, while noting that 300 million Africans live on less than \$1 per day, it is asserted that:

ICTs offer special opportunities to stimulate growth and increase innovation in every local setting, thereby enabling individuals and institutions to interact more productively with the global economy and the wider world. . . . But to realize their potential, technologies must be part of a mix of productive changes and supporting capabilities. Resources must be matched by resourcefulness – combined with other initiatives by local leaders, educators and entrepreneurs to achieve individual and institutional objectives. “ICT4Development” is therefore an effort to distinguish the most constructive opportunities to apply technologies for growth and poverty reduction (Microsoft Corporation, 2007).

This calls for a well-formulated and implemented national strategy and policy to avail the necessary resources. Such strategy would match ICT opportunities with resourcefulness of different players and stakeholders into meaningful national and social development. The five countries comprising the East African Community, namely Burundi, Kenya, Rwanda, Tanzania and Uganda, have each formulated national policies to guide such implementation. This section traces the ICT in education policy via its formulation process in East Africa by fleshing out the main milestones and highlighting key thrusts of the policies as they relate to ICT use for teaching and learning in primary and secondary schools, for each of the countries.

This final reason for policy formation in Kenya could be equated to Tanzania’s where the need to develop an ICT policy led to the formation of a grouping called the eThinkTank, a forum supported by the United Nations Development Program (UNDP). As reported in the ICT survey report by Twaakyondo et al. (2002, p. 5), the

eThinkTank's stated objective was to "present the public and Government with ideas and suggestions to help the transition of the country into the information age". According to the report, one important objective of the eThinkTank was to help harmonise the current ICT Policy and regulatory environment with that of neighbouring states and partner countries.

The consultative process culminated in the formulation of the national ICT policy in 2003. The policy aims at expanding and developing the teaching of ICT at all formal and informal levels of the national education system and using ICT to improve the quality of education and training in all areas including distance learning. The policy proposes to develop and deploy a nationwide e-education system that interconnects schools and higher education/training facilities across the country with each other. (Tanzania Ministry of Communications and Transport, 2003, pp.13-14).

2.6 Synthesis of the Review

The review of literature in this chapter shows that integrating ICT in students own learning is considered as mind tools when students use them as cognitive tools to learn. That is, where students are actively involved in constructing their knowledge using the application that facilitates engaging them in and many thinking tasks. Fisseha explained: For instance, using data Research shows that investments in ICT for enhancing formal and non-formal education systems are essential for schools overall improvement (Tong &Trinidad, 2010).

The Tanzanian overall ICT policy mission is to enhance national economic growth and social progress through ICT in all sectors as seen in the National ICT Policy

(Tanzania. Ministry of Communications and Transport, 2003). This policy recognised the potential for ICT to offer new opportunities to enhance education and to improve the quality of education in all areas. The Tanzania Ministry of Education having acknowledged this importance of ICT, presided over the formulation of a more specific policy to guide the integration of ICT in basic education (MoEVT, 2007). This policy was directed at achieving those aims of Tanzania's education policies and education development programmes which emphasise the acquisition and appropriate use of literary, social, scientific, vocational, technological, professional and other forms of knowledge, skills and understanding for the development and improvement of society.

But due to poor infrastructure the implementation of these policies is deteriorating. There is a huge gap between those who have access to ICT and those who do not. As for the secondary schools, the majority of government secondary schools do not have access to ICT while almost all private schools offer ICT as a subject. In most cases traditional lecture/audio is one way communication or learning method it is mostly teacher centred than student centred. While Simulation is a method that uses a computer to simulate or imitate real life situations, this facilitates various hands-on application and experiences for students. Simulation is more students centred.

According to a business journal by (Mancuso, 1975) a study was done at Xavier University of Louisiana, where BROADEC a computer simulation game designed for application in marketing, broadcast economics, or management courses where the participants make managerial decisions based on the parameters of the game was used. Game participants are divided into three groups called organizations. An

organization is defined as a broadcasting station competing against two other stations in one broadcast operation. The New Orleans, Louisiana, market is similar to the market described in BROADEC.

The results of the study indicated that four of the five hypotheses were accepted. No significant difference occurred when the grades of -the lecture/audio-case study section were compared to the lecture/audio-computer simulation section. The mid-term test probability of .9593, as compared to the final examination probability of .2428. The mean grades were basically the same for the mid-term test; however, the students in the lecture/audio-computer simulation class had a higher mean grade than the students in the lecture/audio-case study class.

