

**USE OF INFORMATION COMMUNICATION AND TECHNOLOGIES IN THE
TEACHING AND LEARNING OF WELDING AND FABRICATION IN
VOCATIONAL TRAINING CENTRES IN MANDERA COUNTY, KENYA**

YAKUB MOHAMED ABDI

REG NO: E55/CE/25474/2014

**A RESEARCH THESIS SUBMITTED IN PARTIAL FULFILLMENT OF THE
REQUIREMENTS FOR THE AWARD OF THE DEGREE OF MASTERS OF
EDUCATION IN THE DEPARTMENT OF EDUCATIONAL, COMMUNICATION
AND TECHNOLOGY AT THE SCHOOL OF EDUCATION,
KENYATTA UNIVERSITY**

APRIL, 2020

DECLARATION

I confirm that this thesis is my original work and has not been presented in any other university/institution. The thesis has been complemented by referenced works duly acknowledged. Where text, data, graphics, pictures or tables have been borrowed from other works including the internet, the sources are specifically accredited through referencing in accordance with anti-plagiarism regulations.

Signature..... Date.....
Yakub Mohamed Abdi
REG NO: E55/CE/25474/2014

This thesis has been submitted for review with our approval as University Supervisors:

Signature: _____ Date: _____

Name: Dr. Bernard Chumbo Mugo

Department of Education Communication and Technology,
Kenyatta University

Signature: _____ Date: _____

Name: Dr. Michael Mchoki Waititu

Department of Education Communication and Technology,
Kenyatta University

DEDICATION

I wish to dedicate this research thesis to my wife Fatuma Abdi adan

ACKNOWLEDGEMENT

First of all I would like to thank Allah who has brought me this far and providing me with strength, knowledge and vitality that has helped me to make this thesis a reality. I wish to acknowledge the supervisory support that Dr. Mugo and Dr. Waititu gave me during preparation and submission of this research thesis. Your insight and gentle corrections were always encouraging and gave me a motivation to progress with the thesis. You held my hand on this journey. Thank you for challenging and encouraging me to keep up and finalize the task.

My thanks also go to the management of the vocational training for allowing me to collect information from the colleges. I highly appreciate the generosity of all the people who gave out information for this study.

I would also wish to thank my family for moral support, financial support and encouragement and their understanding when I was not there for them during the period I was working to come up with this project; I wouldn't have made it this far without them.

TABLE OF CONTENTS

DECLARATION	ii
DEDICATION	iii
ACKNOWLEDGEMENT	iv
TABLE OF CONTENTS	v
LIST OF TABLES	x
LIST OF FIGURES	xi
ABBREVIATION AND ACRONYMS	xii
ABSTRACT	xiii
CHAPTER ONE: INTRODUCTION	1
1.1 Background.....	1
1.2 Statement of the Problem	5
1.3 Purpose of the study.....	7
1.4 Objectives of the study.....	7
1.5 Research Questions.....	8
1.6 Significance of the Study	8
1.7 Scope and limitation of the Study.....	9
1.7.1 Scope of the study.....	9
1.7.2 Limitations of the Study	10
1.8 Assumptions of the study.....	10
1.9 Theoretical Framework.....	10
1.10 Conceptual Framework	12
1.11 Operation definition of Terms.....	15
CHAPTER TWO: REVIEW OF RELATED LITERATURE	17
2.1 Introduction.....	17
2.2 Instructional Practices in Teaching Welding and Fabrication.....	17
2.3 ICTs Resources in Teaching and Learning	19
2.4 Integration of ICT Resources into Pedagogy.....	22
2.5 User-ability of ICT Resources and Student’s learning.....	24

2.6 Attitudes of learners and teachers in ICT application in teaching and learning welding and fabrication	26
2.7 Challenges facing Integration of ICTs in Teaching and Learning	28
2.8 Summary of Literature Review and Main Gaps of the Study.....	31
CHAPTER THREE: METHODOLOGY.....	33
3.1 Introduction.....	33
3.2 Research Design.....	33
3.3 Study locale.....	34
3.4 Target Population	34
3.5 Sampling Techniques and Sample size	35
3.6 Data Collection Instruments Procedure	36
3.6.1 Trainees Questionnaire.....	36
3.6.2 Instructors Interview schedule.....	37
3.6.2.1 Observation Protocol	37
3.6.2.2 Classroom observation schedule.....	37
3.6.2.3 Observation checklists	38
3.7 Pilot Study.....	38
3.7.1. Validity of the Study Instruments.....	39
3.7.2 Reliability of the Study Instruments	39
3.8 Data collection procedures.....	39
3.8.1 Questionnaire Drop and pick Method.....	40
3.8.2 Interviews.....	40
3.8.3 Resources checklist.....	40
3.8.4 Observations	41
3.9 Data Analysis	41
3.10 Logical and Ethical Considerations	42
CHAPTER FOUR: PRESENTATION AND DISCUSSION OF FINDINGS	43
4.1 Introduction.....	43
4.1.1 Response Rate.....	43
4.2 General Information.....	44
4.2.1 Experiences in Teaching	44

4.2.2 Highest Academic Qualification	45
4.2.3 Professional Qualification.....	45
4.3 Instructional Practices Used By the Instructors in Teaching and Learning of Welding and Fabrication	46
4.4 Nature, Functionality and Accessibility of ICT Resources in the Teaching and Learning of Welding and Fabrication.....	47
4.4.1 Availability and Quantities of ICT resources	47
4.4.2 Functionality of the ICT Resources in the Centres	48
4.4.3 Accessibility of the ICT Resources / Internet.....	49
4.5 Teachers’ Skills in Integrating ICT in Teaching and Learning of Welding and Fabrication	49
4.5.1 Teachers’ Awareness about ICT Integration	49
4.5.2 Instructors Use of ICT in Teaching	50
4.5.3 Ways in which Instructors use ICT in Teaching Welding and Fabrication.....	51
4.5.4 Preparedness to Successfully Integrate the E-Schools ICTS into Teaching.....	51
4.5.5 Training on ICT use, Areas Covered, Areas Need Revisit	51
4.6 Methods used by teachers when integrating ICT into the Teaching and Learning of Welding and Fabrication.....	53
4.6.1 ICT Resources Often Used in Teaching	53
4.6.2 Main Use(S) Of the Instructional Resources during Lessons	53
4.7 Teachers’ and Learners’ Attitude towards ICT.....	54
4.7.1 Teachers’ Attitude towards use of ICT in Teaching and learning of Welding and Fabrication.....	54
4.7.2 Learners’ Attitude towards ICTS	56
4.8 Challenges while Integrating the ICT Based Pedagogy into the Curriculum.....	57
4.8.1 Learners’ Challenges in using the E-Schools ICTs	58
CHAPTER FIVE: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS..	60
5.1 Introduction.....	60
5.2: Summary of Findings	60
5.2.1 Instructional Practices Used By the Instructors in Teaching and Learning of Welding and Fabrication	60
5.2.2 Nature, Functionality and Accessibility of ICT Resources in the Teaching and Learning of Welding and Fabrication	60

5.2.3 Teachers' Skills in Integrating ICT in Teaching and Learning of Welding and Fabrication	61
5.2.4 Methods used by teachers when integrating ICT into the Teaching and Learning of Welding and Fabrication	61
5.2.5 Teachers' and Learners' Attitude towards ICT.....	61
5.2.6 Challenges while Integrating the ICT Based Pedagogy into the Curriculum	63
5.3 Conclusions.....	63
5.3.1 Types, Quantities, Functionality and Accessibility of ICT Resources.....	63
5.3.2 Teachers' Skills in Integrating ICT in Teaching and Learning of Welding and Fabrication.....	63
5.3.3 Methods used by teachers when integrating ICT into the Teaching and Learning of Welding and Fabrication	64
5.3.4 Experiences by Teachers and Learners in the Use of ICT in Teaching and Learning of Welding and Fabrication.....	64
5.4 Recommendations.....	65
5.4.1 Types, Quantities, Functionality and Accessibility of ICT Resources.....	65
5.4.2 Teachers' Skills in Integrating ICT in Teaching and Learning of Welding and Fabrication.....	65
5.4.3 Methods used by teachers when integrating ICT into the Teaching and Learning of Welding and Fabrication	65
5.4.4 Teachers' and Learners' Attitude towards ICT.....	65
5.4.5 Experiences Gained, problems and solutions to problems while integrating the ICT Based Pedagogy into the Curriculum.....	66
5.5 Suggestion for Further Studies.....	66
REFERENCES.....	67
APPENDICES.....	73
Appendix One: Introduction Letter.....	73
Appendix Two: Questionnaire for Welding and Fabrication -Instructors.....	74
Appendix Three: Trainees' Questionnaire	78
Appendix Four: College Principals' Interview Schedule.....	83
Appendix Five: Classroom Observation Schedule	86
Appendix Six: ICT Resources Checklist	88
Appendix Seven: Introduction to Research Authorization	89

Appendix Eight: Research Approval	89
Appendix Nine: Map for Mandera County.....	90

LIST OF TABLES

Table 3.1: Target Population	35
Table 3.2: Sample for the Study.....	36
Table 4.1: Response Rate.....	44
Table 4.2: Instructors' Experience in Teaching.....	44
Table 4.3: Highest Academic Qualification	45
Table 4.4: Professional Qualification.....	45
Table 4.5: Instructional Practices Used By the Instructors in Teaching and Learning of Welding and Fabrication	47
Table 4.6: Availability and Quantities of ICT resources.....	48
Table 4.7: Functionality of the ICT Equipment	49
Table 4.8: Accessibility of the ICT Resources / Internet	49
Table 4.9: Main use(s) of the instructional resources during your lessons.....	54
Table 4.10: Teachers' Attitude towards ICT	56
Table 4.11: Learners' Attitude towards ICTS	57
Table 4.12: Challenges of Using the E-Schools ICTs.....	59

LIST OF FIGURES

Figure 1.1: Conceptual Framework on Integrating ICTs into learning and teaching of Welding and fabrication	14
Figure 4.1: Teachers' Awareness on ICT Integration	50
Figure 4.2: Use ICT in your teaching	50
Figure 4.3: Trained/In-Serviced On the Use of ICT Resources in Pedagogy	51

ABBREVIATION AND ACRONYMS

CALL:	Computer Assisted Language Learning
CD:	Compact Disks
DVDs:	Digital Video Disks
EFA:	Education for All
ICT	Information and communications technology
ICT:	Information and Communication Technology
INSET:	In-Service Education and Training
KESSP:	Kenya Education Sector Support Program
KICD:	Kenya Institute of Curriculum Development
LAN	local area network
MDGs:	Millennium Development Goals
MOE:	Ministry of Education
NIIC:	National ICT Innovation and Integration Centre
ROK:	Republic of Kenya
ROM:	Read Only Memory
SDGs	Sustainable Development Goals
TVETA	Technical and Vocational Education and Training Authority
UNESCO:	United Nations Educational, Scientific and Cultural Organization

ABSTRACT

Integration of Information, Communication and Technologies (ICT) in the teaching of the technical courses plays a great role in facilitating students' acquisition of knowledge, skills and values. This study aimed at investigating the integration of ICT in the instruction of welding and at vocational training centers in Mandera County. The study was guided by the following objectives: to establish availability of ICT resources for instruction of welding and fabrication, to establish teacher's skills in integrating ICTs in teaching and learning of welding and fabrication, to establish teachers and learners attitudes towards integration of ICT in teaching welding and fabrication, to identify challenges teachers faced in integrating ICT in teaching welding and fabrication. This adopted a descriptive survey design and used questionnaires, interview protocol and observation schedules for data collection. The target population of this study was the administrators of vocational training centers, the instructors of welding and fabrication, the trainees of welding and fabrications and the personnel concerned with ICT recourses in the vocational training Centers. The study established that among the ICT resources available for instruction of welding and fabrication includes; an electricity supply, computer laboratory, desktop computers, televisions, printers, Radio facilities, tablets and I-pads and mobile phones that are available and fully functional. The study also found that the teachers have attended ICT integration training workshops offered by non-governmental organizations. The teachers had been using ICT resources in making presentations, research and making engineering drawing, typing and giving assignment. The learners were happily using the resources that had improved their training experience. The study also found out that there were challenges of out-dated ICT equipment, viruses, lack of experienced technical staff, unreliable internet and inadequate ICT resources. The study concluded that there are ICT resources used in training welding and fabrication, instructors integrate the ICT equipment through typing, drawing, making presentation and researching, the teachers and students were happily using the ICT resources and there has been improvement with class work. The study also concluded that there are challenges with weak internet, out-dated ICT equipment and inadequate trained staff to integrate the ICT in the curriculum as well as frequent power backups and loss of data. The study recommended for the increase and introduction of ICT resources and to make it available to all trainees such as more computers and introduce projectors in classrooms as well as local area network, the institution also need to bring up to date ICT resources to cope with challenge of breakdown, the institutions also need to configure good access points and also find reliable internet providers, the institutions should also hire technicians on repairs as well as instructing/training the users to ensure their productivity.

