

THE IMPACT OF *ICT* ON TEACHING AND LEARNING

A CASE STUDY OF ALLIDINA VISRAM HIGH SCHOOL

By

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the award of **Postgraduate Diploma in Education** of the University of
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DECLARATION


The Research Project is my Original Work and has **NOT** been presented for any academic award elsewhere.

Signed..........

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This Research Project has been submitted with my approval as a University Supervisor

Signed..........

Date.....*2/05/08*.....

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ABSTRACT

The study attempts to explain the impact of ICT on learning and teaching, with an aim of enhancing student learning and achievements. The question asked by the researchers is whether technology improves learning and students achievements. It has been found that ICT does not increase learning over and above traditional methods. The more appropriate question should be:- How can the Educational technology together with Technology Education be implemented in the learning environment to facilitate learning and teaching process?

When Educational Technology is integrated into classroom, students are able to access more information faster and in an efficient manner. In the absence of these fundamental changes to the teaching and learning process such classrooms may do little but to accelerate the ineffective processes and methods of teaching. The impact of ICT on learning process therefore excites and engages learner's interests. Today, everything that is required for reading , looking up, studying , training , revising , constructing , arranging and informing , saving and reminding , browsing or navigating is available at the click of a mouse. Hence it is necessary for the schools to jump onto the Technology bandwagon so as to become part of information super-highway and make it possible for their learners to have access to the world's knowledge.

The purpose of the study is to determine the impact of ICT in schools with regards to students, teachers and the entire learning environment and the subsequent effect on the students learning and achievement. As a result, the researcher the researcher was able to find whether Educational Technology had a profound impact on the students learning and achievements in the classroom environment. The study was conducted by researcher after following an experimental research approach in the vicinity of **Allidina High School** located in the Mombasa district, Coast Province, Kenya.

The objectives of the study in employing ICT in learning and teaching are vast and include, first, to determine whether students are able to access information readily outside the classroom and use appropriate tools to analyze and interpret such information. Secondly, to find out if students motivation and challenge is motivated and able to identify whether active learning is encouraged and more authentic assessment resulted. Again, to be able to illustrate if the cognitive processes are tapped. Finally, to determine the influence on the learner's independence to engage in the learning process.

In addition, this study addresses a number of **research questions** that were tackled during the investigations and were as follows:-

1. Does the use of ICT in schools influence student's learning and achievements?
2. What are the advantages and disadvantages of deploying ICT as a tool for teaching and learning?

3. What impacts does ICT have with regard to students, teacher and teaching strategies and the entire learning environment?
4. What are some of the recommendations and future plans for Kenyans schools regarding the use of ICT in classrooms?

If this study can be accomplished, it will contribute substantial awareness to a number of people specifically the students, teachers, school administration and the parents. Student's achievement will be greatly enhanced, whereas the impact to teachers is to facilitate effective classroom communication for the interest of the learner through delivering instructional objectives more effectively and efficiently. The school administration is assisted in their management and administration functions which are supported highly by technology.

The implementation of this study had a number of limitations ranging from financial constraints to the use of few resources such as computers and other few technologies while other forms of technologies and hypermedia were not exhausted. The target population size had been 500 and a sample random technique is used to realize 50 sample sizes that include 30 being the students, 5 teachers, 3 officials from the ministry, 5 management staff and 7 technicians; the researcher administers research tools such as questionnaires, conducting interviews and observes scenarios while collecting effective data. Again, more information is sought through internet, magazines, journals and relevant text books while a video camera was used to record the entire procedure of data collection conducted by the researcher and also reflect the project progress at each level. The reliability and validity of these tools is also realized when using them to suit a particular function. The researcher and his assistant participated in the data collection process and general project co-ordination.

Though, the investigation merit limitations, the researcher was able to minimize some of these limitations through soliciting more funds from family and friends, have access to a variety of ICT tools from many sources, building good rapport in the school community and planning in advance to overcome time limitations.

The collected data was organized in tabular form and represented using Single bar graphs and Circular pie-chart and consequently, analysis made to draw out relevant *conclusions and recommendation* tied to the results. Scientific calculator, MS Word and MS Excel Package was used to effect and manipulate these data. The output result after analysis is expressed in Percentages in order to give a meaningful picture about the impact of the study on the Students Achievement. *Video camera* was used to record live on going classroom discussions using Integrated ICT strategies in order to reflect the activeness and motivation of students in the learning sessions. The project is then placed in a DVD to further monitor the entire conduction process.

DEDICATION

This Research Project is dedicated to Allah, My *Fiancee* and My Family.

ACRONYMS

ICT	<i>Information and Communication Technology</i>
AVHS	<i>Allidina Visram High School</i>
LRC	<i>Learning Resource Center</i>
HDEM	<i>Higher Diploma in Educational Management</i>
UNESCO	<i>United Nations Educational Scientific and Cultural Organization</i>
KTTC	<i>Kenya Teachers Training College</i>
HDTTE	<i>Higher Diploma in Technical Teachers Education</i>
VVOB	<i>Flemish Association for Development and Technical Assistance</i>

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CHAPTER ONE

INTRODUCTION

1.1 Background of the study

The question asked by the researchers is whether Technology improves learning. It has been practically found that ICT does not increase learning over and above traditional methods. Many take this as bad news, but the reality is that learning is still taking place. This is good news. The more appropriate question should be, how can the ICT be implemented in the learning environment to facilitate or enhance learning process?

To use ICT to improve learning process, the pedagogical assumptions underlying the design of ICT for educational purposes must be understood. ICT is primarily used to automate the information delivery function in classrooms. Learning process does not change just because ICT is integrated into classroom. *ICT allows us to access more information faster and in efficient manner. Knowing how and when to use various technologies in the classroom will greatly help the students grasp the material during class time.*

In the absence of fundamental changes to the teaching and learning process such *classrooms may do little but to accelerate ineffective processes and methods of teaching.* From a general perspective, it is possible to detail the various benefits to incorporating ICT into learning process.

The benefits and advantages of ICT in the classroom are many and varied.

- Help to motivate and engage learners.
- Help to prepare the learners for the world of work
- Help to improve access to information
- Help to access information in an efficient manner.
- Helps the school to maximize all their resources
- It is flexible
- Help to tap the cognitive process
- Open new opportunities
- It appeals to student's mode of learning
- It is a natural tool for the development of learning skills
- Help in increasing learning productivity,
- Help in solving problems in teaching and learning programmes
- Provide opportunities to share and expand teacher knowledge.

Therefore, it is an important issue to investigate the impact of ICT in school for the purpose of enhancing learning process. The impact of ICT in the school environment is pursued with regard to students, learning and the learning environment, teachers and teaching strategies. Today computers in schools are both a focus of study in them (**technology education**) and a support for teaching and learning (**educational technology**). The ICT is exciting and engages learner's interest.

Today, everything that is required for reading, looking up, studying, training, revising, constructing, arranging, informing, saving and reminding, browsing or navigating is available at the click of a mouse (Peters, 2000 b). That's why it is necessary for many academic institutions to jump on the technology bandwagon so as to become part of the information super-highway and make it possible for their learners to have access to the world's knowledge.

There are many ways to use ICT for teaching and learning. The major challenge however, is to use them efficiently and effectively. Studies of teaching and learning in schools around the world identify four broad stages of implementing ICT in teaching and learning (UNESCO, 2002).

Stage 1: Discovering ICT tools and their general functions and uses

Stage 2: Learning how to use ICT tools, and beginning to make use of them in different disciplines.

Stage 3: Understanding how and when to use ICT tools to achieve a particular purpose.

Stage 4: Specializing in the use of ICT tools to become specialists

Learners are expected to have a lot of skills including knowing, being able to, learning, thinking, communicating, discussing, questioning, searching, inquiring, selecting etc; using ICT can help learners to develop these skills, through the use of databases, didactic software, simulations, intra-or- internet, e-mail, search engines etc.

The use of ICT as part of learning process can be sub-divided in three different forms in as an **Object, Aspect and Medium**. Therefore, it is more crucial to learn how to use technology to enhance students understanding and critical thinking skills.

1.2 Statement of the problem.

Educational technology theorists, in debating the effects of ICT on teaching and learning, have described the range of educational technology from textbooks to computer-based instructions as passive tools that deliver instructions but do not influence student achievements in classroom. Still other theorists have claimed that the content and the way that information is presented to students was the essential element in learning, not the medium through which the instruction is delivered. The researcher therefore, plans to find whether the impact of ICT on learning and teaching may have a profound influence on student learning and achievements in classroom through experimental research in one of randomly selected school in Kenya. This is necessary because ICT is a powerful tool for making presentations and offers unique advantages in the field of education.

1.3 The purpose of the study

The study is intended to determine the impact of ICT in schools with regard to students, learning and the learning environment, teachers and teaching strategies and other areas relevant to teaching and learning in schools. As a result, students' learning and achievements in schools is enhanced through the presence of ICT in the learning environment. This is because ICT being a powerful tool for presentations offers unique advantages in the field of education. For instance, text alone simply does not allow students to get a 'feel' of any of Shakespeare's plays. In teaching Biology, an instructor cannot make a killer whale come alive in classroom. ICT enables the instructors to provide a way by which learners can experience their subject in a vicarious manner. Technology does not necessarily drive education. That role belongs to the learning needs of students.

With ICT, the process of learning can become more goal-oriented, more participatory, and flexible in time and space, unaffected by distances and tailored to individual learning styles and increase collaboration between teachers and students. ICT enables learning to become fun and friendly, without fear of inadequacies or failure. Moreover, under conditions of chronic under-funding ICT can provide an enhanced or augmented learning experience at a low cost per unit. It is here that power of ICT can be unleashed to provide long-term benefit to all. Again, ICT enables learning through exploration, discovery and experience.

1.4 Justification for the study

This research is worthy of exploration because integrating ICT in schools facilitate effective classroom communication that attempts to deliver information more efficiently and effectively. It therefore, tends to promote access to a vast amount of information from different multimedia that opens possibilities for intellectual discourse and connections across disciplines.

1.5 Research Questions

The researcher is able to address the following research questions during his study:-

- (i) Does the use of ICT in schools influences students learning and achievement?
- (ii) What are the advantages and disadvantages of employing ICT as tool for teaching and student learning?
- (iii) What impacts does ICT have with regard to students, teachers and teaching strategies and the entire learning environment?
- (iv) What are some of the recommendations and future plans for Kenyan schools regarding the use of ICT in classroom?

1.5 Basic Assumptions

The *basic assumptions* of the study were:

- ✓ The respondents gave honest views/observations.
- ✓ The research instruments gave correct result and thus treated factual.
- ✓ None of the respondents had prior instructions on information researched upon.
- ✓ Feedback of respondents were accurate, concise and precise
- ✓ The respondents respond to questionnaires willingly.
- ✓ The student's identity in each group of study remained constant in all experimental set-ups.
- ✓ The students were initially of equal intellectual capacity before exposed to experimental set-ups.