The median score of each test for the lecture/audio- case study section and the lecture/audio computer simulation section. A survey of the medians reveals that the lecture/audio-computer simulation class had the higher medians when compared to the other section. (Mancuso, 1975). Simulation based learning was used in nursing education at the school of Nursing and Midwifery, Monash University, Churchill, Victoria, Australia. The study was to review the quantitative evidence for medium to high fidelity simulation (HFS) using manikins in nursing, in comparison to other educational strategies. Twelve studies using experimental or quasi experimental designs were included in the study. All 12 studies reported statistical improvements in knowledge, skill, critical thinking ability and confidence after the simulation education, indicating that simulation is an effective method of teaching and learning.

Assessments to demonstrate statistically significant gains over and above the comparator learning method were mixed. Six of 12 studies demonstrated additional gains in knowledge, critical thinking ability, satisfaction or confidence compared with the control group. Tests for between-group differences quantified these gains as ranging from 7 to 11 percentage points (Robyn P. Cant & Simon J. Cooper, 2009). The available evidence supports the notion that medium HFS using manikins is an effective teaching and learning method where best practice guidelines are adhered to.

However, there is no direct link between the use of ICT and a positive impact on student outcomes, “unless” ICT are used effectively (Becta , 2003). ICT has to be used in an effective way; otherwise, it may be a waste of time (Romeo, 2006). For example, according to Leach and Moon (2000) using computers only for word processing or presentations, does not indicate the “effective” implementation of computers. It is agreed that ICT should not solely be used for replicating existing practices (Leu, Jr., Kinzer, Coiro, &Cammack, 2004; NCTE, 2008; Stolle, 2008). For instance, using digital presentations rather than a chalkboard for presenting notes. Dockstader (1999) argued what is considered to be “not” ICT implementation: Implementation is not substituting 30 minutes of reading for 30 minutes of computer skill development.

It is, however, using computers to teach 30 minutes of reading. Implementation is not providing application software like electronic encyclopaedias, spreadsheets, databases, etc. without a purpose. It is not pre-packaged programs that are often unrelated activities clustered around a particular topic that address few higher concepts or goals. Nor is it teacher created programs that cover special interests

and/or technical expertise but do not fit content-area curriculum. Defining what technology implementation is and is not is the first step in deciding how to integrate it into the classroom.

2.7 Knowledge Gap

There is a huge gap between those who have access to technology and those who do not have. There should be equality of access to technology by young Tanzanians so that we all together can celebrate the benefits of technology. Also we need to consider the social and ethical issues of different IT system available in our country. However the above study does not show how Simulation as a method of learning can help learners construct knowledge. This study is intended to cover this gap.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter is divided into several sections been the study area, study approach, population sample and data collection procedures and analysis.

3.2 Study Area

The study was conducted in Dar es Salaam where by students as the main stakeholders were randomly selected. Dar es Salaam is located between Latitudes 6.36 degrees and 7.0 degrees to the South of Equator and Longitudes 39.0 and 33.33 to the East of Greenwich. It is the largest city in East Africa with a population of

4,364,541 as per the official 2012 census, as well as a regionally important economic centre. It is located on the Swahili coast covering an area of 1,590 km². It is divided into three districts namely Ilala, Kinondoni and Temeke as shown on the map below. Dar es Salaam is bordered by Indian Ocean on the East, Pwani region to the west, Mpigi River to the north and Mzinga River in the South.



Figure 3.1: A Map of Dar es Salaam.

Source: <http://coastalforests.tfcg.org/images/map-dar.gif>

3.3 Study Approach

To meet the objectives of this study, the study adopted quantitative approach as it is interpretive and It can be used to quantify attitudes, opinions, behaviors, and other defined variables. In this study, therefore, quantitative data was collected through experimental method.

3.4 Study Design

Research design is defined as the compasses of the methodology and procedure employed to conduct scientific research. It is a set of methods and procedures used in collecting and analyzing measures of the variables specified in the research problem. The appropriate research design selected for tackling the research problem is causal

experimental research design. This means that the researcher lays out how he or she will control one of more independent variables and measure their effect on the dependent variable. In this research data was collected by using experimental design which is not biased and does not consume time.