CHAPTER ONE

INTRODUCTION

1.1 Background

Information and communication technologies resources (ICTs) have become humdrum entities in all aspects of life. In the past twenty years the use of ICT has fundamentally changed the practices and procedures of nearly all forms of endeavor in the society. The use of ICT in education lends itself to more student-centered learning settings. The world is rapidly moving into digital media and information, the role of ICT in education is becoming more important and its importance will continue to grow and develop in the 21st century (Rajeswari & Saravanakumar, 2013).

ICTs are making dynamic changes in society. They are influencing all aspects of life. The influences are felt more and more at Institutions. Because ICTs provide both trainees and instructors with more opportunities in adapting learning and teaching to individual needs, society is forcing Institutions aptly respond to this technical innovation (Perrons, 2014). Further Mikre, (2011), postulates that ICT has the potentials of increasing access and improving relevance and quality of education in developing countries.

The Kenya 2030 structural development agenda, considers quality education as one of its key pillars on structural development goals (SDG), Education has also been considered as a key enabler of the realization of the other goals. SDG4 is considered therefore most important in ensuring education for all people including children, the young and the

adult. Achievement of SDG4 enables citizens to enjoy or meet other goals including assured better chances of jobs, better health, and access to good housing and secure, taking better meals and remaining informed (Elder, Bengtsson & Akenji, 2016).

Olelewe and Okwor (2017) noted that utilization of e-learning in delta state Nigeria was through application of technologies an application in instructional colleges, the study however noted that there were challenges poor performance of students in the colleges could have been as a result of lack of effectively utilizing technologies available in e-learning. The study posed a number of challenges on effective utilization of technologies on poor perception and conservative lecturers, lack of investment in training on ICT lack of qualified staff to teach using ICT and capacity building on utilization of ICT. In Botswana upgrading of ICT equipment and effective improvement of ICT connectivity would help in effective access and utilization of ICT equipment hence help in providing quality instruction in these colleges. In the developing countries ICTs play significant roles in representing equalization strategy for developing countries, the reality of the digital divide the gap between those who have access to and control technology and those who do not make a huge difference in the use of ICTs. This means, that the introduction and integration of ICTs at different levels and various types of education is the most challenging undertaking. Failure to meet the challenges would mean a further widening of the knowledge gap and deepening of existing economic and social inequalities among the developed and the developing countries (Sreekumar, 2011).

Kenya Government disseminated its ICT policy in 2006 with its vision to become a prosperous ICT-driven society and its aim was to better the welfare of the citizen by ensuring the accessibility, efficiency, reliability and affordability of ICT services (National ICT Policy, 2006). The policy spells out the goals, aspirations and strategies of integrating ICT in education. Therefore, the Kenyan government has the task and responsibility of encouraging adoption and use of ICT in all the schools and other institutions of learning in order to better the quality of teaching and learning. Currently, the Kenyan government is keen on ensuring that strategies used in teaching various subjects are tailored to achieving the strategic vision 2030 initiative, the government has commitment to invest in training, research and development, and offer incentives to boost application of ICT in all operations in order to meet the needs of the society (Murray, 2008).

The Government of Kenya through the Ministry of Education developed a Kenya Education Sector Support Program (KESSP) in 2005 that featured ICT as one of the priority areas with the aim of mainstreaming ICTs into the teaching and learning process. The National ICT Policy embedded this intent as a national priority and provided the impetus for the ministry to develop its sector policy on ICT in Education. This national policy document had; ICT in education policy; digital equipment; connectivity and network infrastructure; access and equity; technical support and maintenance; harnessing emerging technologies; digital content; integration of ICT in education; training (capacity-building and professional development); and research and development (Kinuthia, 2009).

Though the government has emphasized the integration of ICT in teaching and learning, there has been numerous complains that teachers are failing or are insufficiently integrating the technologies in their teaching subjects (Farrell and Isaacs, 2007). Integration of ICT is especially important in the instruction of technical courses for instance welding and fabrication. These courses are normally done in technical and or vocational colleges. The purpose of vocational education is to train students for specific careers or to prepare students for the general skills needed for the workforce (Heldrich, Hernández-March, Martín del Peso & Leguey, 2009). In other words, the purpose of technical education should be to disseminate productive citizens into the workforce (Sparks & Waits, 2011). Further, Evers, Rush and Berdrow (1998) stated that Society, now more than ever, needs graduates who criticize in constructive ways and do not assume that things should be done only in a certain way because that is the ‘way it has always been done; rather craftsmen who want to work in organizations that strive to correct past mistakes, not contribute to new ones. This calls for in-depth information which could lead to creativity. The integration of ICT in training the technical courses is therefore inevitable.

Hubert (2016) noted that the technical colleges are wanting in providing the necessary skills due to serious challenges facing these colleges which include obsolete and worn out technologies, low levels of training skills of instructors, negative attitude towards the technical courses offered in the colleges by the students among others. In Kenya for instance, the programme for welding and fabrication engineering at craft level in technical and vocational colleges is designed to produce competent craftsmen for all

types of metal work operations. Unfortunately there is still lack of qualified and quality craftsmen to meet the demand of industries in the country due to low quality of training in the technical and vocational colleges (International Labour Organization, 2011). In Kenya, TVET programmes aim at producing artisans, craftsmen and technicians under the artisan, craftsman and technical levels of training.

Due to high demand of welding and fabrication skills there exists a continual production of welding and fabrication graduates from technical colleges but a continuous unemployment are a major source of worry especially in Kenya. The major blame for this has been lack of sufficient and necessary skills required by the welding industries (Palmer, 2015). A question one might pose at this point is whether the craftsmen are well equipped with the desired skills needed to be successful in the industry. The skills could be enhanced through the integration of ICT into instruction. Proper integration of technology leads to high skilled and high performance by the students. Based on this background this study therefore aimed at exploring the integration of ICT in the instruction of welding and fabrication at vocational training centers in Mandera County, Kenya.

1.2 Statement of the Problem

Today's workplace demands high performance employees in technical fields one of which is fabrication and welding, but many applicants do not even possess the skills necessary for entry level positions due to a skills gap occurring in society (Palmer, 2015). This skills gap is noticeable with most courses offered in technical and vocational colleges, among which is fabrication and welding craft practice. Many multinational

organizations have continued to outsource for oversee workers with background in technical expertise such as electrical and construction related contracts.

There is a recent call by the Ministry of Education on emphasis and need of the technical courses in Kenya. Despite the several efforts made by the government of Kenya to provide financial and human resources and opportunities to TVET institutions to train more personnel in technical fields such as welding and fabrication the problem of unemployment and underemployment continues to bite. It is not known whether the problem is related to a lack of adequate skills from the training or a lack of jobs in the labor market or due to some other factors. Further there is continual production of welding and fabrication graduates in technical and vocational colleges but there is a continuous unemployment and underemployment of the graduates which is a serious worry in the country (Union, 2012). It has been found out those employers often state that fabrication and welding craftsmen are not being properly prepared for the industry jobs (Singh, 2011; Metcalf, 2012). In Kenya studies have indicated that technical vocational institutes have continued to use traditional methods in teaching such courses like fabrications and welding ((Mbogo, 2010; Aduda & Kingoo, 2012; Wolf, 2011). Could have this be contributing to the problem? This study attempted to answer this question

Since welding and fabrication is a course offered in these colleges and that the skilled craftsmen in this field are on high demand, and given that the graduates in this course have been blamed on lack of or insufficient skills, it is imperative to conduct a study on how this course is being taught. Particularly, since ICTs integration has proven to highly

boost instructions, this study was therefore justified to explore the integration ICTs into the instruction of welding and fabrication at vocational training centres in Mandera County, Kenya.

1.3 Purpose of the study

The purpose of this study was to investigate the use of ICTs in teaching and learning of welding and fabrication in vocational education and training centers in Mandera County in Kenya. This undertaking entailed observation and analysis of efforts by the tutors or instructors to engage students through the use of ICTS in classrooms, workshops or lessons.

1.4 Objectives of the study

- i. To determine the instructional practices by the instructors in teaching and learning of welding and fabrication at the vocational training centers in Mandera County.
- ii. To examine the nature, functionality and accessibility of ICT resources in the teaching and learning of welding and fabrication in the vocational training centers in Mandera County.
- iii. To establish the attitudes of teachers and learners towards the use of ICTs in teaching and learning of welding and fabrication at the vocational training centers in Mandera County.
- iv. To establish challenges facing teachers integration of ICTs in teaching and learning of welding and fabrication at the vocational training centers in Mandera County.

1.5 Research Questions

- i. What instructional practices do instructors use in teaching and learning of welding and fabrication at the vocational training centers in Mandera County?
- ii. What is the nature, functionality and accessibility of ICT resources in the teaching and learning of welding and fabrication in the vocational training centers in Mandera County?
- iii. Which are the ICT integration practices used by the teachers to influence students' achievement in the learning of welding and fabrication at the vocational training centers in Mandera County?
- iv. What are the attitudes of (i) teachers and (ii) learners towards the use of ICTs in teaching and learning of welding and fabrication at the vocational training centers in Mandera County?
- v. What are the challenges facing teachers integration of ICTs in teaching and learning of welding and fabrication at the vocational training centers in Mandera County?

1.6 Significance of the Study

The findings of the study would be of both theoretical and practical value. In term of the practical value the findings would be of significance to: policy makers and institution management. To the policy makers would get to know the challenges encountered in integrating ICTs in learning of welding and fabrication at the vocational training centers and therefore introduce desirable policies regarding the role of ICT on quality instruction in public institutions.

To the institution management they would utilize the recommendations of the study on teacher's skills on utilization of ICT on instructing fabrication and welding to help in understanding the areas that needs improvement and in enhancing the relevance of ICT in the institution.

The results of this study would also be helpful to donors and well-wishers as they would be enlightened and hence spend their resources in an informed manner. The findings would also be of theoretical value by adding to the already existing literature in the field on ICT integration in pedagogy and andragogy.