Application of Educational technology is made possible through Technology Education and provides the following influence in the learning environment: *Enhancing students learning and achievement,*

THROUGH:-

- 1) Students can access readily more information outside the classroom and can use tools to analyze and interpret such information.
- 2) It encourages active learning and thus results in more authentic assessment.
- 3) It engages students by motivation and challenge
- 4) Provide tools that increases students productivity
- 5) Provide scaffolding to support higher level thinking
- 6) Increase learner independence
- 7) Facilitate more collaborative and co-operative learning between students and teachers and learners themselves
- 8) Tailoring learning to learner
- 9) Overcome physical disabilities of the learner
- 10) It helps to tap cognitive process of the learner

1.7 Significance of the study

If this study can be accomplished, it will contribute substantial awareness to a number of people specifically students, teachers, school administration and the parents. The use of ICT in schools have a positive impact on *students* in terms of supporting their learning and providing them with relevant technological literacy.

In this way, their achievements are enhanced. *Teachers* are a key component in the learning environment and therefore the impact of ICT on teachers and the strategies they employ to facilitate the environment are critical. The use of ICT by teachers in classrooms facilitates effective communication so that they can deliver their instructional objectives more efficiently and effectively. ICT uses are increasing being used for *management and administrative task* at levels of Education. The school Administration employs ICT resources in order to assist in management functions since school has a large number of people which raises the need to create more efficient management and administrative functions.

Since the use of ICT in classroom enhances students learning and achievements, parents are motivated to support the school management in providing ICT resources through funding

Application of Educational technology is made possible through Technology Education and its study provides the following result in the learning environment:

Enhancing students learning and achievement, THROUGH:-

1. Accessing readily more information outside the classroom and can use tools to analyze and interpret such information.
2. Encouraging active learning and thus results in more authentic assessment.
3. Engaging students by motivation and challenge
4. Providing tools that increases student's productivity

5. Providing scaffolding to support higher level thinking
6. Increasing learner's independence
7. Facilitating more collaborative and co-operative learning between students and teachers and learners themselves
8. Tailoring learning to learner
9. Overcoming physical disabilities of the learner
10. Helping to tap cognitive process of the learner

1.8 Delimitation of the study.

The researcher was able to conduct the study within the vicinity of *Allidina Visram High School- (AVHS)* - Mombasa. The *experimental research* approach was followed. AVHS is a public secondary school located in Mombasa district- Coast Province.

1.9 Limitations and De-limitations of the study.

1.9.1 Limitations of the study.

- (i) Technology has a wide variety of tools to offer education. One limitation of this study is that it focuses largely on computers and other few technologies while other forms of technology and hypermedia will not be exhausted.
- (ii) Additionally, while this study focuses on AVHS, the findings cannot necessarily be used for generalization purposes when referring to other public and private secondary schools.

- (iii) Further, AVHS has already begun using computers into their classroom. So there is some familiarity with the benefits of technology in education among respondents. More extensive research will be needed to draw a broader generalization.
- (iv) Lack of adequate co-operation from some teachers who were technophobia and who resisted change or co-operation due to their technological incompetence.
- (v) Financial constraints impeded the normal progress of the study.
- (vi) The School Authority had their own schedule that interfered with the normal progress of the study.
- (vii) The difficulty in settling subjects to adhere to the entire study for effective and efficient output.

1.9.2 De-Limitations of the study.

The researcher made a pre-visit (Reconnaissance study) to AVHS -Mombasa and have come to realize the entire Administration, students and non-academic staff are social and friendly. The centre is equipped with Computer resources in place and some of academic staffs are equipped with knowledge and skills for utilizing these resources more appropriately. The researcher therefore, had grounds to pursue the study more optimistically in the presence of all these de-limitations.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

2.1 International scene.

From the earliest times when computers were commercially available, they could be found in use in educational institutions, and educators (e.g. Bork, 1980; Carnegie commission on Higher Education, 1977; Papert, 1980) argue that computers should be used to support learning. There has always been huge community support for this as illustrated recently in a survey of voters in the USA which indicate greatest support for expenditure on ICT in schools when compared with a list of alternative expenditure in education (Lemka, 1999). However, there has always been debate among educators on how the technology should be used and what improvements in student studies could be expected. Initially computers were used to teach computer programming but the development of the microprocessor in the early 1970s saw the introduction of affordable microcomputers into schools at a rapid rate. Computers and Applications of technology became more pervasive in society which led to a concern about the need for computing skills in everyday life. As public awareness grew, this need for computer literacy became extremely influential and many schools purchased computers based on this rationale. The 1990s was the decade of computer communications and information access, particularly with the popularity and accessibility of internet-based services such as electronic mail and the World Wide Web.

At the same time the CD-ROM became the standard for distributing packaged software (replacing the floppy disk). This allowed large information-based software packages such as encyclopedias to be cheaply and easily distributed. As a result educators became more focused on the use of technology to improve students learning as a rationale for investment.

Today, computers in schools are both a focus of study in them (educational technology). Rationales can be presented for both computer literacy and using computers as part of educational technology. This review will concentrate on the latter but will address the issues surrounding computer literacy where relevant. The focus on this review will concern the use of computer technology as an aid to learning and teaching in schools. How can computers help teachers, students and administrators? When should computers be used in classrooms? What is the effect of computer use on teachers, students and learning within the classroom and school?

This review will aim to describe the ways in which computer use in schools impacts on learning, learning environments, students, teachers, and schools. In order to accomplish this, the review will explain a conceptual framework within which to address these concerns.

Any discussion about the use of computers systems in school is built upon an understanding of the link between schools, learning and computer technology. When the potentials use of computers in school was first mooted, the predominant conception was that students would be 'taught' by computers (discussed by Mevarech & Light, 1920). In a sense it was considered that the computer would 'take over' the teacher's job in much the same way as a robot computers may take over a welder's job. Collis (1989) refers to this as "a rather grim image "where a small child sits alone with a computer" (pg.1)

During the late 1970s and early 1980s, computers became more affordable to schools, permitting a rapid decrease in student-to-computer ratios. While tutorial and D&P software continued to be developed (Chambers & Sprecher, 1984) a range of educational software was developed that was not based on the premise of teacher's replacement, for example, simulation software, modeling and tools software. However, the major argument used to support the introduction of greater amounts of computers hardware into schools concerned the perceived need to increase the level of computer literacy of students (Carleer, 1984; Downes, Perry, & Sherwood, 1995).

Towards the end of the 1980s and into the 1990s, while the computer literacy rationale still remained (Hamiafin & Savenye, 1993; Hussein, 1996), the major rationale for having computers in schools was more concerned with the need to use computers to improve students learning (Welle-strand, 1991). Broadly speaking, computer literacy is a component of Technology Education, which is distinct, but not necessarily separate from, using technologies such as computer systems to support learning and teaching processes. The latter is generally referred to as **educational technology**; and is applied to a wide range of technologies such as blackboards and chalk, pencils, books, and slide-rules to television facsimiles, and computers. This review will focus on the use of computer systems as educational technologies. Since the beginning of the 1990s educators have been particularly concerned that very little of the potential of computers to support learning in schools seems to have realized despite a sufficient installed base of computers. Numerous studies (Seekers, Ravitz & Wong, 1999; DeCorte, 1990; Plom & Pelgrum, 1992) have shown that few teachers facilitate substantial student use of computers.

Therefore while it is assumed in this review that computer support for learning is essential, some discussion of the rationale is required as a background to later discussions concerning models for the use of computing systems to support learning and teaching. Technology is developed to solve problems with human need in more productive ways. If there is no problem to solve the technology is not developed and /or not adopted. Applying this principle to educational technology would mean that educators should create and adopt technologies that address educational problems, of which there are many. Further, a technology will not be adopted by educators where there is no perceived need or productivity gain. This is what Lankshear and Snyder (2000) refers to as the '**Workability**' principle.

Therefore, when discussing applications of computer technology to education the questions must always be asked, "what educational problem(s) need to be addressed?" This question needs to be asked at all levels of decision-making, from the teachers planning a programme, to a school administrator purchasing hardware and software, to an educational system officer developing policy and strategic plans.

At the teachers level the questions becomes: Am I satisfied with the educational opportunities that am able to offer children in school classroom? While teachers should never be completely satisfied , and they will always strive to do better, the questions really is whether what they provide adequately develops the potential of the students and adequately prepares them for a productive life in society. Many educators (e.g. National Center for Vocational Education Research, 2002) and educational commentators (e.g. Murdoch, 2001) believe that what is offered in school classrooms in developed countries such as Australia is hopelessly inadequate to match the needs of our society and the needs of individual students.

Schank and Cleary (1995. p ix) put this succinctly when they state " Today's schools are organized around yesterday ideas, yesterday needs, and yesterday resources, (and they weren't even doing very well yesterday).Shank and Cleary (1995) argue that we know enough about learning to support it with computer system, using software that allows children to experience activities at school, that have been impossible or difficult, and thus avoided in the past. Rieber and Welliver (1989) define **educational technology** as a process involving, "a systematic approach to identifying instructional problems and then designing, developing, implementing, and evaluating instructional solutions" (p22). They argued that, "In order for the full potential of educations technology to be realized, it must be viewed more as a process rather than just the implementations of educational tool" (p 22).

Thus the education technology process, begins with the identification of an educational problem, not with the existence of a technology in other words, we need to start with the well supported beliefs we have about learning and make sure that any solutions are consistent with them. *This discussion will assume that educators should create and adopt technologies that address educational problems and/or improve productivity. The rationale for the use of a technology to support learning should arise from dissatisfaction with the educational opportunities offered to learners and a striving to do better.*

Learning environments in schools typically involved one or more adult teachers connected with a number of students, usually in well defined physical settings. These people interact and form a variety of relationships, creating what Solomon (1998) calls "a system of interrelated factors that jointly affect learning in interaction with (but separately from) relevant individual and cultural differences" (p.80). This is what Wubbels, Brekelmans, and Hooymayers (1991) term the "relationship dimension" in learning environments at school.

The learning environment has a physical as well as relationship dimension. Physically it may be in a room, full of particular furniture and equipment. Curriculum materials such as books and videotapes may also be present. The curriculum also has a place in the relationship dimension of the environment in that the students and teacher(s) are focused on certain processes and content in the curriculum and have a relationship with that curriculum and the methodologies that are associated with conveying the curriculum. Students and teachers may have very different relationships with different components of the curriculum. The pace of computers in learning for the majority of children is most likely to occur in the classroom and, for an increasing number, at home.

Most experts in the field of educational computing (e.g. Lynch, 1990; Olson, 1988; Rieber, 1994) would characterize computers as interactive and thus admit them a place within the relationship structures of the classroom learning environment, not just the physical environment.