For this study experimental methodology was used of which provided quantitative description of learning by experimenting a sample of the population. According to Smith, Thorpe, and Lowe (2002) the main purpose of a survey design is to obtain information from a defined set of people so as to generalize the sample results to the population. The comparative survey design is, therefore, selected because the researcher wants to ascertain the most influential way of learning. The design is also selected because it enables the researcher to experiment scientifically. Documentary review was carried out at data analysis stage; the researcher compared the information with quantitative results from the experiment.

3.5 Sampling Procedures

For the purpose of this study random sampling method was used. For this reason students of similar age group and education background were randomly selected from the schools.

3.6 The Population and Sample Size

The targeted population for this study include all the government secondary school students, in Dar es Salaam region who are more than 190,000 of which 50,393 are form two students. A total of 180 Form two students, a mixture of both boys and girls were randomly selected in the sample.

3.7 Data collection Methods

The studies employed two different sources for data collection, namely secondary and primary sources. While secondary data was obtained through various ways including library books and Internet documents, primary data was obtained by means of experimental study. These sources were employed because of the fact that they are complimentary to each other and for triangulation purpose (Kothari, 1999). Primary resources give us first hand information while secondary resources give a light of what studies were done earlier on giving a strong background to the study. It is for these reasons that the study used both data collection methods.

3.7.1 Sources of Secondary Data

Secondary sources was used to collect information relevant to the research topic. Literature reviews also helped the researcher obtain required data. Sources of secondary data included books, journals and other publications, different articles and other electronic media with related information.

3.7.2 Primary Data

Primary data are data collected for the first time (Kothari, 1999) using experimental method the main data collection instruments. The students were randomly sampled; they were divided into four groups. One group used lecture/audio method, the second group issued with handouts to read from, the third group used simulation method of learning and the fourth group searched using internet.

3.8 Research Instruments

Research instruments were used based on the objectives effectiveness of the learning style used. Two types of instruments were involved in the study namely multiple

choice and matching items. The same written test was given to the four groups at the same time after giving them ample time to learn so as to determine which method is better. The test was comprised of both matching items and multiple choice questions. There was a pre test on the topic then the samples were divided into four different groups where the topic was learned using four different ways such as simulation, lecture/audio, internet search/resources and handouts. After the allocated time the sampled group were tested again that is post test so as to determine the results. Thus, the experiment was focused on the four different groups of respondents that are simulation, lecture/audio, internet search/resources and handouts.

3.8.1 Matching Items

Matching item questions consists of two sides the question side and the answers side. The candidate needs to match the question with the most correct answer by writing the corresponding later against the question. Ten matching item questions were tested covering the content studied. The full test is provided in appendix II.

3.8.2 Multiple

Multiple choice questions are question designed in such a way that a question has several options as answers to choose from. Ten questions were given testing the entire content studied. Appendix II shows the test.

3.9 Experimental Groups

An experiment is a procedure carried out to support, refute or validate a hypothesis. Experiments provide insight into cause and effect by demonstrating what outcome occurs when a particular factor is manipulated. Experiments vary greatly in goal and scale, but always rely on repeatable procedure and logical analysis of the results. For

this study a Solomon group experiment design was used there were four different groups, all the groups took a pre-test then each group used a different learning method and there after a post- test was given so as to determine which method is better.

Table 3.1: Experimental and Control Groups

Group	Participants	Treatment	Learning Method/Style
Group 1	45	Lecture/audio	Listened to the lecture/audio
Group 2	45	Handouts	Read plain printed text
Group 3	45	Online Search	Used websites to search on the given topic to learn from.
Group 4	45	Simulation ICT – enriched	Used video, audio and presentations to learn.

3.9.1 Lecture/audio Experimental group

This group was lecture/audio for 40minutes of which they had to listen to the lecture/audio and they were given a test after the lecture/audio so as to get the knowledge gained by the learners.

3.9.2 Handouts Experimental Group

This group was provided with handouts of which they read the information from the handouts for 40 minutes followed by a test aiming at finding out how much the students gained from the reading.

3.9.3 Online search Experimental group

This group had an opportunity of searching from the internet for 40 minutes. They were given relevant websites which would help them get the information required then sat for a test to determine how much was obtained from the search.

3.9.4 Simulation Experimental Group

The fourth group had the opportunity to learn through a mixture on video, simulation and a PowerPoint presentation for 40 minutes then did a test.

3.10 Validation of instruments

The quality of data gathered depended on validity of instruments and procedures, which measure what is supposed to be measured i.e. concepts and meanings (Kothari, 2002). In this study, all instruments for data collection were subject to content analysis. It involved experimenting different methods or ways of learning aiming at refining the instruments in terms of relevance, consistence and reliability.