1.7 Scope and limitation of the Study

This study was conducted within the following scope and limitations

1.7.1 Scope of the study

The study only focused on integration of ICTs in teaching and learning of welding and fabrication in public owned vocational training centre in Mandera County. Further in spite the fact that ICT covers a wide range resources, this study focused on computers based tool for teaching and learning. The study basically captured aspects of utilization of computer software, communication gadgets including use of radios, microphones, availability and utilization level of internet as well as presentation and demonstration in classrooms and workshops through use of projectors and television.

1.7.2 Limitations of the Study

This study used tools employed in descriptive survey design which often enquire about respondent's opinions. The opinions might not be treated as gospel true and therefore caution should be taken in generalizing the study result.

The study was limited to the integration of ICT in the teaching of welding and fabrication hence leaving out other aspects of teaching and learning that are essential to performance.

1.8 Assumptions of the study

The study was conducted with the following assumptions:

- i.** That the teachers teaching welding and fabrication had been trained to integrate ICT in the instruction,
- ii.** That there were available functional and current resources for the teaching of welding and fabrication in the vocational training centers;
- iii.** That teaching of welding and fabrication continued during and after conducting this study;
- iv.** That the college administration offer supports to the teaching of welding and fabrication in the vocational training centers and that there existed certain challenges facing the teaching and learning of welding and fabrication in the vocation training center.

1.9 Theoretical Framework

This study was mainly guided by the Theory of Reasoned Action (TRA) postulated by Fishbein and Ajzen (1975). The theory explains an individual's behavior based on his or her behavioral intention, which is influenced by his/her attitude toward the behavior and

perception of the subjective norms regarding the behavior. TRA has been used in ICT adoption and use in research as a fundamental theoretical framework, and it also has been combined with other theories and models. Both attitude and subjective norm were found to be important determinants of peoples' intentions to adopt and use ICTs (Brown, Massey, Montoya-Weiss, & Burkman, 2002). Attitude was found to have a significant influence on the intention to adopt and continue to use ICT (Anol Bhattacharjee & Premkumar, 2004). Regarding the subjective norm, previous studies found that subjective norm influences not only the behavioral intention (Hu, Lin, & Chen, 2005), but also other constructs including satisfaction (Hsu & Chiu, 2004), image (Chan & Lu, 2004), and perceived usefulness (Venkatesh & Davis, 2000).

The theory was important in this study since it helped the research to understand and get a deep view of how the study variables integrated in the study. First, one principle of the TRA is that of individual's behavior which helped to shape attitudes of the teachers which are a relevant characteristic in the utilization of ICT resources. Secondly, the theory emphasizes on the availability and accessibility of ICT resources. A teacher cannot be able to use what does not exist and would only use strenuously when what is available is scarce. Skills level of the teachers to use ICT is imperative. The philosophy of TRA directs the training of the user and help determine the level at which the user could be said to be comfortable to integrate ICT into pedagogy.

The study therefore helped to depict the fundamental variables for the study which included: availability of ICTs, teacher's competencies and attitudes in the use of ICT,

students' development of skills and attitudes as a result of learning under the mediation of ICTs, subject matter and quality of teaching and learning.

1.10 Conceptual Framework

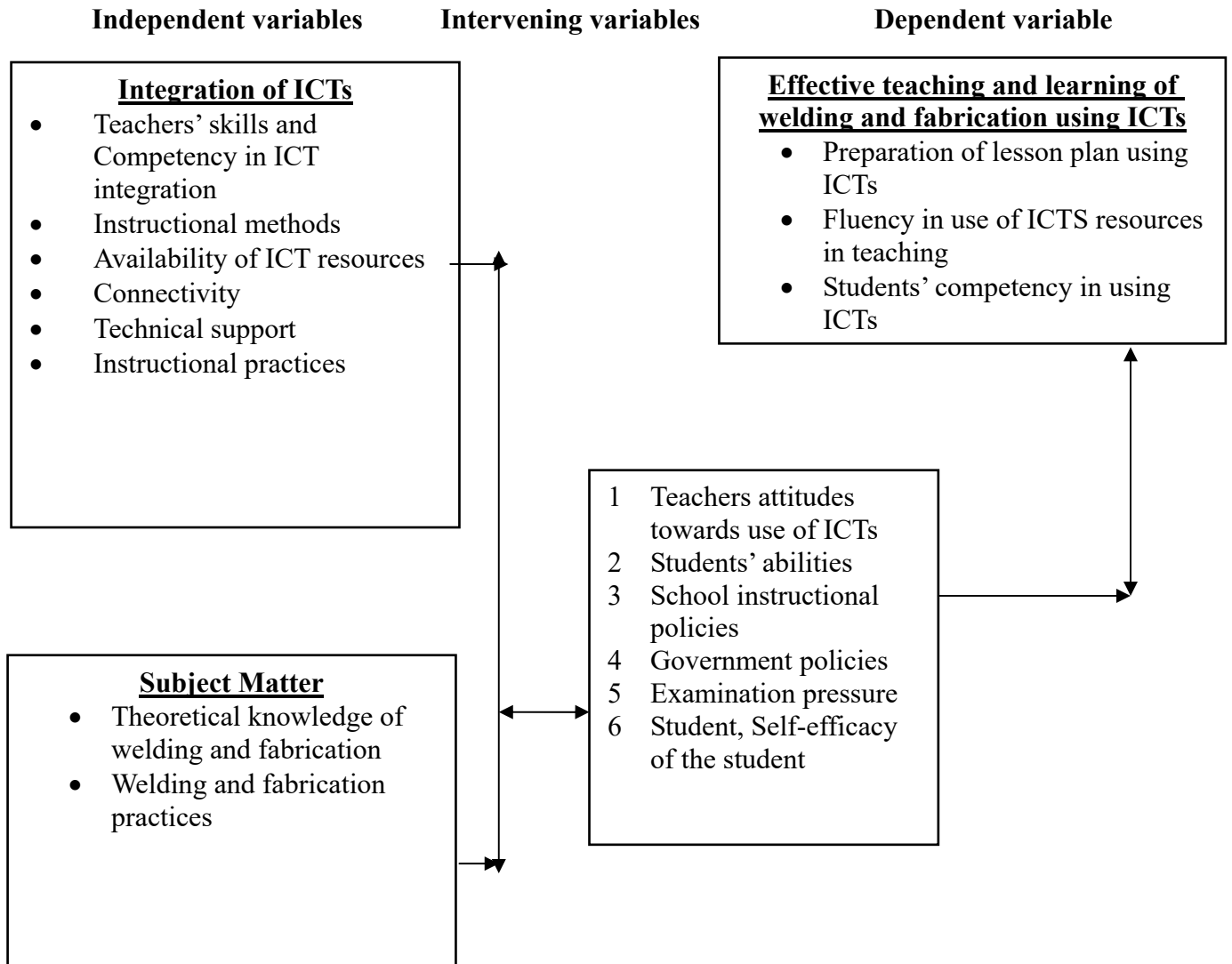
Mugenda & Mugenda (2008) defines conceptual framework as a concise description of the phenomenon under study accompanied by a graphical or visual depiction of the major variables of the study. According to Pahl-Wostl (2009), conceptual framework is a diagrammatical representation that shows the relationship between variables of the study. The following conceptual framework shows the influence of ICT on the learning and teaching of welding and fabrication course in vocational training colleges. The independent variables of this study are of two levels.

The first level called integration of ICTs in teaching and learning of welding and fabrication was measured through: teachers' skills and Competency in ICT integration, instructional methods used in teaching, availability of ICT resources such as computers , cell phones or TVs, connectivity to internet, technical support and instructional practices. The second level of the independent variable called subject matter comprised of theoretical knowledge of welding and fabrication and welding and fabrication practices.

The intervening variable in the study comprised of: teachers attitudes towards use of ICTs such as computers or tablets, students' abilities, school instructional policies, government policies and examination pressure.

The dependent variable of the study comprised of two levels. The first level called effective teaching and learning of welding and fabrication using ICTs involved:

Preparation of lesson plan using ICTs; fluency in use of ICTS resources in teaching such as office, computers, websites, computer graphics, internet search, simulations, animations and video conferencing; students' competency in using ICTs. On the other hand the second level of dependent variable Students' attitude on use of ICTs involved the self-efficacy of the student. The illustration is as shown on the figure below.



Source: Adopted from by Fishbein and Ajzen (2015).

Figure 1.1: Conceptual Framework on Integrating ICTs into learning and teaching of Welding and fabrication

1.11 Operation definition of Terms

Content Knowledge	knowledge of the contents, characteristics and practice of a subject
Digital economy	Varieties of economic interactions among people with the aid and use of ICTs and computer-related devices and media.
Digital inclusion	the deliberate extension of ICTs and related skills, services and infrastructure to persons and areas previously excluded.
Digital information	information that is generated disseminated and received with the aid and use of ICTs and related devices and media.
E-Schools	this is a virtual learning environment where the learners and teachers can achieve their target of learning and instructing respectively using ICT
Hacking:	Accessing networks, and/or intercepting data, calls or voicemail messages, legally or otherwise, without the ICT device owner's consent and/or awareness.
ICTs:	information and Communication Technologies - the different forms of interactions among people with the aid and use of computers and related electronic devices and media.
Information society	a situation in society where ICTs are regularly and widely used to generate, disseminate and receive information.

Instruction	the acts and processes of deliberate teaching and/or learning.
Integration	the adoption, inclusion and use of ICTs; especially during instruction to aid the teaching-learning processes.
Knowledge society	a situation in society where ICTs are regularly and widely used to generate, disseminate and receive knowledge and creativity.
Pedagogical Knowledge	knowledge of the instructional processes, methods, and purposes.
Technological Knowledge	knowledge about the potential of instructional technologies.
Technophobia:	fear of using ICTs and related facilities
AutoCAD	AutoCAD is a commercial computer-aided design (CAD) and drafting software application. It is used by architects, project managers, engineers, graphic designers and city planners
Welding	This involves the act of joining together metal parts through heating the surface to the point of melting with electricity arc and uniting them by hammering and pressing
Fabrication	this process of inventing something in the manufacturing process.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

2.1 Introduction

The previous chapter introduced the topic and contextualised this study. This chapter is concerned with the review of literature related to this study. The review is done based on the objectives of this study under the following themes: availability of ICT resources for instruction of welding and fabrication, teacher's skills in integrating ICTs in teaching and learning of welding and fabrication at the vocational training centres, instructional methods the teachers use when integrating ICT in the teaching and learning of welding and fabrication, the attitudes of (a) teachers and (b) learners towards the use of ICT in teaching and learning of welding and fabrication and experiences by (a) teachers and (b) learners in the use of ICT in teaching and learning of welding and fabrication.

2.2 Instructional Practices in Teaching Welding and Fabrication

Asubiojo and Ajayi (2017) carried out a study on the practices applied in the teaching of fine arts and applied arts in colleges in Nigeria, the study was carried out among 451 colleges in Lagos, descriptive research design was applied in the study and research questionnaires applied as the major tool of data collection among the teachers/ instructors in these colleges. He study established that the process of teaching involved reading, illustrating as well as writing. In applied arts the study noted that practical cases were mainly involved unlike lecturing in classrooms where demonstrations were done to capture the attention of the students. The study also recommended for the application of the best practices in teaching in order to capture the attitude of the learner because of the lecturing and teaching involved students developing a particular attitude.