The majority of school classroom learning environments that incorporate computers could thus be depicted using the model in figure 1 below.

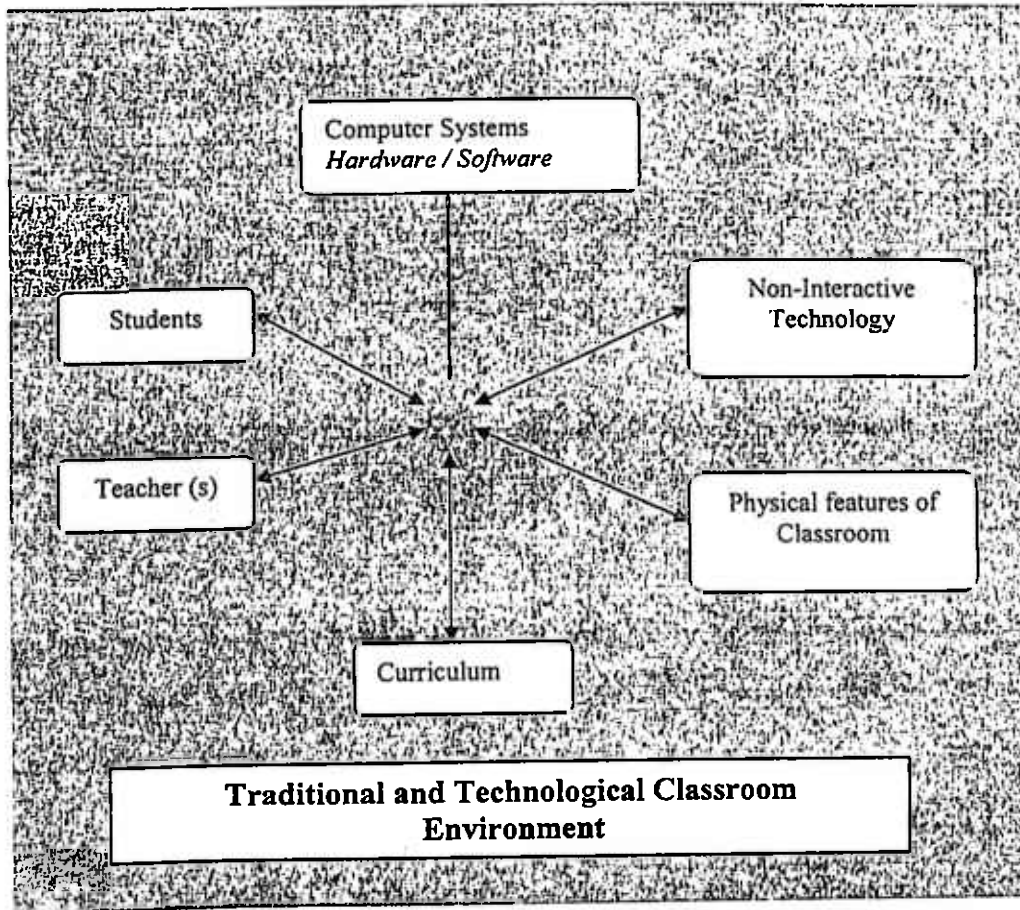


Figure 1: *A model to consider the relationship of computer systems to other elements to other elements of the classroom learning environment.*

The curriculum is concerned with **what** is learned and taught and **how** this learning and teaching occurs. What is learned/ taught includes objective, content and learning outcomes (the knowledge, skills and attitudes that students are intended to demonstrate.) The how of the curriculum concerns teaching/learning methodology, teaching strategies and media resources.

Most teaching/learning methods and strategies involve the use of some equipment. Some teaching methods may only include the use of a blackboard and chalk while others may make use of a television or overhead projector.

These equipments and its use within the curriculum are often referred to as **educational technology**. Educational technology concerns the technology that is used to facilitate the teaching/learning process. As such it is included in the *how* part of the curriculum. We could consider educational technology as the *tools of the teaching trade*, part of the medium used to convey the curriculum. Some of these technologies involve the use of computers.

There is a two-way relationship between the curriculum and educational technology in that to some extent they each affect the other. Typically the teacher and other components of the education system determine what is to be taught and learned and then on this basis the methodology (including the educational technology) to be used is selected. Thus the technology used is determined by the intended curriculum. Also part of the context of the curriculum concerns the role of the teacher, the physical setting and the general pedagogical views of the teacher and education system. These are likely to affect the technology used.

There have also been a number of instances where the curriculum has been changed due to changes in technology. In *some cases the invention of new technology has added content to the curriculum* (e.g. technology based on electricity). In other cases new technology has made parts of the content obsolete (e.g. using calculators instead of logarithms for calculation). And some technologies such as overhead projectors, videos and computers have led to the development of new methods of learning and teaching which were not feasible before their introduction. *So in many ways technology can be seen to be affecting the curriculum both in terms of contents and methodology.*

While theoretical arguments can be put forward to provide a strong rationale for the use of ICT, the only real rationale is based on whether, in practice, it has a positive impact on learning, the learners and teachers. This report will now review the impact of ICT on learning, students, the curriculum, teachers, schools and school systems. The relevant connections between these entities are shown in the diagram next page that will act as theoretical framework for the discussion.

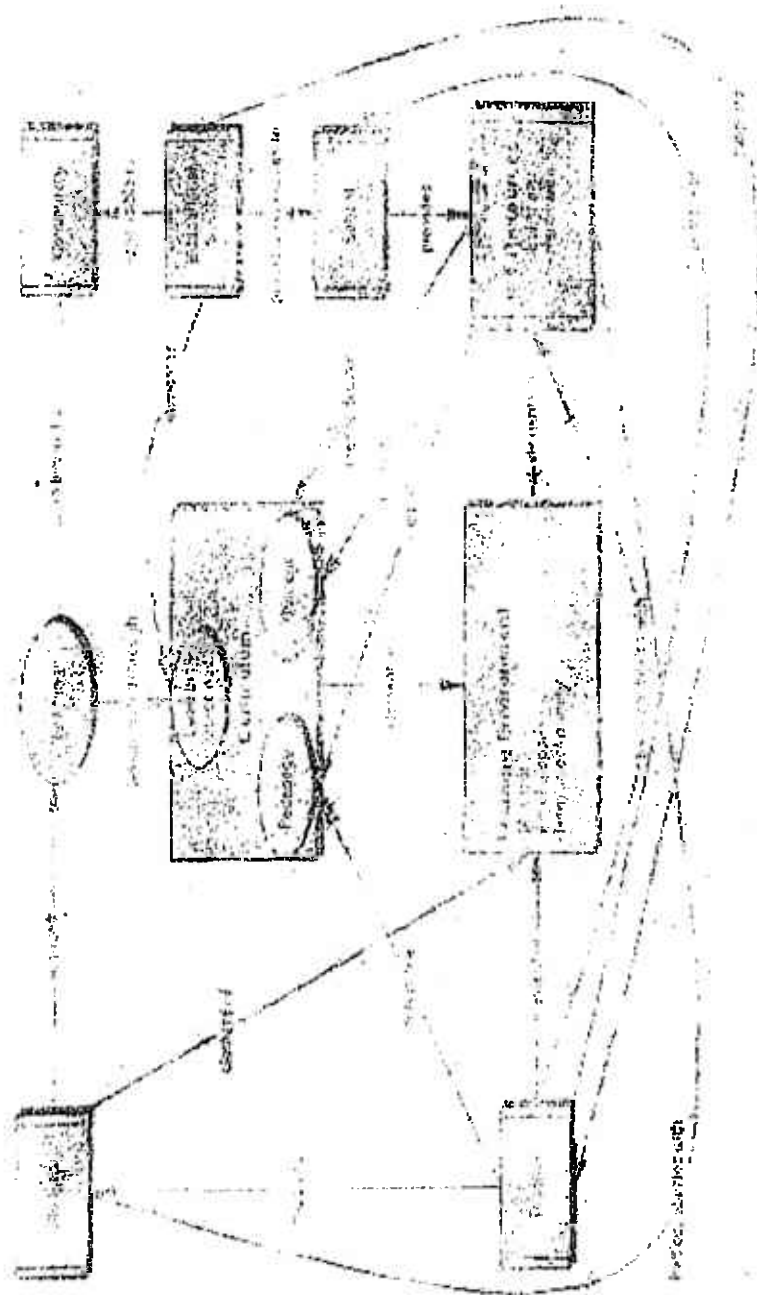


Figure 2 Concept map indicating relationships between learning environment entities and learning outcomes

No direct link between learning and the use of ICT!

While it would be convenient to be able to make a direct connection between the use of ICT and learning outcomes, most reputable educational researchers today would agree that there will never be a direct link because learning is mediated through the learning environment and ICT is only one element of that environment. Studies that have tried to identify this mediated impact of ICT on learning have found it impossible to entirely remove the effects of other *element of the learning environment*.

There is little purpose in attempting to compare the cognitive outcomes when using computers, with using a textbook or some other resource. Salomon (1994) support is this view by arguing that, it is not possible to study "the impact of computers use in the absence of others" (p 80). The educational aim is to try to isolate its effects on learning environment (Decorte, 1990), rather than to try to isolate its effect on learning. Using computers in learning is concerned with methods of using the technology to create environments and learning situations. There have been many decades of solid educational research not necessarily related to using computers, on which to base decisions about appropriate applications of computers to learning. For example, Mevarech and Light (1992) suggest that the relationships between student characteristic, learning environments, behaviors and schooling outcomes are crucial and need further research, yet there has been much research which has considered these relationships in other contexts than educational computing. Rieber and Welliver (1989) criticize media comparison studies, claiming that they were of no value applied to research into the use of educational television and therefore many question their value to educational computing research.

They quote from the report of a 1984 USA government educational task force which suggested that one of the four important points for improving the use of educational technology in schools was the "Identification of instructional problems and development of realistic solutions." (p22.). As a result, they argue that media selection should be the final step in instructional elements and certain media have the ability to utilize certain features much more readily than other media" (p. 26).

They suggest that the identification of educational problems should be the first step.

They cite LOGO as an example where there was "no systematic plan for incorporating this new thinking technology into the schools" (p.26) and as a result, they argue it failed.

If the aim is to offer new learning opportunities or to improve the way in which current learning activities are implemented then the overall effectiveness of learning environments and episodes is of paramount concern, not whether they are more effective with or without computers. Therefore in implementing computers applications it is necessary to start by deciding what a student, teachers or school want to achieve. To achieve these outcomes, teachers can then rely on long traditions of education theory, their own experience and knowledge, of the educational situations (e.g. students attributes) to make decisions about what required. Finally, teachers can identify what problems are associated with providing these environments and with decisions concerning computer support rather than starting with such decisions (for example refer to Campione et al., 1990).