3.11 The Pilot Study

There was a pilot study to test the experiment. Unlike a descriptive study, an experiment is a study in which a treatment, procedure, or program is intentionally introduced and a result or outcome is observed. Therefore a pilot study was conducted so as to eliminate possible errors in the main experimental research.

3.12 Cleaning data

A true experiment have four elements; manipulation, control, random assignment and random selection. This experiment research involved the manipulation of an independent variable and the measurement of a dependent variable.

3.13 Coding of data

The purpose of coding data was to enable people other than the researcher to know the responses to the questions posed. In other words even the open-ended answers were turned into numerical categories. The data frequencies were produced using Statistical Package of Social Science (SPSS) analysis.

3.14 Data processing and analysis

Quantitative information from the observation and experiments was analyzed and described quantitatively to involve percentages and ratios.

CHAPTER FOUR

DATA ANALYSIS AND PRESENTATION

4.1 Introduction

The purpose of this study was to investigate the effectiveness in learning by integrating ICT in students' learning in government secondary schools in Dar es Salaam, Tanzania. Integrating ICT can enhance learning but depending on what learning strategy is used students might not grasp what they learn. Four different

way of learning were used which are lecture/audio, online resources, printed handout and Simulation presentation to learn which was done after the pre tests.

4.2 Data Analysis Procedure

A pre test was given to evaluate the objectives of the study which based on the effectiveness of students learning through traditional lecture/audio and notes taking compared to learning through simulation of which is ICT enriched which included online research/resources, video and simulation. 180 Form two students were randomly selected and used for this study. Out of which 80 were boys and 68 girls. There were four experimental groups which were lecture/audio, handouts, online research/resources and audio visual simulation where by the participants were randomly placed into the different groups with different learning style model.

Table 4.1: Participants in Different Learning Styles

Learning style model	Participants					
	Male		Female		Total	
	Number	Percentage	Number	Percentage	Number	Percentage
Lecture/audio	24	53	21	47	45	100
Handouts	24	53	21	47	45	100
Online research/resources	24	53	21	47	45	100
Simulation	24	53	21	47	45	100
Total	96	53	84	47	180	100

Source: researcher, 2019

4.3 Pre and Post – Tests Results in the Different Presentations

The 180 students who were involved into the study were evenly distributed into the four experimental groups. That is each group had 45 students involved. The table shows that simulation is the group that performed the best followed by online search.

Table 4.2: Mean Difference between Pre – Test and Post – Tests among the Groups

Group	Treatment	No:	Mean score	Mean difference	Std. deviation
Group 1	Lecture/audio pre- test	45	25.34	12.57	10.89
	Lecture/audio Post-test	45	37.91		14.30
Group 2	Handouts Pre-test	45	28.15	13.05	11.06
	Handouts Post-test	45	41.20		15.87
Group 3	Online search Pre-test	45	39.17	17.89	12.39
	Online search Post-test	45	57.07		14.79
Group 4	Simulation Pre-test	45	43.57	19.27	11.30
	Simulation Post-test	45	62.84		18.90

Source: researcher, 2019

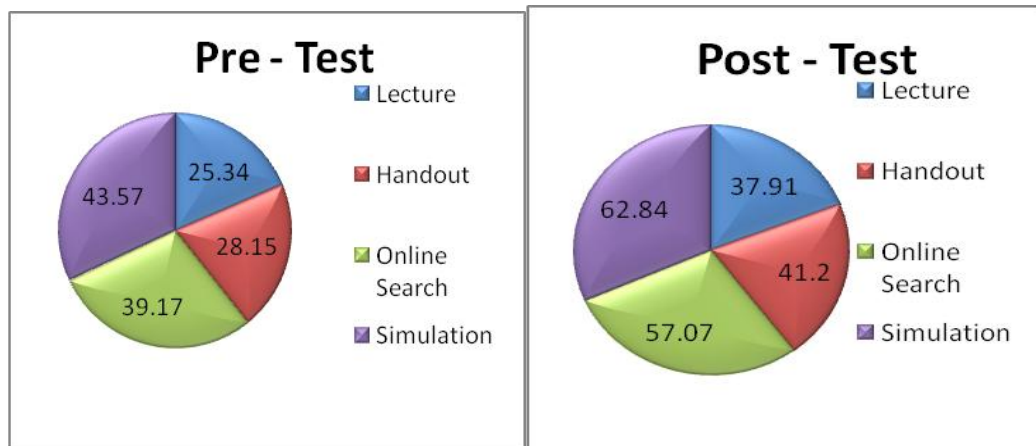


Figure 4.1: Pre-test and Post-Test Mean Scores in Pie Chart

4.4 Testing the Hypotheses of the Study

The study had three objectives and three associated hypothesis that aimed at finding out the effectiveness of students learning using different learning materials and styles.