Cheok, Wong, Ayub and Mahmud (2017) carried out a study on the necessary conditions that a teaching practice should have. The study was carried out among 51 instructors in vocational training centers in Malaysia. The study involved collection of data through interviewing the respondents. The study analysis was done through content analysis. Results of the study revealed that a teaching structure/ approach needs to be student centered in order for it to impact knowledge and skills onto the students. The study noted further that a teaching approach needs to take care on the effect of five senses (touch, feeling, and hearing, seeing and testing). Such teaching method should involve visual teaching aids like videos on computers or TVs as well as radios. By so doing such a teaching approach should take care of contemporary environment through critical thinking. A teaching approach should as well take care of linking classroom activities to the outer world by showing real life situation. On the other hand the teaching methodology needs to take basic requirement of the student, prompt the student to engage the teacher as well as motivating the learner in classroom.

A study carried out by Rowe and Zegwaard (2017) on the teachers' effectiveness on teaching in vocational training centers. The study was carried out among 123 vocational training centers in Australia, Data for the study was carried out through classroom observation to see the different strategies applied by the teachers and how they could effectively utilize them. The study noted that a more effective teacher was the one who could use more than one strategy in classroom and effectively utilize them to get results. Among the strategies that were noted as commonly used in teaching practical cases in vocational training centers involved the use of demonstration in classrooms, discussions, assignment, lecturing in classrooms, carrying out field trips where the learner gets a

chance to interact with the outside and connect with what happens in classrooms as well as problem solving method as well as electronic learning method.

2.3 ICTs Resources in Teaching and Learning

A number of ICT resources are used in teaching including computers, radios, TVs, internet and phones. The use of micro-computer based technology by teachers in secondary schools involves the collection of data, recording of data as well as generation of graphs. Learning institutions are now assigning their students study assignment through website searches as well as electronic mails. Institutions are required to have in place computers as well as internet to receive mails. Students and teachers are able to carry on discussions through chats enabled through such application like whatsapp groups, Google talk, instagram, and face book pages e.tc.as well as students across the world using chats over their phones and laptops (Steel & Levy, 2013).

According to Ololube (2016) televisions and radios can also be used as it has been used since 1920 to educate people, because of the use of computers. Television shows can be recorded and down loaded later for viewing which is referred to as personal on demand. Some running shows over Tvs or radio stations could be educative for instances topics on environmental management and recycling of resources which are core in the ‘Jua kali’ industries in Kenya which again future in welding and fabrication business.

Technology is now key pillar in education where computers and associated software are used in technical colleges to come up with products designs in masonry works as well as welding where simple equipment such as farming equipment as well as kitchen wares

have been designed to attract and achieve certain customer demands (Nye, 2017). Most of the studies recorded herein were done in the developed countries and more so in the mainstream schools, primary and secondary schools. This means there exist a gap of studies in vocational training especially in developing countries Kenya included. This study will therefore endeavor to bridge the gap.

Many different types of technology can be used to support and enhance learning. Everything from video content and digital moviemaking to laptop computing and handheld technologies has been used in classrooms (Tella, Tella, Toyobo, Adika & Adewuyi, 2010). Various technologies deliver different kinds of content and serve different purposes in the classroom. Word processing and e-mail promote communication skills; database and spreadsheet programs promote organizational skills; and modeling software promotes the understanding of Science and Mathematics concepts (Hofer & Swan, 2012).

Technologies available in classrooms today ranges from simple tool-based applications (such as word processors) to online repositories of scientific data. Others are primary historical documents, handheld computers, closed-circuit television channels, and two-way distance learning classrooms (Shane, Laubscher, Schlosser, Flynn, Sorce & Abramson, 2012). Gudanescu, (2010) asserts that even the cell phones that many people nowadays carry with them can be used to learn. Trainees can learn from computers where technology are used essentially as tutors and serve to increase student's basic skills and knowledge. Moreover, they can learn with computers where technology is used as tool

that can be applied to a variety of goals in the learning process and can serve as a resource to help develop higher order thinking, creativity and research skills.

According to Druin (2012), the primary form of student learning from computers is described as Discrete Educational Software (DES). These software applications are also the most widely available applications of educational technology in schools today, along with word-processing software, and have assisted in classroom for more than 20 years. Dagkakis and Heavey (2016), explains that Instructors use DES not only to supplement instruction, as in the past, but to introduce topics, provide means for self-study, and offer opportunities to learn concepts otherwise inaccessible to trainees. The software also manifests two key assumptions about how computers can assist learning. First, the users' ability to interact with the software is narrowly defined in ways designed specifically to promote learning with the tools. Second, computers are viewed as a medium for learning, rather than as tools that could support further learning. As DES is recognized as the commonly used approach to computer use in student learning, in more recent years, use of computers in schools has grown more diversified as educators recognize the potential of learning with technology as a means for enhancing trainees reasoning and problem solving abilities. Haddad and Jurich (2002) notes that the shift which has been driven by the plethora of new information and communication devices now increasingly available to trainees in school and at home, each of which offers new affordances to instructors and trainees alike for improving student achievement and for meeting the demand for 21st century skills.

2.4 Integration of ICT Resources into Pedagogy

Effective integration of ICT in schools would call for a whole institution to be networked to ensure access to multimedia and learning- rich resources via the school's Intranet and the Internet wherever Trainees and Instructors are, in or out of school. The computer labs and classroom computers need to be sufficient in number to allow ready access by Trainees and staff in most subjects across the school curricula. A wide range of peripheral and remote working devices, including video-conferencing, is provided and integrated into the curriculum (Walsh, 2015). Despite the above desired situation, most institutions in Africa face barriers to effective integration of ICT in the teaching and learning process; limited infrastructure in terms of satisfactory physical conditions of laboratories and the subsequent accessibility of the resources (ICT) to the learners.

Many commercial and academic developers of educational multimedia have focused primarily on information access and presentation (Schank & Kass, 2015). However, it is easy to see that multimedia has tremendous potential to enhance the vividness with which information can be presented and ease with which it can be accessed, the main barriers to learning are not generally that appropriate information is difficult to access or badly presented. The problem has more to do with that information (Blumenfeld, Soloway, Marx, Krajcik, Guzdial, & Palincsar, 2011).

Accessibility and use of ICT allows Trainees to investigate more thoroughly the real world. Trainees can therefore more readily access information sources outside the classroom and can use tools to analyze and interpret such information. Information may

be accessed through online systems or through data logging systems. The technologies allow them to receive feedback, refine their understanding, build new knowledge and transfer from school to non-school settings (Bransford, Brown, Cocking, Donovan, Pellegrino & Learn, 2010).

Barriers, associated with ICT integration that fall within the physical realm are beyond the direct control of the teacher. These barriers centers around accessibility and infrastructure and include decisions about purchasing, locations of wiring drops and decisions regarding the placement of computers in centralized labs verses placement of computer pods in classrooms. Placing computers in centralized labs may provide trainees with equitable and efficient exposure to technology but severely limit the technology's accessibility for classroom instruction. Labs deny instructors the flexibility of deciding when technology should be incorporated into instruction and may send the message to trainees that computers are not central to learning or the activities in their classrooms. In addition, physical limitations of the classroom including size and location of desks, often limit choices of room arrangement and do not provide the space that is necessary to add pods of computers to be used as technology centers (Blumenfeld, et al, 2011).

Governments and training institutions seem to recognize the importance of introducing ICT in education and training. Much as trainees and staff need training on a continuous basis with modern requisite skills to fully exploit the ICT environment in their different functions awareness skills only may not be sufficient enough but rather continuous accessibility to ICT resources would do much better. Continuous access to computers

helps instructors feel more secure in their ICT use during lessons and gives them the courage to experiment more and thus helps them integrate ICT into lessons effectively. Many studies also indicate that the impact on learning will increase over time as Instructors and trainees become more experienced in continued practice on using computers (Johanson, 2014).

Tedd and Large (2014) argues that information that is accessed but never put to use during that process, may be difficult to retrieve and use when need arises in the real world. Equal attention must be paid to ensuring that the technology is actually being used by the target learners and in ways that truly serve their needs. Whereas Tedd, et al looked at the accessibility of ICT resources in institutions of learning, key information in regards to access points like library, laboratory, and halls of residence were not explored and the frequency of access by the trainees and staff was never looked at. This study therefore aimed at closing the gap through wider scope coverage on these areas.

2.5 User-ability of ICT Resources and Student's learning

Teaching is becoming one of the most challenging professions in our society where knowledge is expanding rapidly and much of it is available to trainees as well as Instructors at the same time (Gross & Latham, 2012). Modern developments of innovative technologies have provided new possibilities to teaching professions, but at the same time have placed more demands on Instructors and trainees to use these new technologies in the teaching and learning process (Page & Thorsteinsson, 2013).

Recent research by British Education Communication and Technology Agency (BECTA) has highlighted user-ability of ICT resources as one of the key pillar of successful integration of ICT in schools. In developed countries, instructors are fully using ICT in all aspects of their professional life to improve their own learning and the learning of their trainees where they use ICT to assist trainees assess their own learning in completing specific personal projects. It is natural for instructors to collaborate with other colleagues in sharing experiences to solve problems (Rossi, 2016).

It is the skill and attitude of the trainees and instructors that determines the effectiveness of technology integration into the curriculum. Once instructors and trainees developed skills, they could begin to find ways to integrate technology into the teaching and learning process and demonstrate its use to others. If learning was the factor that drove the use of technology in the school, Instructors and trainees could be partners in the learning process, altering traditional paradigms of the teacher providing wisdom and the student absorbing knowledge. Motivation to endure the frustration and turmoil of the process of change needed to be intrinsic (Arteaga Sánchez, Duarte Hueros & GarcíaOrdaz, 2013).

ICT if used positively enhances learning processes and outcomes. Duarte and Van den Brink (2013) assert that both the learning environment and curriculum pedagogy and content are central to the effective use of ICT. However, Instructors and trainees need to be confident in their subject knowledge as well as in basic ICT literacy's so that they can effectively integrate ICT into teaching and learning programs. A large number of studies

have found that trainees are often more engaged and motivated to learn when using relevant ICT to support specific intentional learning.

O'Mara (2014) did show that the context of the use of ICT determines any effects that ICT may have on learning, and that it is extremely difficult to separate the uses that new technologies are put to from the context of their use. Ito, Horst, Bittanti, Stephenson, Lange, Pascoe and Martínez, (2009) suggested that it is not the sole effect of ICT on learning gains which should be studied but the combination of ICT use with particular pedagogical practices in enhancing much improved trainees learning. Trainees also learn more quickly, demonstrates greater retention, and are better motivated to learn when they more often use computers. Though studies have been done in the field of use of computer based technology in pedagogy, there is still scarcity of recorded research findings in the field of andragogy especially in vocational training colleges. The study endeavored to add to this existing gap.

2.6 Attitudes of learners and teachers in ICT application in teaching and learning welding and fabrication

Edmunds, Thorpe and Conole (2012), studied elementary and secondary school students' use of technology and their attitudes towards ICT. The study was grounded in an analysis of the literature relating to motivation, as it indicates that the regular use of ICT for various topics can have a stimulating and beneficial effect on students' learning. Students' responses showed their increasing commitment to the learning task, reinforcing enjoyment, benefit and feeling of achievement in learning when using ICT, and emphasizing their self-esteem. Over 75% of secondary school students stated the

response I agree“ or I strongly agree’ to the statement that the use of computers made the school subjects more exciting. Also, over 50% of the students showed agreement that the use of ICT helped them understand their topics in a better manner (Cox, 2007).