A report from the impact study (Becta, 2002, p.3) conducted in the UK found that,

There is no consistent relationship between the average amount of ICT use reported for any subject at a given key stage and its apparent effectiveness in raising standards, it therefore seems likely that the type of use is all important.

It has been argued earlier that ICT is a mediator of learning, as a component of the learning environment. While it is difficult to measure and directly demonstrate the impact of ICT in schools on learning, it is possible to suggest possible impacts by connecting ICT as a mediator with well researched theories of learning and strategies for providing learning opportunities. The Committee on Developments in the Science of Learning completed such an exercise and stated that "*several groups have review the literature in technology and learning and concluded that it has great potential to enhance achievement and teachers learning but only if is used appropriately*"

The following illustrate the impact of ICT on the learning:-

a) Investigating reality and building knowledge

ICT allows students to investigate more thoroughly the real world (Reginald Gregoire inc.. Bracewell, & Laferriere, 1996;1998)

b) Active learning and Authentic assessment

In many classroom situations it is difficult to allow students to be sufficiently active as participants. Typically students are often passive, spending a lot of time listening or reading. It is well known that students are more likely to be interested and attentive and will achieve a wider range of learning outcomes if they can be active-learning by doing (committee on Developments in the Science of Learning, 2000: Reginald Gregoire inc. et al., 1996). Their engagement with the curriculum will increase as they are afforded opportunities to create their own information and represent their own ideas (Riel, 1998). Computers software can be used to provide students with learning experiences where they are interacting with the computer system. Alternatively the software may support activities where they interact with other people either in person or on-line (Riel 1998).

c) Collaborative learning

Researchers have found that typically the use of ICT leads to more cooperation among learners within and beyond school and more interactive relationship between students and teachers. (Reginald Gregoire inc. et al., 1996).

d) Tailoring Learning to the Learner

In most traditional learning situations it is not possible to provide each student with an instructor and for that instructor to specially design learning experiences for that student. The closest to this is the apprenticeship system. The programmability and interactivity possible with computer systems provides the opportunity to develop software which simulates the role of an instructor. Intelligent tutoring software may use information about the students to recommend appropriate sequences or sections of a tutorial for the student.

e) Overcome physical Disabilities

The variety of input and output devices available provide the opportunity for students who are physically handicapped to be involved in the same learning activities as other students.

2.2 Kenyan Scene.

The Learning Resource Centre (LRC) was established in January 2002 as part of new Educational Programme by the Kenya Teachers Training College, KTTC- <http://www.kttc.ac.ke/>. It is run by the Department for Open Learning & ICT Integration at the Kenya Technical Teachers College in Nairobi, Kenya. Since its inception it had continuous support from the Flemish Association for Development and Technical Assistance (VVOB). Some additional funding by UNESCO during the first project year helped to kick-start a more ICT integrated approach. The project is assisted by two VVOB advisors and was fully sustainable by the end of 2005.

The project's main focus is to support the offering of an educational management programme to school administrators in Kenya, including the Higher Diploma in Educational Management (HDEM) through mixed-mode delivery (face-to-face and distance learning). Short courses derived from the HDEM are also offered during the school holidays. Open course ware is being developed for all modules. Some manuals are already available.

As part of the project, training in *ICT Integrated Education* has been offered to both lecturers and students. This has raised considerable interest in the wider educational community. As a matter of fact, most ICT training in the educational sector tends to focus on some hardware skills and software packages.

However, the LRC offers a programme that looks at ICT from a pedagogical perspective, in order to give teachers the necessary skills to use ICT in the classroom in a way that enhances the learning experiences of the students. The training is tailor-made to the Kenyan curriculum. The programme is in the process of being re-designed for a wider target group in the Kenyan educational sector. The department offers customised ICT training to civil servants of the Ministry of Education, Science and Technology.

The department has also offered services to the Kenya Institute of Education (KIE) in order to **mainstream ICT in the school curricula.**

An HIV/AIDS attitude training programme was developed in collaboration with the Kenya Medical Training College (KMTC) and offered to all KTTC lecturers and some of the non-teaching staff. All students undertaking courses at KTTC are sensitised through targeted workshops. The programme was to be taught using flexible modes and innovative methods through the development of an "active learning centre", a learning centered place where lecturers and students comes to teach, learn or undertake research. Since ICT cannot be optional or dropped all together in a flexible learning setting the LRC project team identified ICT as a core technology. The United Nations Educational, Scientific and Cultural Organization (UNESCO) provided the additional funding that enabled the LRC project to link the ICT Units to a wireless satellite connection that provides for 24- hour internet access.

Today, the LRC embodies 3 ICT Units comprising of 68 networked computers next to a large Documentation Unit and working space accessible for the students enrolled in the school management programme. (Total computers online in the KTTC: 124) the LRC remains open in afternoon hours and on Saturdays to allow for lecturers, Students and non- teaching staff to browse. The LRC partly recovers the cost of the Internet access fee through the offering of specific services by multi skilled persons.

Some teachers training colleges in Kenya do not have access yet to such a fully equipped resource centre. Even in urban areas not all the schools or institution do have access to high speed computers linked to the Internet.

The VVOB project in the KTTC is part of the government's policy to address the major problems in the educational institutions of Kenya, including this need for ICT infrastructure and training. The LRC project has become an example of how this can be done in a cost-effective way.

The Higher Diploma in Technical Teachers Education programme (HDTTE) was to provide trainees with the knowledge, skills and attitudes necessary to administer and manage technical training programmes and institutions. The reason for developing the HDTTE programme was that some 1000 out of 5000 graduated KTTC students were holding managerial or administrative functions for which they did not receive specific training. They were employed in technical schools, organizations offering technical training programmes, the ministry (e.g. inspectorate.) etc.

But this proved to be too narrow; what is the difference between managing an educational institution or a technical training institution? Therefore, the HDTTE- curriculum has been rearranged and adapted into a Higher Diploma in Educational Management (HDEM) curriculum. In 2005 the Kenya Institute of education (KIE) approved a competency based curriculum with a set of 3 modules. The changes also gave high priority to delivering the HDEM programme through the means of distance education since the initial target group has been broadened. Following the keys principles for effective ICT development in teacher education cited by the UNESCO planning Guide for ICT in teacher education (2002); technology was infused into all courses of the HDEM programme. Throughout the HDEM experience students learn about and with technology and more specifically, they learn how to incorporate it into their own teaching.

Since the KTTC adopted an open learning philosophy, it delivers the HDTTE programme in a traditional classroom setting and the HDEM programme using both face-to face and distance teaching (Mixed Mode Delivery). Consequently, the learning materials for distance education had to be specially designed according to the principles of self directive learning. Studying the topology of the different delivery systems it seemed that the independent study model (print based) was the best option. The design of quality learning materials and the integration of ICTs in those manuals and in the classroom was the core activity in the Learning Resource Center Project.

At the KTTC more than 500 pre-and in-service teachers have been offered training in basic ICT skills including Internet research. Then, the focus of the VVOB capacity building programme changed, since more complex educational methods are needed to prepare the 21st Century students for problem-based learning, case-based learning, competency oriented learning and project-based learning.

Approximately 100 teacher educators have been trained in more advanced use of ICT, active teaching/ Learning approaches, next to the development and writing of open learning materials. These workshops focused in critical thinking and meta-cognitive skills such as learning to learn, self-regulation and self-assessment. The ability to solve new problems or to reason about complex domains is not the result of simply adding up a number or acquired skills, but of being able to flexibly coordinate those skills in new situations (Jochems et al., 2004) therefore, teaching was not directed at discrete skills, knowledge elements and attitudes, but at a combination of them in integrated learning goals or competencies.

CHAPTER THREE

RESEARCH METHODOLOGY AND DESIGN

3.1 Introduction

This chapter attempts to explain how the research data will be collected, organized, represented and finally analyzed in order to draw relevant conclusions and recommendations from the findings. The delimitation of the study is acknowledged and the subjects determined using sample techniques. The target populations of study together with the sample size are identified. Some of the reasons for choosing samples size are realized and the characteristics of subjects spelt. Some of the research instruments are identified, giving suitable reasons for their choice and their reliability and validity of the instrument for use is mentioned. Again, further explanation on how these instruments were administered during the study. The research scope and design of the study is also described and the proposed way to analyze the research data is entailed. Furthermore, explanation for the development of study limitations is also outlined.

3.2 Research scope, Design and Type.

A research design is the arrangement of conditions for collection and analysis of data in a manner that aims to combine relevance to the research purpose with economy in procedure (Kothari, 1990). It is needed as it is facilitates the smooth sailing of various research operations, by making research as efficient as possible yielding maximal information with minimal expenditure of effort , time and money (Kothari, 1990). Both *Descriptive* and *Experimental Research approaches* were used in the study. The research type adopted for experimental treatment was such that sample students were allowed in class which was highly integrated with ICT resources and lessons conducted.

This was the experimental class. On the other hand, similar sample students were allowed to have lessons in a class which lacks completely ICT resources and traditional methods of Instructional techniques adopted. This was treated as a control class- as it lacks treatment of variables. Another class setting had been allowed where samples were exposed partially to ICT resources and partially to traditional methods treatment. In each three cases evaluations were conducted to give comparatively factual information that is reliable and relevant to the study. The research was carried out at **Allidina Visram High School-AVHS**, located in *Mombasa Island-Coast Province*. AVHS is a public secondary school implementing 8-4-4 Educational Curriculum.

The study covered 50 sample sizes 30 being the students, 5 teachers, 3 officials from the ministry, 5 management staff and 7 technicians. The sample sizes were picked from a target population of 500.

Some research limitations popped up during the study and include financial constraints, few ICT resources were tested while other form of technologies and hypermedia not exhausted unwillingness for some teachers with technophobia ailment to co-operate and thus resisted change etc.

The researcher was be able to collect the data during live lesson in all three experimental set ups and evaluation tests and assessment were done to students in their respective lessons in each experimental treatment. The result of the out come will be used to compare the value of teaching strategies and choice of instructional techniques to impart knowledge to students in order to achieve their academic goals,

3.3 Target Population.

The target population of the study at AVHS is 500. The researcher was able to employ a sample random technique and come up with a sample size of 50 including students, teachers, Technicians, management staff and members of the ministry of education. Teachers are selected because they use ICT as an instructional technique to enhance effective classroom communication.

Students on the other hand, are chosen to investigate whether ICT strategies enhance learning to students. Technicians are responsible to fix and maintain ICT tools in place whereas the management staff employ ICT for management function and are responsible to provide for ICT resources in the school. Ministry of education is acknowledged in the use of ICT in school so that they can reinforce the technologies in government schools. Hence, their correspondence is mandatory. The teachers are matured, highly qualified and comprises of male and female teachers, whereas students are adolescents and a class of 20 comprising of boys and the sampled students were of varying intellectual capabilities and few are computer literates. Technicians, management staff and members in the ministry of education are matured responsible individuals, highly devoted to their work and comprises of male and female.