4.4.1 Objective 1: To Assess the Differences in Learning Effectiveness between Traditional Lecture/audio Method and Simulation

Students' performance in the four different learning style models namely lecture/audio, handouts, online searching/resources and simulation were assessed in order to obtain the most effective method of learning. The four methods used four different styles and it was assumed that simulation would give the best performance at the end of learning. The least performed was expected to be handouts. With a mean score of 37.91 lecture/audio and 62.84 simulation, Simulation has turned out to be superior to lecture/audio due to the fact that simulation is a better quality, it cooperates all sought of media in one go which becomes interesting to learn from.

Simulations engineer information retention into the brain making a learner remember what was learnt for a longer time compared to lecture/audio. Therefore the hypothesis that "there is a considerable difference in learning effectiveness between traditional lecture/audio method and simulation" is accepted as the results show a higher performance in simulation compared to lecture/audio.

Table 4.3: T-Test to Compare Students' Academic Performance of Lecture/Audio and Simulation

Group Statistics										
	Groups	N	Mean	Std. Deviation	Std. Error Mean					
Learning Differences	Lecture/Audio	45	37.91	13.578	2.024					
	Simulation	45	62.84	17.753	2.647					

Performance	t-test for Equality of Means									
	F	Sig.	T	df	Sig. (2-tailed)	N	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Lecture/audio	6.569	.012	-7.483	88	.000	45	-24.933	3.332	-31.555	-18.312
Simulation			-7.483	82.352	.000	45	-24.933	3.332	-31.561	-18.306

Source: researcher, 2019

From the Table 4.3 it is evident that there is a difference in performance between lecture and simulation learning method. Simulation method produces better performance in students learning considering the standard deviation show in the table.

4.4.2 Objective 2: To Assess the Significant Differences in Learning Effectiveness between Traditional Lecture/Audio Method and Internet Search

In this objective the traditional lecture/audio method was compared to online searching. The study assumes that there would be a difference in academic performance between those who learn through lecture/audios and those who learn by conducting online research/resources. In online research/resources different multimedia resources are available to enhance the learning process. There is a huge difference in performance between lecture/audio and online search. From the study results the lecture/audio mean score performance was 37.75 while online search mean score performance was 57.25. Thus the hypothesis that “there is an obvious difference in learning effectiveness between traditional lecture/audio method and

internet search” is accepted as the online search learning style has proved to be more effective than lecture/audio style. (Below is a table 4.4 showing the results).

Table 4.4: T–test to Compare Students’ Academic Performance of Lecture/Audio and Online Research/Resources

Group Statistics					
	Groups	N	Mean	Std. Deviation	Std. Error Mean
Learning Differences	Lecture	45	37.91	13.578	2.024
	Online Resources	45	57.07	14.589	2.175

Performance	t-test for Equality of Means									
	F	Sig.	t	df	Sig. (2-tailed)	N	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Lecture/audio	.633	.428	-6.448	88	.000	45	-19.156	2.971	-25.060	-13.251
Online resources			-6.448	87.550	.000	45	-19.156	2.971	-25.060	-13.251

Source: researcher, 2019

4.4.3Objective 3: To Investigate on the Effectiveness of Integrating ICT Enriched in Students Learning In Government Secondary Schools in Dar es Salaam Tanzania

It is obvious from the test results that students learning through lecture/audios and handouts shows a poor evidence of understanding the concepts in a given time, this was evident in the test performance. By integrating ICT in learning it improves students’ performance.

4.5 The Effectiveness of Chosen Learning Style Model and Student Performance

The learning style used by the learner can contribute a lot into the learners’ performance. The environment the learners are can lead into the learning style the

learner might choose. Students exposed into technology will more likely use technological instruments into their learning of which contributes greatly into good performance. Those with less or no access to technology at all will end up learn through lecture/audios and handouts leading them into very poor performance cause all they do is creaming and not understanding the content read.