A study carried out by Cortazzi and Jin (2016) on the English teaching and learning in China where secondary and elementary scholars were involved in the study revealed that low retention of students as observed when teaching of English was done in the absence of ICT facilities such as simulators in computer software. On the other hand there was higher enrolment and retention in schools that adopted ICT in teaching English language. Students were more attentive in such classes and worked positively on the attitudes of the students. The students found it easier to remember English words more easily where simulators were used in translation of words and the required sound and spelling.

A study carried out by Alharbi (2014), in Kuwait where both secondary as well as elementary schools were involved noted that in areas where ICT was used in teaching science courses in schools helped in improving self-confidence, self-control and overall improved performance in science tests. Through the use of ICT the students were able to record correctly and generate graphs using computer software that went a long way in impressing the students through the different patterns generated by the graphs.

James and Monica (2014), carried out a study on youths achievement of technical skills through the use of ICT in Kenyan workshops. The study tested on commitment to training as a result of use of ICT. The study found that on a score of 1 to 5, where 1

represented not improves and 5 represented most improved noted that a score of 4 was achieved showing that commitment to attendance had improved and learners were able to improve their general performance in the tests carried out at the end of short courses.

The fact that Integration of ICT resources improves motivation in learning is not a new concept. However, there is scarcity of recorded literature on whether this motivate young adults and old adults who are quite often pursuing welding and fabrication in vocational training centre in Northern Kenya. This study looked at this issue.

2.7 Challenges facing Integration of ICTs in Teaching and Learning

Integrating ICTs into teaching and the curriculum in general is not an easy task. Teachers and educators in general face a number of challenges, both intrinsic and extrinsic, which they have to surmount as they try to fully integrate technology into their teaching. One of the challenges is the readiness and preparedness of the teachers to accept and embrace the ICTs themselves (Sife, Lwoga and Sanga, 2017). Rather than seeing ICTs as some foreign invader come to confuse and complicate the simple life of the past, teachers need to recognize that ICTs are very much our own response to overcoming obstacles that stand in the way of a better, more productive way of life. They need to realize that ICTs are intended to be part of our path to a better life, rather than an obstacle in its way.

Majority of teachers have insufficient training in technology materials and uses and, even modern teacher training is not keeping up with technology developments. Teacher preparation and teacher training continues to pose a big challenge to education. Colleges of education have not been responsive to the expectation that new teachers will come into

classrooms prepared to use the resources the schools have purchased. Therefore, many teachers graduate but still feel either not prepared or poorly prepared to use technology. One of the reasons for such a feeling of inadequacy on the part of new teachers is because colleges of education are less equipped than some of the schools where their graduates will be working. Most college teachers also are unable to make appropriate use of ICTs in their own classrooms and unwilling to try because of anxiety or lack of interest. Moreover, the common teacher preparation curriculum is designed in a manner that most experiences with technologies are focused in a single course that concentrates on learning to use the technologies rather than on learning how to facilitate learning with technologies (Sife, Lwoga and Sanga, (2017).

Another challenge closely related with training is teachers' lack of sufficient understanding of the terms and concepts related to ICTs. Teachers with a precise understanding of ICTs are able to understand information with other users and experts and to ask and answer questions in order to expand their knowledge. Teachers without such understanding cannot know what to communicate, what to expect, what to ask or answer and even where to start when faced with the challenge of integrating ICTs in their teaching. They instead develop a phobia for anything ICTs and fear trying out new ideas thereby disadvantaging themselves and their learners (Bingimlas, 2009).

Frequent technological changes also pose a big challenge to educators. A general overview of the history of ICTs continues to show that the resources and methods of applying them will change, sometimes quickly and dramatically, placing a special burden

on the already overworked teachers to continue learning new resources and changing their teaching methods. Yet, it seems evident that teachers have failed to keep up with the very fast technological changes. The implication, thus, is that the latest ICTs are in limited use in education and in schools in particular (Jamieson-Proctor, Burnett, Finger & Watson2016).

Due to financial constraints and stringent budgets, schools rarely afford to allocate funds to update their ICTs. Educators cannot afford most current technologies since their schools are almost ever in dire financial straits. The implication will be that schools will usually have out-of-date equipment and materials. Moreover, the same financial challenge leads to schools lacking the infrastructure necessary to keep up with new technologies. In effect, this will simply imply that schools cannot take advantage of the newest, most powerful technological developments and innovations in the market (Unwin, 2015).

Most schools in developing countries also have not been adequately capacitated on the necessary maintenance and repair of ICTs, making it very common to see schools' computer labs full of broken down computers, repairable or otherwise. Lack of technical capacity to repair and maintain ICTs in schools reduced the number of ICTs available for use by teachers and learners (Chai, Koh, Tsai, & Tan, 2011).

A lot of studies have been conducted concerning challenges facing integration of ICT in teaching and learning but these challenges varies depending on many factors that includes

environment, types of learners teachers preparedness to integrate among others. Given that this study was conducted in arid area in Kenya, a lot of helpful information about the challenges was unearthed by this study.

2.8 Summary of Literature Review and Main Gaps of the Study

This chapter has looked at the studies done and scholarly work related in this area of the study. In review of the literature various gaps have been identified which include: scarcity of recorded information on availability and accessibility of ICTs, Personality of teachers especially their attitude to use the ICTs, attitudes of the learners in vocational training centre towards the use of ICTs and the skill levels of the teachers towards integration of ICTs in the instruction of practical subjects. These gaps culminated to the major gap of this study; integration of ICT in teaching and learning of wilding and fabrication in Vocational Training Centers in Mandera County, Kenya.

In a study carried out by Jamieson-Proctor, et all on ICT integration and teachers' confidence in using ICT for teaching and learning in Queensland state schools. The study noted that utilization of ICTs in classrooms resulted in improved confidence among the trainers in classroom due to their ability to use internet for clarity purpose or effective use of demonstration in classroom using Tvs and you-tube. This study was however conducted in first world country where internet is stable and instructors are well trained to enable them handle such ICTs resources and therefore the need to pursue a student on the case scenario of Mandera county which is a remote place in Kenya which is a developing county.

Kinthia (2009) carried out a study on Educational development in Kenya and the role of information and communication technology. The study noted that ICTs has played a key role in facilitating learning in classroom through the use ICTs resources such as computers, internet and phones. However, the study was a general case and failed to unearth important concepts on the effect of attitudes of the learners and teachers in utilization of ICTs and the general quality of education and instruction for training. The study was also general and did not pay special attention into vocational training centers which are of applied arts and instruction is different from fine arts or general lecture in classrooms.

Ogongo (2015) carried out a study on factors influencing integration of information communication technology in management of public secondary schools in Kikuyu sub county, Kenya. The study found that financing, management policies and political goodwill were the major factors influencing adoption of ICTs in these centers. However this study did not capture what this study intends to do. It provides a gap from the fact that important aspect of integration of ICTS and quality of education was not covered.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

This chapter presents the research design and methodology of this study. The sections of this chapter included the research design, variables, location of study, target population, sampling techniques and sample size, research instruments, piloting procedure, validity and reliability of the instruments, data collection procedures, data analysis and logistical and ethical considerations.

3.2 Research Design

This study adopted a descriptive survey research design. The design allows collection of both quantitative and qualitative data and integrates different methods in collecting the data (Ploywright, 2011). Through the design, information on various variables or subject will be collected. According to Creswel (2012), descriptive design deals with incidence, distribution and relationship of educational variables. Further, Kothari, (2004) stipulates that the design is also concerned with describing, recording and reporting conditions as they exist. In this study, descriptive survey aimed at exploring the integration of ICT in teaching and learning of welding and fabrication. Descriptive survey design uses both qualitative and quantitative methods of data collection which ensured that accurate data was collected comprehensively. This study employed these techniques in data collection. This design was found to be appropriate for this study in view of the fact that teaching and learning is a day-to-day process and at the same time, the information was collected from a cross section of respondents over a wide field.

3.3 Study locale

This study was conducted in Mandera County which is located at Northern region of Kenya. The county is estimated at a distance of 1350 kilometres from Nairobi, the Capital city of Kenya. It is a remote dry land bordering Somali to the East and Ethiopia to the North. The county has six vocational training centres. However, only two of them offer welding and fabrication courses which mainly require the use of ICT in teaching as well as learning due to its scientific nature. This county was selected for the study due to the fact that it is accessible to the researcher, the county is also in a remote dry land where many graduates from secondary schools only make it to the vocational training but very few get to universities. This is to say the demand for the technical courses especially welding and fabrication is high. This gave a good number of respondents for the purpose of this study. Being a dry land there is scarcity of timber and therefore many homes and business premises furniture (especially beds and chairs) is expected to be made of metal since timber is very expensive. This is to mean that there is a high demand of craftsmen who are qualified in welding and fabrication. The respondents here would be information rich for the purpose of the study.

3.4 Target Population

The target population describes a complete set of individuals with some common characteristics to which the researcher want so generalize the results of the study. Therefore target and study population of this study consisted of all the staff and trainees , both working and learning respectively in at Mandera Vocational training centers and Takaba Vocational Training Centre which offers Welding and Fabrication courses in the level of technical management, institution administrators, instructors in different courses

offered by the institution and trainees undertaking the different course. The two institution administration by 2018 indicated that these categories have (technical management=5, administration=7, Instructors =25). On the other hand there are on average around 133 students being trained on welding and fabrication as noted by the institutions school registry of 2018 at Mandera Vocational training centers and Takaba Vocational Training Centre. Therefore the population for the study targeted was 170 respondents. The targeted population is shown on the table below.

Table 3.1: Target Population

Categories	Target population
Technical staff	5
Administrators	7
Instructors	25
Trainees	133
Total	170

Source: Vocational training registry (2018)

3.5 Sampling Techniques and Sample size

A sample is a finite part of a statistical population whose properties are studied to gain information about the whole (Lohr, 2009). A good sample should be adequate and representative of the underlying population. Mugenda and Mugenda (2008), indicates that a sample size of 30% of the target population is large enough so long as it allows for reliable data analysis. The sample size depends on what one wants to know, the purpose of the inquiry, what is at stake, what is useful, what has credibility and what can be done with available time and resources (Mugenda and Mugenda, 2008). Therefore, a proportionate sample size of 30% is appropriate as a representative of the target population. For this study, 30% of the population across all the strata was selected for the study. The probability techniques were used for this study. To start with, since the

vocational training centers are all government owned and hence homogeneous and that only two of them offer welding and fabrication course. Purposive sampling technique was used to select the vocational centers. The principals of the centers were therefore used as respondents (purposive sampling technique). For the purpose of the trainees respondents 100% of the population was used. Each center has an estimate 20 trainees pursuing welding and fabrication course. This was the case with the technical staff. The following Table presents the sample size of this study.

Table 3.2: Sample for the Study

Respondents Categories	Target population	Percentage (30%)	Sample size
Technical staff	5	30%	2
Administrators	7	30%	2
Instructors	25	30%	8
Trainees	133	30%	40
Total	170		52

3.6 Data Collection Instruments Procedure

Data was collected in this study using both questionnaire and interview schedules.

3.6.1 Trainees Questionnaire

The questionnaire comprised closed-ended and open-ended items. In the open ended questions, the respondents were required to give their opinion in the spaces provided. In the closed ended questions the respondents specifically responded using tick for their answers. The study sought to find out the attitudes towards the use of ICT among the students, challenges faced in the use of ICT resources, availability of resources as well the effect that integration of ICT in learning had on the learning of fabrication and welding in these vocational training institutes.

