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OF ADVANCED RESEARCH****RESEARCH ARTICLE****CONSTRAINTS TO THE INTEGRATION OF ICT IN THE TEACHING-LEARNING  
PROCESS:A CASE OF TAMBACH TEACHERS TRAINING COLLEGE,KEIYO-  
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**Key words:****\*Corresponding Author****CHRISTOPHER  
KIPKOSGEI RONO***Copy Right, IJAR, 2015,. All rights reserved***INTRODUCTION****1.0 Background to the Study**

In the recent past, the world has witnessed a high rate of developments in technology. These developments have had an effect on almost every sector of the world economy and the education sector has not been spared either. It has also become clear that increasing the quality of teaching and learning has been seemingly important concern for education. The government has been committed in ensuring that important policy documents are put in place to guide in the implementation of important projects in the education sector. For example, the Sessional Paper No. 1 and the Kenya Education Sector Support Programme (KESSP) documents of the year 2005, outline the introduction of Information and Communication Technologies (ICTs), educational priorities, their integration into education and the associated financial investments. The National ICT Policy embedded this intent as a national priority and provided the impetus for the ministry to develop its policy on ICT in education ([www.infodev.org](http://www.infodev.org)). From all fronts, information and communication technologies (ICTs) represent a new approach for enhancing the dissemination of information and helping to meet various challenges in the education sector. That is why the role of the teacher in the 21<sup>st</sup> Century is shifting to an essential mission of being the frontier for applying technological innovations to the teaching and learning process.

A variety of action plans have been developed to effectively integrate ICTs in teaching/learning but teacher trainers still seem not to use ICT fully in Teaching at Tambach Teachers College.

**1.2 Problem Statement**

Increasing the quality of teaching and learning has been a seemingly important concern for education (Januszewski and Molenda, 2008). Information Communication Technologies (ICTs) represent a new approach for enhancing the dissemination of information (Level-Duffy, McDonald, and Mizell, 2003). There have been several workshops held by the Ministry of Education in Partnership with the Academy for Educational Development (AED) among other

bodies to sensitize teacher trainers on ICT in education. Amongst the specific objectives of the workshop under the topic, “ICT in Education” were to enable the participants to:

- a) Use ICT in effective curriculum delivery
- b) Demonstrate how various ICT systems and processes can be used in teaching and learning

The participants popularly known as “Master Trainers” cascaded the skills acquired in the workshop to all the teaching staff in their respective teacher training colleges. To ensure that this was done, at least one member from AED (now fhi360) visited the colleges to ensure the success of the project at the college level.

In addition to the workshops held and attended by the “Master Trainers”, the government through the Ministry of Education in collaboration with AED donated a machine to each of the 21 public primary teacher training colleges. The project was popularly referred to as “Tafakari Project” and in it, several Science based programmes are aired. Generally, all these programmes are meant to help in integrating different ICT issues in education.

Further, the AED donated to Public Primary Teacher Colleges two printers, two portable cameras and two LCD Projectors each all meant to aid in integrating ICT in education.

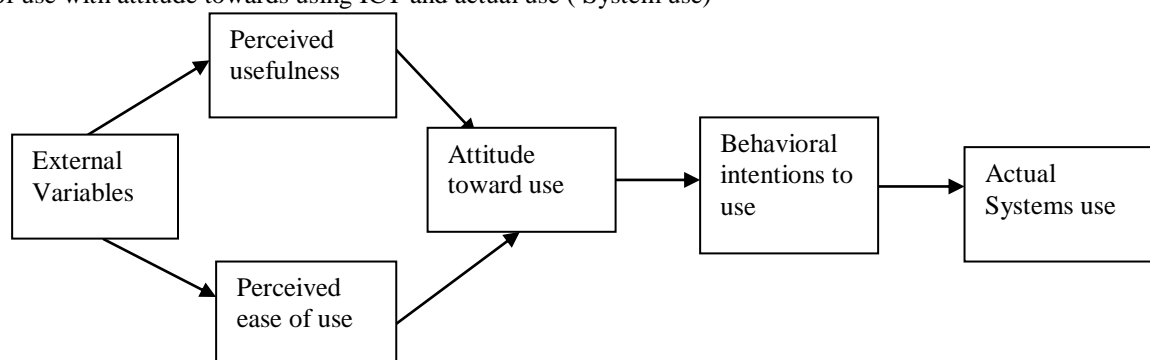
At the college level, Tambach TTC has a well-equipped computer laboratory together with a cyber café. There are three computer teachers falling under the ICT department, a college LRC technician and a computer laboratory technician.

The college spends to a tune of Ksh.74, 000/= per term to service and maintain the computers besides expenditure on software and printing material (**Source:** Accounts Office, Tambach TTC).

The expenditure incurred either through external and internal seminars, purchasing and maintaining machines, paying staff could be justified if teacher trainers could fully integrate ICT in teaching and learning among other uses. At the college, this is limited to the trainers who have been exposed to computer skills, computer lecturers and those who have a passion for ICT. To this end, ICT equipment are not being utilized fully in the teaching/learning process to justify their availability, expenditure incurred in their maintenance and computer skills acquired through seminars/workshops. These issues lead to one asking the question- What constraints the teacher trainers from fully integrating ICT in Education? This forms the gist of the study.

### 1.3 .Theoretical Framework

Bagozzi and Warshaw ( 1989) in ( Coxetal – 1999)developed a theory of “ Action relating to reasons” ( Technology Acceptance Model) based on the work of Fishben and Ajzen ( in David et al 1989) to investigate why some people use computers and their attitude and towards them. Their model links the perceived use fullness and ease of use with attitude towards using ICT and actual use ( System use)



**Fig.1.Technology Acceptance Model, (Davis,Bagozzi and Warshaw,1989) in Cox at al,1999.**

#### 1.3.1 External variables

In the above model, the external variables represent the various influences on teachers which come from outside their sphere of control they may include

- The requirements of a national curriculum ( Need for ICT integration/
- The new opportunities for training of college tutors
- The changes in society with the rapid growth in the uses of the internet and ICT in general
- College Policies on using ICT

- Opinions of colleagues
- Responsibilities of the teacher
- Pressure from parents and trainers

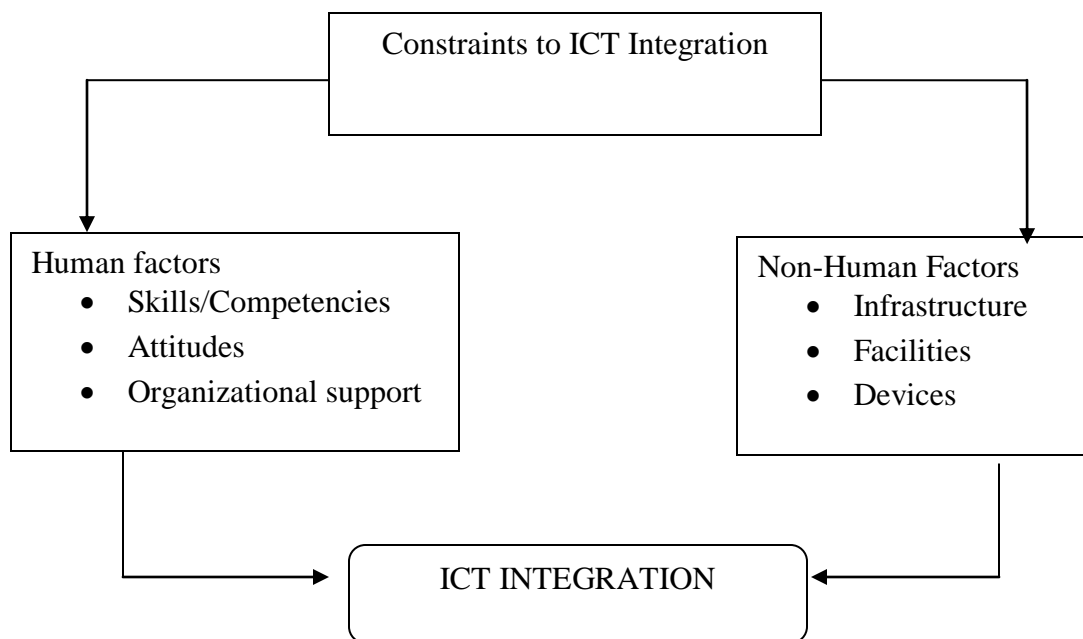
### 1.3.2 Perceived Usefulness

If teachers see no need to change their professional practice then they are unlikely to adopt the use of an innovation, ICT. However, if they perceive ICT to be useful to them, their teaching and their pupils learning then they are more likely to have a positive attitude towards the use of ICT in the classroom (Cox et al 1999).

## 1.4 Conceptual Framework

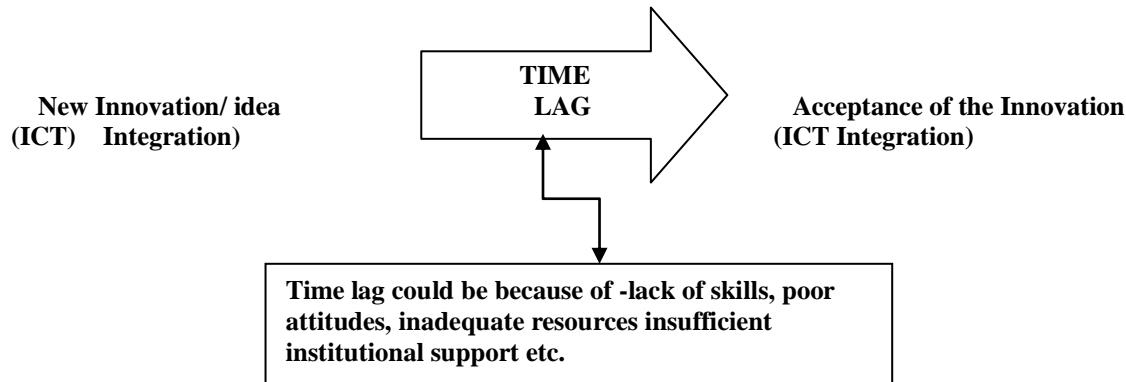
When a new idea/innovation is introduced, it may take a long before is officially takes root. ICT integration is an innovation in education. It has taken some time for tutors to “own” it. This study, besides hinging on the above theoretical framework borrows heavily from this conceptual framework. Key words here include skills, attitudes infrastructure, support network and institutional management support.

In conceptualizing the framework, the researcher attempted to point out the relationship between the constraining factors and the use of ICT in teaching. The framework is represented diagrammatically as follows:-



**Fig.2. Conceptualized model of ICT integration- supportive/constraining factors**

The conceptualized model was further strengthened by another conceptualized model which was diagrammatically represented as follows;



**Fig.3. Time-lag in embracing change/innovation**

After the introduction of the idea, there is a likelihood or a possibility of the innovation not taking root immediately due to the constraining factors like skills, attitudes, infrastructure, support network, phobia for replacement and technophobia among other reasons.

### 1.5 Purpose of the study/Objectives of the study

The objective of the study was to investigate the constraints to the integration of ICT in the teaching/learning process at Tambach Teachers Training College.

Specifically, the study sought to:

- Determine the availability of ICT infrastructure and facilities in the college
- Establish the competency skills of the lecturers in the use of ICT facilities
- Assess the attitudes held by lecturers and student teachers on the integration of ICT in the teaching and learning process.
- Establish the competencies of administrative staff and their role in ICT Integration.

### 1.6 Significance of the study

The study on the constraints to the integration ICT in teaching and learning process in Tambach TTC is significant in a number of ways: The findings will

- Be used to arrive at staff needs on in-service training on ICT Integration
- Help in determining the extent to which ICT facilities and resources are available.
- Help in transforming the attitudes of teachers and student teachers on use of ICT in the teaching and learning process.
- Be used to improve the capacity of lecturers to use ICT in the teaching and learning process. hence improving on lesson delivery and generally faster syllabus coverage.

### 1.7 Delimitations of the study

The study limited itself to the use of ICT in the process of teaching and learning only. It also limited itself to teacher trainers who had been exposed to seminars on ICT integration in education.

## CHAPTER TWO: LITERATURE REVIEW

### 2.0 Introduction

Information and Communication Technology (ICT) has become an important part of most organizations and businesses these days.

Throughout the world there is awareness of the fundamental role of new Information and Communication Technologies (ICTs) in the field of education (<http://ccsenet.org/journal/index.php/ies/article/view/5891>). They provide teachers and students an opportunity to learn to manipulate ICT resources in this information age. It offers many means of improving teaching and learning ([http://www.ejmste.com/v5n3/EURASIA\\_v5n3\\_Bingimlas.pdf](http://www.ejmste.com/v5n3/EURASIA_v5n3_Bingimlas.pdf)). After several years of effort, Kenya promulgated a National ICT Policy in January 2006 that aims to "improve the livelihoods of Kenyans by ensuring the availability of accessible, efficient, reliable and affordable ICT services" ([www.infodev.org/ict4edu-Africa](http://www.infodev.org/ict4edu-Africa)). Policy guidelines are an asset in enabling the success of an undertaking.

In 2011, the World Bank kicked off a new initiative to build a global database of policy documents related to ICT use in education, to aid policymakers assess and benchmark their own policies against those of comparator countries around the world. As part of this process, [SABER-ICT](#) is attempting to assess the state of ICT-related policy formulation in the education sector according to a number of key policy domains and characteristics, including:

- vision and political commitment;
- ICT infrastructure;
- teachers and teaching;
- learning materials;
- skills development;
- educational administration;
- monitoring and evaluation;
- equity;
- institutional arrangements;
- non-formal education; and
- child digital safety.

The first set of results from this work was expected in mid-2012.

(<http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTEDUCATION/0,,contentMDK:2306947>) Under the Performance Contracting, every college is required to design an ICT policy and Tambach College is no exception. Its policy came into existence in the year 2011.

### 2.1: ICT Facilities, Devices and Infrastructure

ICT facilities and devices cover computers (including palm and handheld devices); telephones (including mobiles); removable media; radios or other high frequency communication devices; television sets; digital or analogue recorders (including DVD and video); cameras; photocopiers; facsimile machines; printers (and other imaging equipment); electronic networks, internet; email; web mail; and fee-based web services. (<http://www.qgcio.qld.gov.au/qgcio/architectureandstandards/informationstandards/current/Pages/Use%20of%20ICT%20facilities%20and%20devices.aspx>), [www.qgcio.qld.gov.au](http://www.qgcio.qld.gov.au))

ICT facilities and devices, including the internet and email are important sources of information and means of communication that can assist Government to provide services that are more effective to the community. The use and/or access to these must be able to withstand public scrutiny and/or disclosure.

To ensure consistent and effective management of ICT facilities and devices the concerned must:

- develop and implement clear policies and guidelines relating to the use of ICT facilities and devices;

- clearly inform employees what their responsibilities are under the policies and guidelines and the consequences if those policies and guidelines are broken; and
- clearly inform employees of procedures that will be used to monitor compliance with the policies and guidelines.  
(<http://www.qgcio.qld.gov.au/qgcio/architectureandstandards/informationstandards/current/Pages/Use%20of%20ICT%20facilities%20and%20devices.aspx>)

Before launching any ICT-based programme, policymakers and planners must carefully consider the following on infrastructure:

- In the first place, are **appropriate rooms or buildings** available to house the technology? In countries where there are many old school buildings, extensive retrofitting to ensure proper electrical wiring, heating/cooling and ventilation, and safety and security would be needed.
- Another basic requirement is the **availability of electricity** and telephony. In developing countries large areas are still without a reliable supply of electricity and the nearest telephones are miles away. Experience in some countries in Africa point to wireless technologies (such as VSAT or Very Small Aperture Terminal) as possible levers for leapfrogging. Although this is currently an extremely costly approach, other developing countries with very poor telecommunications infrastructure should study this option.
- Policymakers should also look at the ubiquity of different types of ICT in the country in general, and in the educational system (at all levels) in particular. For instance, a basic requirement for computer-based or online learning is **access to computers** in schools, communities, and households, as well as affordable Internet service.

In general, ICT use in education should follow use in society, not lead it. Education programs that use cutting-edge technologies rarely achieve long term success:

*It is cheaper, and easier, to introduce a form of technology into education, and keep it working, where education is riding on the back of large-scale developments by governments or the private sector. Television works for education when it follows rather than precedes television for entertainment; computers in schools can be maintained once commercial and private use has expanded to the point where there is an established service industry.*

## 2.2 ICT competency skills

To live, learn, and work successfully in an increasingly complex, information-rich and knowledge based society, students and teachers must utilize technology effectively. The Dakar Framework of Action for Education for All (EFA), adopted in 2000 as a roadmap to meet the Education for All goals by 2015, highlights the role that Information and communication technologies (ICTs) has to support EFA goals at an affordable cost. ICTs have great potential for knowledge dissemination, effective learning and the development of more efficient education services (<http://www.un-gaid.org/tabid/883/Default.aspx>).

Attainment of competencies in ICT use is considered a critical step in its integration in education. This could explain why major world bodies like the World Bank are spending a lot of financial resources on ICT especially in the developing countries. The World Bank is currently working with partners in multiple countries to contextualize and adapt the ICT competency standards for teachers (ICT-CFT) proposed by UNESCO for use in national teacher professional development programs. The ICT competency standards for teachers were designed by [UNESCO and its partners](#) to help educational policymakers and curriculum developers identify the skills teachers need to harness technology in the service of education (<http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTEDUCATION/0,contentMDK:22931444>).

Through the ongoing and effective use of technology in the schooling process, students have the

opportunity to acquire important technology capabilities. The key individual in helping students develop those capabilities is the classroom teacher. The teacher is responsible for establishing the classroom environment and preparing the learning opportunities that facilitate students' use of technology to learn, and communicate. Consequently, it is critical that all classroom teachers are prepared to provide their students with these opportunities. (<http://www.unesco.org/en/competency-standards-teachers>) Teachers must teach students to apply strategies for solving problems and to use appropriate tools for learning, collaborating, and communicating. However, effective integration of emerging ICTs in traditional education models is impeded by many factors. A key retardation factor relates to the lack of proper ICT competencies on the part of teachers. (<http://www.un-gaid.org/tabid/883/Default.aspx>)

Today's classroom teachers need to be prepared to provide technology-supported learning opportunities for their students. Being prepared to use technology and knowing how that technology can support student learning have become integral skills in every teacher's professional repertoire. (<http://www.unesco.org/en/competency-standards-teachers>) Schools and classrooms, both real and virtual, must have teachers who are equipped with technology resources and skills and who can effectively teach the necessary subject matter content while incorporating technology concepts and skills.

The University of Tennessee website, <http://www.sis.utk.edu/computing> and *ICT Learning Resources* breaks down the basic competency skills into five categories, which include;

- a) **Basic knowledge of computers which comprises-**
  - Understanding basic computer hardware components and technology
  - Understanding the concepts and the basic functions of windows operating systems
  - Start up, log on, and shut down a computer system properly
  - Use a mouse pointing device and keyboard
  - Use help and know how to troubleshoot routine problems
  - Identify and use icons (folders, files, applications and shortcuts)
  - Minimize, maximize and move windows
  - check how much space is left on a drive or other storage device
  - download and install software on a hard disk
  - check for and uninstall operating system updates
- b) **Proficiency in using Productivity Software which comprises:**
  - creating documents of various types and saving in a desired location
  - retrieving an existing document from the saved location
  - selecting, copying and pasting text in a document or desired location
  - print a document
  - name, rename, copy and delete files
  - understand and know how to use different types of software-word processing, presentation, and spreadsheet
- c) **Electronic Communication Skills**
  - Email, using a common email program (examples Outlook, Apple Mail)
  - Compose, send, reply, and forward messages
  - Add attachments to a message
  - Retrieve attachments from an email message
  - Copy, paste and print message content
- d) **Internet Skills**
  - Use Browser effectively, including bookmarks, history, toolbar, forward and back buttons
  - Download files and images from a web page
  - Use search engines and directories to find information on the web
- e) **Moving Files**
  - Transfer files by uploading or downloading
  - View and change folder/document security settings
  - Copy files from hard disk to storage devices and vice versa

In a study carried out by UNESCO in the year 2008 dubbed "ICT Competency Standards for Teachers", some specific competency skills which teachers need to possess were identified. These skills were thought to be essential if a teacher was to integrate ICT in the teaching/learning process. They include;

- a) Teachers must have a deep knowledge of their subject and the ability to apply it flexibly in a variety of situations. They must also be able to create complex problems as a measure of students' understanding.