4.6 The Effectiveness of Integrating ICT Enriched Learning Style Model in Students Own Learning

From the overall performance, out of the four experiments done in this study was the use of simulation or ICT enriched learning. In 40 minutes students could learn so much individually, given the test, all passed. This means that they could retain what they saw and experienced, they understood the content and could be able to attempt most questions correctly. The use of ICT such as PowerPoint presentations, multimedia presentations, electronic books, animated clips, videos seem to be interesting to most children of 21st generation. Fortunately enough, the majority of these students can operate electronic gadgets with easy. Learning through ICT interests them more than reading plain text from textbooks or listening to a teacher lecturing them.

CHAPTER FIVE

DISCUSSION OF THE FINDINGS

5.1 Introduction

This experimental study was set out to investigate the effectiveness of integrating ICT in students learning in government secondary schools in Ilala district, Dar es Salaam Tanzania. The study was conducted using four different learning style models which included lecture/audio, handouts, online search and simulation. The effectiveness of the four styles was assessed. This chapter therefore provides an overview of the findings and implications to Dar es Salaam as well.

This chapter is structured into four sub sections which includes initially the effectiveness of integrating ICT in students learning and performance discussed through a comparison of the four learning style models used in this study namely lecture/audio, handouts, online search and simulation. Secondly, the dominance of integrating ICT in learning. Thirdly, factors affecting the choice of learning style model and lastly concluding by the factors affecting the integration of ICT in government secondary schools in Ilala District, Dar es Salaam, Tanzania.

5.2 The Effectiveness of Integrating ICT in Students Learning and Performance

There is no doubt technology is everywhere. Technology has become part of our day to day living, it affects how we communicate to one another, how we shop, pay bills such as LUKU, Mwendokasi tickets, transfer money and even how we use it in class to learn. Integrating ICT in learning involves learning by using information technology such as text, images, video, sound, animations and simulation. Text could be in different colours, size and style so as to make the learners interested into

reading the text. Images should be relevant to the content this illustrate more on a point of which help the learner understand better the content taught. Videos include sound and motion with some visual effects where the learner will use both the sense of seeing and hearing.

Power Point presentations in most cases use all the multimedia effects such as text, images, video, sound and animation. Animation is giving life to a still picture or diagram. Animation involves a lot of drawings then gives certain motion to the drawings which adds interest to learners and makes them understand the content better. And simulation is imitation of real life situation. Using computer models a really life situation is designed virtually so as to both learn from it and predict its future. For example a weather model could be simulated to show the effects it might cause. A flight simulator for instance was created to teach pilots on how to fly a plane virtually on a computer before flying the really one. Simulators are safer and easy to learn from.

Integrating ICT in students learning can help them enjoying learning and understand better the content taught. In this study the findings revealed that the mean performance of the simulation group was the best followed by online search, handouts and lastly lecture/audio. This was measured by the students' scores in each style. This shows that students understand and retain better information if they use interesting learning style models like simulation as well as online search of which are ICT enriched. In addition to that studies reveal that integrating ICT in learning can improve knowledge, skills, critical thinking, confidence and performance. Furthermore studies show that simulation is an effective method of learning. (Robyn

P. Cant & Simon J. Cooper, 2009).

5.2.1 Lecture/Audio as a Method of Learning

This is the oldest method of teaching and learning in education setup. It is one way channel of communication presentation aiming at teaching and learning. In this experiment the group that was selected for lecture/audio performed the least showing how poor this method is in learning.

5.2.2 Effectiveness of Handouts Style of Learning

A handout is a paper based resource that can be used to facilitate learning. It could be plain text, text and illustrations, a text book, a few sheets printed as long as it is in hardcopy it can be considered as handouts. In this study a plain text handouts was issued to the sampled student. This group performed a bit better than the lecture/audio group.

5.2.3 Effectiveness of Online Search

Online search is advantageous compared to lecture/audio and handouts as a lot of active information is available on the internet. By using internet one can learn a lot from active text, images, sound, videos and animations. Different scholarly materials, text books and other resources are available online. In this study selected students who learned through online research/resources performed better than those who learnt through lecture/audio and handouts.

5.2.4 Effectiveness of Simulation

As an approach of learning simulation is an imitation of real life situation and procedures designed to be used in a much safer environment. It is a form of

experimental learning making the learner learn by doing, watching, listening and experiencing the feeling as in real life. In this study sampled students under this group performed the best.