3.6.2 Instructors Interview schedule

The interview guide contained semi- structured questions that were prepared in advance to collect data on the attitudes towards the use of ICT, the ability of the instructors to use ICT resources, as well as the different usage of the available ICT resources in teaching fabrication and welding in vocational these centers. According to Turner (2010) an interview guide, or aide memoire, is a list of topics, themes, or areas to be covered in a semi-structured interview. This is normally created in advance of the interview by the researcher and is constructed in such a way as to allow flexibility and fluidity in the topics and areas that are to be covered, the way they are to be approached with each interviewee, and their sequence. The researcher booked appointments with the principals of the Centers where he obtained the consent and explained the purpose of the study. Opinions coming from the respondents were noted down as well as recording on the proceeding of the interview.

3.6.2.1 Observation Protocol

Observation checklists not only give an observer a structure and framework for an observation but also serve as a contract of understanding, which may as a result be more comfortable, and help to get specific feedback on aspects of the class. Two types of observations were used for this study as follows.

3.6.2.2 Classroom observation schedule

The Observation schedule was used to gather information about the instructional methods used to teach welding and fabrications and to observe how the instructors integrate ICT in the teaching. This helped the researcher to gather information about the students' levels

of participation and displayed ICT skills. All the sampled teachers and students were observed in order to elicit more reliable and valued results when comparing observations made against the responses given by the teachers and students.

3.6.2.3 Observation checklists

The first one was an observation checklist which was used to gather information about the types and functioning status of assistive technology available to support the teaching and learning in the schools. A list of possible resources such as computers projectors, tablets and phones was prepared and presented in a tabular form so that it would be quick to identify them (see appendix on check list attached).

3.7 Pilot Study

Piloting is usually done to determine the suitability of the research instruments through assessment done on a percentage of a sample. To pilot the research instruments 10% of the sample size which mean that 10 respondents were involved were e distributed across the strata noted on the sampling size. It helps to detect deficiencies in the instrument before the actual study is undertaken (Orodho, 2008). Results on piloting were however not included on the actual collection of data for the study. The pre-testing enabled the researcher to validate the study instruments and also make sure that they are reliable for the purpose of collection of accurate and in-depth data. The piloting exercise also enabled the researcher to find out how easy and correctly the respondents gave their responses.

3.7.1. Validity of the Study Instruments

Validity refers to the extent to which an instrument measures what is supposed to measure without ambiguously or incorrectly addressing a particular subject of interest. To ascertain the validity of the instruments for this study, the researcher sought the opinion of the thesis instructor/supervisor, research experts and guide on previous similar study instruments from past empirical studies carried out which made a few adjustments before the actual collection of the data was done. Also triangulation was used where various instruments were used to correspond each other.

3.7.2 Reliability of the Study Instruments

Reliability refers to the consistence, stability, or dependability of the data. Whenever an investigator measures a variable, he or she wants to be sure that the measurement provides dependable and consistent results (Creswel 2012). A reliable measurement is one that if repeated subsequent times gives the same results as it did the first time. If the results are different, then the measurement is unreliable (Mugenda & Mugenda 2006). This was provided for by analyzing the data obtained and then after a period of two weeks the instruments were administered again to the same respondents (test re-test method). Finally a comparison between the first and the second attempts was made.

3.8 Data collection procedures

The researcher sought approval from the university authorities as shown in the appendix eight, after which the researcher obtained a government permit (shown in Appendix nine) authorizing the conduct of the study. The researcher then visited the sampled schools for reconnaissance, necessary groundwork and, thereafter, data collection from the concerned

study subjects. The research instruments were systematically administered and data collected as follows.

3.8.1 Questionnaire Drop and pick Method

The questionnaires were given to the trainees and instructors of the vocational centres and given two weeks to fill by ticking against their desired response. During the two weeks the research assistants assigned to collect the data could visit the institution to give clarifications where the trainees' faced difficulties in filing the questions. Afterwards the questionnaires were picked for analysis.

3.8.2 Interviews

Interviews were administered among the principals of the institution where face to face discussions on important aspects of integration of ICT in teaching of fabrication and welding were done. Challenges on ICT use were mainly the focus in the discussions. Brief notes on responses given were taken for analysis.

3.8.3 Resources checklist

The researcher first administered the resources checklist in a class room where welding was taught to investigate and record the ICT equipment that support teaching welding and fabrications in school, assess their quality (functionality), quantity and accessibility. This gave the researcher prior understanding of these resources, their nature, state and purposes on their usage.

3.8.4 Observations

Observation was done during the instruction of teaching welding and fabrications to observe how teachers integrate ICT into their teaching. Three observations were made in one week. Scott and Usher (2010) assert that one of the benefits of a researcher undertaking a purely observational role is that this allows the observer to gain a more comprehensive view of what is being observed since they are less likely to be influenced by the agendas of the participants. It also allows observers to become more detached from their own specific agendas and from the way they are positioned or inclined in relation to the subjects of their research.

3.9 Data Analysis

The nature of the data collected for analysis was both quantitative and qualitative. Quantitative data from closed questions was analyzed through descriptive analysis where measures of central tendency (mean), measures of dispersion (standard deviation), frequencies and percentage were applied for the variables. Tables and other graphs were used as appropriate to present the data findings with interpretation of the figures and tables as well as comprehensive discussion of findings done. On the other hand, qualitative data from open ended questions were analyzed using content analysis, through developing a thematic framework from the key issues, concepts and themes emanating from the open ended questions, the results for qualitative analysis were presented through narratives and discussions from previous scholars done (Krippendorff, 2012).

3.10 Logical and Ethical Considerations

Major ethical issues in research include informed consent which means that the respondent knowingly and voluntarily gives consent. By this the respondents' rights are protected (De Vaus, 2013). None of the respondents was coerced or manipulated to give information against their will. The respondents were briefed on the study requirements and the use of information being only for academic purposes, after consent was given the researcher went ahead to collect the data by either interviewing or leaving a questionnaire to be filled. Confidentiality was achieved through non-disclosures of the respondents' names in such a case key challenges and attitudes on the integration of ICT in teaching and learning of fabrication and welding was captured.

CHAPTER FOUR

PRESENTATION AND DISCUSSION OF FINDINGS

4.1 Introduction

This chapter presents data on integration of information communication and technologies in teaching and learning of welding and fabrication in vocational training centers in Mandera County, Kenya. The chapter presents findings on the following objectives: to establish availability of ICT resources for instruction on welding and fabrication at Mandera Vocational Training Centers, to establish teacher's skills in integrating ICT in teaching and learning of welding and fabrication at the vocational training centers, to determine the instructional methods the teachers use when integrating ICT in the teaching and learning of welding and fabrication, to establish the attitudes of (a) teachers and (b) learners towards the use of ICT in teaching and learning of welding and fabrication and to explore challenges faced by (a) teachers and (b) learners.

4.1.1 Response Rate

The study aimed at collecting data from sample of 48 respondents, however the researcher managed to collect data from 40 respondents; this represents 83.33% of response rate. The shortfall from the expected 100% response was as a result of some respondents shying away from giving response, taking too long to respond, absenteeism from vocational centers or giving feedback that was irrelevant to the researcher. With 66.7 % of technical staff, 50% administrators, 66.7% instructors and 87.5% trainees. This was made a reality after the researcher made frequent calls to remind the respondents to fill in the questionnaire. Baruch and Holtom (2008), observed that a response rate above

50% is adequate for analysis; therefore, 83.33% response rate in this study is adequate for analysis. The results are shown on the table below.

Table 4.1: Response Rate

Constituencies Category	Responded		Non-Responded	
	Frequency	Percentage	Frequency	Percentage
Technical staff	2	66.7	1	33.3
Administrators	1	50	1	50
Instructors	2	66.7	1	33.3
Trainees	35	87.5	5	12.5
Total	40	83.33	8	16.67

4.2 General Information

4.2.1 Experiences in Teaching

This section of the study sought to establish the experience of the instructors and technicians in the Vocational training centers. The study established that a majority of the respondents had experience in teaching of between 11 and 15 years as shown by 50%, followed by those of between 16 and 20 years and above 20 years had with 25% each. None had experience of below 5 years. The results are as shown in the table below.

Table 4.2: Instructors' Experience in Teaching

Years	Frequency	Percentage
11 - 15	2	50%
16 - 20	1	25%
above 20	1	25%
Total	4	100

4.2.2 Highest Academic Qualification

This section of the study sought to establish the highest academic qualification of the teachers/ instructor in for the study. The study established from a majority of the respondents that diploma was their highest level of qualification as shown by 60% followed by 25% of the respondents who had degree and a similar percentage with KACE as their highest level of education. None of the respondent had KCSE as their highest level of education. The results are as shown in the table below.

Table 4.3: Highest Academic Qualification

Academic Qualification	Frequency	Percentage
KCSE	0	-
diploma	2	50%
KACE	1	25%
Degree	1	25%
Total	4	100

4.2.3 Professional Qualification

This section of the study sought to establish the highest professional qualification of the teachers/ instructor in the study. The study established from a majority of the respondents that diploma was their highest Professional qualification as shown by 60% followed by 25% of the respondents had B.ED and a similar percentage had M.ED as their highest level of education. None of the respondent had PhD as their highest level of education. The results are as shown in the table below.

Table 4.4: Professional Qualification

Professional qualification	Frequency	Percentage
Diploma	2	50%
B.ED	1	25%
M.ED	1	25%
PhD	0	-
Total	4	100

4.3 Instructional Practices Used By the Instructors in Teaching and Learning of Welding and Fabrication

Objective (i) of the study sought to establish the methods used in teaching welding and fabrication in Mandera County, in carrying out this task likerst scale was applied where a mark of one represented no extent, 2 represented little extent, 3 represented moderate extent, 4 represented great extent whereas 5 represented very great extent. The study revealed that on use of demonstrations in class rooms a mean of 4.02 was revealed showing that it was utilized to a great extent; discussion approach, a mean of 3.07 was revealed showing that it was utilized to a moderate extent; carrying out field trip for learning, a mean of 3.02 was revealed showing that it was utilized moderately; attachment on work industrial, a mean of 4.16 was revealed showing that it was utilized to a great extent; on continuous assessment tests, a mean of 4.22 was revealed showing that it was utilized to a great extent ;assignment of projects, a mean of 3.92 was revealed showing that it was utilized to a great extent; lecturing in classrooms, a mean of 4.11 was revealed showing that it was utilized to a great extent; problems solving methods, a mean of 4.42 was revealed showing that it was utilized to a great extent and on computer simulations in teaching practical skills, a mean of 4.34 was revealed showing that it was utilized to a great extent. Similar studies carried out by Asubiojo and Ajayi (2017) noted that the process of teaching involved reading, illustrating as well as writing. In applied arts the study noted that practical cases were mainly involved unlike lecturing in classrooms where demonstrations were done to capture the attention of the students. The results are shown on the table below.