- b) Teachers must know basic hardware and software operations, as well as productivity applications software, a web browser, communications software, presentation software, and management applications
- c) Teachers must be able to use technology with the whole class, small groups, and individual activities and assure equitable access.
- d) Teachers must have the technological skill and knowledge of Web resources necessary to use technology to acquire additional subject matter and pedagogical knowledge in support of teachers' own professional development.
- e) Teaching is student-centered in this approach and the teacher's role is to structure problem tasks, guide student understanding, and support student collaborative projects. In this role teachers must have the skills to help students create, implement, and monitor project plans and solutions.
- f).Teachers must be able to create flexible classroom learning environments. Within these environments, teachers must be able to integrate student-centered activities and flexibly apply technology to support collaboration.
- g).Teachers must have the skills and knowledge to create and manage complex projects, collaborate with other teachers, and make use of networks to access information, colleagues, and outside experts in supporting their own professional development.
- h).Teachers must be able to design ICT-based knowledge communities and use ICT to support the development of students' knowledge creation skills and their continuous, reflective learning.
- i).Teachers should be able to play a leadership role in training colleagues and in creating and implementing a vision of their school as a community based on innovation and continuous learning, enriched by ICT.
- J).Teachers, too, must have the ability and inclination to experiment and continuously learn and use ICT to create professional knowledge. Communities

Besides the skills mentioned above, there are other basic elements of digital literacy which include the following:

**Manage:** Applying an existing organizational or classification scheme. Conduct a rudimentary and preliminary organization of accessed information for retrieval and future application.

**Integrate:** Interpreting and representing information - summarizing, comparing, and contrasting. **Interpret** and represent information by using ICT tools to synthesize, summarize, compare, and contrast information from multiple sources.

**Evaluate:** Making judgments about the quality, relevance, usefulness, or efficiency of information. Judge the currency, appropriateness, and adequacy of information and information sources for a specific purpose (including determining authority, bias, and timelines of materials).

**Create:** Generating information by adapting, applying, designing, inventing, or authoring information. Adapt, apply, design, or invent information in ICT environments (to describe an event, express an opinion, or support a basic argument, viewpoint or position).

**Communicate:** Communicate information persuasively to meet needs of various audiences through use of an appropriate medium. Communicate, adapt, and present information properly in its context (audience, media) in ICT environments and for a peer audience. (<http://www.mnddc.org/asd-employment/6a-ict-competencies.html>)

### 2.3 Use of ICT in teaching and learning and its contributions

**It is worth mentioning that ICTs in teacher training in Kenya's education sector is still a new field .** Investment into upgrading computer laboratories and building ICT capacity in the Teacher Training Colleges (TTCs) is an intervention that can quickly yield high returns. By providing adequate access to ICTs, the TTCs can use ICTs to achieve learning objectives at various levels. At the simplest level, ICTs allow for storage and display of information. However, using ICTs also fosters exploration of materials and ideas. ICTs allow learners to apply a concept or understanding to a new situation; to analyze ideas by organizing them and manipulating them; and to learn how to evaluate and problem solve. At the highest level, ICTs are used to foster the design or construction of

integrating projects, whereby students must explore wide range of ideas and resources, analyze and evaluate them, and synthesize them in a project. ([http://ict.aed.org/kenya/ex\\_summary.htm#Infrastructure](http://ict.aed.org/kenya/ex_summary.htm#Infrastructure))  
 ICT is revolutionizing learning in the learning institutions in that learning is taking place from many directions as the following statement holds:

‘ICT has enabled learning through multiple intelligence as ICT has introduced learning through simulation games; this enables active learning through all senses’.  
 ([http://en.wikipedia.org/wiki/Information\\_and\\_communication\\_technologies\\_in\\_education](http://en.wikipedia.org/wiki/Information_and_communication_technologies_in_education))

By providing adequate access to ICTs, the TTCs can use ICTs to achieve learning objectives at various levels. At the simplest level ICTs allow for storage and display of information. However, using ICTs also fosters exploration of materials and ideas. ICTs allow learners to apply a concept or understanding to a new situation; to analyze ideas by organizing them and manipulating them; and to learn how to evaluate and solve a problem. ICTs can fully utilize the multimedia environment to support this process. ([http://ict.aed.org/kenya/ex\\_summary.htm#Infrastructure](http://ict.aed.org/kenya/ex_summary.htm#Infrastructure))  
 Several studies have been carried out in order to establish the uses of ICT by teachers. In one of the studies, it was discovered that “One of the most common uses of ICT by teachers was to use a data projector and PowerPoint or similar package to enhance their presentation of new work. Presentations were often visually attractive and could be used in a flexible way. Teachers were also able to develop and revise such materials more easily. This technology was used in both the primary and secondary sectors, but was more prevalent in the secondary schools visited”. ([www.hmie.gov.uk/documents.html](http://www.hmie.gov.uk/documents.html))

Although the current study centers on teacher trainers in teacher training colleges, the findings above can be of great comparative help as they will be used to unearth the similarities or differences in ICT use.

In the **social subjects**, departments made much use of the Internet to enable pupils to carry out individual or group research. As in other subject areas, some teachers downloaded these activities on to a CD ROM to avoid network problems for pupils exploring the resources. Teachers also made good use of data projectors and PowerPoint to enrich the quality of presentations and allow pupils to self-pace through a new topic. Some pupils carried out effective research on local politics on the local council website and word-processed an information leaflet. Others prepared PowerPoint presentations to show to their class

Research evidence has also confirmed that effective ICT integration can promote student-engaged learning. For example, in a research study on the uses and effects of mobile computing devices in K–8 classrooms, Swan, Hooft and Kratoski (2005) reported that the students’ motivation to learn and engage in learning processes were improved by the use of mobile computing. In another study exploring the use of ICT tools to engage students in Higher-order thinking in a Singapore school, Lim and Tay (2003) observed higher students’ engagement in higher order thinking by using ICT tools.

In Kenya now, secondary school students are not allowed to carry mobile phones to school because of discipline-related issues. Therefore, for the Kenyan case, mobile computing may be a bit difficult to apply and measure its effectiveness in motivating learners to study.

ICT can also help to accelerate teacher training as the world is facing an acute and growing shortage of teachers with currently, 60 million teachers in the world, but another 15-35 million needed to achieve Education for All by 2015. (<http://www.un-gaid.org/tabid/883/Default.aspx>)

### 2.3.1 Contributions of ICT to learning

In a study conducted to find out the contribution of ICT in supporting learning, it came out that staff and students view the ICT contribution with a positive mind. The study, among other things found out that;

A number of **support for learning** staff spoke positively about the contribution of ICT in supporting the learning of pupils experiencing a range of difficulties. They cited as key elements of the impact specialized laptops and other computers, and pupils’ engagement with a good range of searchers Software. The use of computers often allowed a better focus on the individual’s needs and increased pupil motivation and involvement with activities and games that offered feedback, encouragement and reward.

The use of these tools in lessons often encouraged a better quality of questioning and interaction between teacher and learners, in that pupils were not looking down at books or worksheets, but focused collaboratively as a class on a single information source.

Their listening and talking skills were also developed effectively in some schools through making their presentations using PowerPoint. In one school, pupils practiced their writing skills by sending e-mails to the main character in the novel they were reading. ([www.hmie.gov.uk/documents.html](http://www.hmie.gov.uk/documents.html)) Compared with our local situation (Kenya), the level of ICT knowledge among students and pupils is still low and that majority of schools are not able to allocate a computer to every single learner in school. At the same time, students who can afford to open and maintain e-mail addresses are likely to be very few. This is because of the low level of exposure to ICT facilities and resources.

#### **2.4 Attitudes towards ICT**

Teacher- trainers' attitude towards ICT is a very important factor that plays an important role in determining the success of ICT integration in teaching and learning. With the introduction of the new ICT initiatives and other innovations in education, it becomes crucial particularly for newly employed teachers to be knowledgeable in using ICT effectively in training teachers. Attitude, in conjunction with support and skill have at times been found to affect the way people perceive and use ICT. In addition, cultural beliefs also have a share of blame in relation to the perception of technology. In a study carried out in New Zealand, it was found out that people believe that computers are for brainy people, for males, for young, are difficult to use or belong to the middle-class 'white' culture. In addition, the concern over lack of security of personal information or that computers are unsafe for families because of the amount of unsuitable material on the internet is sometimes expressed ([www.qgcio.qld.gov.au/use](http://www.qgcio.qld.gov.au/use)). The study adds 'One significant reason why some groups choose not to access the internet is because the content is not relevant or interesting to them'. Thus, from the findings of the study above, it can be inferred that the culture and the economic class level of the teacher trainer may affect the integration of ICT in education. It has come to the notice of many internet users that a lot of pornographic content is highly available in the net. This could be the reason why many old teacher trainers feel that the content in the net may not be relevant. To solve a problem like the one above, policy guidelines come in very handy and that could be the reason why many countries including Kenya have promulgated the ICT policy guidelines. With this in place, institutions like teacher training colleges have been mandated to design their ICT policies. The Tambach TTC one was produced in the year 2011 and has well-thought out guidelines on ICT

In a study carried out in Cyprus involving Primary teacher trainees on 'Attitudes towards use of ICT', the study revealed that;

- a) The majority of student-teachers have positive attitudes towards computers for personal use. More than 60% of the Cypriots revealed not only that they like working with computers but also that they have confidence working with them.
- b) Almost all student teachers believe that the computer is useful both to their future work and for personal tasks. Similarly, the great majority of student teachers have positive attitudes towards the role of IT in both teaching and learning.

These results may lead to one concluding that the University of Cyprus graduates have a positive attitude towards ICT in education as well as an acceptance of the potential role of ICT within teaching and learning. They also appear to have sufficient basic ICT skill competence for operating the ICT equipments. This appears to be a necessary first step for their further ICT professional development to facilitate the implementation of learning with ICT into Cypriot Primary Education (<http://www.leeds.ac.uk/educol/documents/00001300.htm>).

The findings of a study, which were obtained by analyzing the data collected from the teachers revealed that, teachers had a low level of ICT use for educational purpose, teachers hold positive attitudes towards the use of ICT, and a significant positive correlation between teachers' level of ICT use and their attitudes towards ICT was found. (<http://ccsenet.org/journal/index.php/ies/article/view/5891>)

Resistance to change and negative attitudes was investigated by a number of researchers to find out if they affected ICT integration in schools. Around six researchers' findings did correlate in that resistance to change and negative attitudes were very significant barriers towards use of ICT in education.

In a study carried out by Watson (2005), it came out clearly that integrating the new technologies into educational settings requires change and different teachers will handle this change differently. Schoepp (2005) found out that although teachers felt that there was more than enough technology available, they did not believe that they were being, guided or rewarded in the integration of technology into their teaching. According to Maslow's theory of

motivation, human beings require recognition as a way of motivation. When this is not achieved, the individual may get demoralized and may eventually withdraw.

In another study by Empirica (2006), it was found out that teachers who were not using new technology such as computers in the classroom were still of the opinion that the use of ICT had unclear benefits. However, it is worth pointing out that there are other ICTs apart from the computers that teachers can utilize as a way of integrating ICT in education. They include video cameras, 35mm cameras, mobile phones, projectors, televisions, radios among other resources.

## 2.5 Administrators' competence and role in ICT use

In the past decade, public educators—both teachers and administrators have faced considerable pressure from parents, the private sector, and politicians to be accountable from the “bottom line.” The bottom line is student learning, and now more than ever, educators are expected to create schools in which all children achieve excellent outcomes in the face of shrinking budgets, dwindling resources, and rapid social change. School principals must possess a wide array of competencies in order to lead schools effectively toward the accomplishment of educational goals.

In a study that went by the title ‘*ICT in Education/Key Challenges in integrating ICTs in Education*’, it was found out that school leadership plays a pivotal role in enhancing the success of ICT use. In part, the statement read: “Leadership plays a key role in ICT integration in education”. Many teacher- or student-initiated ICT projects have been undermined by lack of support from above. For ICT integration programs to be effective and sustainable, administrators themselves must be competent in the use of the technology, and they must have a broad understanding of the technical, curricular, administrative, financial, and social dimensions of ICT use in education’. The statement underscores the role of competency in the use of the ICT together with another array of understandings.

In a report published by the National Council for Science and Technology in June 2010 that went by the title-“**ICT Capabilities and Capacities in Secondary Schools in Kenya**”, the report recognizes the role played by school administrators in curriculum implementation. The report, in part read;

*“Probably, one of the most pressing concerns to competences, skills and abilities required for ICT in education for further training or life skills is preparing students and teachers to take up new roles in the 21st Century. This is indeed determined by availability of support especially from school administrators, since they make decisions on top priority if schools are to be institutions that contribute upon graduation dependable and continued inflow of enabled individuals for social change in communities”.*  
 (.<http://www.prel.org/products/Products/Curriculum.htm>)

The quotation above underscores the role and competencies of the heads of institutions in curriculum. Since ICT is now in the teacher training curriculum though not examinable externally, it has to be implemented in totality. This means that as the administrators are the main decision makers, they have a crucial role to play and need to possess adequate competencies. This could be the reason why Erlandson and Witters-Churchill say this on the principals and their competencies in curriculum implementation;

‘Dual focus on the principalship and school improvement in the last quarter of the 20th century has intensified the need for principals to excel at competencies related to curriculum and instruction. The implications of this intensified need are that principals:

- Must understand the various aspects of curriculum development and implementation.
- Must be informed of **current trends in instruction**.
- Must know how to provide appropriate staff development to support teachers in implementing curriculum and instruction change.
- Must be able to **provide adequate resources** to teachers for curriculum implementation.
- Must be able to communicate effectively with parents so the school’s curricular and instructional programs are relevant, understood and supported by the community.
- Must be able to incorporate all of these activities and understandings in a coherent plan that ultimately leads to improved student learning. (<http://www.prel.org/products/Products/Curriculum.htm>)

One of the trends in education is the issue of ICT and subsequently, its integration in education. It is obvious that for integration to succeed, adequate resources need to be provided. Again, this is the duty of the principal to acquire the necessary resources, which may include financial, human and material. With the provision of the above resources, student learning is likely to improve.

It is further suggested that Principals, have the responsibility for coordinating the entire school's activities and dealing with a more vocal external public and must assume a more "macro" perspective. They must have an understanding of not only what is occurring in individual classrooms, but the relationship between teachers, students, and content throughout the school. Principals who work at developing an understanding of these often-complex relationships are better able to function effectively as curriculum leaders. Therefore, in relation to ICT integration the principal need to know what is happening in all classes so that he can act effectively as a curriculum leader. Principals must bring teachers together to develop a curriculum that meets the state's requirements, fits the school community, and supports the school's vision and its mission. (<http://www.prel.org/products/Products/Curriculum.htm>)

Principals are very instrumental in routine setting which eventually translate into effective curriculum leadership. Nevertheless, this may differ from school to school depending on effectiveness of institutions. In effective schools where there is a strong emphasis on learning and positive student outcomes, principals play an important role. They establish routines to work with teachers to examine the curriculum at every grade level and in every content area to determine areas of strength, and areas, which need improvement. It can be argued that routine work may finally lead to the establishment of very strong school traditions, which may become instrumental in school performance.

### 2.5.1 Role of the administrators in ICT integration:

Efficient, competent and dedicated institutional leadership can have a significant impact on the integration of ICT into pedagogical practice and, in turn, on student learning. College principals have a role to play in the integration of ICT in education. He/she is duly charged with identifying, acquiring, maintaining and even using the ICT resources in the institution.

Despite the increasing presence of ICT hardware and software in schools and countless workshops on skill acquisition for teachers, the consistent integration of ICT into regular classroom programs is still a far cry from reality

([http://technologysource.org/article/elementary\\_school\\_principal\\_as\\_a\\_change\\_facilitator\\_in\\_ict\\_integration/](http://technologysource.org/article/elementary_school_principal_as_a_change_facilitator_in_ict_integration/)). It has been found out that some teachers do not use the ICT resources as mainstream teaching resources as the following study unearthed;

*Many teachers use ICT only as an addition to regular instruction or as a reward for pupils after their work is completed. In other words, teachers use ICT to extend traditional pedagogical practices. Their challenge is to incorporate ICT into the pedagogy so that it also becomes integrated with the learning process* (Riffel & Levin, 1997)

([http://technologysource.org/article/elementary\\_school\\_principal\\_as\\_a\\_change\\_facilitator\\_in\\_ict\\_integration/](http://technologysource.org/article/elementary_school_principal_as_a_change_facilitator_in_ict_integration/)).

One effective agent for change in this context is the school principal (ibid). Different principals may exhibit different ways of facilitating change popularly referred as 'change facilitation (CF) styles'. According to Hall et.al(1984)(in

[http://technologysource.org/article/elementary\\_school\\_principal\\_as\\_a\\_change\\_facilitator\\_in\\_ict\\_integration/](http://technologysource.org/article/elementary_school_principal_as_a_change_facilitator_in_ict_integration/)), these styles can be classified as *initiator*, *manager*, and *responder*. *Initiator* principals publicly demonstrated a strongly held vision of where their schools were heading and what was best for students. They had high expectations of their staff, and they made these expectations clear through many forms of communication. *Manager* Principals focused on the administrative aspects of the school to ensure that it was well organized and efficient. They tended to resist change until all components of the change were ready for implementation. *Responder* principals focused on current concerns of the staff and the school community without looking at the "bigger picture." They tended not to intervene as much as their counterparts did. In simplistic terms, initiator principals "made it happen," managers "helped it happen," and responders "let it

happen."

([http://technologysource.org/article/elementary\\_school\\_principal\\_as\\_a\\_change\\_facilitator\\_in\\_ict\\_integration/](http://technologysource.org/article/elementary_school_principal_as_a_change_facilitator_in_ict_integration/))

In the study cited above, the researcher also sought to find out more about the specific steps that efficient principals were taking in order to attain high levels of ICT integration in their institutions. The principals reported that the following interventions were particularly helpful in their institutions:

- regular discussion about ICT and frequent, brief workshops during staff meetings;
  - one-on-one practice sessions during lunch breaks or after school;
  - peer tutoring;
  - team teaching with, and shadowing of, more experienced colleagues;
  - encouragement to attend computer courses offered within the system and by other providers, such as technical colleges and private training companies;
  - assistance from friends and colleagues who were more computer literate;
  - use of "train the trainer" approaches; and
- clear identification/appointment of a technology leader or leaders in the school.

It is clear from the interview transcripts that the principals were the main source of these interventions. All stated that they expected their staffs to use ICT in teaching and learning, and that they visited classrooms to observe ICT use and discuss integration strategies with teachers. Such actions are typical of an initiator CF style. ([http://technologysource.org/article/elementary\\_school\\_principal\\_as\\_a\\_change\\_facilitator\\_in\\_ict\\_integration/](http://technologysource.org/article/elementary_school_principal_as_a_change_facilitator_in_ict_integration/)). In our setting, principals of the Teacher Training Colleges have attended several workshops geared towards sensitizing them on ICT in education. As such, majority of them are expected to possess the basic skills of ICT integration in education. If it happens that these principals decided to visit some classes, how will the teachers view the whole practice? How will the students rate their subject teacher's competence? Will the subject teacher have the confidence to withstand the lesson observation? These questions may look simple but may affect the lesson delivery and even teacher's perception of the principal. Different school principals depict varying leadership styles that some teachers may not be comfortable with. Therefore, seeing an authoritative principal enter his/her class may make teaching difficult.

## **CHAPTER THREE: RESEARCH DESIGN AND METHODOLOGY**

### **3.0 Introduction**

This section dealt with the description of the methods applied in carrying out the research study. It was arranged as follows: design of the study, sample and sampling methods, tools of measurement, data collection procedures and analytic plan.