3.4 Sample and Sampling Procedures.

Sampling is the process of selecting a representative of the total population as possible in order to produce a miniature cross-section (Kothari, 1990). Best (1977) defined a *sample* as a small proportion of target population selected for analysis. The researcher used **Simple Random sampling method**, this is applied to obtain a representative samples. The data was collected from the chosen groups namely students, teachers, technicians and management staffs.

3.5 Research Instruments.

Instruments are tools in which data are collected (Mutai, 2000). Primary tools of research were used to collect data during the study and include Questionnaires, observations and interview. Furthermore, secondary tools of research were also used and include video camera, magazines and journals. The data was collected with the aid of *questionnaires* and evaluation test papers to the respondents.

Both closed and open questions were used. The questionnaires are selected as a data gathering tool because according to (Best and Khan, 2003), it is appropriate when factual information is required. In this study factual information is required to validate the impact of ICT on teaching and learning on academic performance of students. Secondly, administration of questionnaires is easy and saves time.

Where possible the researcher tried to administer the questionnaires in person to develop the rapport and be able to explain the purpose of the study and meaning of the items that may not be clear. For instance, distant respondent like management staff and the ministry of education are given questionnaires at ease. The questions asked are precise and therefore making the questionnaires more valid and reliable. *Observation technique* was used to collect data on personal intuitions.

The researcher was able to see a class in action hence avoiding any report bias and also observe the naturalistic behavior of teachers and students in class. Again, *interview schedules* were organized with different *subjects* regarding the impact of ICT in learning and teaching and also general school administration. This method is regarded valid and reliable as data is collected directly from the subjects recorded and analyzed. This method is flexible, adaptable and can be used to a number of subjects. The data obtained in this way is more clarified and is in detail.

Video camera was used to record live on going class discussion using Integrated ICT strategies in order to reflect the activeness and motivation of students in the learning sessions. More journals, magazines and textbooks were read to collect relevant information pertaining to Educational Technology and also to understand the vicinity of AVHS.

3.6 Administration of Research Instruments.

The questionnaires were drafted and presented personally to all subjects related in the study. They were then collected upon confirmation that they are ready from the subjects. Observations were made at all time and at anytime once the aspect of the research activity was in place. The interview schedules were set so that face to face verbal questioning to be enhanced. More detailed and clarified information collected was then recorded for analysis. Video camera was taken in the class in order to record live learning session where student's activities in the on-going class were tapped. The researcher was able to read for himself from textbooks, magazines, journals and access internet matters related to educational technology. The researcher hired a research assistant to supervise evaluation tests and many activities in order to save time and smoothening the entire study.

3.7 Minimizations of Research Limitations.

Though financial constraints was encountered there was a plan for soliciting more funds from relatives, family and trust organization. Not only computer was used, the researcher was able to use additional technologies to open avenues for the use of variety of ICT resources these included projectors, interactive boards DVD players, Television, internet etc. The researcher was able to convince Teachers with technophobia element and guided them to appreciate technology in teaching and even advised them to take in-service teacher education on educational technology.

3.7 Instrument Validity.

Validity is the degree to which results obtained from the analysis of the data represents the phenomenon under study (Mugenda and Mugenda, 2003). The instruments will be validated by use of a pilot study. This will be carried out at any local University.

3.8 Instrument Reliability.

Reliability is a measure of the degree to which research instrument yields a consistent result or data after repeated trials (Mugenda and Mugenda, 2003). The researcher used the split half method and the Spearman Brown Prophecy formulae to calculate the reliability of the research instrument.

$$r = \frac{\pi \sum xy - (\sum x \cdot \sum y)}{N \sum x^2 - (\sum x)^2 (N \sum y^2 - (\sum y)^2)}$$

Where: x = sum of odd numbered scores

y = sum of even numbered scores

x^2 = sum of squared odd numbered scores

y^2 = sum of squared even numbered scores

xy = sum of the product of paired even and odd numbered scores

N = number of paired even and odd numbered scores

π = constant pie 3.14.....

Source:

Roscoe, J (1983) Fundamental Research Statistics for behavioral science, New York : (Holt , Rinchart and Winston Inc. Page 102)

The computation showed the correlation coefficient - r - to be 0.0005597. By applying Spearman Brown Prophecy formulae:

$$R_e = (2 * r) \div (1 + r)$$

The full reliability of the item was found to be 0.0011

3.8 Data Analysis Technique.

Analysis is the process of interpreting the survey data. It is part computation and part intuition- knowing which variable to examine and what relationships to explore. Once totals, averages, ratios and proportions have been calculated estimate from different sub-population or periods of time can be compared with each other (Benjamin Mutai 2000). The collected data –response- is recorded in the mark sheets and grouped into tables. Various computations in percentages on the students score in the test is determined using computer packages like MS Excel and relevant statistical packages employed to calculate the mean actual performance of each class investigated in each experimental set up. In addition, scientific calculator was also used for simple arithmetic's. Single bar graphs may then be used to represent the mean class performance in percentages of each class. The class with the highest mean percentage performance indicate that teaching and learning is favored or enhanced by the treatment of the variables whether present or absent.

CHAPTER FOUR

DATA PRESENTATION, ANALYSIS AND INTERPRETATION

4.0 Introduction.

This chapter contains the information about the respondents and the detailed information on the impact of ICT use on learning given by respondents at AVHS. Questionnaires were distributed to 50 subjects and 40 questionnaires were returned depicting 80% return rate. Again, the data collected from respondents is analyzed, represented and finally relevant conclusions drawn from the findings. Tools of analysis and representation of data include Microsoft Excel – Windows XP Version - and use of Scientific Calculator.

4.1 General Information about respondents.

Majority of students in form three classes 2007 at AVHS were 17years old and the researcher was able to ask each one of them their educational achievement and their access level of Technology. Teachers on the other hand, were asked to state their educational attainment, age and access level of Technology.

4.2 Students Performance in the experiments.

The researcher was able to organize the student samples in group one and two in each experimental setup arranged as follows:-

Experiment I : *TRADITIONAL METHOD ONLY.*

Experiment II : *MEDIUM TECHNOLOGY AND TRADITIONAL METHOD*

Experiment III : *HIGH TECHNOLOGY*

This was necessary for *comparative studies* in each experiment. The percentage performance of each individual in the group for each experimental setup was later determined using Evaluation Tests at the end of each experiment. The tables of Performances to this effect is attached to APPENDIX I. Moreover, the table for AVERAGE PERFORMANCES for each Experiment (Setup) being investigated is tabulated below:-

Table 7.0 Average Performance of groups in each Experiment Setup

EXPERIMENTAL SETUP			
	TRADITIONAL METHOD	MEDIUM TECHNOLOGY AND TRADITIONAL METHOD	HIGH TECHNOLOGY
Average Performances for Both Groups (Percentages)	69.52%	76.48%	86.52%

From the table it is shown that the HIGH TECHNOLOGY have a great impact to the student learning and Achievement garnering the Highest Percentage Performance of 86.52% unlike the TRADITIONAL METHOD with a lower Percentage Performance of Academic Achievement at 69.52%.

4.3 Charting the Data.

The Percentage output performance for each experiment in each group trial is charted below.

Chart 1.

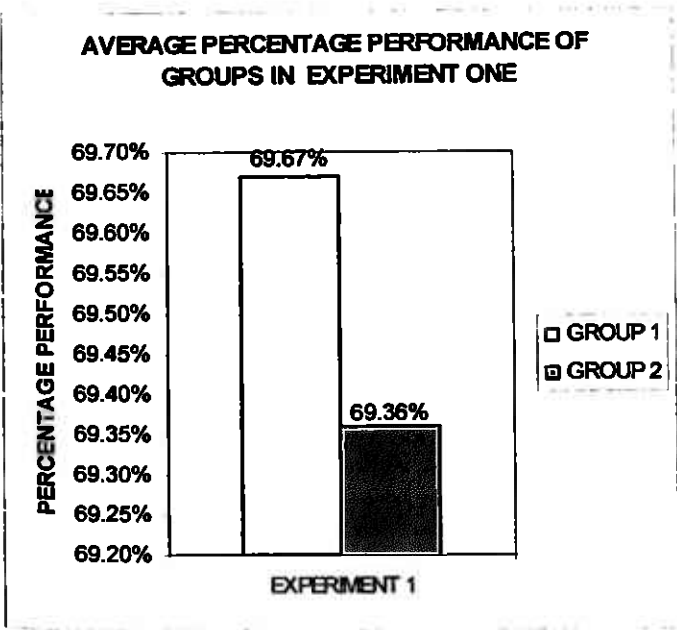


Chart 2.

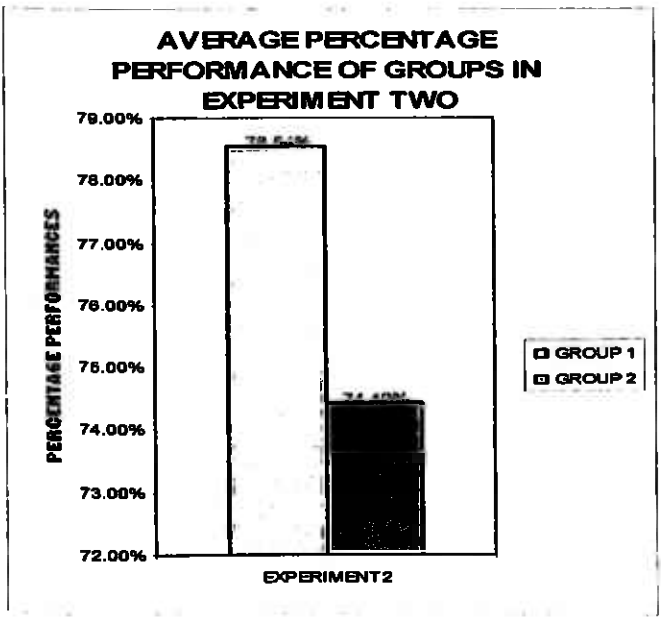
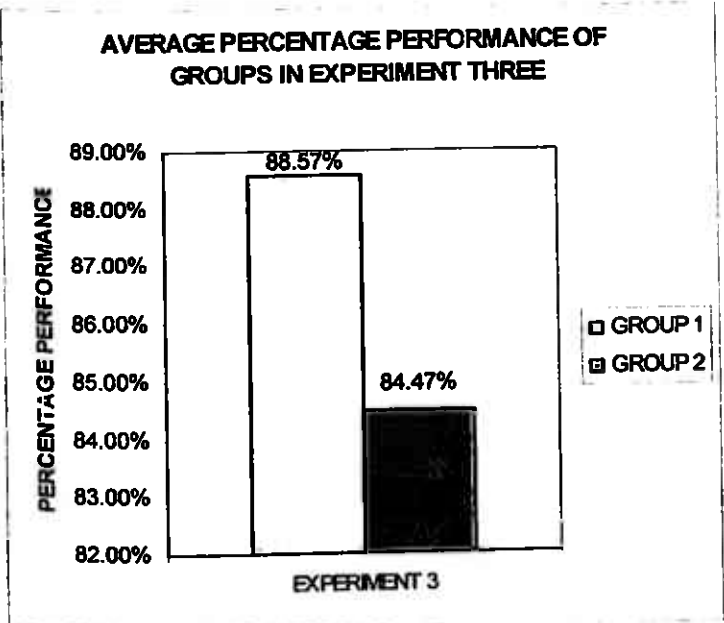


Chart 3.