5.3 The Supremacy of Integrating ICT in Learning

The use of ICT in education provides problem based learning and enables students to be independent, have a critical thinking. The impact of ICTs on learning can be approached in various ways to meet the need of learners. This experimental study has shown that the use of different approaches offered by ICTs enhance learning by transforming the environment into the one that is learner-centered and promote deep learning (Integration of ICT in Education key challenges).

5.4 Factors Affecting the Choice of Learning Style Model

There is no doubt that people learn differently, in most cases learning style is a combination of characteristic cognitive, affective and physiological characters that serve as relatively stable indicators of how a learner perceives, interacts with, and responds to the learning environment. There are several factors affecting the choice of learning style model these are peer influence, cultural background, technology in classroom home or community, educational awareness, poverty, as well as socioeconomic factors.

5.5 The Factors Affecting the Integration of ICT in Government Secondary Schools in Ilala District, Dar es Salaam, Tanzania

Some of the factors affecting the integration of ICT in government secondary schools are access to current technology, the infrastructure, policies, capacity

building, education administrators, content developers and technical support specialists.

CHAPTER SIX

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

6.1 Introduction

In this chapter the major issues that emerged from the study are considered a summary and conclusions as well as recommendations are made on the best learning style model that the learner could use so as to improve performance in government secondary schools in Tanzania.

6.2 Summary of the Findings

The study set out to explore the effectiveness of integrating ICT in students learning in government secondary schools in Ilala, Dar es Saalam, Tanzania. Four different learning style models were used including lecture/audio, handouts, online search and simulation. To meet the study objectives and aims, the study compared the differences in students' performance between lecture/audio, handouts, online search and simulation learning styles. The study was guided by Constructivism theory of learning insisting on student centered learning and stakeholders to make sure students are enabled to possess their own learning. The study was guided by three objectives aiming at compare differences in learning effectiveness between traditional lecture/audio method and simulation (ICT enriched) and online search. Also finding out the effectiveness of integrating ICT enriched in students learning in government secondary schools, Tanzania.

6.3 conclusion of the Study

The use of ICT can play a number of roles in education by changing the learning process. However ICT integration is not easy task. There are significant challenges

in integrating ICT use in education rising from environmental, cultural and educational faced by policy makers, educators, educational administrators and students. Thus there is a need of government authority support and the ministry of education to making the integration of ICT in education a successful process. The dominant learning styles of students in according to this study can be concluded as ICT enriched learning.

In this case it was simulation which was completely ICT enriched, this made almost all the sampled students in the group wishing to learn nonstop it was very interesting for them and no wonder their performance was much better. Information delivered to learners that involve images, motion graphical as well as aural information that is “heard or spoken” is more understood hence produce satisfying results. Thus, if the lecture/audio could strategize their teaching and learning activities around these two learning styles, it will create an avenue for effective learning.

6.4 Recommendations on the Basis of the Findings

The study covered a very small portion of education and area as whole

- i. In the future a wide research is required so as to cover a larger area and involve more students
- ii. Time to conduct research should be considered and if possible class in oriented from form one all the way to form four and observe the final results.
- iii. The government under the ministry of education should consider providing technology to secondary schools as technology is advanced and it is now a necessity.

- iv. Education without technology is like a tree without roots, it will not grow to its maximum and it will dry within no time.

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APPENDICES

Appendix I: Research Test Items for students

Introduction

My name is Pamela Mboya, I am enrolled at the Open university of Tanzania pursuing Master of Education in Administration, Planning and Policy Studies (MED APPS). Am conducting a research on *The Effectiveness of ICT Integration in Students ' Learning in Government Secondary Schools in Dar Es Salaam, Tanzania.*

The purpose of this study is to investigate the effectiveness of integrating ICT in students' learning by comparing the differences in learning effectiveness between traditional lecture/audio method and simulation in government secondary schools in Dar es Salaam, Tanzania.

This research is intended to collect data that will assist the study in a number of ways: 1.) it will provide statistics that will show the effectiveness of integrating ICT in learning; 2.) it will provide the challenges of integrating ICT in students learning and also 3.) it will be used by the Ministry of Education and other stakeholders to improve students' learning by integrating ICT into their learning. Your answers will be treated as completely confidential and will only be released as part of a statistical analysis. Please take a minute to study the information provided and then answer the questions that follows. Thank you.

Appendix II test Questions for students

A: personal Information

1. Write your given number: _____
2. Gender (Tick one) male female
3. Age _____ years.

B: Test questions

Multiple Choice questions

This section consists of multiple choice items on computer models and simulation. Each question is followed by **three** options lettered a) to c). Find out the correct option for each question and kindly circle the letter with the most correct answer.