### **3.1 Research Design**

A research design can be thought of as the structure of research (Kombo and Tromp 2006). Orodho (2003) in Kombo and Tromp (2006) defines research design as 'the scheme, outline or plan that is used to generate answers to research problems' (P 70).

The study on constraints to the integration of ICT in the teaching/learning process adopted a descriptive survey. In the study, the data was collected using majorly primary sources i.e. observation checklist and questionnaire.

The state of affairs was described as it existed i.e. the skills/competencies possessed by teacher trainers and the college administrators, the availability of ICT infrastructure, the attitudes held by teacher trainers and student teachers on ICT integration.

### **3.2 The Sample and Sampling Method**

#### **3.2.1 The Population and the Sample**

Tambach TTC had a total of 536-second year students and 466 first year students. This made 1002 student teachers. There were 75 members of teaching staff.

However, it was only the second year student teachers and teaching staff who participated in the study. Second year students, had been in the college for over one year and had been exposed to ICT lectures long enough than the first year student teachers. Therefore, they were thought to be in a better position than the first year student teachers to provide adequate responses. At the same time, teacher trainers also participated in the study because of their role as the curriculum implementers and more so, the implementers of ICT integration programme during the teaching and learning process.

However, only 25% of the second year students which was one hundred and thirty (130) formed the sample for the study.

On the other hand, only teachers who participated in the seminar on ICT integration in teaching participated in the study. The newly transferred or employed teachers did not participate in the study because they may not have been exposed to the ICT Integration Skills.

### 3.2.2 Sampling Methods

Sampling is the procedure a researcher uses to gather people, places or things to study (Kombo & Tromp 2006). It is the act, process or technique of selecting a suitable sample or a representative part of a population for determining parameters or characteristics of the whole population (Ibid:78). Both probability and non-probability sampling methods were applied when selecting a suitable sample for the study. Sampling for Teacher trainers to participate in the study was arrived at in the following way:-

- a) All staff who took part in the Seminar/Workshop on ICT integration in teaching were picked to participate in the study. This is because the workshop highlighted on ICT integration skills. Newly transferred or employed lecturers were left out of the study. This is because they may not have been exposed to ICT integration skills.
- b) The Senior Administrative team comprising of the Principal, Deputy Principal, the Deans, and the (Heads of Department) HODs participated. This is because the administration has the responsibility of coordinating the entire college's activities including directing curriculum and co-curriculum issues. For the case of teacher trainers and administrators, Non-Probability sampling (purposive) was applied. This is because the respondents were particular people who met some particular criteria for example having attended a seminar on integration for the case of teaching staff and being office holders for the case of the administrators.

On the part of the student teachers, the respondents were arrived at by using probability sampling methods. Students were stratified into their respective classes followed by sex (Male /Female). Systematic random sampling to pick the specific respondents followed. The class lists were re-arranged in terms of sex before picking the respondents systematically. Basing on the number of male and female, every  $n^{\text{th}}$  student was picked till the required 25% of each category (male/female) was arrived at.

The distribution of student-respondents per classes was as follows:

CLASSES													
	2A	2B	2C	2D	2E	2F	2G	2H	2J	2K	2L	2M	TOTAL
TOTAL	45	45	46	45	46	45	43	75	44	44	46	46	536
MALE	28	28	26	30	24	29	12	15	18	15	16	16	260
FEMALE	17	17	20	15	22	16	31	30	26	29	30	30	276
MALE(sample)	5	5	7	8	6	7	3	4	5	4	4	4	63
FEMALE(sample)	4	4	5	4	6	4	7	8	7	8	8	8	67

**Table 1: Distribution of student-respondents**

From the table there were 63 male and 67 female participants for the study. In total, there were 130 respondents from the students' side.

### 3.3 Tools for Data Collection

The study adopted a questionnaire and an observation check-list to collect the data for the study.

There was a questionnaire for student teachers which sought to find out their attitudes on ICT integration together with their perception of lecturers' knowledge of Information Communication Technology, their perceived usefulness and accessibility to ICT facilities.

There was a separate questionnaire for the lecturers that sought to establish their ICT skills and their attitudes towards the introduction use of ICT in education. There was a separate questionnaire for the administrative staff that intended to find out their competence in ICT and their role in ICT integration in the college

The observation checklist was used to establish the physical availability of ICT facilities, devices and infrastructure for use in the college.

### 3.4 Data Analysis

After data collection, editing had followed. This was done by looking at responses that lacked clarity. Editing assisted in eradicating confusion later. In editing the data, different color of ink was used to mark the data to be omitted.

One questionnaire was discarded because a section of the questionnaire was not responded to. Blank responses in some questionnaires were assigned a mid-point scale of 3 in the case of a five-point scale which ranged from: - **SA**-Strongly Agree ( 1 or 5), **A**-Agree (2 or 4), **NS**-Not Sure (3), **D**-Disagree (4 or 2), to **SD**-Strongly Disagree(5 or 1), the first digit in the bracket being for the positively- worded statements while the second one is for the negatively worded statements

#### Coding

After handling blank responses, coding followed. It was handled in the following way:-

##### (a)Administrative staff:

- **Personal details**:-Female-1, Male-2
- **Workshop attendance**-Yes-1, No-2
- **Frequency of workshop attendance**-None-1, Once-2, Twice-3, More than twice-4
- **SA**-Strongly Agree (1 or 5), **A**-Agree (2 or 4), **NS**-Not Sure (3), **D**-Disagree (4 or 2), **SD**-Strongly Disagree (5 or 1), the first digit in the bracket being for the positively- worded statements while the second one is for the negatively worded statements.

##### (b)The lecturing staff

- **Personal details**:-Male-1, Female-2
- **Department**: -Education-1, Science-2, Social Science-3, Languages-4, Maths-5, ICT-6, LRC-7, C/Art-8
- **Teaching subject**- Education-1, Science-2, Home Science-3, Agriculture-4, Social Studies-5, Christian Religious Education-6, English-7, Kiswahili-8, Maths-9, Craft-10, ICT-11, Physical Education-12.
- **Seminar attendance**-Yes-1, No-2
- **Frequency of seminar attendance**-None-1, Once-2, Twice-3, More than twice-4
- **Competency in ICT skills**-Very Competent-3, Competent-2, Not competent-1
- **ICT integration**- **SA**-Strongly Agree ( 1 or 5), **A**-Agree (2 or 4), **NS**-Not Sure (3), **D**- Disagree (4 or 2), **SD**-Strongly Disagree (5 or 1), the first digit in the bracket being for the positively- worded statements while the second one is for the negatively worded statements.

#### Entering Data

After editing data, treating the blank responses then coding the data, entering it followed. The data was manually entered into the computer. The SPSS data editor was used in entering the data for analysis. The SPSS also provided a window for entering the variables for the study.

Reliability of the data entered was established for the different sets of questionnaires i.e. for the senior administrative staff, the lecturing staff and the students. Cronbach Alpha reliability coefficient was established so as to determine how well the test items were positively correlated. The following were the reliability coefficients for the respective questionnaires: Administrative staff questionnaire was 0.6 as shown in the following table:

**Reliability Statistics**

Cronbach's Alpha	N of Items
.587	12

**Table 2: Cronbach's alpha for administrative staff questionnaire**

The lecturing staff was also presented with a questionnaire. The reliability coefficient of the data collected was as shown in the following table:-

**Reliability Statistics**

Cronbach's Alpha	N of Items
.900	31

**Table 3: Cronbach's alpha for students' questionnaire**

Students were also provided with a questionnaire whose Cronbach's Alpha was calculated and found to be 0.7 as shown below:

**Reliability Statistics**

Cronbach's Alpha	N of Items
.651	10

**Table 4: Cronbach's alpha for lecturing staff questionnaire**

The three sets of reliability coefficients especially one for students' questionnaire showed high internal consistency reliability. This is because the calculated coefficients were close to 1 (one).

During the analysis, the following measures were established: the frequency distributions, the mean and the standard deviation. At the same time, cross tabulation was used to compare the effects of different variables. Data analyzed was presented by use of tables and bar graphs

**CHAPTER FOUR: RESULTS****4.0 Introduction**

This chapter presents in two parts the data collected i.e. data analysis and subsequently interpretation.

The study was geared towards finding out the constraining factors to the integration of ICT in education in Primary Teacher Colleges with specific reference to Tambach Teachers College situated in Keiyo-Marakwet County. Specifically, the study sought to find out the extent of ICT skills held by college lecturers, the administrators' competence in ICT and student teachers' perception of lecturers' knowledge of ICT and the availability of ICT facilities, devices and infrastructure for use in the college. In presenting the analyzed data, tables and graphs have been used to summarily bring out the relationship between different variables where applicable.

In the study, the sex of the respondent, the department and the teaching subject, seminar attendance were independent variables while independent variables included the ICT skills/competence(which were broken down into different sections),the attitudes towards introduction and use of ICT in education(which were broken down into different sections) and student teachers' perception of lecturers' knowledge of ICT.

**4.1 Distribution of the respondents based on sex, department, teaching subject and frequency of seminar attendance****4.1 Lecturers' ICT competency skills**

The lecturing staff was provided with a questionnaire that sought to establish the level of ICT skills they possessed. The distribution of the lecturers as per sex was as shown in the table below. The analysis revealed that out of the twenty (20) lecturing staff that participated in the study, there were sixteen male (80%) and four female (20%).These

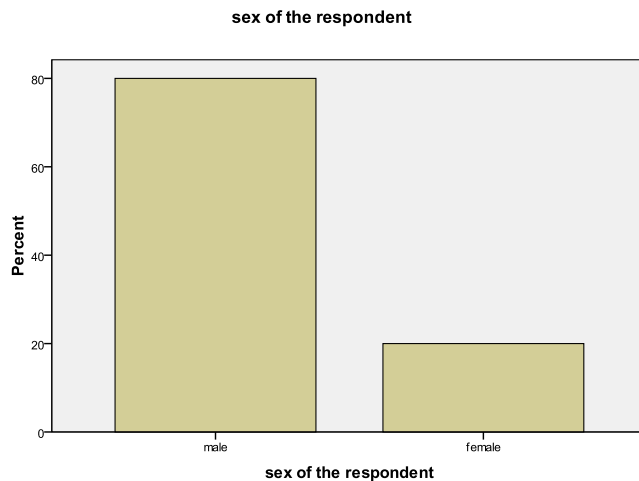
figures formed 35% of the total lecturing staff and were thought to be representative enough. The statements relating to skills expected of the lecturers included:-

#### 4.1.1 Sex of the respondents

The study involved twenty (20) lecturing staff out of which, sixteen were male while 4 were female. The distribution and percentage representation was as shown in the table and graph below :

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid male	16	80.0	80.0	80.0
female	4	20.0	20.0	100.0
Total	20	100.0	100.0	

**Table 5: Distribution of respondents as per sex**



**Figure 4: Sex of the respondents (lecturing staff)**

From the bar chart above, it is clear that the ratio of male to female was 4:1; which is a true reflection of the state in the college. The participants were picked purposively from all the departments.

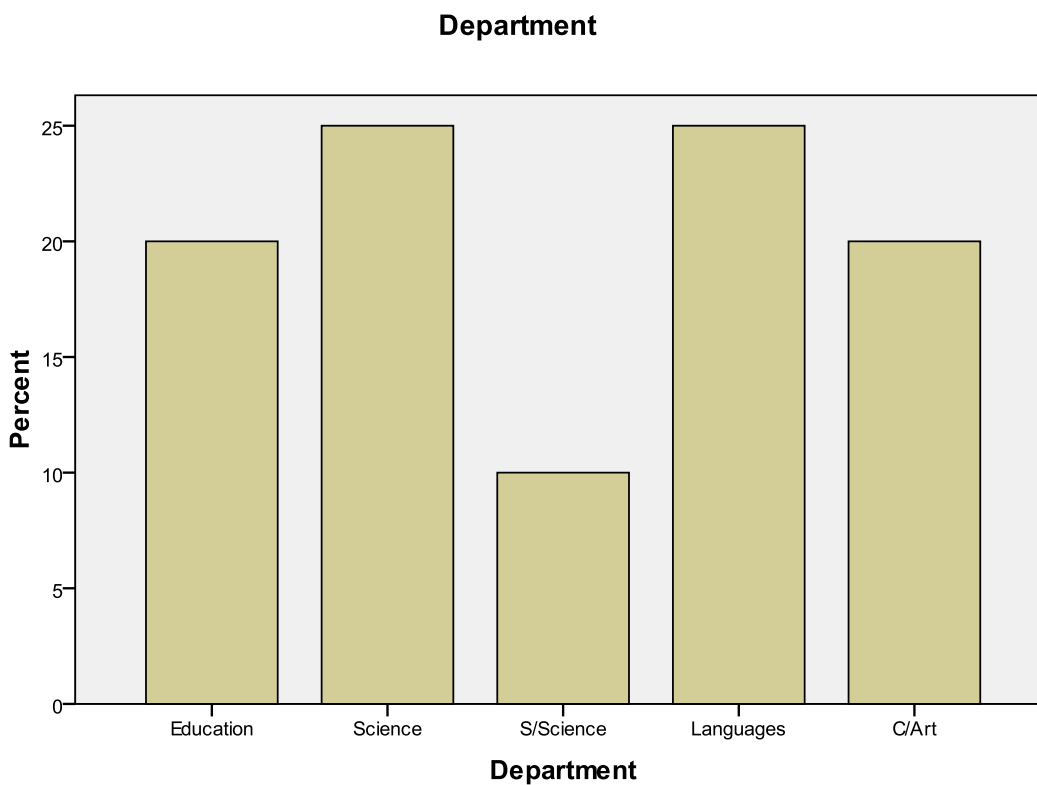
#### 4.1.2 Distribution of respondents based on the departments:

The distribution of respondents as per the departments was as presented below in the table and the bar chart.

		Department			
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Education	4	20.0	20.0	20.0
	Science	5	25.0	25.0	45.0
	S/Science	2	10.0	10.0	55.0
	Languages	5	25.0	25.0	80.0
	C/Art	4	20.0	20.0	100.0
	Total	20	100.0	100.0	

**Table 6: Distribution of respondents as per department**

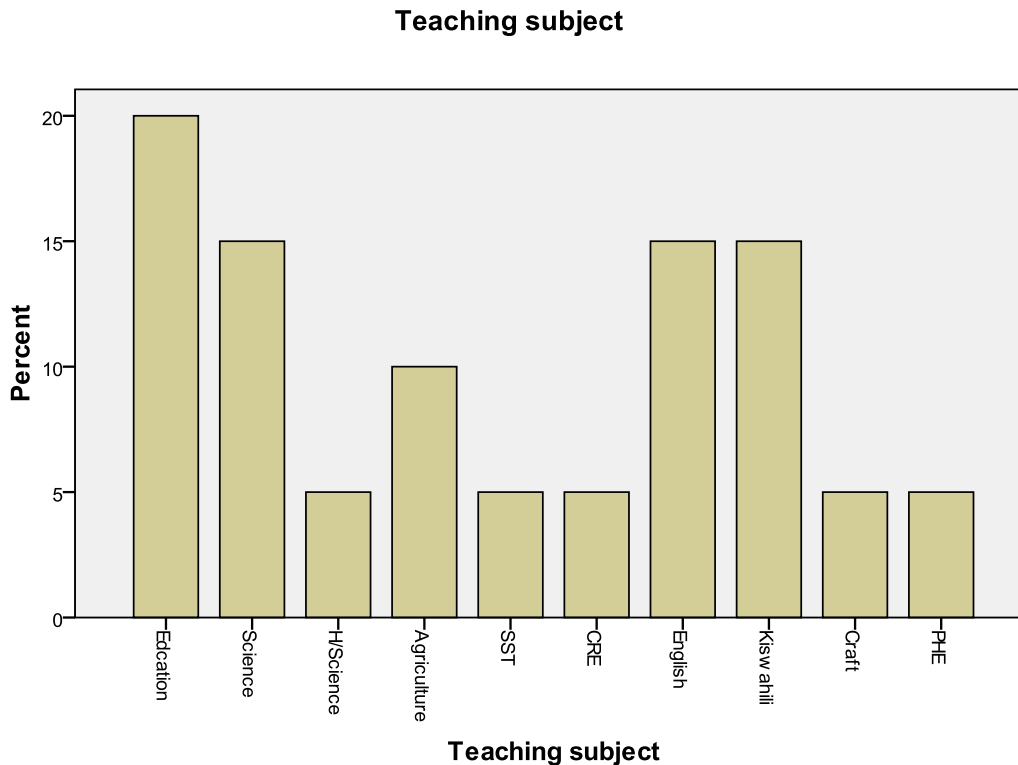
From the table above, Science and Languages departments had the highest number of respondents which was five(5) in each case followed by Education and Creative Arts with four(4) respondents each. The same information is reflected in the bar chart below.



**Figure 5: Distribution of respondents as per department**

#### 4.1.3 The distribution of respondents as per teaching subject

The distribution of respondents according to the teaching subject is reflected in the bar graph above. The graph clearly shows that education produced the highest number of respondents while Home Science, Christian Religious Education Craft and Physical Education produced the least number of respondents



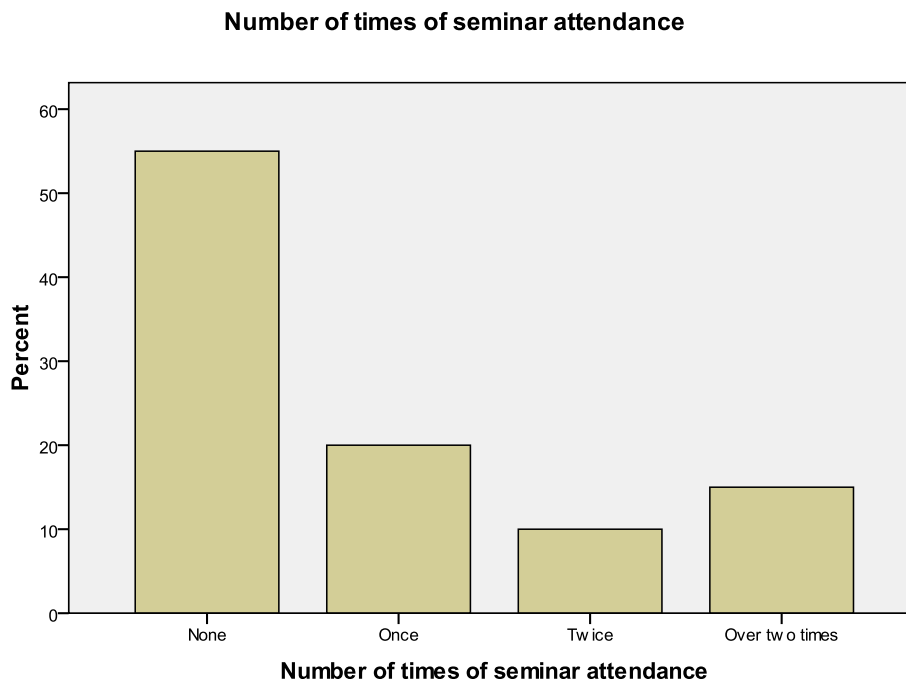
**Fig.6: The distribution of respondents as per teaching subject**

#### 4.1.4 Seminar attendance by the teaching staff:

Members of the teaching staff were also expected to indicate the number of times they had attended ICT seminars. From the table below, it is clear that over one-half the respondents (55%) had never attended an ICT seminar at all. From the statistics, it comes out clearly that those who had attended seminars for more than twice were only three out of twenty (3/20). Those who had attended seminars only twice were only two out of twenty (2/20). The same information on seminar attendance is depicted in the bar chart on seminar attendance.

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid None	11	55.0	55.0	55.0
Once	4	20.0	20.0	75.0
Twice	2	10.0	10.0	85.0
Over two times	3	15.0	15.0	100.0
Total	20	100.0	100.0	

**Table 7: Seminar attendance by lecturers**



**Figure 7: The frequency of seminar attendance**

#### 4.2.0 Lecturer's ICT competency skills and their attitudes towards ICT use

##### 4.2.1 Lecturers' ICT competency skills

The lecturing staff was provided with a questionnaire that sought to establish their level of ICT competence they possessed. Each item of response was analyzed individually and the results appear as in the table below.