Comparing the Academic Achievement and the impact of the experiments to teaching and learning their aggregate percentage performance is calculated and tabulated below.

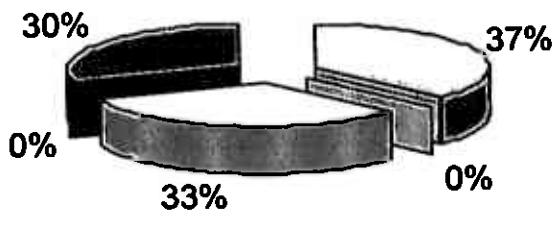
Table 8.0 Proportions of Performance Output in each Experiment

EXPERIMENT TYPE	PROPORTION CATEGORIES	
	DEGREES	PERCENTAGES
HIGH TECHNOLOGY	133.95°	37%
PARTIAL TECHNOLOGY	118.41°	33%
TRADITIONAL	107.64°	30%
GRAND TOTAL	360°	100%

From the table 2 above, the **High Technology Method** adopted the highest proportion of Percentage output on a Circular Pie- Chart Mode seconded by **Partial Technology** and tailed by **Traditional Method** in which the later act as a *control experiment* with minimal strength of impact to teaching and learning. The Chart below illustrates this competitive strengths percentage output of the three experiment type on circular pie-chart mode.

Chart 4.

CIRCULAR PIE-CHART SHOWING PROPORTIONS OF EXPERIMENTS PERFORMANCE OUTPUTS



4.4 Conclusion

From the research findings, the **High Technology Experiment** attracted the Highest Percentage aggregate performance- **86.52%** - of learner's engagement in teaching and learning that aroused a lot of motivation and participation in the learner and teacher point of view during the learning session. The three dimensional aspect of teaching materials and visual images extracted from the DVD in this experiment had further boosted learners interests, engagement and attention in learning thus enhancing their academic achievements measured by their aggregate percentage performance output of the evaluation test deployed at the end of learning session.

On the other hand, **Traditional Method** had attracted the *lowest* aggregate percentage output – **69.52%** - of learner's engagement, interests and attention in learning session because it offered minimal motivations and participation in learning and easily bred boredom. In this experiment there were very minimal aspects that aroused student's engagement and attention in learning that made it alive and workable like student questioning, making notes, discussions etc. The teacher's instructional technique was not highly enhanced to impart adequate instructional materials and information to students compared to the High technology experiment that gave the instructor a vast mode of instructions ranging from Audio, visual. Audio-Visual equipments and facilities that made him to reiterate the instructions for emphasis and therefore inculcating information more effectively and efficiently.

Likewise, the experiment setup two that used Partial Technology and Traditional strategies had attracted a sufficient aggregate percentage output performance - 76.48% - of the learner's motivation and participation, because it had employed partial strategies of High Technology and Partial merits of the Traditional Technique.

Conclusively, the use of High Technology resources in classroom have been seen to arouse a lot of motivations and participation to learner's engagement in learning and also increased their classroom learning attention , consequently enhancing their academic achievement over Traditional Method.

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

5.0 Introduction

This chapter gives information on the study summary , conclusion , recommendations and suggestions for further research , following the case study on the *Impact of ICT on teaching and learning* experienced at Academic institutions and in particular **Allidina Visram High School- AVHS- 2007**.

5.1 Observation

The researcher observed that some misconceptions still exist concerning the use of ICT in educational context. Many teachers recognize that ICT are indispensable instruments to the development of essential competences in the students. However, the majority of teachers continue to look for ICT as something that is good for motivating. Others, on its turn, refer that ICT are effective to motivate students for learning but they aren't for teachers to reach certain goals related to contents indicated in the plans. It is therefore necessary to initiate the development of cooperative and collaborative work among the several teachers, because in that kind of work each teacher is simultaneously teacher and student. This would be a way to carry out the lack of formation of some teachers, of increasing the motivation for the use of ICT, of thinking about the practices for an improvement of the teaching process and the students learning and to develop in the sense of making that schools be able to form citizens able of adapting to the demands of the **XXI** century.

5.2 Research Findings

The researcher was able to come up with the following research findings from the problem investigated:-

(i) Enhancement of Academic Achievement

The use of Technology have enhanced academic achievement as seen from the experiment set up THREE in both individual and classroom average performance, garnering the highest percentage performance output of 86.52 % . This is because it brought a sense of academic motivation and attention in the classroom environment thus enhancing the impact of teaching and learning and consequently yielding good aggregate academic performance output depicted from Evaluation tests by students.

(ii) Changing Teaching

Teachers could give many different and specific examples of how technology had changed their work. A number of things were being done with Web sites, from giving students notes which one teacher described as a "low end thing," to getting students to create their own Web pages. One teacher was using a Web site to enhance an actual field trip. The Web site introduces students to the animals and tells them what they are going to be doing while on the field trip. It shows them techniques they can use to analyze the ecosystem and record the data. The prior preparation through the Web site helps students benefit from the actual field trip. Several teachers mentioned that they used Power Point and other computer programs to improve their presentation of material to class.

Teachers explained that technology enabled teachers to deliver more material to students and it also eliminated several basic problems such as; poor hand writing, poor artistic skill, contrast, lighting, and visibility. Another teacher makes extensive use of software programs to help teach physics. The students go into the laboratory and collect their data using the computer.

Then they use word processing programs along with Excel to do graphs and presentations. The software allows the students to collect different kinds of data using various attachments that are plugged into the computer.

Using computer technology, students have more time to explore beyond the mechanics of counting dots and setting up the experiment. It actually lets them look at it and understand the concepts better. Another teacher made the point that resource-based teaching or resource-based learning is almost becoming "seamless, almost natural" in everything that teachers do because information is becoming easier to access.

(iii) Changing the Teaching and Learning Relationship

Teachers reported that the relationship between teacher and learner is sometimes reversed with regards to information technology. Many teachers mentioned that they had students show them how to use technology. One teacher commented that when students could help teachers, it gave the students a big confidence boost. Some teachers went as far as to use terms like "co-learners" to describe the new relationship between teacher and student. Teachers also saw the potential for technology to be isolating and realized that classroom and other activities had to be arranged in a way that reduces the likelihood of isolation.

Another point made, was that in some ways the use of new technology may be increasing socialization in some ways. People may be able to find someone who has interests similar to their own to converse with through the Internet. One teacher put forth the idea that the use of technology in the classroom will mean those areas where students interact, will increase in importance of socialization.

(iv) Administration and Expanding Professional Networks

The use of information technology has changed school administration in several ways. One teacher explained that when she started teaching six years ago, it was not expected that teachers know how to type their own test. Now teachers are expected to know how to use word processors and have their tests done in a proper format.

Several teachers noted that there is a move toward recording grades and attendance electronically. Teachers are expected to check their e-mail, and a lot of things that used to be done at a staff meeting are now done via e-mail. Also, e-mail is becoming an important communication tool between parents and teachers. In addition most of the teachers use e-mail to keep in touch with other teachers and friends.

(v) Concerns Teachers have about the use of Technology

While recognizing that there were some concerns and problems with integrating the use of information and communication technology, teachers thought it was beneficial to the educational process and should be continued. Several concerns emerged from the interviews and include:-

➤ *Maintenance*

The problem most often noted by teachers was the maintenance of the equipment needed to operate a technologically enhanced school.

➤ *Inequalities*

Another frequently mentioned problem was the disparities between students who have access to computers at home and those who do not.

➤ *Need for training*

Teachers provided evidence of the importance of the efforts in-school to promote professional development in integrating information technology into classroom teaching. The professional development days held and the flexible mentor type training available at the school was viewed as being very important by the teachers interviewed.

➤ *Information Overload.*

Teachers recognized that sometimes students are overwhelmed with the amount of information available and with the task of filtering through the information.

➤ *Pace of Change and Stress*

Teachers have a hard time keeping up with the pace of change. One teacher said, "People are stressed. Families are stressed" and she felt this level of stress is being transferred to young students.

➤ *Plagiarism*

One teacher raised the problem of increased plagiarism because technology was making it easy to reproduce and revise someone else's work. She said, "There is a lot of cutting and pasting going on."

➤ *Teachers' Time*

Teachers stated that information technology was placing more demands on their time. Teachers noted that extra time was needed to learn new software and also to create new things for teaching because greater expectations were being placed on them.

5.3 Study Achievements

The researcher was able to accomplish a number of elements that include:-

- Raise adequate funds to support the study
- Organize and co-ordinate activities appertained to the study
- Able to inculcate effective knowledge to students-samples.
- Represent the entire project exercise in the DVD
- Initiated the importance of Educational Technology to teaching staff at AVHS
- Conducted successfully the Evaluation Test Programmes to the Students.
- Motivated students to appreciate the use of Technology in the classroom over traditional method.
- Hiring people to aid in the research study exercise mainly the research assistant and the camera man.
- Appreciated the concepts of research skills and integrated them practically

5.4 Constraints

The limitations associated to the research study are vast. Some of these constraints experienced in the investigation include:-

- ✓ Lack of adequate knowledge on the use of technologies in specific areas of Sciences and Humanities
- ✓ Inadequate Funds to support the project.
- ✓ Resistance to change from some teachers due to Technophobia
- ✓ Schedule interruptions as the school prioritizes their own activities
- ✓ Misconceptions, namely the loss of teacher importance and the idea that the use of ICT is loss of time
- ✓ Lack of support technician with sufficient information in ICT area.
- ✓ Lack of adequate pedagogic and didactic information of how to use ICT in classroom context
- ✓ Limited and unproductive time allocated for the research study by the school administration
- ✓ Lack of sufficient technological resources/materials/infrastructures.