Table 4.5: Instructional Practices Used By the Instructors in Teaching and Learning of Welding and Fabrication

Statement	Mean	Std dev
Use of demonstrations in class rooms	4.02	.0895
Discussion approach	3.07	1.023
Carrying out field trip for learning	3.02	1.022
Attachment on work industrial method and Apprenticeship	4.16	0.712
Assignment and continuous assessment tests	4.22	0.981
Assignment of Projects	3.92	0.562
Lecturing in classrooms	4.11	0.412
Problems solving methods	4.42	0.757
Use of models and computer simulations in teaching practical skills	4.34	0.8451

4.4 Nature, Functionality and Accessibility of ICT Resources in the Teaching and Learning of Welding and Fabrication

Objective (ii) of the study sought to establish the availability of ICT resources for instruction of welding and fabrications in the vocational training centers in Mandera County. In carrying out this task the study sought for availability, quantities if available, functionality if available and accessibility if available.

4.4.1 Availability and Quantities of ICT resources

The study revealed that Computer Laboratories, Desktop Computers, fully established Internet connectivity and access, Televisions, Printers, Multi-functional Printers/ Copiers/Scanners/Faxes, Projectors, Radio facilities, Tablets and i-pads and Mobile phone were all available. The study further established that there were 2 computer laboratories, a total of 20 desktop computers, 4 Televisions, 4 Printers, 2 Radio facilities, 4 Tablets and i-pads and 30 mobile phone owned by students and used in classes to make references. Similar study by Shane, et al. (2012), revealed that technologies available in classrooms today ranges from simple tool-based applications (such as word processors)

to online repositories of scientific data. Other ICT resources available were primary historical documents, handheld computers, closed-circuit television channels, and two-way distance learning classrooms. Gudanescu (2010) asserts that even the cell phones that many people nowadays carry with them can be used to learn. Trainees can learn from computers where technology are used essentially as tutors and serve to increase student's basic skills and knowledge. The results of the study therefore revealed that mobile phones were majorly used since the trainees owned smart phones that had applications such as search engines and visual audio application that helped in learning, this was followed by followed by desktop computers as ICT resources mainly used in learning. The results are as shown in the table below.

Table 4:6: Availability and Quantities of ICT resources

Institution	laboratories	computers	Televisions	Printers	Radios	Tablets and ipads	Phone
Institution A	1	12	2	2	1	2	17
Institution B	1	8	2	2	1	2	13
Total	2	20	4	4	2	4	30

4.4.2 Functionality of the ICT Resources in the Centres

The study revealed that all the two computer laboratories were in use, the study also revealed that 15 computers were functional whereas 5 were not, 3 televisions were functional whereas 1 was not, all the two radios and all the 30 phones were functional. The results are shown in the table below.

Table 4.7: Functionality of the ICT Equipment

Item	laboratories	computers	Televisions	Printers	Radios	Tablets and ipads	phone
Functional	2	15	3	4	2	4	30
Not functional	0	5	1	0	0	0	0
Total	2	20	4	4	2	4	30

4.4.3 Accessibility of the ICT Resources / Internet

The study established that only three (3) access points among four (4), which represents a 75% accessibility and only 25% not accessible where internet connectivity was weak.

The results are shown on the table below.

Table 4.8: Accessibility of the ICT Resources / Internet

Accessibility	Frequency	Percentage
Accessible	3	75
Not accessible	1	25
Total	4	100

4.5 Teachers' Skills in Integrating ICT in Teaching and Learning of Welding and Fabrication

Objective (iii) of the study was to assess the skills that the instructors had on using the available ICT resources in teaching welding and fabrication.

4.5.1 Teachers' Awareness about ICT Integration

The study established 75% of the respondents were aware whereas only 25% were not.

This is shown in the figure below.

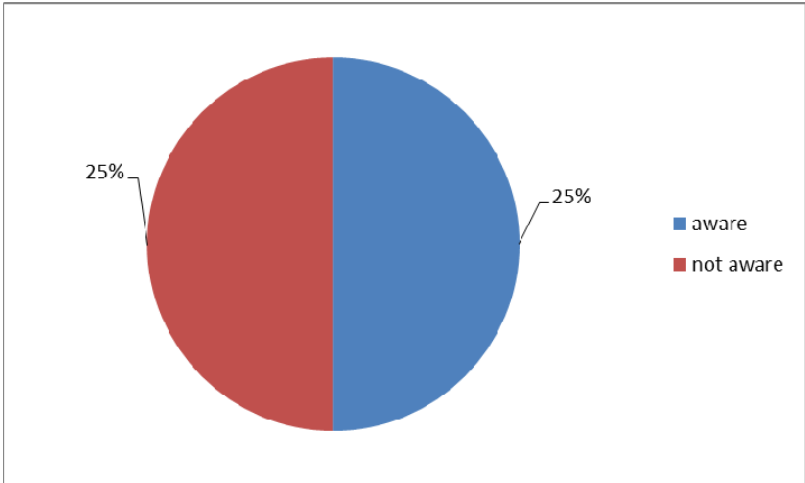


Figure 4.1: Teachers' Awareness on ICT Integration

4.5.2 Instructors Use of ICT in Teaching

The study revealed that majority of the respondents as shown by 75% does not use ICT whereas 25% of the respond use ICT. This is as shown in the table below.

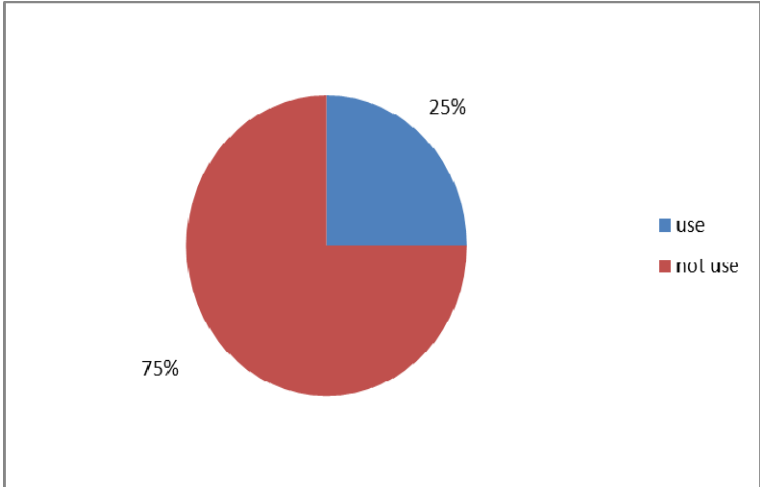


Figure 4.2: Use ICT in your teaching

4.5.3 Ways in which Instructors use ICT in Teaching Welding and Fabrication

The respondents revealed that they display examples to students while teaching using phones or computers, others revealed that they give assignments based on what is in ICT, research using ICT resources and typing notes as well as drawings or making designs.

4.5.4 Preparedness to Successfully Integrate the E-Schools ICTS into Teaching

The aim of this section was to ascertain whether the respondents had been trained/ in-serviced on the use of ICT resources in pedagogy. The results of the study revealed that majority of the respondents as shown by 75% had been trained on use of ICT equipment whereas only 25% of the responds had not been trained. The results are shown in the figure below.

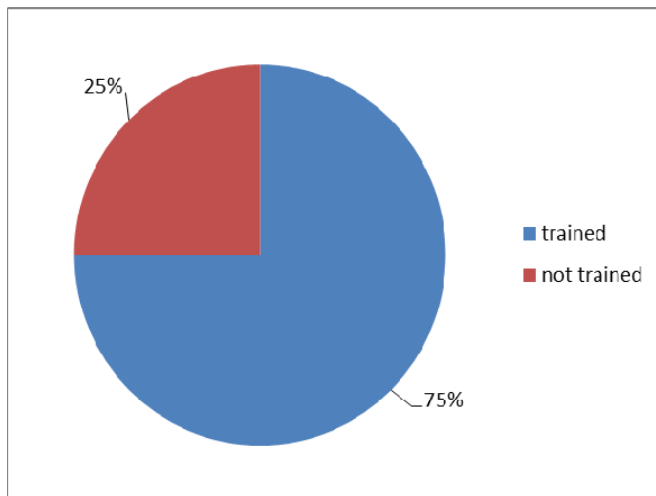


Figure 4.3: Trained/In-Serviced On the Use of ICT Resources in Pedagogy

4.5.5 Training on ICT use, Areas Covered, Areas Need Revisit

This section of the study sought to find out the training attended by the responds, where training were attended, who carried out the training and what was covered. The study

revealed from two respondents that they have attended over five trainings whereas only one attended lesser than these sessions. These training sessions were taught by non-governmental organization ICT technicians in Mandera town.

The respondents also revealed that the training lessons involved computer applications, use of cameras for captions and use of projectors. Despite the training, the instructors expressed that they could not adequately put in practice integration of ICT in teaching in classes. However, they were able to use Microsoft application in surfing internet, preparing notes use Microsoft word as well as presenting through slides using Microsoft - power point.

The instructors indicated that they need to have frequent training on the use of ICT especially on presentations using projectors. There was also concern by the instructors that they needed retraining on use of computer aided design such as use of computer aided drawing (AUTOCAD) and ARCHICAD in making engineering drawing because their courses were technical based for demonstration to their trainees. Similar studies by Roblyer (2013), revealed that majority of teachers have insufficient training in technology materials and uses and even modern teacher training is not keeping up with technology developments. Teacher preparation and teacher training continues to pose a big challenge to education.

4.6 Methods used by teachers when integrating ICT into the Teaching and Learning of Welding and Fabrication

Objective (iv) of the study sought to find out the methods used by the instructors in integrating ICT into the Teaching and Learning of Welding and Fabrication.

4.6.1 ICT Resources Often Used in Teaching

The aim of the study in this section was to establish the ICT equipment often used in teaching. The study revealed that computers, phones, tablets were the ones mainly used equipment. Similar findings by (Johanson, 2014) revealed that continuous access to computers helps instructors feel more secure in their ICT use during lessons and gives them the courage to experiment more and thus helps them integrate ICT into lessons effectively.

4.6.2 Main Use(S) Of the Instructional Resources during Lessons

This section of the study sought to establish the main uses of ICT instructional resources in lesson. The study revealed that 75% of the respondents use ICT to illustrate major ideas during lessons, fifty per cent (50%) of the respondents indicated that they use of ICT to give learners assignment, whereas only 25% of the respondents revealed that ICT was used as marginal aids to teaching. The results are as shown in the table below.

Table 4.9: Main use(s) of the instructional resources during your lessons

Statement	Percentage
To illustrate major ideas during lessons	75%
To give learners assignments	50%
As marginal aids to teaching (rarely used)	25%

4.7 Teachers' and Learners' Attitude towards ICT

Objective (iv) of the study sought to find out the attitude of both the instructors and the learners on the use of ICT in teaching and learning of welding and fabrication in vocational training centres in Mandra.

4.7.1 Teachers' Attitude towards use of ICT in Teaching and learning of Welding and Fabrication

This section of the study sought to establish the attitudes of teachers towards ICT in E-school projects in technical vocational schools in Madera County. The study established from a majority of the teachers that new technology: had made teaching more enjoyable; is good for any teacher, irrespective of their academic/professional qualifications and teaching experiences; teaching had improved and changes in technology have made me to be more informed as show by 75%, this was followed by 50% of the respondents who felt that the new technology are an idea whose time has come, colleagues are happily using the project resources while teaching and respondents can confidently use new technology in front of students and that anyone can easily grasp the terms and concepts related to the new technology.

On the other side some respondents as shown by 50% felt that using the new technology is a time consuming activity only 25% of the respondents noted that the new technology

is interfering with established, productive teaching routine and that the terms and concepts related to the new technology are beyond understanding and that they can work with or without technology.