Items of response	N	Minimum	Maximum	Mean	Std. Deviation
Understanding the functions of the windows operating systems	20	1.00	3.00	2.1500	.67082
Ability to start up, log on, shut computer	20	1.00	3.00	2.3000	.80131
Use of the mouse pointing device	20	1.00	3.00	2.3500	.74516
Ability to troubleshoot	20	1.00	3.00	1.9000	.78807
Ability to identify icons	20	1.00	3.00	2.1000	.71818
Ability to maximize, minimize, move windows	20	1.00	3.00	2.2500	.78640
Ability to check space available	20	1.00	3.00	2.0000	.91766
Ability to create and save documents	20	1.00	3.00	2.0000	.85840
Ability to retrieve document	20	1.00	3.00	2.2500	.78640
Select, copy, paste text	20	1.00	3.00	2.1000	.85224
Print document	20	1.00	3.00	2.1000	.91191
Use email programmes	20	1.00	3.00	1.8500	.81273
Compose, send, reply forward messages	20	1.00	3.00	1.9500	.88704
Retrieve email attachments	20	1.00	3.00	1.9500	.82558
Use browser effectively	20	1.00	3.00	1.9500	.82558
Download files and images	20	1.00	3.00	1.9000	.78807
Find information from web	20	1.00	3.00	2.0500	.82558
Transfer file by uploading or downloading	20	1.00	3.00	1.7500	.85070
Copy files from hard disk to storage devices and vice versa	20	1.00	3.00	1.9000	.96791
Connecting and using LCD projector	20	1.00	3.00	1.8000	.89443
Taking photos using a camera	20	1.00	3.00	2.1500	.93330
Scanning documents using scanner	20	1.00	3.00	1.9000	.96791
Printing	20	1.00	3.00	2.1500	.87509
Valid N (list wise)	20				

**Table 8: Analyses of responses based on the mean and the standard deviation**

Based on the structure of questionnaire the report was presented as follows:

- A. Basic knowledge of computers ( understanding the concepts and basic functions of windows and operating systems ,using mouse,troubleshooting,identifying icons, maximizing and minimizing windows, and checking space is left on a drive).
- B. Proficiency in using productivity software( creating, saving and retrieving documents,selecting,copying and pasting texts and printing documents)
- C. Electronic communication skills(ranged from using common email progress to retrieving attachments from emails)
- D. Internet skills( using browser effectively, downloading files from the web and using search engines to find information on the web)
- E. Moving files(transferring and copying files)

#### 4.2.1.2 Basic knowledge of computers and Proficiency in using productivity software

Under this broad response item, there were other branching sub-items which tutors responded to. They included: understanding the concepts and basic functions of windows and operating systems, using mouse, troubleshooting, identifying icons, maximizing and minimizing windows, and checking space is left on a drive.

Respondents were required to respond to a 3-point scale items on level of competence .They were to indicate whether they were “Very competent”, “Not competent” or “Not competent at all” on the above mentioned basic ICT skills.

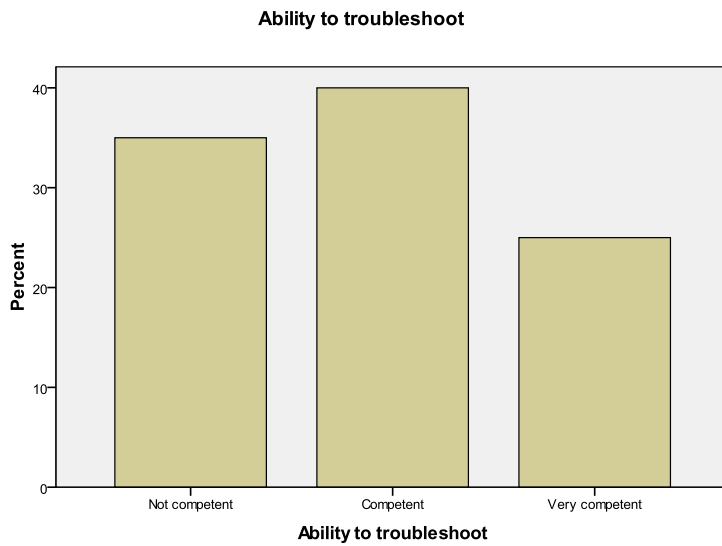
Figure 8 on troubleshooting shows the percentage competence level as per the tutors’ self assessment. The analysis showed that the percentage of those who were either competent or very competent at trouble shooting was 65%.The remaining 35% was not competent at all at troubleshooting. Troubleshooting is the process of solving a problem or determining a problem to an issue. It often involves the process of elimination, where a technician will follow a set of steps to determine the problem or resolve the problem.

<http://www.computerhope.com/jargon/t/troushoo.htm> .

In troubleshooting, some of the challenges faced by the users may be expressed in form of questions like the ones below:

- Can't start your computer? Check the basics.
- Can't get on to the network or the Internet?
- The computer is on but... Everything on the screen is frozen and the keyboard and mouse are not responding.
- The computer is on, but there is no sound. (<http://www.computerhope.com/jargon/t/troushoo.htm>)

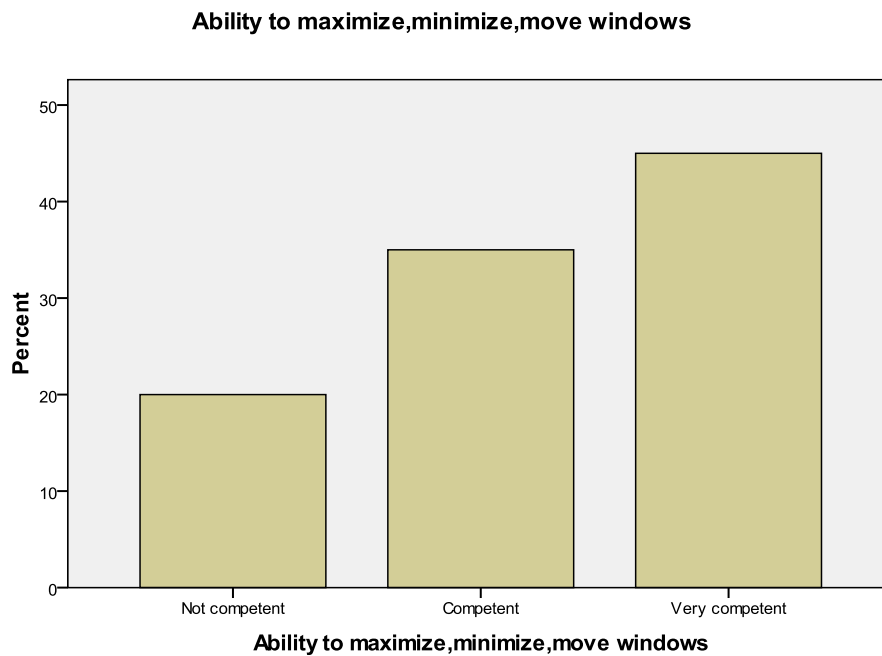
A teacher who has no or very little knowledge on troubleshooting may not be able to do much during the process of integrating ICT in teaching. This is part of basic information on computer use. The fact that 35% of the tutors at Tambach TTC were not competent in troubleshooting alone raises pertinent questions on the success of the project dubbed “Computers for Class One pupils” by the ruling Jubilee Party in the Republic of Kenya. This is because the tutors are the trainers of teachers teaching at the primary school level.



**Figure 8:Ability to troubleshoot**

**Ability to maximize,minimize and move widows**

Figure 9 below shows the analysed results on the ability to maximize,minimize and move widows as one works on a computer.The analysis showed that 80% of the respondents had no problem with the are while 20% were not competent at all in maximiiing,minimizing or moving windows.This was not found to be a constraining factor since majority of the respondents did not have a problem with the area.Maximizing windows gives the computer operator an opportunity to view the print clearly.Minimizing windws allows the computer user to work on a number of documents whose titles are displayed at the tool bar of the computer.At a glance,the user can easily identify the document then maximize if need be.

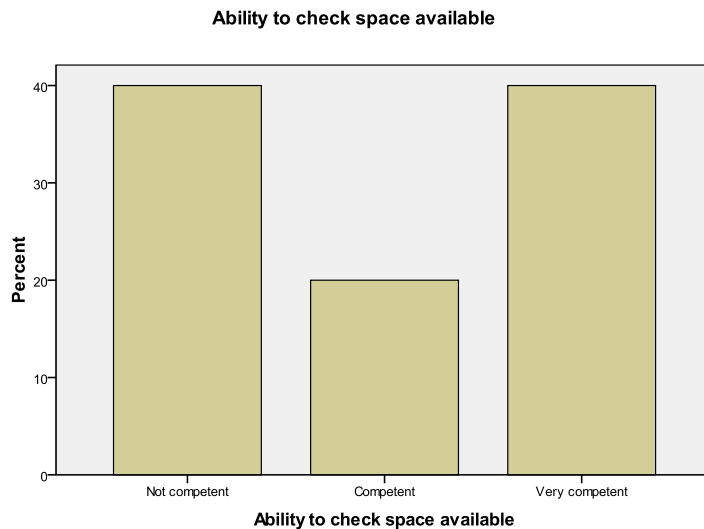


**Figure 9:Ability to maximize,minimize and move windows**

### Ability to check space available

Tutors were asked of their ability to check the space available in a disk and it was found out that up to 40% of the respondents were not competent at all on this matter. The findings could be one of the contributing factors towards low ICT uptake by tutors.

Ability to check space available in a disk is very important in that the user will be in a position to estimate the amount of information to be taken up by the remaining space in the disk.



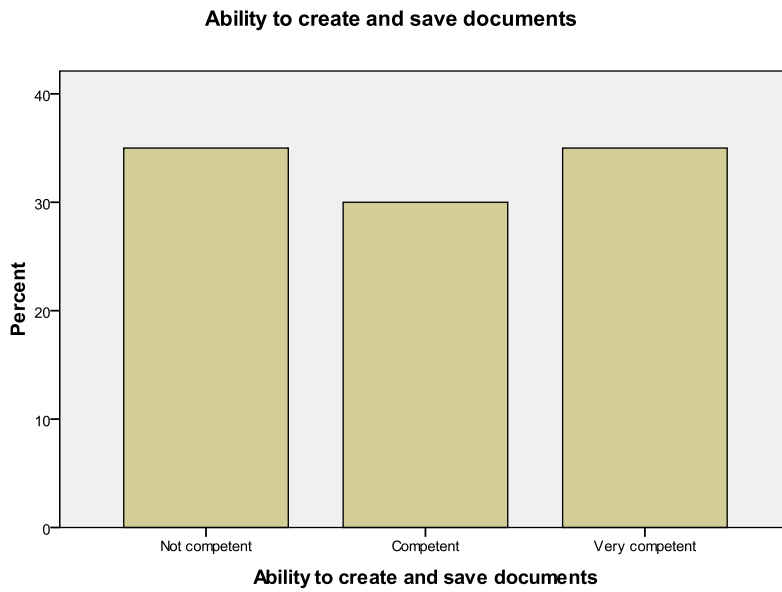
**Figure 10: Ability to check space available**

### Ability create and save documents, retrieve, select and copy and print a document:

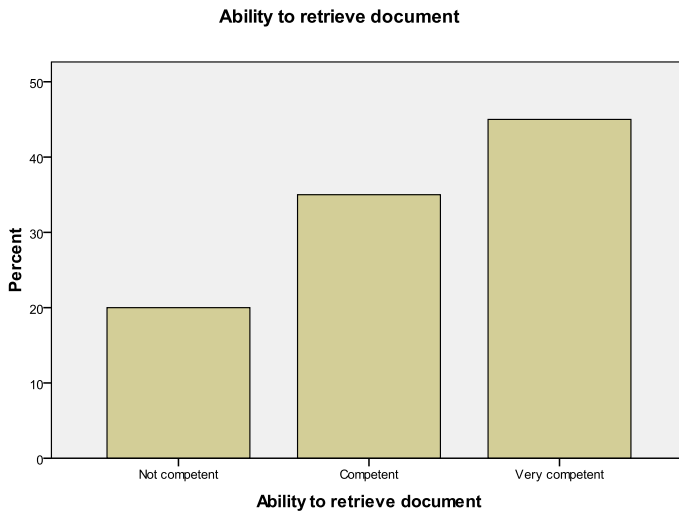
Figures 10, 11, 12, 13 and 14 show the percentage of respondents together with the levels of competence in relation to the skills under discussion. The study established that on average 30% of the respondents were not competent in all the skills stated above. This finding is worrying because the skills are considered the “foundation stones” for ICT integration yet some tutors didn’t possess them.

These skills are very basic but important in the integration of ICT in teaching. Creating a document is the first step in the integration of ICT after opening a window. For the user to be able to do this, they have to know the program to use. After creating the document, saving it for later use is another essential step. Again, the user should be in a position to distinguish between the “Save” and “Save As” procedures together with the relevant icons.

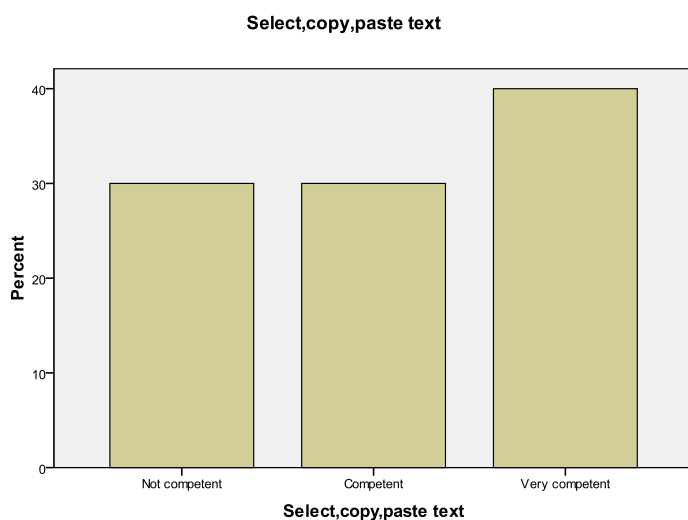
The saved documents can be retrieved reading printing purposes after saving. The user again should be able to identify the relevant locations to save the document. This makes retrieval simple and easy. The study, therefore, concluded that lack of the basic ICT skills discussed above was one of the constraining factors towards the integration of ICT in teaching.



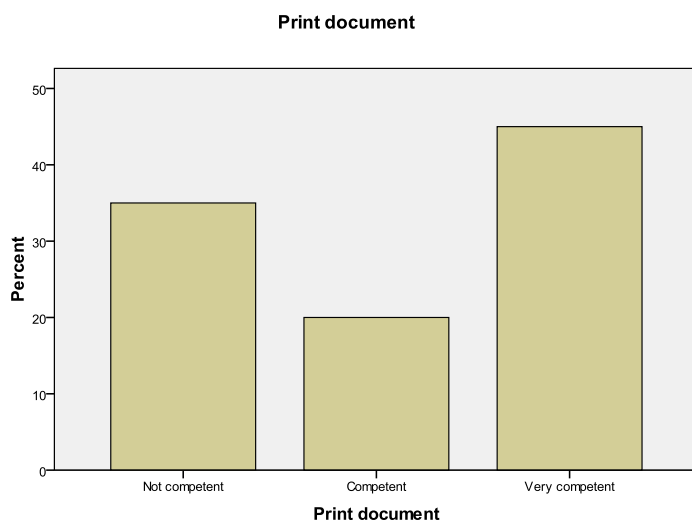
**Figure 11:Ability create and save documents**



**Figure 12:Ability to retrieve documents**



**Figure 13: Ability select,copy and paste text**

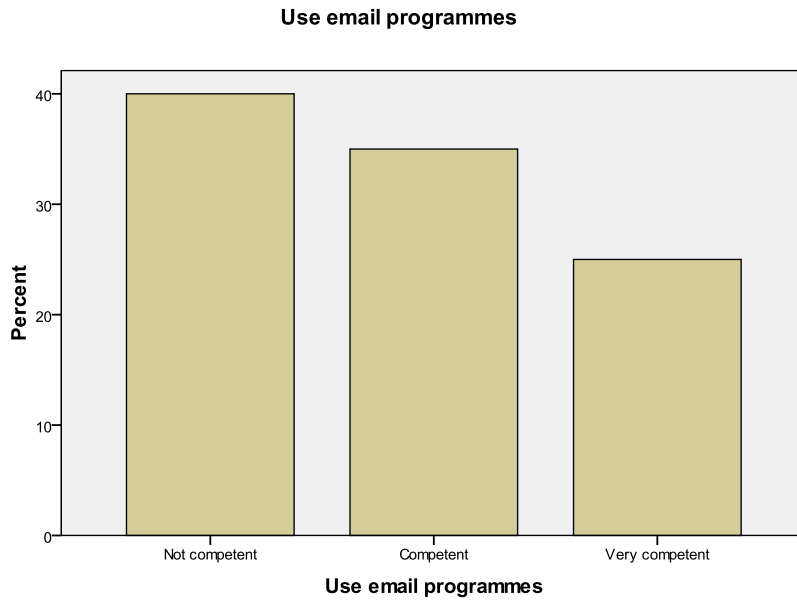


**Figure 14: Ability print a document**

#### **4.2.1.3 Electronic communication skills, Internet skills and Moving files.**

The analysis of the data related to the skills above showed that at least 40% of the respondents were incompetent in employing the skills as a subset of ICT integration in teaching. This meant that the affected tutors were either not able to use email effectively, compose, send, reply and forward messages, retrieve an email attachment or unable to do all. The analysis is shown in figure 15, 16, 17,18,20,21 and 22.

To many teachers who embrace technology, communicating with their students through email is very cheap. Assignments or any other task can be sent to the students as an email message. For this to succeed, the recipient of the email message must be having an active account and be connected to either the internet or have smart phones which have internet features activated. Tutors who are incompetent on these communication skills are likely to miss out on very crucial issues like job advertisements. From the analysis, it was concluded that this are also presented a challenge to tutors in the journey towards successful ICT integration in teaching.