5.5 Conclusion

The following conclusions related to this investigation were reached:-

1. Through the use of Technological Infrastructures in the classroom context the academic achievements are highly enhanced.
2. The use of ICT infrastructures by teachers in classroom context had greatly changed their initial working environment.
3. The Information Technology in the school community had reversed Teacher's and learner's relationships
4. ICT use enable teaching staffs to have access to vast number of services related to academic, economics, politics , social and administrative functions
5. The members of school community and in particular teachers have lots of concern regarding the implementation of ICT use in the classroom context.
6. The use of ICT in Education stimulate dynamic learning environment
7. The implementation of ICT in school teaching/learning has affected the distribution of roles/responsibilities and classroom interactions
8. The effectiveness of ICT based innovations and pedagogical models depend on their successful integration into existing educational activities.
9. The acceptance of ICT use in school teaching/learning relies of regular access for teachers and students to up-to-date networked ICT.
10. Regardless of their differing learning patrimonies and characteristics, schools still produce ICT teaching/learning innovations
11. Teachers with self-motivation and a real desire to embrace new technologies will often find the time and overcome many barriers in order to use ICT

5.6 Key Recommendations

The following key recommendations were made:-

- 1) More research and evaluation of practice is needed to determine that the universal application of ICT is always desirable for educational quality.
- 2) Teachers are crucial to successful use of ICT. Teachers will be required, and should be positively encouraged, to assume new roles and responsibilities if ICT is effectively applied to enhance teaching and learning quality
- 3) Initial teacher education for all teachers should include compulsory ICT training to an adequate level of competences and skills
- 4) Investments should be based on an integrated approach in implementing ICT strategies, including the four major components - hardware, software, communications provisions and trained human resources, and should be assured on a sustainable basis. Where public/private partnerships to complement public sector investment are applied, they should not be undertaken in conditions of monopoly domination of hardware or software. Open source software should be considered where possible.
- 5) Teachers should have adequate planning time as part of their work obligations to ensure they are able to introduce ICT into their pedagogical practice which favours high quality and appropriate learning.
- 6) For technical/professional support, including electronic networking, schools should benefit from help desks, ICT systems' managers or ICT specialists.
- 7) Funding for ICT infrastructures in schools is the primarily the responsibility of the government

- 8) CPD-Continual Professional Development- for teachers related to provision for ICT competency may be assured primarily by governments, but also through a mix of public and private sectors. Delivery mechanisms should include distance learning options such as Web-based portals and e-mail exchanges
- 9) New teaching methods - collaborative, team teaching - should be encouraged, but new pedagogical models should be further researched and piloted before widespread introduction
- 10) The use of teacher assistants in classrooms may be considered to help teachers, provided that they are not employed to take over the teaching functions of qualified teachers.
- 11) Social dialogue between educational authorities, teachers and their organizations in the first place, and other stakeholders as appropriate, is a crucial means to obtain full ownership and application of ICT in teaching practice. Social dialogue is understood to mean full information sharing, consultation and negotiations or collective bargaining according to the issue.

5.7 Suggestions for further studies

This section entails the research topics and suggestions that merit further investigation and includes:-

- How do exposure to and use of ICT in school affect future employment?
- What is the gender impact of ICT in education on access, use of, attitudes toward, and learning outcomes?
- How can ICT be used to present, comment on and discuss student work, and what are the implications of such impact?
- Are some school subjects better suited for ICT integration than others?
- The research should be replicated to other reputable academic institutions e.g Universities for better solutions to effective use of ICT on teaching/learning
- The use of ICT should be extended to other non-academic sectors like Business firms
- How can issues related to ICT use for special needs and disadvantaged students be introduced into teacher professional development activities, and what are best practice examples of such activities?
- How can ICT be used to reach out to and teach illiterate youth?

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APPENDIX I : The Tables of Individual Performances

Table 1.0

ALLIDINA VISRAM HIGH SCHOOL

**ASSESSMENT GROUP ONE
EXPERIMENT TYPE : TRADITIONAL
METHOD**

**SUBJECT : MATHEMATICS
EVALUATION TOPIC : GRAPHICAL METHOD & COMMERCIAL
ARITHMETICS**

LIST TYPE: ASSESSMENT RESULT.

	Student Name	Admission Number	Form	Percentage Score	Remarks
1	ABDALLA RIZGALLA	11577	3S	80.0%	V.Good
2	ALI MATANO	11646	3N	65.0%	
3	AWADH SALIM	11650	3S	45.0%	
4	BRIAN OCHIENG	11595	3S	70.0%	
5	FRED OTIENO	11613	3S	70.0%	
6	GABRIEL OJWANG	11585	3N	75.0%	
7	GEORGE OUMA	11596	3W	70.0%	
8	GEORGE OWINO	11568	3S	60.0%	
9	HERMAN MWALANDI	11915	3W	70.0%	
10	KEVIN NGUGI	11552	3S	75.0%	
11	KIOKO MUTUA MOHAMMED	11597	3S	45.0%	
12	ABUBAKAR	11641	3S	100.0%	Excellent
13	NOAH ANTHONY	11564	3N	70.0%	
14	RASHID .B.	11617	3S	80.0%	V.Good
15	SAGAR MODASIA	11576	3N	70.0%	
			SUM	1045.0	
			Average Performance	69.67%	

Table 2.0**ALLIDINA VISRAM HIGH SCHOOL****ASSESSMENT GROUP TWO**
EXPERIMENT TYPE : TRADITIONAL
METHOD**SUBJECT : PHYSICS****EVALUATION TOPIC : GAS LAWS : CHARLES LAWS****LIST TYPE: ASSESSMENT RESULT.**

Student Name	Admission Number	Form	Percentage score	Remarks
KURI JAMES	11426	3W	65.0%	
MUTUKU VICTOR	11426	3S	75.0%	Good
IRFAN VARVAN	11426	3S	77.5%	V.Good
ABDULLAHI AHMED	11669	3S	75.0%	Good
PATRICK NJAGI	11536	3S	67.5%	
OTIENO HOPE	11615	3N	80.0%	V.Good
DOMINION OМУYA	11542	3S	67.5%	
EMMANUEL WEKOBO	11554	3W	60.0%	
BEN OMONDI	11644	3S	70.0%	Good
DANIEL O.V. KITWA	11578	3W	77.5%	V.Good
GIBSON .M. KEA	11557	3W	48.0%	
	SUM		763.0	
	AVERAGE PERFORMANCE		69.36%	

Table 3.0

ALLIDINA VISRAM HIGH SCHOOL

ASSESSMENT GROUP ONE		SUBJECT : MATHEMATICS		EVALUATION TOPIC : QUADRATIC J
EXPERIMENT TYPE : TRADITIONAL METHOD AND MEDIUM TECHNOLOGY				
LIST TYPE: ASSESSMENT RESULT.				
Student Name	Admission Number	Form	Percentage Score	Remarks
MOHAMED.A.ABDUL	11641	3S	82.5%	V.Good
OTIENO HOPE	11615	3N	95.0%	Excellent
MUTUKU VICTOR	11600	3S	87.5%	V.Good
SAAGAR MODASIA	11576	3N	100.0%	Excellent
NOAH ANTHONY	11564	3N	80.0%	V.Good
BRIAN OCHIENG	11595	3S	75.0%	Good
AHMED ABDALLA	11624	3N	60.0%	
GABRIEL OJWANG	11585	3N	75.0%	Good
GEORGE OWINO	11561	3S	72.5%	
FRED OTIENO	11613	3S	70.0%	
KIOKO MUTUA	11597	3S	80.0%	V.Good
ALI MATANO	11646	3N	65.0%	
SUM			942.5	
AVERAGE PERFORMANCE			78.54%	

Table 4.0

ALLIDINA VISRAM HIGH SCHOOL

ASSESSMENT GROUP **TWO** SUBJECT : **MATHEMATICS** EVALUATION TOPIC : **QUADRATIC**
 EXPERIMENT TYPE : **TRADITIONAL METHOD AND MEDIUM TECHNOLOGY**
 LIST TYPE: *ASSESSMENT RESULT.*

Student Name	Admission Number	Form	Percentage Score	Remarks
HERMAN MWALANDI	11915	3W	80.0%	V.Good
EMMANUEL GATHAGE	11602	3W	75.0%	V.Good
IRFAN VARVANI	11583	3S	80.0%	V.Good
ABDULLAHI AHMED	11669	3S	80.0%	V.Good
KURI JAMES	11426	3W	70.0%	
RASHID .B.	11617	3S	75.0%	V.Good
EMMANUEL WEKOBO	11554	3W	67.5%	
DOMINION OМУYA	11542	3S	70.0%	
DANIEL .O.V.KITWA	11578	3W	65.0%	
KEVIN NGUGI	11552	3S	85.0%	V.Good
AWADH SALIM	11650	3S	62.5%	
GIBSON KEA	11557	3W	80.0%	V.Good
GEORGE OUMA	11596	3W	77.5%	V.Good
	SUM		967.5	
	AVERAGE PERFORMANCE		74.42%	

Table 5.0

ALLIDINA VISRAM HIGH SCHOOL

**EXPERIMENT TYPE: HIGH TECHNOLOGY
ASSESSMENT GROUP : ONE
LIST TYPE: ASSESSMENT RESULT.**

**SUBJECT : BIOLOGY
EVALUATION TOPIC : CYTOLOGY**

	Student Name	Admission Number	Form	Percentage Score	Remarks
1	GEORGE OWINO HERMAN	11568	3S	83.4%	V.Good
2	MWALANDI	11915	3W	96.0%	Excellent
3	NOAH ANTHONY	11564	3N	93.8%	Excellent
4	PATRICK NJAGI EMMANUEL	11536	3S	73.0%	
5	GATHAGE	11602	3W	87.6%	V.Good
6	KIOKO MUTUA	11597	3S	96.0%	Excellent
7	PETER .M.	11625	3S	83.4%	V.Good
8	IRFAN VARVANI	11583	3S	87.6%	V.Good
9	GABRIEL OJWANG	11585	3N	87.6%	V.Good
10	FRED OTIENO	11613	3S	87.6%	V.Good
11	OTIENO HOPE	11615	3N	89.7%	Excellent
12	BRIAN OCHIENG	11595	3S	96.0%	Excellent
13	GEORGE OUMA	11596	3W	89.7%	Excellent
		SUM		1151.4	
		AVERAGE PERFORMANCE		88.57%	

Table 6.0**ALLIDINA VISRAM HIGH SCHOOL**

EXPERIMENT TYPE: HIGH TECHNOLOGY		SUBJECT : BIOLOGY		
ASSESSMENT GROUP : TWO		EVALUATION TOPIC : CYTOLOGY		
LIST TYPE: ASSESSMENT RESULT.				
Student Name	Admission Number	Form	Percentage score	Remarks
ALI MATANO	11646	3N	79.0%	
KEVIN NGUGI	11552	3S	91.7%	Excellent
MOHAMED				
ABUBAKAR	11641	3S	87.6%	Excellent
ABDALLA RIZGALLA	11577	3S	81.3%	V.Good
DOMINION OMUYA	11542	3S	87.6%	V.Good
AWADH SALIM	11650	3S	77.1%	
SAAGAR MADASIA	11576	3N	91.7%	Excellent
RASHID .M.	11617	3S	93.8%	Excellent
MUTUKU VICTOR	11600	3S	73.0%	
KURI JAMES	11426	3W	83.4%	V.Good
EMMANUEL				
WEKOBO	11554	3W	89.7%	Excellent
DANIEL .O.V. KITWA	11578	3W	77.1%	
BEN OMONDI	11644	3S	79.0%	
GIBSON KEA	11557	3W	91.7%	Excellent
PATRICK .M.	11536	3S	83.4%	V.Good
	SUM		1267.1	
	AVERAGE PERFORMANCE		84.47%	

APPENDIX II: Introductory Letter.