1. What is a computer model?
 - a) Is a computer program that creates a simplified, mathematical representation of a real world process
 - b) Is a computer hardware that creates a simplified, mathematical representation of a real world process
 - c) Is a behaviour construction that creates a simplified, mathematical representation of a real world process
2. What is simulation?
 - a) Is the imitation of the operation of a computer process or system over time.
 - b) Is the imitation of the operation of real-world process or system over time.
 - c) Is the imitation of the computer system that behaves like a robot.
3. A model can be used to:
 - a) Construct a house
 - b) Investigate hardware and software

- c) Investigate a wide variety of “what if” questions about real-world system.
4. Simulation can be used as:
- a) Design tool to predict the performance of a new system
 - b) A flight simulator
 - c) A tool to investigate what if questions.
5. Computer models outputs are
- a) Guarantee
 - b) Predictions not guarantees
 - c) Prediction
6. Computer models use
- a) Variables
 - b) Processes
 - c) Both variables and processes
7. Flight simulators are a common example of computer simulators
- a) Nothing like this exists
 - b) False
 - c) True
8. Flight simulators that are used to train pilots use complete, accurate recreation of the air craft’s cockpit.
- a) Nothing like this exists
 - b) True
 - c) False
9. One type of model is
- a) Physical

- b) Chemical
- c) Mechanical

10. One type of simulation is

- a) Virtual
- b) Sensors
- c) Computer

Matching Items

Please answer the following questions based on computer models and simulation:

Match the statements in Column **A** with the equivalent item in Column **B**, by writing the correct letter on the space provided

Column A	Answer	Column B
1 Live	_____	A Hardware and software Models with complex calculations
2 Mathematical A combination of computer model, realistic input and output devices	_____	B Type of simulation
3 Climate model	_____	C Type of modeling
4 Flight simulator	_____	D Simulations
5 No loss or damage	_____	E System
6 Expensive to develop Used for prediction and decision making	_____	F Model G Common simulation
8	_____	H

9	Spreadsheet software	_____	I	Model and Simulation
10	Run on supercomputers	_____	J	Simulators
			K	Computer models
			L	Basic models

Appendix III: Expected Answers

Multiple Choice Questions

1. What is a computer model?
 - a) **Is a computer program that creates a simplified, mathematical representation of a real world process**
 - b) Is a computer hardware that creates a simplified, mathematical representation of a real world process
 - c) Is a behaviour construction that creates a simplified, mathematical representation of a real world process

2. What is simulation?
 - a) Is the imitation of the operation of a computer process or system over time.
 - b) **Is the imitation of the operation of real-world process or system over time.**
 - c) Is the imitation of the computer system that behaves like a robot.

3. A model can be used to:
 - a) Construct a house
 - b) Investigate hardware and software
 - c) **Investigate a wide variety of “what if” questions about real-world system.**

4. Simulation can be used as:
 - a) **Design tool to predict the performance of a new system**
 - b) A flight simulator
 - c) A tool to investigate what if questions.

5. Computer models outputs are
 - a) Guarantee
 - b) **Predictions not guarantees**
 - c) Prediction

6. Computer models use
 - a) Variables
 - b) Processes
 - c) **Both variables and processes**

7. Flight simulators are a common example of computer simulators
 - a) Nothing like this exists
 - b) False
 - c) **True**

8. Flight simulators that are used to train pilots use complete, accurate recreation of the air craft's cockpit.
 - a) Nothing like this exists
 - b) **True**
 - c) False

9. One type of model is
 - a) **Physical**
 - b) Chemical
 - c) Mechanical

10. One type of simulation is

- a) Virtual
- b) Sensors
- c) Computer

Matching Items

Match the statements in Column A with the equivalent item in Column B, by writing the correct letter on the space provided

Column A	Answer	Column B
1 Live	C	A Hardware and software
2 Mathematical A combination of computer model, realistic input and output devices	D	B Models with complex calculations
3 Climate model	E	C Type of simulation
4 Flight simulator	F	D Type of modeling
5 No loss or damage	G	E Simulations
6 Expensive to develop Used for prediction and decision making	H	F System
7 Spreadsheet software	I	G Model
8 Run on supercomputers	J	H Common simulation
	K	I Model and Simulation
	L	J Simulators
		K Computer models
		L Basic models