**Figure 15: Ability to use email programmes**

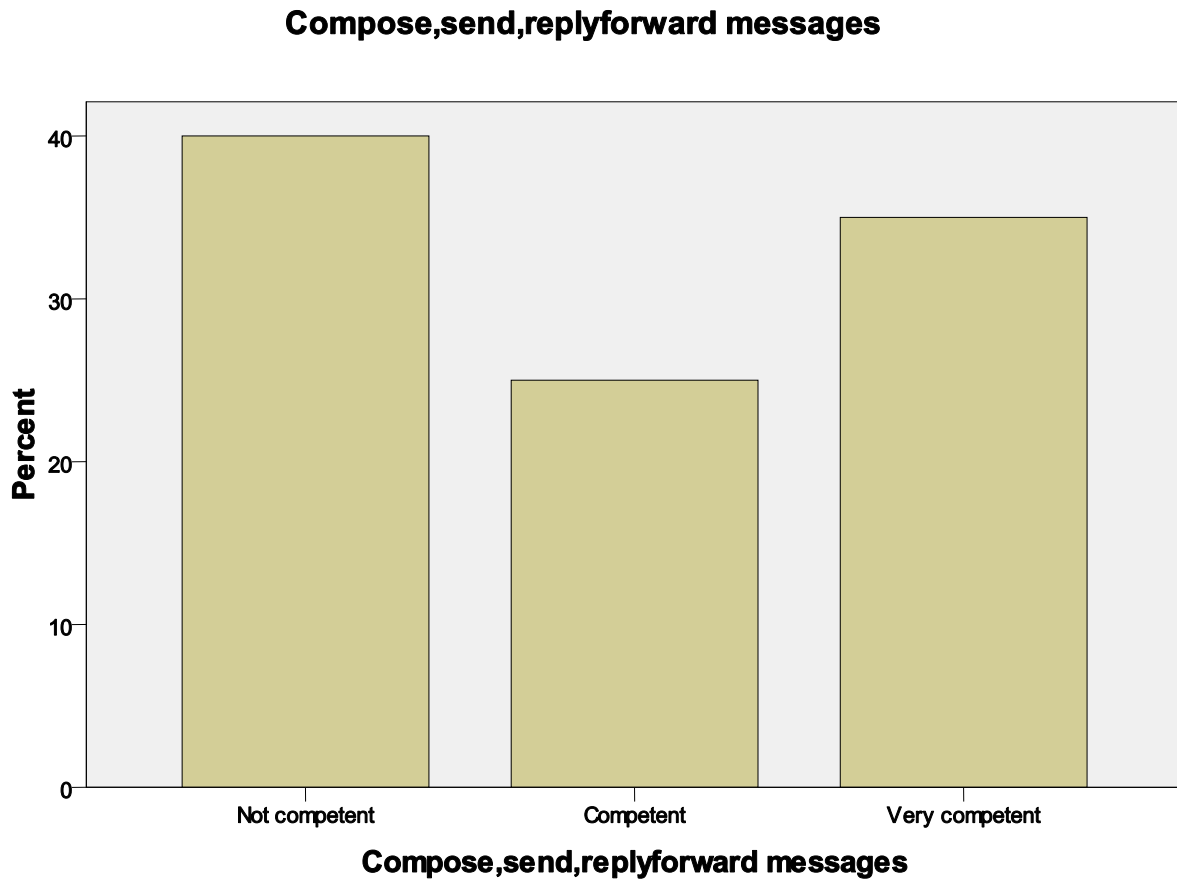
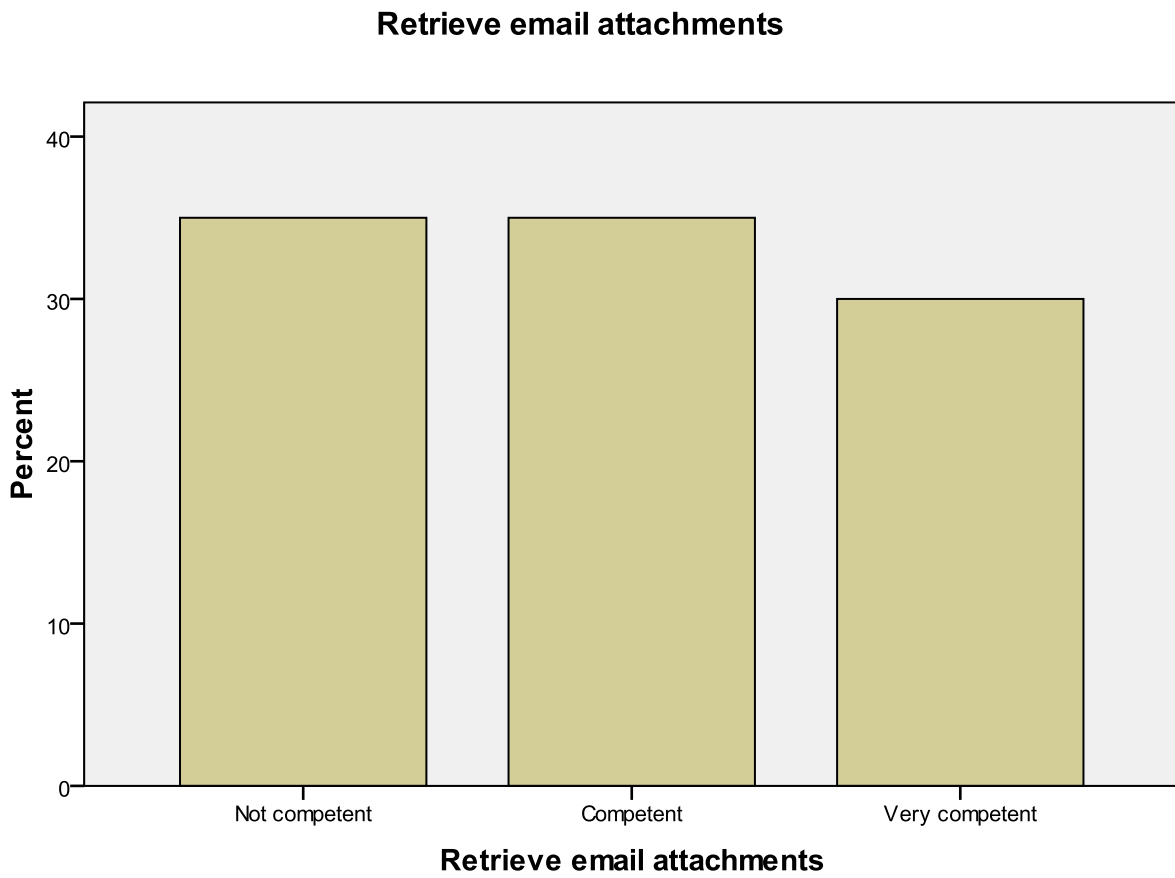
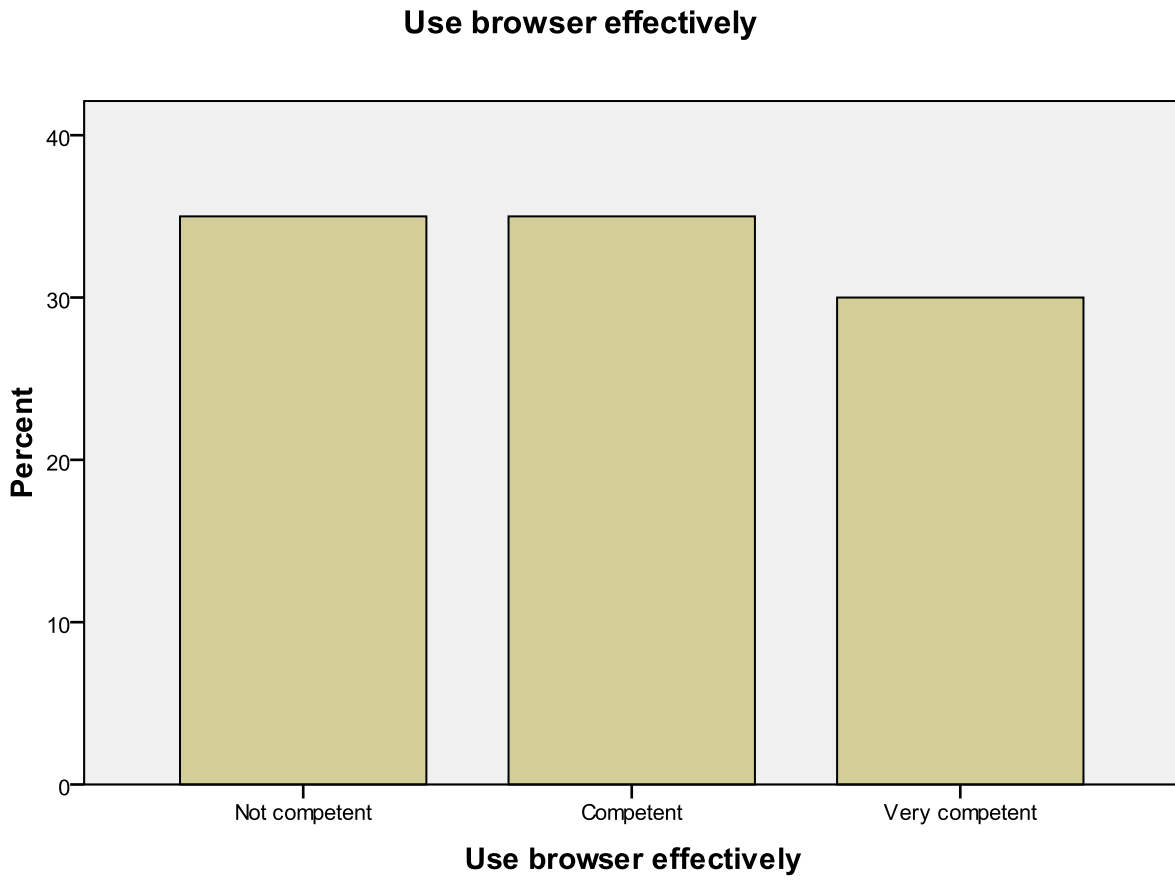


Figure 16: Ability to compose, send reply or forward messages

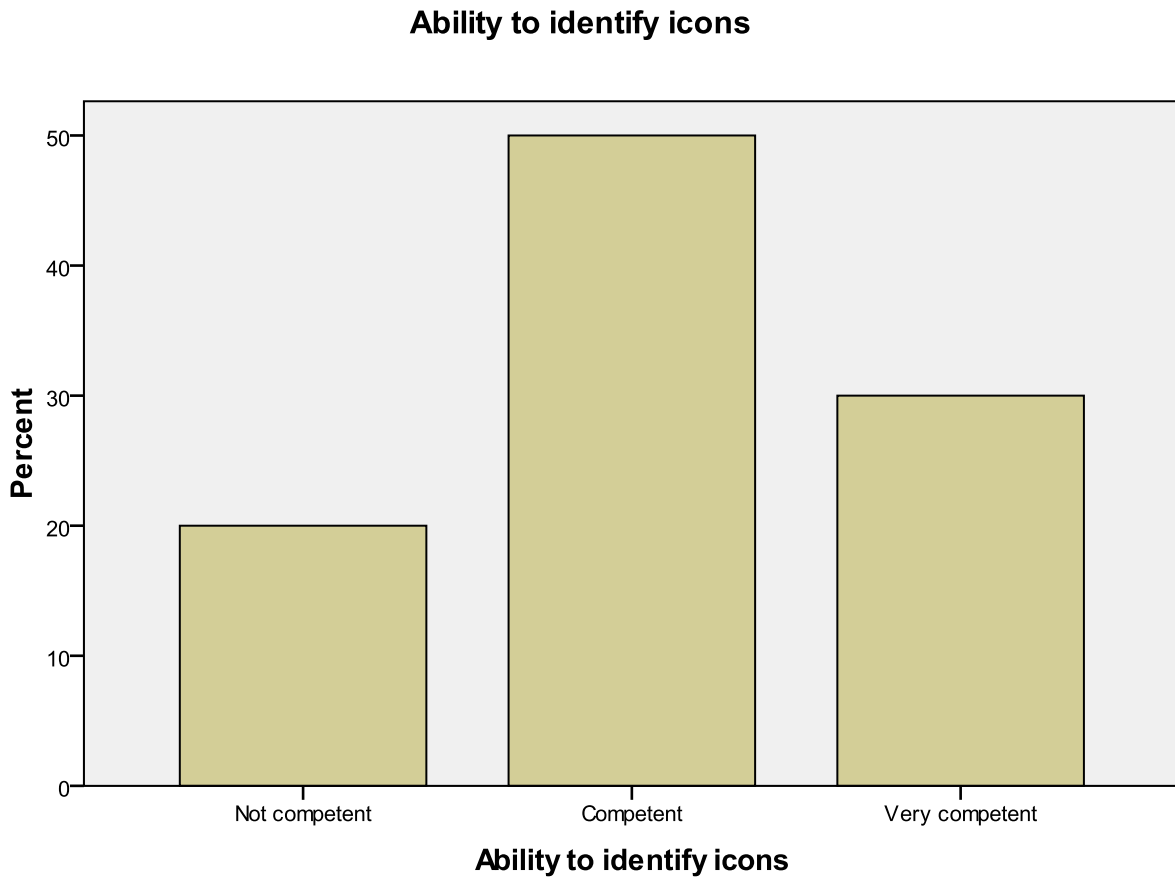
**6: Ability compose,send,reply and forward messages**



**Figure 17: Ability to retrieve email attachments**



**Figure 18: Ability to use browser effectively**



**Figure 19: Ability to identify icons**

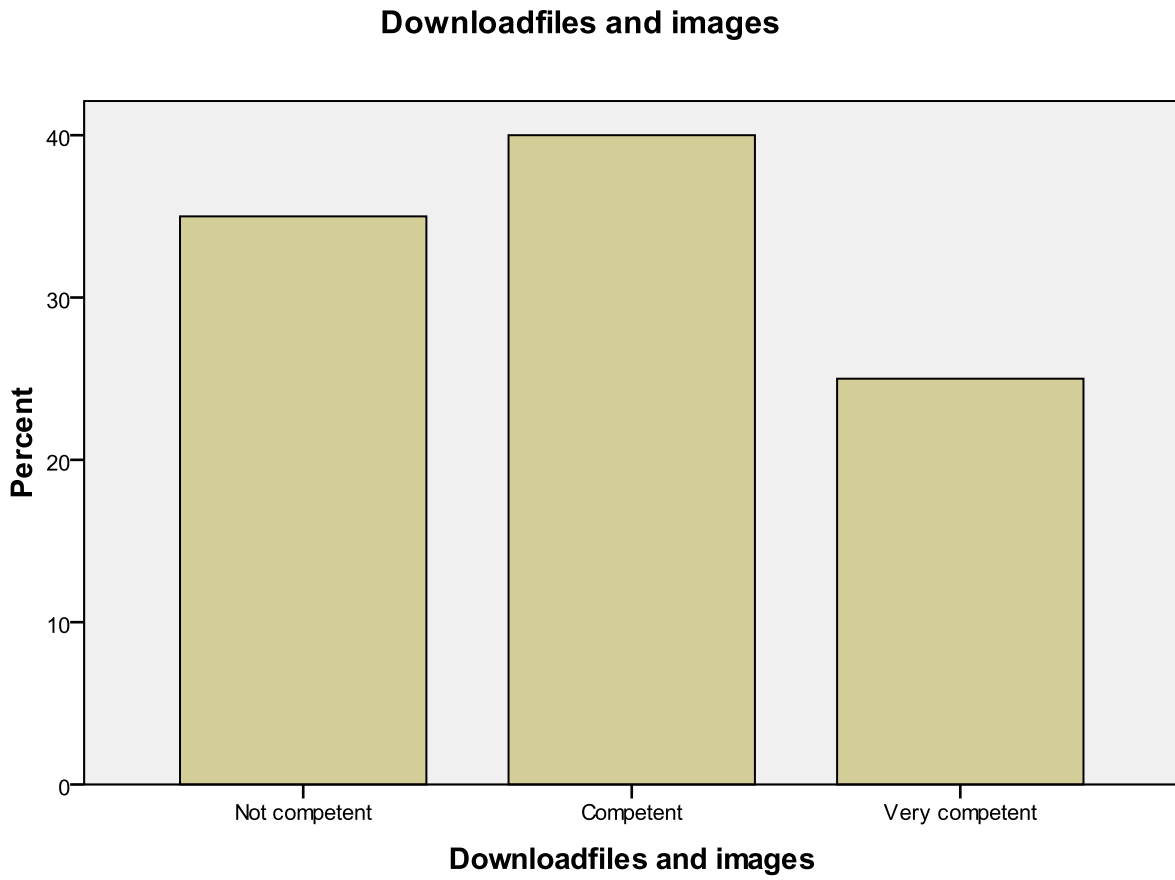
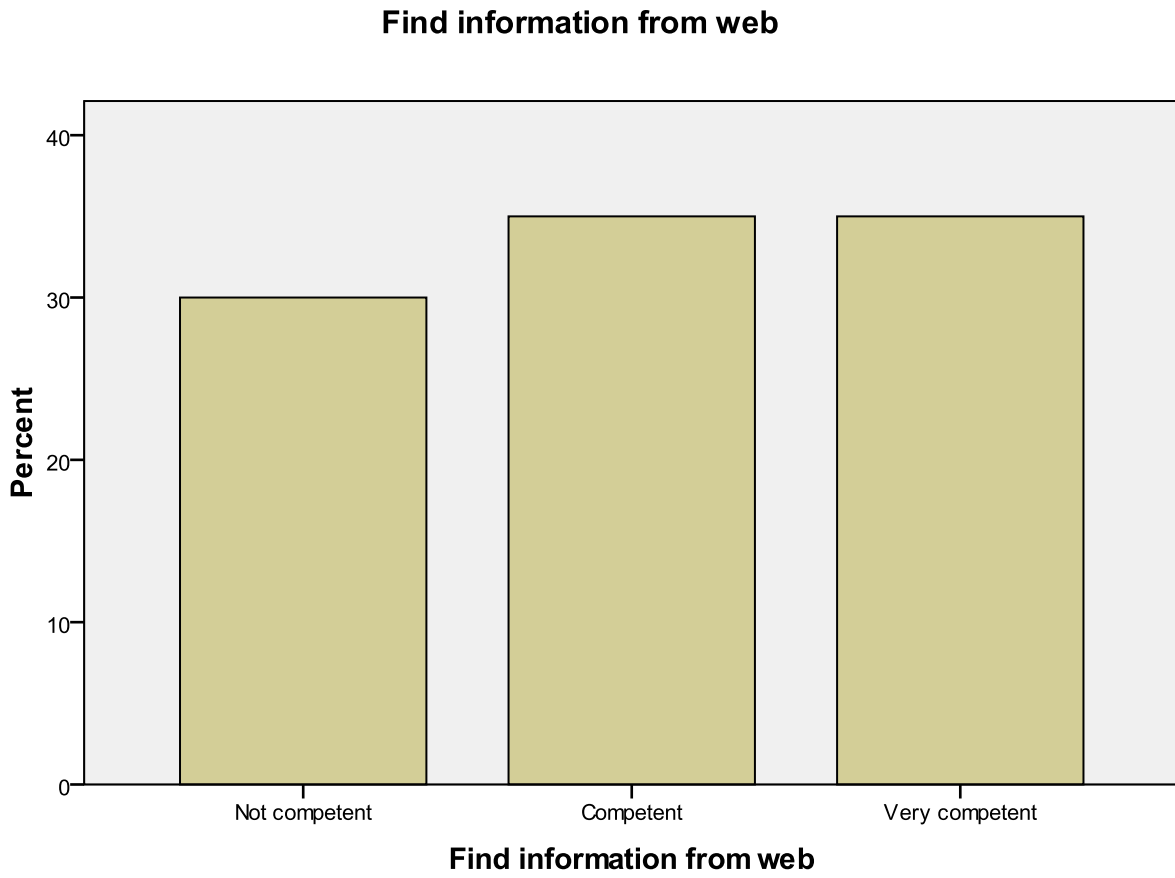
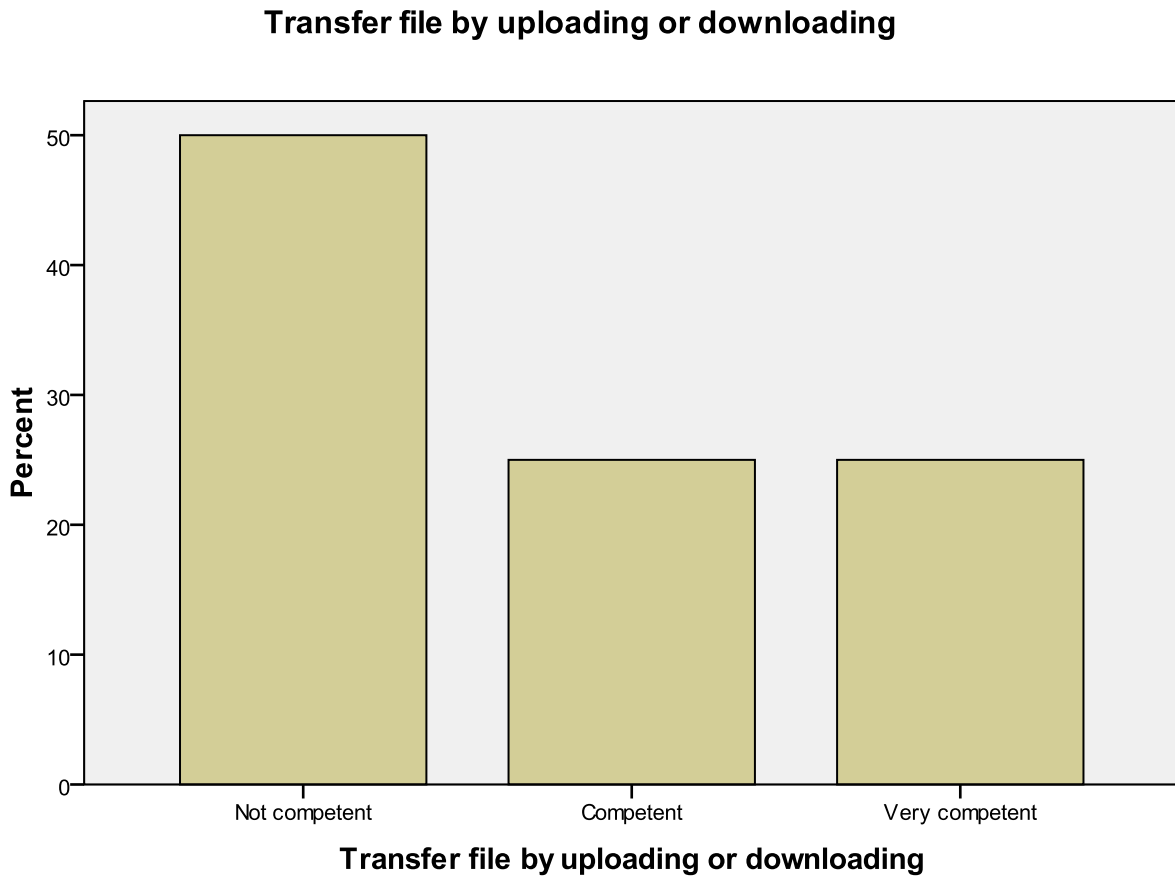