**SALIM SALMAN
P.O.BOX 42120-80100
MOMBASA**

**The HEADMASTER
ALLIDINA VISRAM HIGH SCHOOL- AVHS
P.O.BOX
MOMBASA**

May, 2007.

Dear Sir,

Subject: **REQUESTING FOR A RESEARCH CENTER**

I am a Post-graduate student at the University of Nairobi pursuing a *Post graduate Diploma in Education course in the academic year 2006-2007.*

The research study that I undertake to fulfil the requirement of this Programme is '*The Impact of ICT on Teaching and Learning*'. I therefore, humbly and politely request your office to allow me to use your institution –AVHS- as my case study hoping to keep any information confidential and consequently enable us to use the data collected to improve the academic environment of our children as part of the objectives of the research study.

Any assistance accorded will be highly appreciated and honoured.

Sincerely,

**SALIM SALMAN
Post-Graduate Student
University of Nairobi- L40/8161/2006
TEL: 0722-711587
MOMBASA, KENYA.**

APPENDIX III: The Budget

PARTICULARS	AMOUNT- Ksh.
Pens and Pencils	100
Full scups - one ream	350
Field Study	18000
Transport	1000
Printing	1000
Binding	1600
Miscellaneous	750
GRAND TOTAL	22800

APPENDIX IV: The Questionnaires

Questionnaire

'The IMPACT OF ICT ON TEACHING AND LEARNING'

A case study of Allidina Visram High School – AVHS

Questionnaire No.....

Recipient Type: **STUDENT**

Date:.....

Dear Respondent,

You are kindly and humbly requested to answer all the questions appertained to this questionnaire to enable the researcher to successfully undertake the study aforesaid above. Furthermore, you are advised that your identity and other information you give will be confidentially treated and secured. Again all the details in this questionnaire will be used solely for the research study and nothing else.

Survey Instrument - Part I for Students

1. Country:

2. Name of School:

3. Address:

4. Type of area where school is located:

Urban

semi-urban

rural

minority area (can be combined with urban, semi-urban, and rural)

5. Type of school:

Public/government

private

special school

6. Student's name (optional):

7. Academic Level: Primary Secondary Non-formal

8. Grade/Year Level/ Form:

9. Gender: Male Female

10. Age in years:

11. How many years have you been using computers?

- Less than 1 year
- 1-2 years
- 2-4 years
- 4-6 years
- More than 6 years

12. Please indicate whether you have/have no access and using/not using the following in your schoolwork:

	Access (have physical access)		Use for schoolwork	
	Yes	No	Yes	No
Overhead projector	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
TV	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
VCD	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
VHS	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
DVD	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Video camera	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Photo camera	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Radio/cassette player	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Digital photocopier	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Multimedia projector	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
LCD Projector	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Computers:				
Desktop	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Laptop	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Handheld/PDA	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Computer printer:				
Colour printer	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Black and white printer	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Dot matrix	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Laser printer	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Ink jet	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Bubble jet	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Scanner	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
CD writer	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Computer speaker	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

13. In which classes or subjects do you use computers and related ICTs?

- Computer class
- Mathematics
- Science
- Social sciences
- Local language
- English
- Art
- Music
- others (please specify)

14. Please indicate your level of skills in the use of the following computer applications:

	Excellent	Very Good	Good	Fair	No Capability
I. BASIC - SIMPLE USE OF APPLICATIONS FOR PURPOSES OTHER THAN CLASSROOM LEARNING					
Word processing -prepare papers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Spreadsheets	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Presentation tools (PowerPoint)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Basic E-mailing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Basic Internet browsing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Graphics	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Web page designing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Use of chatting platform	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

II. INTERMEDIATE - USE OF EXISTING APPLICATIONS FOR LEARNING BOTH INSIDE AND OUTSIDE THE CLASSROOM					
Use of applications (word processing, spreadsheets, etc.) in classroom learning of specific subjects	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Use of various applications for doing assignments and lessons	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
E-mailing for tele collaboration/online collaborative projects, exchanging assignments and lessons, commenting on papers used in schools	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Use of Internet resources to prepare homework, research, lessons, or for collaborative school projects	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Developing basic and static webpage for schoolwork	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
III. ADVANCED - USE OF ICTS TO CREATE AND DEVELOP NEW APPLICATIONS, CONTENTS, LEARNING MATERIALS, ETC.					
Use statistical tools for developing formulations and packages	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Programming	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Database development and management	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Advanced website designing, maintenance and use for teaching/learning	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Developing educational software and new applications	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Developing and operating e-learning or online learning platforms	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Setting up and moderating discussion groups and chats	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Creating web-based and ICT-based multimedia materials	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

15. Who taught you about computers?

- I have taught myself
- My teachers
- My friends
- My family
- Other students
- Training outside of schools
- Online courses or helpdesk
- Others (please specify)

16. For what purpose and in what degree do you use ICT in schoolwork?

Purpose	Very Often (everyday)	Often (twice or more a week)	Sometimes (a few times a month)	Rarely (once in several months)	Not at all
Informative: to find, acquire and use information	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Functional: to use and manipulate existing information for educational purposes using existing information (compile lists of books, abstract and summarize books and materials, use accessed information to prepare homework, compare information)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Creating - to compose, compile, produce new information (write papers, drawing, programming, make PowerPoint presentations, give oral presentations, prepare newsletter, create own website, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Communication - to exchange and to transmit information with other students, teachers and others using email and Internet; to join discussion forum and chats	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

17. In your school, are you able to use the required ICT tools and facilities that you need in doing your subject schoolwork?

Yes No

18. Where do you use computers in school?

- In a classroom
- In a computer laboratory
- In both classrooms and laboratory
- In the library
- I do not use computers in schools
- Others (please specify)

19. What are your favourite activities using computers? (Check as many as applicable)

- Find and research information
- E-mail
- Chat
- Download music
- Play games
- Surf the Internet
- Use educational software
- Write papers
- Write computer programs
- Draw and paint
- Make presentations using PowerPoint
- Others (Please specify)

20. If you are using computers and related ICTs, how many hours on the average per week of normal school hours are you able to use these computers and related ICTs to do your studies?

21. If no, where else can you have access and use of these ICT tools and facilities outside of your normal school hours?

- at home
- in commercial places (cyber cafe?)
- friends' house
- ICT training courses
- Others (pls. specify)

22. Do you have access to Internet?

- Yes No

23. How often do you use the Internet for surfing websites in schools?

- Never
- Once a month
- Once a week
- Several times a week
- Daily

24. Please check if you have any of the following?

- Mobile phone
- Handheld/PDA
- Email address
- Personal website/webpage

25. How often do you use and send email

- Many times every day
- A few times every day
- A few times every week
- A few times every month
- A few times every year
- Never

REMEMBER: *The researcher respects your privacy and will not share the information provided here with any other organization or company.*

Survey Instrument - Part II for Teachers and Teaching Staff

1. Name of staff (optional)

2. Country:

3. Name of School

4. Address:

5. E-mail address

6. Type of area where school is located:

- Urban
- semi-urban
- rural
- minority area

7. Type of school:

- Public /government
- private
- special school

8. Gender: Male Female

9. Age in years:

- Under 30
- 30-50
- Over 50

10. Number of years in the service

11. Designation:

12. Category: teaching non-teaching

13. Educational Level:

Highest degree earned

Undergraduate degree

Specialization

14. Academic levels taught: (please check all that apply.)

- Preschool
- Primary
- Secondary
- Non-formal

15. In which subjects do you use ICT as teaching tool?(Check all that apply)

- Computer class
- Mathematics
- Science
- Social science
- Local language
- English
- Art

- Music
- Others (please specify)

16. How many years have you been using computers?

- Less than one year
- 1-2 Years
- 2-4 Years
- 4-6 Years

17. Did you receive any training on information and communications technology before you joined the teaching profession (pre-service)?

- Yes No

18. what are your main reasons for attending computer training?

- Financial
- Prestige
- Career enhancement
- Personal growth
- Training is required
- Others (please specify)

19. Please rate your expertise in the use of the following:

	Excellent	Very Good	Good	Fair	No Capability
Word processing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Spreadsheets	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Presentation tools (PowerPoint)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
E-mailing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Internet browsing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Statistical tools	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Graphics	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Web page designing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Programming	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Database management	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Project management	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

20. How often do you use ICT tools in the following purposes:

	Very often (everyday)	Often (twice or more times a week)	Seldom (a few times a month)	Never
Teaching-learning for specific subjects	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Teaching computer skills	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Finding/accessing information and educational materials	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Making presentations/lectures	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Preparing lessons	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Communicating with students	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Communicating with other teachers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Communicating with parents	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Monitoring and evaluating students' progress or keeping track of student's performance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Preparing reports	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Further personal development	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Others, please specify	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

21. Please check under each column to indicate that you have/have no access to computers and Internet in the following:

Location	Computer		Internet	
	With Access	Without Access	With Access	Without Access
School	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
At home	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Commercial places, e.g. cyber cafe	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
ICT training course	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

centres				
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22. Where do you use computers in school?

- Teachers lounge
- In my office
- Administrator's office
- Classrooms
- Computer laboratory
- Library
- Others (please specify)

23. How many hours per week are your school's computers accessible to you?

- Less than one
- 1-2
- 2-4
- 4-6
- 6-10
- More than 10

24. Do you use computers outside of school hours?

- Yes No

25. If you have access to the Internet, how often do you use in the schools?

- Never
- Once a month
- Once a week
- Several times a week
- Everyday

26. How do you use Internet in your job as a teacher?

- For teaching specific lessons in various subjects
- For making presentations/lectures
- For preparing lessons
- For communicating with students
- For communicating with teachers
- For accessing and using online assessment tools
- For preparing papers and teaching materials
- For collecting handouts and reference materials
- Others (please specify)

27. Do you have an email address?

- Yes No

28. Do you maintain a personal web page as teaching tool?

- Yes No

APPENDIX V: Time Schedule

The Research is conducted based on the following Schedule.

PERIOD	RESEARCH ACTIVITY
APRIL 2007	Proposal Writing
MAY-JULY 2007	Pre-Testing Instruments and Data Collection
AUGUST 2007	Data Analysis
SEPT-OCTOBER 2007	Report Writing
APRIL 2008	Submission of Research Project