Figure 20: Ability to download files and images



**Figure 21: Ability to find information from web**



**Figure 22: Ability to transfer files by uploading or downloading**

### Copy files from hard disk to storage devices and vice versa

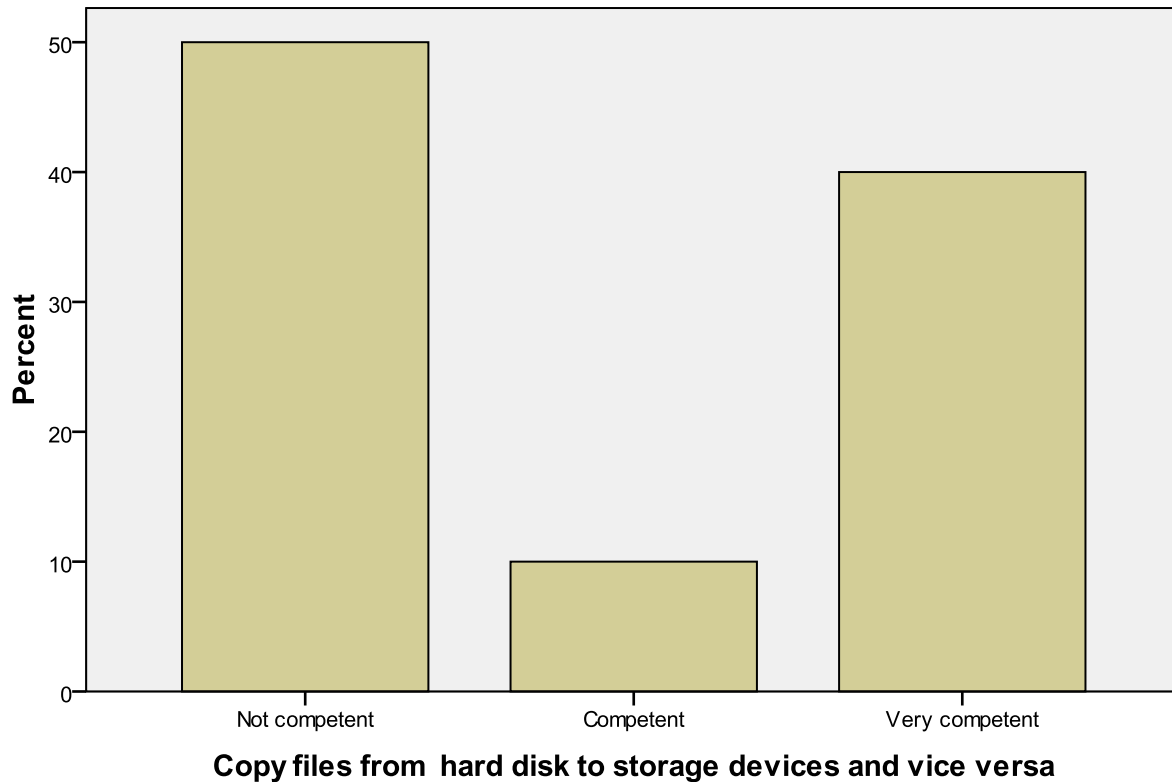


Figure 23: Ability to copy files

#### 4.2.1.3 Ability to connect and use LCD projector and take photos using a camera

One of the most important gadgets used in ICT integration is the LCD Projector. A camera also comes in handy where the photos can be taken then projected on the screen for students to observe. The study found out that 50% of the respondents faced challenges in an attempt to connect and use an LCD projector. On the other hand, 35% of the respondents were not competent at all in using a camera to take photos. Some respondents felt that it would be very embarrassing to them if students were to assist them set up the equipment instead.

### Connecting and using LCD projector

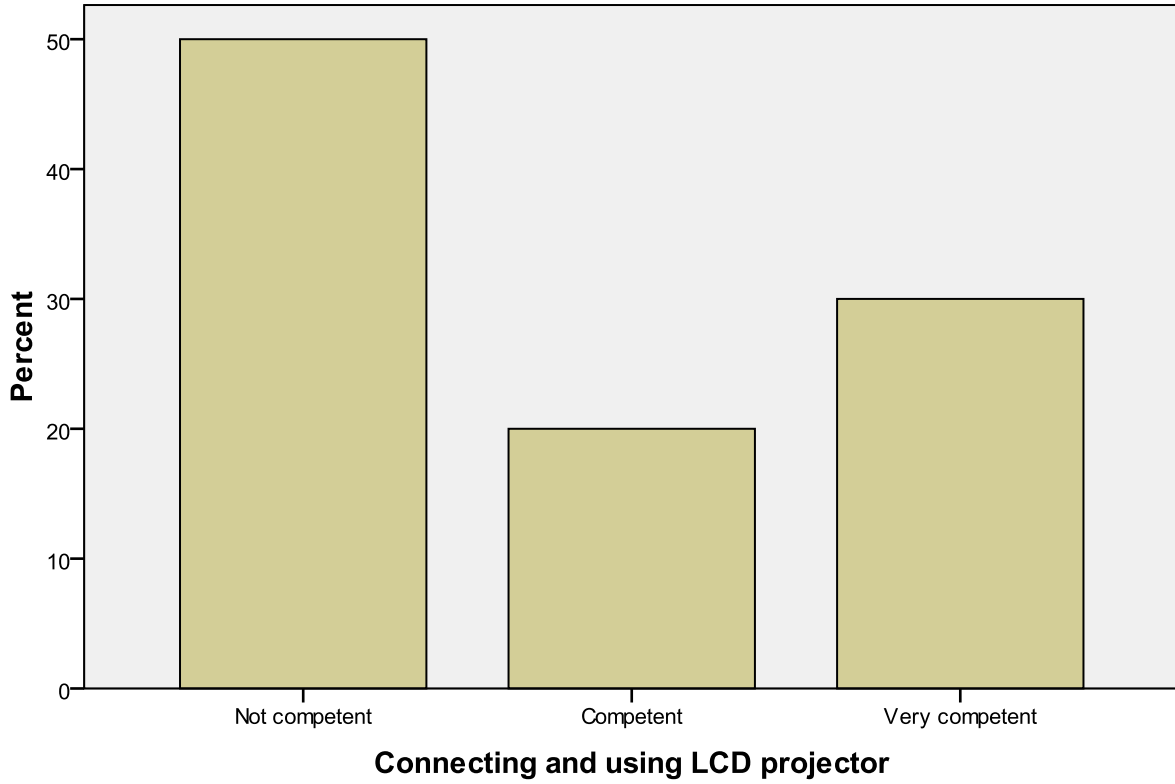
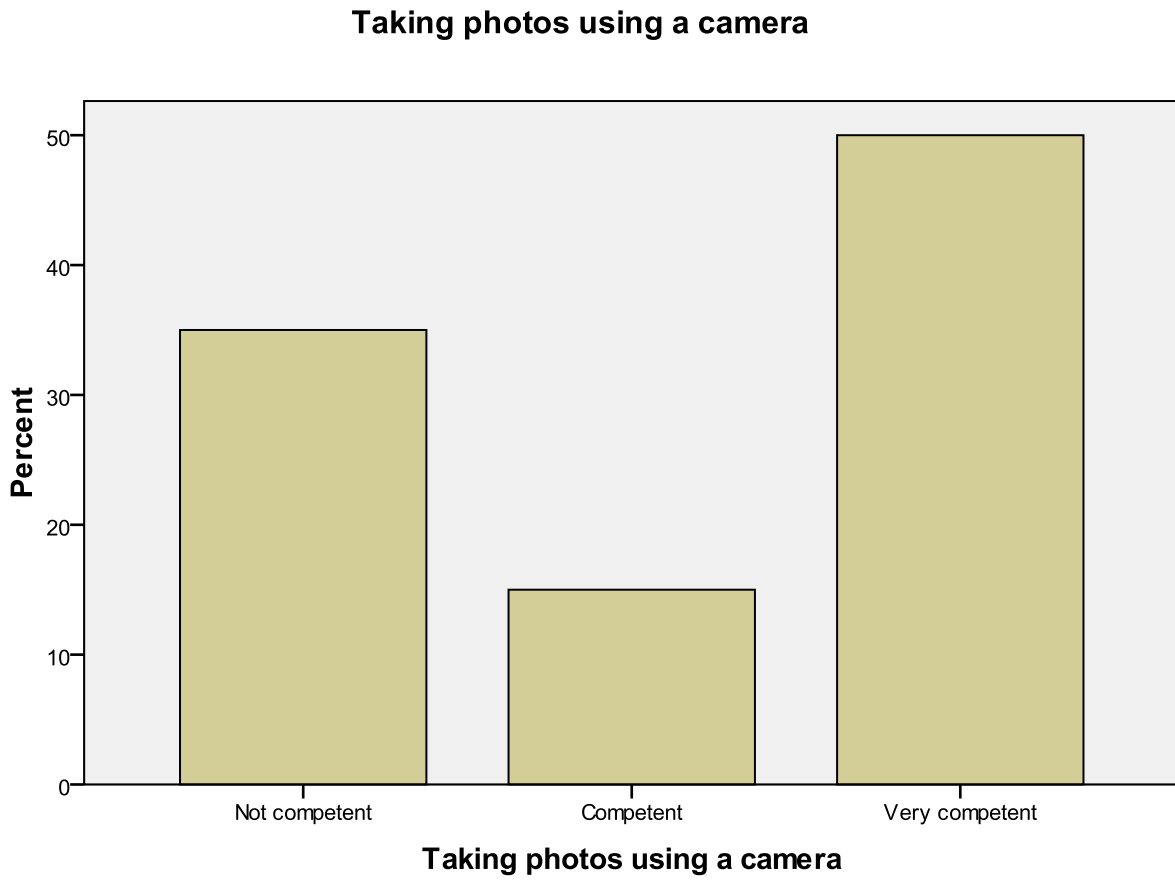
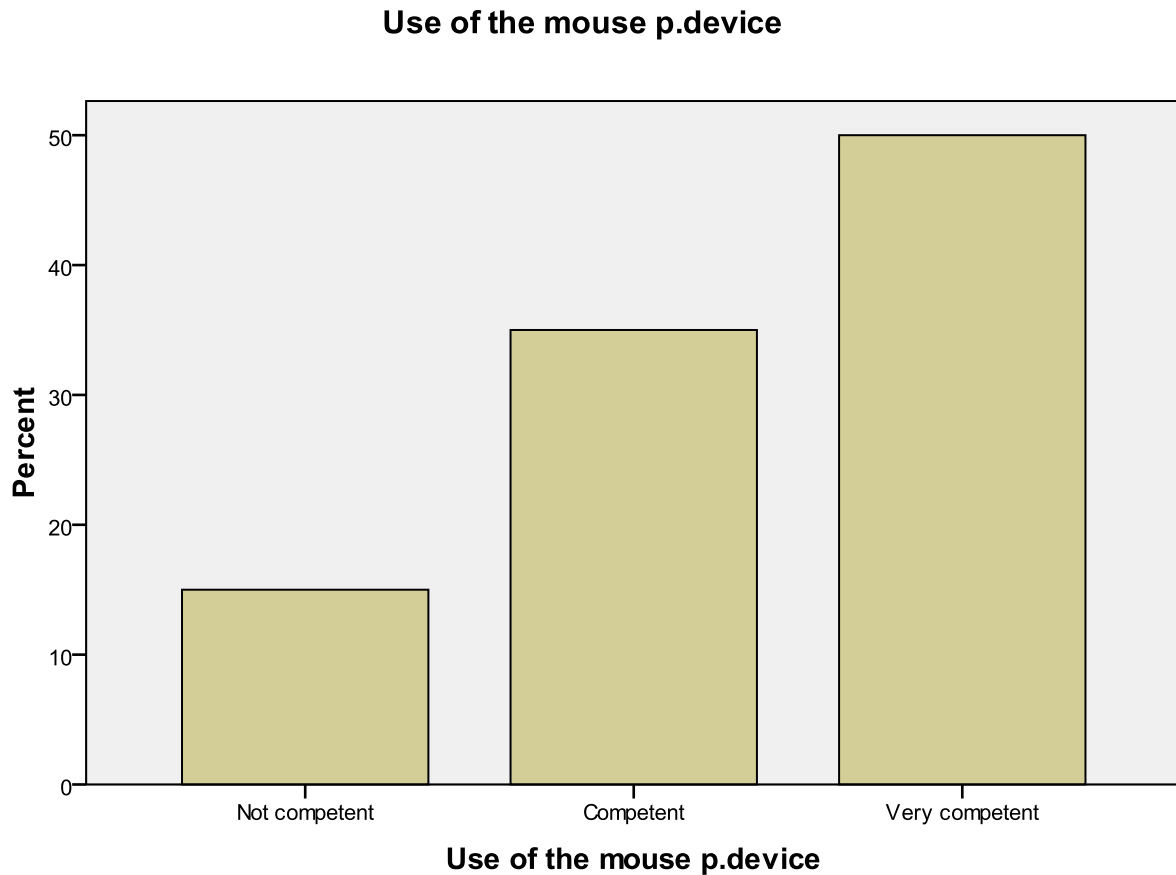


Figure 24: Ability to connect and use LCD projector



**Figure 25: Ability to take photos using a camera**



**Figure 26: Ability to use mouse pointing device**

**Ability to use mouse pointing device**

Lecturers were also asked whether they were skilled in using mouse pointing device; starting up, logging on, shutting up a computer; printing a document and taking photographs for use in teaching. These are basic skills that are expected to be possessed by one in order to integrate ICT in teaching. It was surprising that some lecturers were not competent at all in performing the skills mentioned above.

Over fifty percent of the respondents indicated, through the open-ended question that they needed training on most of the skills indicated.

### Ability to start up,log on,shut computer

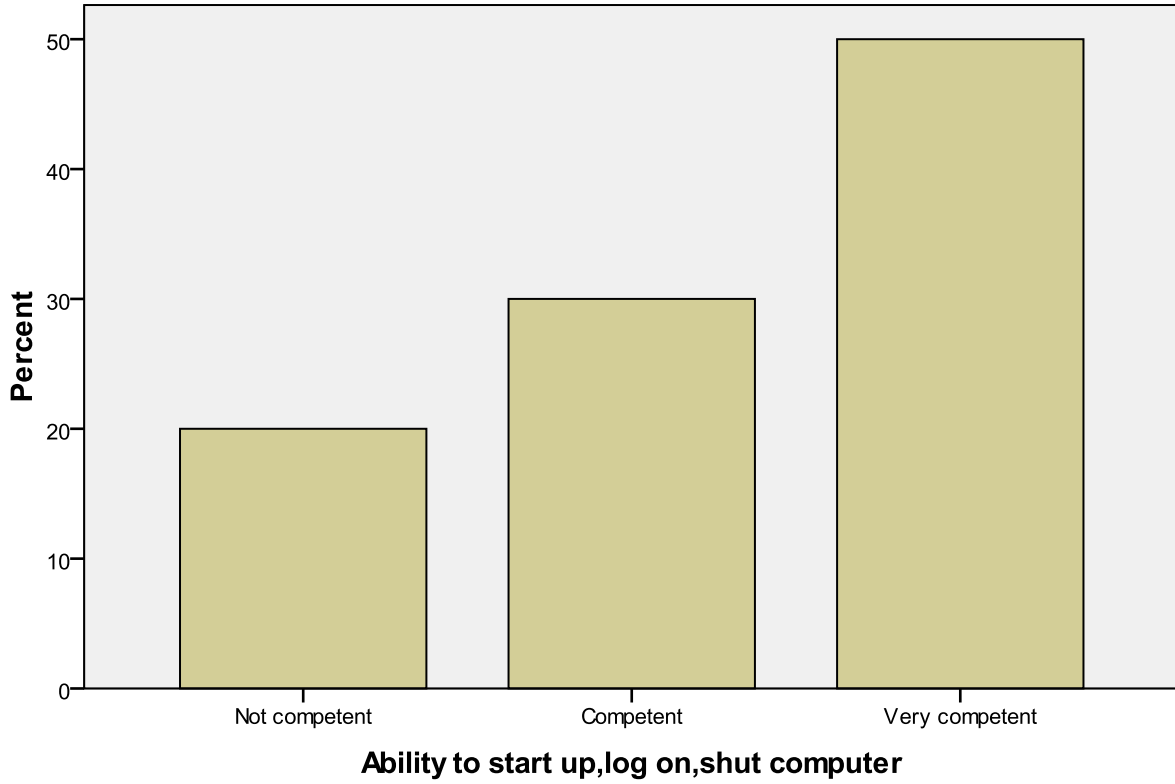
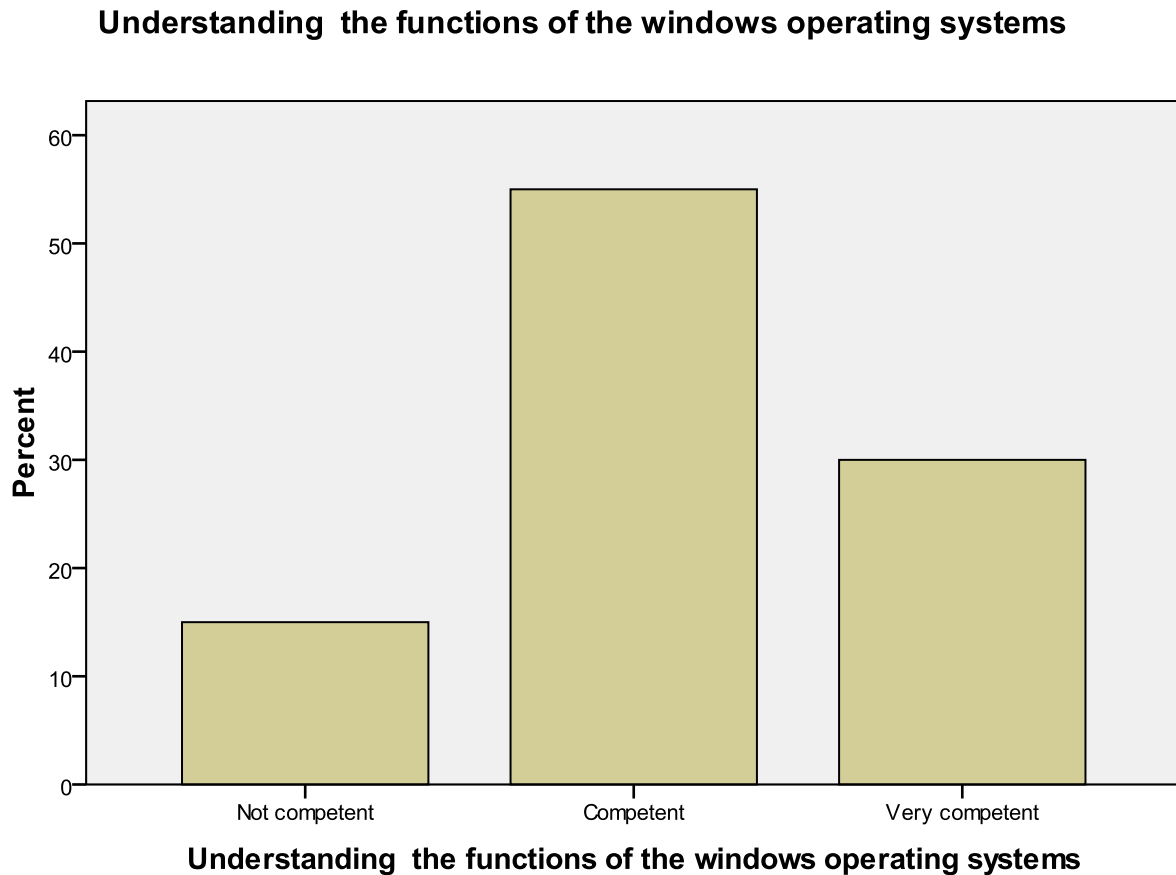


Figure 27: Ability to start up,log on,shut computer



**Figure 27: Ability to understand the functions of windows operating systems**

#### **4.3:0: Lecturers' attitudes towards ICT use**

The success of a programme may to some extent depend on the attitude held by the implementers about it. The lecturing staff was presented with a number of items that sought to find out their attitude towards ICT use in teaching and learning. The table below summarizes the findings on the items of response. The table shows that the attitude towards the 'introduction of ICT integration in education', 'owning his/her own computer to accelerate interest in ICT integration', 'syllabus completion and ICT use' and 'usefulness of computers in content delivery, was found to be positive. This was judged from the means which ranged between 1.4500 and 2.400. The findings meant that majority of the lecturers received the introduction of ICT integration positively. There was positive attitude towards own computer ownership as it was seen as a way of accelerating ICT integration in education. The staff also indicated a positive attitude towards ICT integration as this was thought as a way of accelerating syllabus coverage.

### Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Introduction of ICT integration is a good move	20	1.00	5.00	1.4500	.99868
Computer ownership and ICT integration	20	1.00	5.00	1.6000	1.09545
Syllabus completion and ICT use	20	1.00	4.00	2.0000	1.07606
Usefulness of computers in content delivery	20	1.00	5.00	2.4000	1.42902
Amount of time needed for preparation	20	1.00	5.00	3.1500	1.08942
Lack of guidance on ICT integration	20	1.00	5.00	3.4000	1.23117
Integration of ICT in teaching	20	1.00	5.00	3.5500	1.27630
Class work versus own work	20	1.00	5.00	3.7000	1.30182
Valid N	20				

**Table 9: Descriptive Statistics for lecturers' response**

The statistics also showed that some lecturers rarely used computer for class work. This was because the mean for the response item on 'use of the computer for own work versus class work' recorded close to four (3.7). This may explain why the lecturers were expressing a positive attitude towards own computer ownership.

There were two items of response, which the respondents seemed undecided. These were;

- 'Using ICT in teaching requires a lot of time for preparation' and
- 'Lack of proper guidance on integration makes ICT integration less motivating'. The reasons could be that the respondents lacked knowledge on ICT integration. In a section that required the respondents to indicate any information that could aid in effectively enabling the lecturers integrate ICT in teaching, a good number of them hinted that they needed training, seminars or workshops on ICT use. Those who indicated either 'Not Sure (NS), Disagree (D), or Strongly Disagreed (SD) strongly felt that lecturers should be given regular classes on computer use and its applications. Some also felt that laptops and LCD projectors should be supplied to departments to enable the lecturers learn how to use them.

#### 4.3.1: Administrative staff ICT competency skills

The Tambach TTC administrative staff consisted of the Principal, the Deputy Principal, the Dean of Curriculum, Students, and the Heads of Department. Eleven (11) out of thirteen (13) respondents returned the questionnaire. This formed around eighty-five (85%) percent of the total number of questionnaire returns.

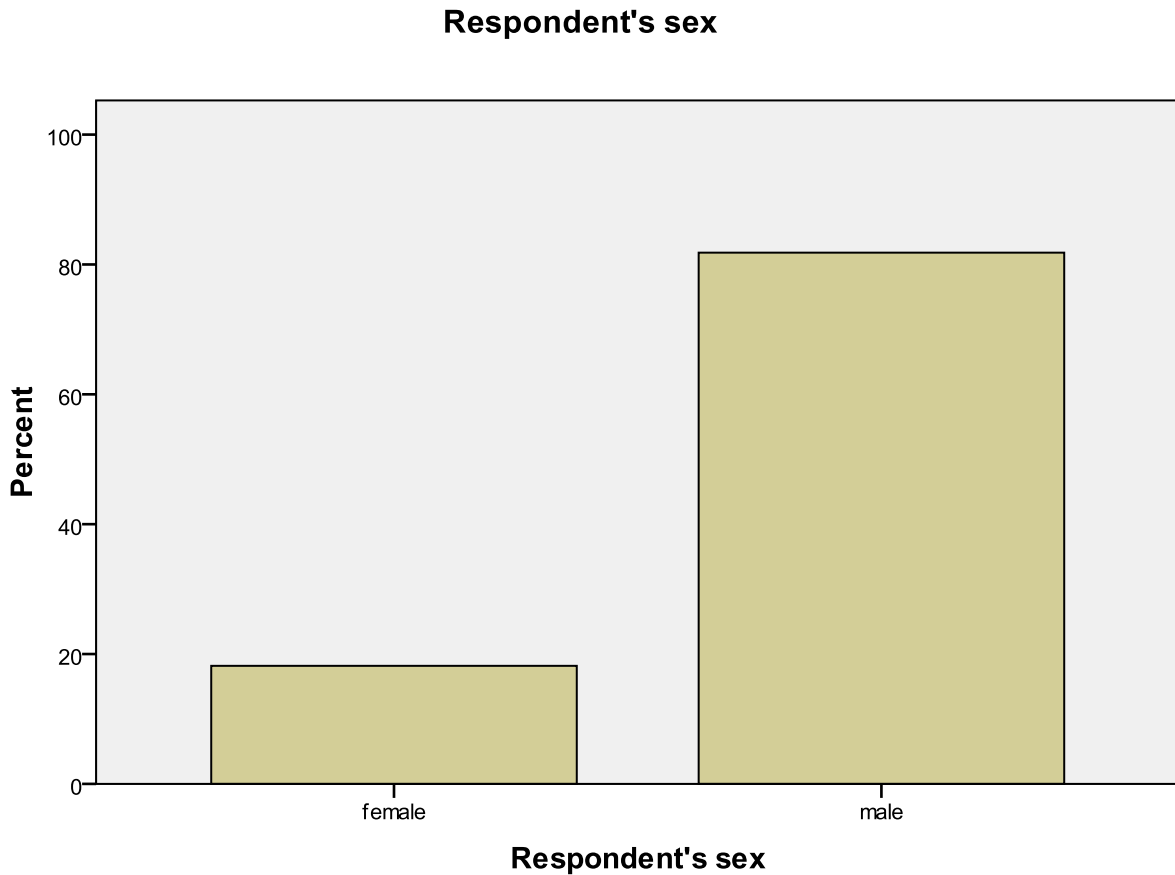
On sex distribution, there were two (2) female versus nine (9) male administrators. This is clearly shown on the table on respondent's sex and the bar chart on the same.

#### Respondent's sex

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid female	2	18.2	18.2	18.2
male	9	81.8	81.8	100.0
Total	11	100.0	100.0	

**Table 10: Administrative staff sex**

**Figure 29:Administrative staff sex**



Some of the variables for this part of the study included the following:

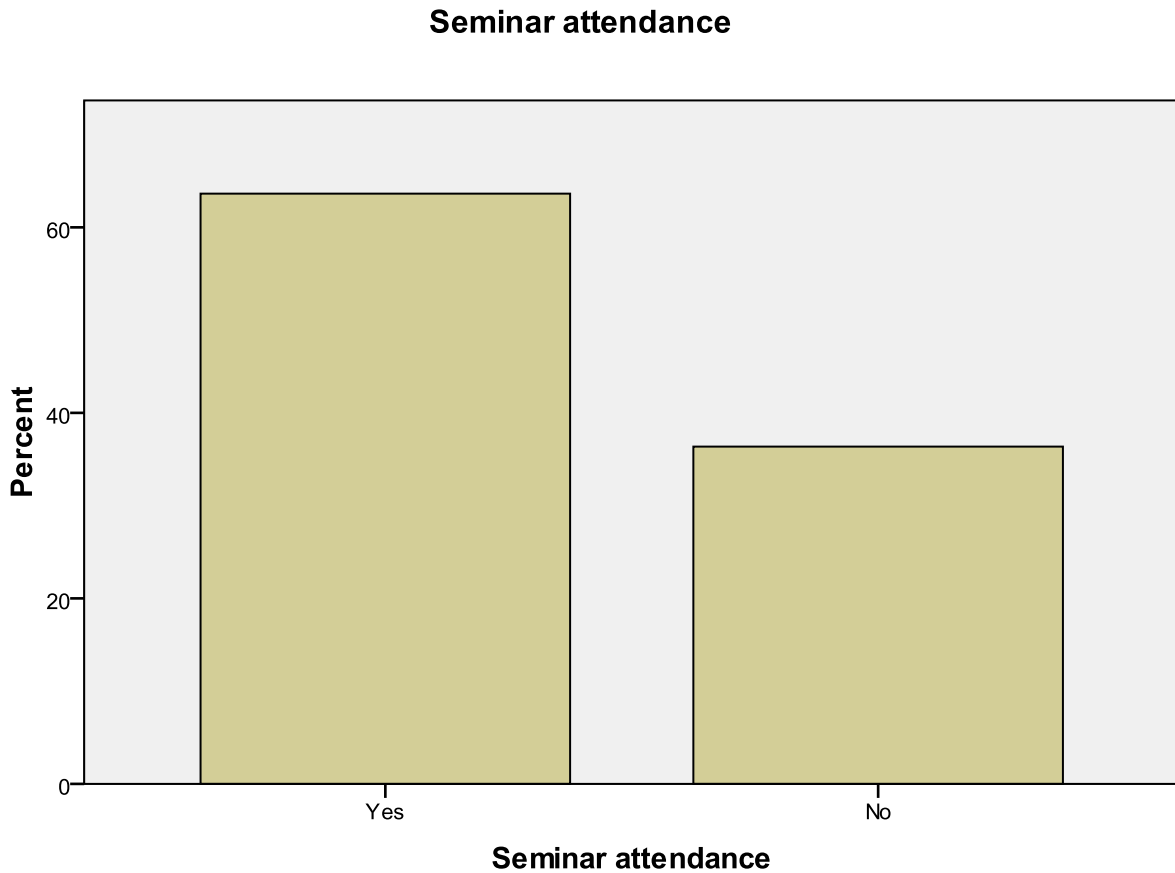
- Seminar attendance and it's frequency and the
- Sex of the respondent.

**Seminar attendance**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Yes	7	63.6	63.6	63.6
No	4	36.4	36.4	100.0
Total	11	100.0	100.0	

**Table 11: Frequency of seminar attendance by the administrative staff**

From the table, it is clear that some administrators who had never attended any ICT seminar at all. They were four in number and this accounted for around thirty-six percent.



**Figure30:Seminar attendance the administrative staff**

**Respondent's sex and the number of times one has attended seminars: Cross tabulation**

		Number of times one has attended seminars				Total
		None	Once	Twice	more than twice	
Respondent's sex	female	1	0	0	1	2
	male	3	3	2	1	9
Total		4	3	2	2	11

**Table 12: Cross tabulation-seminar attendance the administrative staff**

When cross-tabulation was carried out, it was discovered that one female and three male administrators had never attended a single seminar on ICT. Those who had attended the seminars more than twice were only two out of eleven. Of the two, one was a male.

When descriptive statistics was computed, the overall competences of the administrators came out. The administrative staff was tested on various competencies and on the role they played in ICT integration. The competencies included:

- a. Knowledge on the provision of staff development on curriculum implementation and instruction change
- b. Knowledge on current trends in education
- c. Understanding the various aspects of curriculum development and implementation
- d. Knowledge on specific aspects of integration.

On their role in ICT integration, the specific issues of concern included the following:

- ✓ Role in identifying, acquiring and maintaining ICT resources
- ✓ Holding discussions on ICT during meetings
- ✓ Encouragement of staff to attend seminars
- ✓ Provision of ICT resources for use in integration.

#### Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Competence in use of technology	11	1.00	2.00	1.1818	.40452
Competence in ICT integration	11	1.00	5.00	3.0000	1.61245
Provision of staff development	11	1.00	5.00	2.4545	1.36848
Aspects of curriculum. implementation	11	1.00	3.00	1.6364	.80904
Role in resource identification....	11	2.00	5.00	3.8182	1.47093
Rare discussion on ICT	11	1.00	4.00	3.0909	1.13618
Constant encouragement to staff	11	1.00	5.00	2.8182	1.60114
Rare encouragement on peer training	11	1.00	4.00	2.2727	1.19087
Knowledge on trends in instruction	11	1.00	4.00	2.1818	1.25045
Provision of adequate resources for integration	11	1.00	5.00	3.8182	1.53741
Valid N	11				

**Table 13: Descriptive Statistics for administrative staff responses**

From the statistics above, it was clear that most administrators were of the opinion that for ICT integration programmes to be effective; there was need for the administrators to be competent in the use of the technology. This had a mean of 1.1818 as in the table. The mean fell within the 'Strongly Agree' category of the five-point scale. It also came out clearly that most administrators possessed some competencies in some aspects of curriculum development and implementation. On the other hand, the same administrators lacked competencies in the following areas:

- Specific competencies in ICT integration,
  - Provision of staff development on implementation of the curriculum and instructional change
- Possession of specific competences in ICT is crucial to successful ICT integration in education. In situation where the senior administrative staff lacks the skill, then integration of ICT in education may go at a snail pace. Attendance of seminars on ICT by the staff may have an effect on its success in integration. From the statistics on seminar attendance, it was found that a number of administrators had not attended even a single seminar. Non-attendance of seminars or workshops by the administrative staff could be one of the contributing factors to lack of integration of ICT in education.

Administrators need to understand the role they need to play in the ICT integration process. They were required to indicate the extend they agreed or disagreed with the following statements related to their expected role in ICT integration;

- ✓ Role in identifying, acquiring and maintaining ICT resources
- ✓ Holding discussions on ICT during meetings
- ✓ Encouragement of staff to attend seminars
- ✓ Provision of ICT resources for use in integration.

Looking at the means of various items of response, one can easily deduce that the administrators have not taken their rightful place in relation to their expected roles in ICT integration. On their role in identifying, acquiring and maintaining ICT resources, the mean recorded was 3.8182 which when rounded off, came to four(4).In a positively designed five-point scale, this mean fell within the 'Disagree' point .This meant that the administrators played a less important role in identifying, acquiring and maintaining ICT resources.

Holding discussions on ICT during meetings was identified as one important role supposed to be shouldered by school administrator. The descriptive statistic for this item gave a mean of 3.0909.This mean fell within the 'Not Sure' point and this meant that the administrators were unaware of the role of constant discussions on ICT integration.

Provision of adequate resources for integration

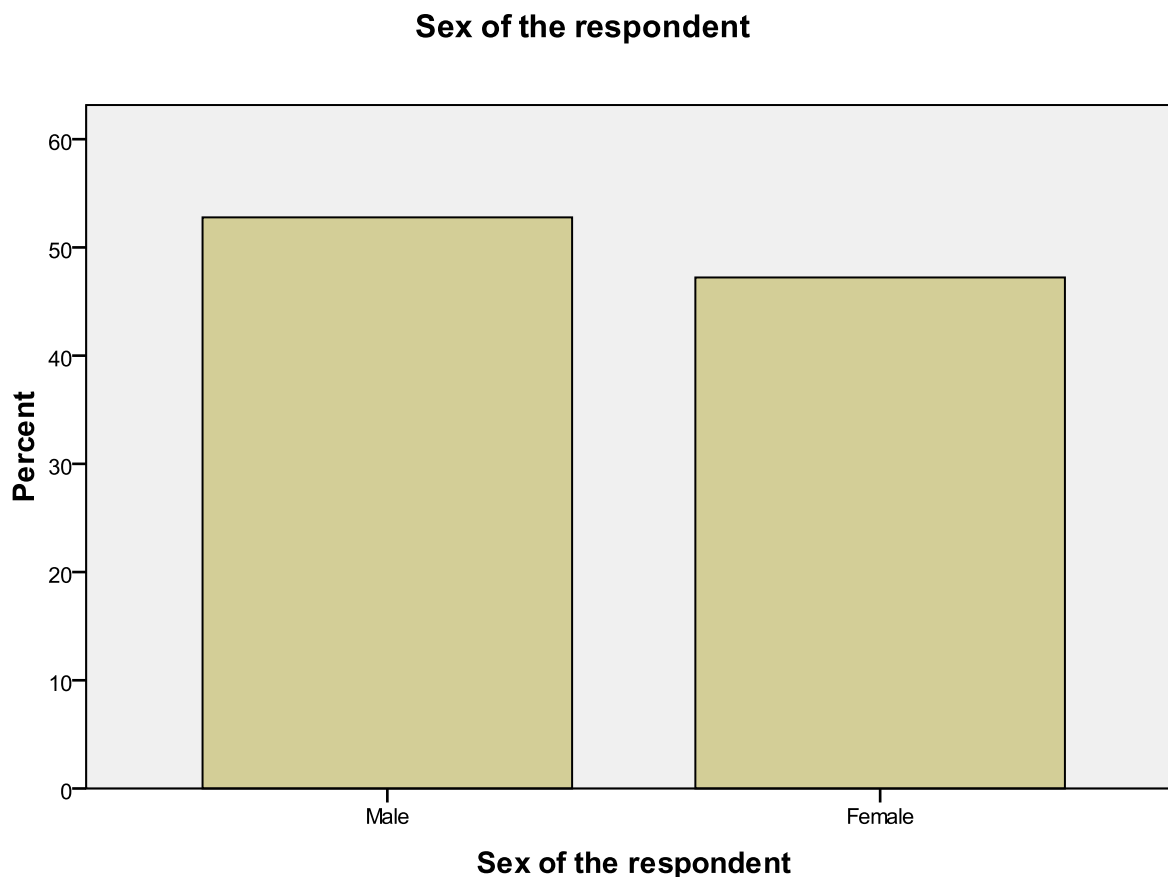
#### **4.4.0: Student teachers' view of ICT integration and their perception of their lecturers' ICT competence**

##### **Introduction**

This subsection sought to find out the student-teachers' view on integration and their perception of their lecturers' competence in ICT.

##### **Sex of the respondent:**

The number of students identified for the study were one hundred and thirty(130).Out of these, there were sixty three male against sixty seven female participants. When the questionnaire was distributed based on identified subjects, only one hundred and eight were submitted back. This formed eighty three percent (83%) of the returned completed questionnaire.



**Figure 31: Sex of student teachers**

**Reliability Statistics**

Cranach's Alpha	N of Items
.900	31

**Table 14: Reliability Statistics for student teachers' questionnaire**

Following the return of the questionnaire, data was coded and entered into the computer for analysis. The reliability coefficient was computed and found to be .900. It was found to be appropriate because of its nearness to 1.00.

#### **4.4.1: Student teachers' perception of their lecturers' ICT competence**

The participants were presented with items that sought to establish their perception of their lecturers' competence on the use of ICT in teaching. Surprisingly, over sixty percent (60%) of the participants seemed not to be sure of their teachers' perceived ICT competence. At the same time, eighty percent of them indicated that use of ICT in teaching is not common among the teaching staff except the ICT lecturers and a small number of lecturers teaching other subjects.

#### 4.4.2: Student teachers' view of ICT integration

From the response gathered, student teachers were eager and wishing to see many lecturers in which ICT integrated. In four items presented to the participants that sought their views on the benefits of integration, over eighty two percent of them were of the view that;

- They enjoyed lessons in which ICT was part;
- ICT integration helped them better understand concepts taught;
- Use of ICT aid in faster syllabus coverage;
- Internet material greatly supplemented lecturers' work.

However, respondents felt that they were not being referred to the internet and that access to ICT facilities in the college was limited only to class work. This was a view of ninety-one and eighty six percent respectively.

Student teachers also felt that in order to encourage more of ICT integration in teaching, the computer laboratory and the cyber café should remain open most of the time. This was seen as one way of increasing access to ICT facilities and resources.

#### 4.5.0: Availability of ICT facilities, devices and infrastructure.

The study also sought to establish the availability/unavailability of ICT infrastructure, devices and facilities in the college. A checklist was designed and availed to ICT experts to use it in identifying the availability and their quantity, unavailability and general comments on the same. The check-list included the following: Computers for teaching(Laptops)'LCD projectors,whiteboards,TV sets, cameras(video,35mm and digital),scanners,radios,printers,email facilities, internet facilities and photocopiers on the side of the facilities and devices while on the side of the infrastructure, areas covered included appropriate rooms for example, laboratories, availability of electricity and human infrastructure.

The study revealed that laptops for teaching were only two (2) against seventy five (75) teaching staff in Tambach TTC. This meant that lecturers who may be interested in integrating ICT in education may not get a chance to do so. In the college, there are twenty four (24) classes meaning that at one given time, holding other things constant, twenty four (24) laptops are needed for integration or instructional purposes. It means that technically, there is a shortage of twenty two (22) laptops. Laptops are easy to carry from one place to another and that their availability with unrestricted access and technical support may encourage their use by the lecturers.

LCD Projectors also ran short of the required number in that they are supposed to match the number of classes. The number of projectors found to be present in the college was three (3) against twenty four (24) classes.

Whiteboards were found to be only two (2) and were situated in the computer laboratory.Generally,white boards serve as writing and projection screens... Essentially, if ICT integration is to be accelerated, and then the whiteboards should be availed in every classroom although there are financial implications associated with taking the step..

Television Sets were found to be present but inadequate. It was discovered that some of the TV sets were damaged beyond repair. All the TV sets were also found to be used for entertainment, recreation or news. They are found either in offices or common rooms for example the staffroom, dining hall or in the theatre hall. Other screens like the AED donation (Tafakari) are in constant use by the science department.

There were two video cameras, one 35mm camera and two digital cameras donated by fhi360.From observation; these cameras (video and digital) were mostly used during important college functions like graduation and during assemblies in the college.

Scanners found in the college were two (2).They become very useful when documents in question are too small to be used effectively or when sending them through the internet. When lecturers were asked whether they were competent in scanning, it came out clearly that most of them were not competent enough to scan documents.

In the college, there were six (6) printers. Two of the printers were donated by USAID/AED/fhi360, one by JICA and the college bought the rest. In most cases, lecturers found it very difficult to print their work with these printers because they were not adequate. Another limiting factor to printing by the college lecturers was the cost element on the part of the college. Reasons given majorly touched on the cost of printing paper and the toner.

Internet facilities were available in the college but require activation. The college was found to be having a well-furnished cyber room with computer interconnection. Ability of lecturers to browse, download and upload information is key to successful internet facility use. When lecturers' competency skills on internet skills were put to test, it was discovered that they were not "very competent". This is because the mean was 2.02, which stood for 'competent'. The measurement scale had three levels of measuring competence. The digit '3' stood for 'very competent', '2' for 'competent' and '1' for not competent. Therefore, 2.02 just fell within just 'competent'.

The college has four (4) photocopiers, two of which are of the normal standards while one has extraordinary features that include very high photocopying/printing speed and stencil cutting. These machines are thought to be enough to run the college photocopy activities. One problem with the three normal machines is the frequent breakdown that leads to high maintenance costs.

The study also sought to find out the availability of infrastructure. The checklist-analyzed data showed that the college had appropriate rooms for example the computer laboratory and the cyber room. Electricity supply was also found to be adequate. In situations where there interruption of electricity supplied by Kenya Power and Lighting Company, a college standby generator automatically switches on. Therefore, supply of electricity was not a problem.

Human infrastructure is very essential in determining the success of ICT integration in the college. The college had only three ICT teachers against all ICT needs in the college. These lecturers were also expected to assist staff to acquire or improve their ICT knowledge. At times, they were expected to service the ICT facilities and devices. As a result, the work before of them was found to be unbearable.

#### 4.6.0: Summary results

From the findings of the study, the following summary was made:

- Most members of the lecturing staff lacked basic ICT skills. In other words, they were not very competent in operating most ICT facilities and resources.
- Members of the lecturing staff had a positive attitude towards ICT integration in teaching.
- Members of the administrative staff were competent in the use of technology
- Members of the administrative staff were competent in aspects of curriculum implementation that is a subset of ICT competence.
- Members of the administrative staff lack specific skills in ICT integration per se and in the provision of staff development programmes, which is a sub-set of ICT competence.
- The Members of the administrative staff were not taking an active role in the following areas of ICT management:-identification, acquisition and maintenance of ICT resources, constant encouragement to staff on ICT, discussion on ICT during meetings and in provision of ICT resources for use in teaching.
- Student teachers had a positive attitude towards ICT integration in teaching.
- Laptops, LCD projectors, whiteboards, cameras and printers were found to be inadequate.
- Rooms were available and appropriate for ICT use but classes needed to be fitted with whiteboards because of their multipurpose nature and role in ICT integration.
- Human infrastructure was found to be inadequate. There were only 3 ICT lecturers in the college against 24 classes and over 69 lecturers..

#### 4.6.1: Comparison with other findings

In a study carried out in Cyprus involving Primary teacher trainees on ‘Attitudes towards use of ICT’, the study revealed that;

- a)The majority of student-teachers have positive attitudes towards computers for personal use. More than 60% of the Cypriots revealed not only that they like working with computers but also that they have confidence working with them.
- b) Almost all student teachers believe that the computer is useful both to their future work and for personal tasks. Similarly, the great majority of student teachers have positive attitudes towards the role of IT in both teaching and learning.

Comparing the Cypriot findings to the findings of the current study, a very close correlation could be seen. This was because the study findings revealed that student teachers who responded to the questionnaire showed a positive attitude towards ICT use in education.

The following information from the findings indicated the positively identified relationship between the findings of the two studies.

In four items presented to the participants that sought their view on the benefits of integration, over eighty two percent (82%) of them were of the view that;

- They enjoyed lessons in which ICT was part
- ICT integration helped them better understand concepts taught
- Use of ICT aid in faster syllabus coverage

From the three points above, one could ably conclude that the attitude of teacher trainers in Tambach TTC towards ICT use in teaching was positive.

The findings of a study, which were obtained by analyzing the data collected from the teachers revealed that, teachers had a low level of ICT use for educational purpose, teachers held positive attitudes towards the use of ICT, and a significant positive correlation between teachers' level of ICT use and their attitudes towards ICT was found. (<http://ccsenet.org/journal/index.php/ies/article/view/5891>)

Comparing some sections of the above findings with the study at hand, some positive correlation was identifiable especially in relation to the attitude held by lecturers towards the use of ICT in education. This study found that teachers held positive attitude towards the following areas of ICT:-

- Private computer ownership: one having his/her own computer to accelerate interest in ICT integration. They indicated that with private ownership of computers, they would be able to learn on their own how to use the computer and its accessories.
- ICT use and faster syllabus coverage: They felt that computers were in a position to help them cover the syllabus at a much faster rate than the use of the conventional methods of teaching.
- Introduction of ICT integration in education,
- Usefulness of computers in content delivery.

A strong correlation between the findings referred to above and the study at hand in relation to computer use for class work versus own work. In the former study, the result was that the teachers showed low level of ICT use. In the study at hand, the mean recorded for the item on the use of computers for class work 3.7 which meant that its use for educational purposes was minimal.

Erlandson and Witters-Churchill say that 'dual focus on the principalship and school improvement in the last quarter of the 20th century has intensified the need for principals to excel at competencies related to curriculum and instruction. The implications of this intensified need are that principals:

- Must understand the various aspects of curriculum development and implementation.
- Must be informed of **current trends in instruction**.
- Must know how to provide appropriate staff development to support teachers in implementing curriculum and instruction change.
- Must be able to **provide adequate resources** to teachers for curriculum implementation.

Relating the above competencies to the findings of the study, it is evident that some correlation can be drawn. This is because most administrators possessed some competencies in some aspects of curriculum development and implementation as specified by the two writers above.

However, the same administrators lacked competencies in relation to provision of staff development on implementation of the curriculum and instructional change. They also lacked specific competencies in ICT integration. The two are some of the competencies related to curriculum and instruction.

Possessing specific competences in ICT is crucial to successful ICT integration in education. In situation where the senior administrative staff lacks the skill, then integration of ICT in education may go at 'snail speed'.

Provision of adequate resources is another important competency required of an administrator for effective ICT integration. Again; the administrators failed this test in that the mean attained was approximately four (4) in a positively designed five-point Likert scale.

Identifying, acquiring and maintaining ICT resources is one of the roles that an administrator has to play in ICT integration. On this item, the mean was 3.8 and when rounded off to a whole number, gave 4. This again meant that the administrators failed the test.

#### **4.5.7: Implications of the results to practice, policy and research:**

The findings of the study have several implications to practice as follows;

- ✓ There is need to further take advantage of the lecturers' positive attitude towards ICT and assist them acquire basic skills for the benefit of the classes they teach.
- ✓ The revelation that ICT has positive implications to learning means that there is need to provide adequate required facilities through collaboration, sponsorship or college initiative in order to enhance ICT integration.
- ✓ If teachers can employ more of ICT strategies in teaching, then learning will be made more interesting and enjoyable hence more retention of learned concepts. It will also aid in faster syllabus coverage.

- ✓ If lecturers are made to own private computers through any positive means, then ICT integration is likely to move at a higher rate.
- ✓ Administrative staff need to understand their roles in ICT integration and play the same well. They also need to be more skilled in identification, acquisition and maintenance of ICT resources
- ✓ Adequate resources should be provided for ICT integration to be successful.

Policy can provisionally be defined as '**a set of decisions which are oriented towards a long-term purpose or to a particular problem**'. <http://www.fao.org/wairdocs/ILRI/x5499E/x5499e03.htm>

On policy, the following observations could be made;

- ICT policy in a college should encompass clear strategies to enable college lecturers acquire ICT skills within a specific period.
- ICT policy should include strategies used to provide adequate and appropriate resources for ICT integration in education.
- The policy should also include ways of addressing the issue of attitude.
- The policy must be in line with the national policies especially the Vision 2030 that aims at making Kenya an industrialized nation.

On research, the following points could be noted ;

- ✓ Baseline research on ICT staff needs should be carried out in order to make justifications on any ICT programme launched.
- ✓ Research should always be carried out to find out the level of implementation of any ICT project launched through either seminars or workshops.

#### 4.5.8: Limitations of the study

The study was limited by the following factors;

- Insufficient literature for review owing to the fact that the area on ICT is still new. Most of the literature reviewed came from the web. In some cases, the web information may still be undergoing some editing.
- Some literature reviewed seemed too high a level compared to the level of development that the lecturers and other administrative staff are at. An example is a situation in which the administrative staff are expected to acquire and maintain ICT resources.
- Difficulty in convincing the lecturing staff to accept to participate in completing the questionnaire. Some of them considered it as an activity that could consume much of their valuable time.

#### 4.5.9: Conclusions

From the analysis of the data collected on factors that hinder the integration of ICT in teaching at Tambach TTC, the following were the conclusions:

- Lack of basic ICT skills/ICT competency skills by the lecturing staff was one of the constraining factors. In other words, the study found out that they were not very competent in operating most ICT facilities and resources.
- Members of the administrative staff did not possess adequate specific skills in ICT integration per se and in the provision of staff development, which is a sub-set of ICT competence. This inadequacy renders them unable to 'push the wheel of integration' forward.
- The Members of the administrative staff do not take an active role in the following areas of ICT management: -identification, acquisition and maintenance of ICT resources, constant encouragement to staff on ICT, discussion on ICT during meetings and in provision of ICT resources for use in teaching. This is a third hindrance to effective ICT integration.
- Inadequacy of resources like Laptops, LCD projectors, whiteboards, cameras and printers is another hindrance.
- The lecturing staff and students have a positive attitude towards integration of ICT in teaching and learning.
- Teaching staff need more in-service courses on ICT and specifically its integration in teaching.
- There is need to employ more ICT lecturers to assist the three overloaded lecturers.

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**TAMBACH TEACHERS'TRAINING COLLEGE PROFESSIONAL CENTRE**

**Appendix A: Availability of ICT infrastructure, devices and facilities checklist**

<i><b>ICT facilities and Devices &amp; Infrastructure</b></i>	<i><b>Available?</b></i>	<i><b>Not available</b></i>	<i><b>Shortfall(where applicable)</b></i>	<i><b>Comments</b></i>
Computers for teaching (Laptops)				
LCD and overhead Projectors				
White Boards				
TV sets				
Cameras(video, digital and 35mm)				
Scanners				
Radios				
Printers				
Email facilities				
Internet facilities				
Photocopiers				
<b><u>Infrastructure</u></b>				
Appropriate Rooms e.g. labs				
Availability of electricity				
Human infrastructure				

**APPENDIX B: TAMBACH TEACHERS'TRAINING COLLEGE PROFESSIONAL CENTRE**

**TTC LECTURERS' ICT COMPETENCY SKILLS QUESTIONNAIRE**

Dear Tambach TTC lecturer. This questionnaire seeks your views on ICT competency skills and integration in the college. Kindly respond to it as honestly as possible. Your response will be accorded the confidentiality it deserves.

**Personal details:** SEX-Male (---) Female (---) Department (-----) Teaching subject (-----)

**Section A: Attendance of ICT seminars/workshops**

(i) Have you ever attended any ICT/computer use seminar/workshop?-Yes---No---- (Put a tick (√) where applicable)

(ii)As much as you can remember, indicate **the number of times** you have attended them-Once (---)Twice(---)more than two times(---)(Put a tick (√) where applicable)

(iii)How did the seminars/workshops you attended assist you in relation to teaching?-----  
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**SECTION B- Basic ICT skills: Please indicate the extent to which you possess the following ICT competency Skills.**

Statements	Levels of competence		
A. Basic knowledge of computers	Very competent	Competent	Not competent at all
-Understand the concepts and basic functions of windows Operating systems			
-Start up ,log on and shut down a computer properly			
<ul style="list-style-type: none"> <li>- Use a mouse pointing device &amp; keyboard</li> <li>- Use help &amp; know how to troubleshoot routine problems</li> <li>- Identify and use icons</li> <li>- Maximize &amp; minimize &amp; move windows</li> <li>- Check how much space is left on a drive or other storage devices</li> </ul>			
B. Proficiency in using Productivity Software			
<ul style="list-style-type: none"> <li>- Creating docs of various types &amp; saving them in desired locations</li> <li>- Retrieving an existing document from saved location</li> <li>- Selecting, copying &amp; pasting text</li> <li>- Print a doc</li> </ul>			
C Electronic communication Skills			
<ul style="list-style-type: none"> <li>- Using a common email progress e.g. MS Outlook</li> <li>- Compose, send ,reply, forward messages</li> <li>- Retrieve attachments from emails</li> </ul>			
D Internet skills			
<ul style="list-style-type: none"> <li>- Use browser effectively</li> <li>- Download files &amp; images from a web</li> </ul>			

**APPENDIX C: TAMBACH TEACHERS'TRAINING COLLEGE PROFESSIONAL CENTRE**

page - Use search engine to find information on the web			
<b>E Moving files</b> - Transfer files by uploading or downloading - Copying files from hard disk to storage devices + vice versa			

<b>Indicate the extent to which you are competent in using the following ICT facilities &amp; devices to aid teaching</b>			
	Very Competent	Competent	Not Competent
Connecting & using LCD projector			
Taking photos for class use using digital or analogue camera			
Scanning documents using a scanner			
Printing a document using a printer			

Please indicate any other skill/competency that you feel you need in order to effectively integrate ICT in your subject-----

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**USE OF ICT**

Please indicate the extent to which you agree or disagree with the following statements in relation to ICT integration.

**SA-Strongly Agree, A-Agree, NS-Not Sure, D-Disagree, SD-Strongly Disagree**

Statements	Extent of Agreement of Disagreement					Comments
	SA	A	NS	D	SD	
1. Introduction of ICT integration in education is a positive move						
2. I always integrate ICT in teaching my subject						
3. Computers are very useful in assisting me deliver my content very easily						
4. At times, use of computer for my own work supersedes its use for class work						
5. Using ICT may interfere with timely completion of the syllabus.						
6. Using ICT in teaching requires a lot of time for preparation.						
7. Lack of proper guidance on integration make ICT integration less interesting and less motivating.						
8. Having my own computer may accelerate my interest in ICT integration.						

Please indicate any other information which can aid in effectively enabling lecturers integrate ICT in teaching-----  
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**APPENDIX D: TAMBACH TEACHERS' TRAINING COLLEGE PROFESSIONAL CENTRE****THE TTC ADMINISTRATIVE UNIT QUESTIONNAIRE**

Dear Tambach TTC Administrative unit. This short questionnaire seeks your views on ICT competence and integration in the college. Kindly respond to it as honestly as possible. Your response will be accorded the confidentiality it deserves.

**Personal details:** Sex ( )

(i) Have you ever attended any ICT/computer use seminar/workshop?-Yes----No---- (Put a tick (✓) where applicable)

(ii) As much as you can remember, indicate **the number of times** you have attended them- Once ( ) Twice ( ) more than two times ( ) (Put a tick (✓) where applicable)

(iii) How did the seminars/workshops you attended assist you in relation to teaching using the latest technologies?-----  
 -----  
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Please indicate the extent to which you agree or disagree with the following statements in relation to ICT integration.

**SA-Strongly Agree, A-Agree, NS-Not Sure, D-Disagree, SD-Strongly Disagree**

<b>ICT COMPETENCE</b>	<b>SA</b>	<b>A</b>	<b>NS</b>	<b>D</b>	<b>SD</b>	<b>Your comments</b>
For ICT integration programs to be effective, administrators themselves must be competent in the use of the technology.						
I possess adequate competencies in relation to ICT integration in education						
I know how to provide appropriate staff development to support teachers in implementing curriculum and instruction change						
Am well-informed of current trends in instruction.						
I understand the various aspects of curriculum development and implementation						
<b>ROLE OF THE ADMINISTRATION IN ICT INTEGRATION</b>						
I play a big role in identifying, acquiring and maintaining ICT resources						
I rarely hold discussions on ICT during meetings						
I constantly encourage staff to attend computer courses to help them integrate ICT						
I rarely encourage peer training on ICT integration						
I constantly provide adequate ICT resources for use in integration						

In your view, what other role can the college administrative unit play in enhancing more integration of ICT in teaching and learning?-----

**APPENDIX D: TAMBACH TEACHERS' TRAINING COLLEGE PROFESSIONAL CENTRE****STUDENTS' QUESTIONNAIRE**

Dear Tambach TTC second year student. This short questionnaire seeks your views on ICT integration in the college. Kindly respond to it as honestly as possible. Your response will be accorded the confidentiality it deserves. **Personal details:** SEX-Male (---) Female (---) Class(---)

Please indicate the extent to which you agree or disagree with the statements provided below.

**SA-Strongly Agree, A-Agree, NS-Not Sure, D-Disagree, SD-Strongly Disagree**

<b>Statements on ICT use in your class</b>	<b>SA</b>	<b>A</b>	<b>NS</b>	<b>D</b>	<b>SD</b>	<b>Your comments</b>
Teachers teaching different subjects seem to be ICT literate.						
-Teachers use of ICT in teaching is very common						
I enjoy lessons in which ICT is integrated						
ICT integration helps me better understand concepts taught						
Use of ICT aid in faster syllabus coverage by teachers						
Being referred to the internet gives me a chance to practice using the resource						
Internet material greatly supplements lecturers' work						

There is unlimited access to ICT facilities in college						
Lecturers should use more of ICT technologies in teaching than the conventional methods.						

In your view, what measures should the college put in place so as to encourage more of ICT integration in teaching---