Similar studies by Grabe and Grabe (2011) revealed that one of the reasons for such a feeling of inadequacy on the part of new teachers is because colleges of education are less equipped than some of the schools where their graduates will be working. Most college teachers also are unable to make appropriate use of ICTs in their own classrooms and unwilling to try because of anxiety or lack of interest. Moreover, the common teacher preparation curriculum is designed in a manner that most experiences with technologies are focused in a single course that concentrates on learning to use the technologies rather than on learning how to facilitate learning with technologies. The results are as shown in the table below.

Table 4.10: Teachers' Attitude towards ICT

Statement	Frequency	Percentage (%)
The new technology have made my teaching more enjoyable	3	75
The new technology are good for any teacher, irrespective of their academic/professional qualifications and teaching experiences	3	75
My teaching has improved thanks to the new technology	3	75
I am too old to use the new technology in my teaching	3	75
I am enthusiastic and willing to use the new technology in teaching	3	75
Frequent changes in technology have made me to be more informed	3	75
Age is not a limitation in using the new technology in my teaching	3	75
Using the new technology is a time consuming activity	2	50
The new technology is interfering with my established, productive teaching routine	2	50
The new technology are an idea whose time has come	2	50
My colleagues are happily using the project resources while teaching	2	50
I can confidently use new technology in front of my students	2	50
Anyone can easily grasp the terms and concepts related to the new technology	2	50
The terms and concepts related to the new technology are beyond my understanding	1	25
Technology changes too fast for me to cope with	1	25
I produce results with or without using the new technology	1	25

4.7.2 Learners' Attitude towards ICTS

This section of the study sought to establish the attitudes of the learners towards the use of ICT resources in their institutions. Majority of the respondents revealed that the new technologies had made their learning more enjoyable, colleagues were happily using the ICT resources while learning, fast changes in technologies made them smarter and more informed as shown by 75 % whereas only 50% of the respondents felt that the new

technologies are good for any learner and that studies have improved thanks to the new technologies. Similar studies carried out by Cox (2011), revealed that for over 75% of secondary school students stated the response ‘I agree’ or ‘I strongly agree’ to the statement that the use of computers made the school subjects more exciting. Also, over 50% of the students showed agreement that the use of ICT helped them understand their topics in a better manner. Results on the effect of ICT use on student motivation revealed that a great improvement in the motivation of the great majority of students. In particular, students were more enthusiastic to start the tasks, and this zeal continued over the period of the task. The results are as shown in the table below.

Table 4.11: Learners’ Attitude towards ICTS

Statement	Frequency	Percentage
The new technologies have made my learning more enjoyable	3	75
My colleagues are happily using the ICT resources while learning	3	75
I am enthusiastic and willing to use the new technologies	3	75
Fast changes in technologies make me smarter and more informed	3	75
Any willing learner can cope up with the fast changes of ICTs	3	75
The new technologies are good for any learner	2	50
My studies have improved thanks to the new technologies	2	50

4.8 Challenges while Integrating the ICT Based Pedagogy into the Curriculum

Objective (vi) of the study sought to find out problems that the students and the instructors in the vocational training centres face in integrating ICTs in vocational centres. The study established that the instructors have in some cases not had enough training on connecting devices while making presentation whereas in other instances the gadgets have malfunctioned while making presentation and also loss of power and weak internet and memory backups in case of malfunction of hard disks in computers.

The study also sought to find out the solutions that will solve instructors challenge in integrating ICT in vocational centres. The study established that procuring best technical experts to impart the skills to the instructors, seeking for adequate financing will help in resolving the problems and identifying of certain programs that cannot be easily phased out.

The study revealed that in the opinion of the instructor frequent and comprehensive training on ICT would go a step further in enhancing their productivity. Also regular check-ups on the gadgets to test their status would avoid their breakdowns. There also need to be good antivirus to guard against malfunctions, Heavy backups of data is also needed to avoid loss of information during equipment malfunction.

4.8.1 Learners' Challenges in using the E-Schools ICTs

This section of the study sought to find out the challenges that the learners are facing in using the e-Schools ICTs. The study revealed that a majority of respondents face slow, inadequate and/or unreliable network/internet access as shown by 60%, this was followed by inadequate access to the facilities as shown by 45%, followed by frequent breakdown of resources/facilities as shown by 33%, out-dated computer hardware and software followed with 30%, followed by computer viruses, worms, Trojan horses, spam etc. as shown by 27%, followed by inadequate online literature on my subject areas as shown by 23%, followed by inadequate support/guidance from my teachers on the use of resources as shown by 22%, this was followed by inadequate technical assistance, help or services as shown by 20%, followed by inadequate time allocations as shown by 16% and finally competition for the scarce ICT resources as shown by 15%. The study however, noted that

the trainees could overcome the challenges through acquiring laptops that can also be used in their homes to carry out their studies in-case of power breakdown and inadequacy of the resources. The acquisition of laptops and computers would also solve the problem of inadequacy and competition of resources. The trainees can also enrol for short-term courses outside schools to learn on such software like Ms-Office or AutoCAD.

A similar study carried by According to Roblyer (2013), revealed that due to financial constraints and stringent budgets, schools rarely afford to allocate funds to update their ICTs. Educators cannot afford most current technologies since their schools are almost ever in dire financial straits, the implication will be that schools will usually have out-of-date equipment and materials. Moreover, the same financial challenge leads to schools lacking the infrastructure necessary to keep up with new technologies. In effect, this will simply imply that schools cannot take advantage of the newest, most powerful technological developments and innovations in the market. The results are as presented in the following .

Table 4.12: Challenges of Using the E-Schools ICTs

statement	Frequency	Percentage
Slow, inadequate and/or unreliable network/internet access	21	60%
Inadequate access to the facilities	16	45%
Frequent breakdown of resources/facilities	12	33%
Out-dated computer hardware and software	11	30%
Computer viruses, worms, Trojan horses, spam etc.	9	27%
Inadequate online literature on my subject areas	8	23%
Inadequate support/guidance from my teachers on the use of resources	8	22%
Inadequate technical assistance, help or services	7	20%
Inadequate time allocations	6	16%
Competition for the scarce ICT resources	5	15%

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

The previous chapter presented in detail the study finding based on the study objectives this chapter gives a summary of the findings, conclusion of the study, recommendation of the study and finally suggestions for further studies.

5.2: Summary of Findings

5.2.1 Instructional Practices Used By the Instructors in Teaching and Learning of Welding and Fabrication

The study revealed that classroom demonstrations; discussion approach, carrying out field trip for learning, attachment on work industrial, on continuous assessment tests, lecturing in classrooms and computer simulations were greatly used as Practices Used By the Instructors in Teaching and Learning of Welding and Fabrication.

5.2.2 Nature, Functionality and Accessibility of ICT Resources in the Teaching and Learning of Welding and Fabrication

The study established that among the ICT resources available for instruction of welding and fabrication at Mandera vocational training centers includes; an electricity supply, computer laboratory, desktop computers, televisions, printers, Radio facilities, Tablets and I-pads and mobile phones that are available and fully functional. Also the study

found that there was fully established internet connectivity and access points where some had some problems with accessibility.

5.2.3 Teachers' Skills in Integrating ICT in Teaching and Learning of Welding and Fabrication

The study also established that majority of the instructors of welding and fabrication had been trained/ in-serviced on the use of ICT resources in pedagogy. The study also revealed that majority of respondents had attended over five trainings which were taught by non-governmental organization ICT technicians.

5.2.4 Methods used by teachers when integrating ICT into the Teaching and Learning of Welding and Fabrication

The study also found that instructors use ICT integration into instructional to illustrate major ideas during lessons and to give learners assignment as main sources of instructional content in the teaching and learning of welding and fabrication.

5.2.5 Teachers' and Learners' Attitude towards ICT

The study further established that according to instructors: age is not a limitation in using the new technology in teaching, colleagues are happily using the project resources while teaching, teaching experience had improved due to the new technology, the new technology is an idea whose time has come, instructors were enthusiastic and willing to use the new technology in teaching. However the instructors were undecided that they can confidently use new technology in front of their students, undecided that the new technology has made their teaching more enjoyable, undecided that frequent changes in

technology have made them to be more informed, undecided that the new technology is good for any teacher irrespective of their academic/professional qualifications and teaching experiences. The instructors finally disagreed that they were too old to use the new technology in my teaching, can still teach better without the new technology, using the new technology is a time consuming activity, were not yet ready for the new technology, the terms and concepts related to the new technology are beyond their understanding and finally that the new technology is an obstacle on their way of productive better teaching life on welding and fabrications.

The study also found from the learners that; their colleagues are happily using the ICT resources while learning, their studies have improved thanks to the new technologies, the new technologies are an idea whose time has come, they are enthusiastic and willing to use the new technologies, fast changes in technologies make them smarter and more informed, the new technologies are good for any learner. However the trainees were undecided: as on whether the terms and concepts related to the new technologies are easy to grasp, on whether they can confidently use new technologies in front of their classmates, any willing learner can cope up with the fast changes of ICTs, my peers feel uncomfortable using the new technologies. Finally they disagreed that they can learn better without the new technologies, was not yet ready for the new technologies, using the new technologies is boring and time consuming, fear exposing their poor skills in the new technologies to classmates their learning would be more enjoyable without the new technologies, that technologies change too fast for them to cope with and that the frequent need to be updated in technologies is too demanding.

5.2.6 Challenges while Integrating the ICT Based Pedagogy into the Curriculum

The study finally established that teachers face a number of problems in integrating ICT in teaching welding and fabrication at the vocational training centers including; lack of enough ICT facilities in these institutions to carry out integration as well as lack of experienced technical trainers on ICT. On the other hand the learners face the challenge of inadequate access to the facilities out-dated computer hardware and software competition for the scarce ICT resources, slow, inadequate and/or unreliable network/internet access, inadequate technical assistance, help or services, computer viruses, worms, Trojan horses and spam, inadequate time allocations and frequent breakdown of resources/facilities as well as little help from their teachers in learning of welding and fabrication at the vocational training centers.

5.3 Conclusions

5.3.1 Types, Quantities, Functionality and Accessibility of ICT Resources

The study concluded that the vocational training institutes in Mandera County have computer laboratories, desktop computers, local area network and access points, Televisions, Printers, Multi-functional printers/scanners/fax, Projectors, Radios, Tablets and i-pads and phones that comprise the ICT resources in these institutions. However the Centres require more of these resources since they are inadequate.

5.3.2 Teachers' Skills in Integrating ICT in Teaching and Learning of Welding and Fabrication

The study further concluded that the teachers training fabrications and welding in the vocational training institute in Mandera County have skills acquired through trainings

attended including workshops frequently attended and computer courses. The study concluded that the teachers have some skills in making presentations and giving reading assignment to trainees.

5.3.3 Methods used by teachers when integrating ICT into the Teaching and Learning of Welding and Fabrication

The study also concluded that ICT resources provided numerous learning and instructional materials for the both teachers and learners. Whereas the study also concluded that only a few of the respondents both learners and teachers could effectively and comfortably demonstrate or present something using ICT resources available.

5.3.4 Experiences by Teachers and Learners in the Use of ICT in Teaching and Learning of Welding and Fabrication

The study concluded finally that there were challenges on the use of ICT resources in both learning and teaching of welding and fabrication including; lack of enough ICT facilities in these institutions to carry out integration as well as lack of experienced technical trainers on ICT. The learners also faced the challenge of inadequate access to the facilities out-dated computer hardware and software competition for the scarce ICT resources, slow, inadequate and/or unreliable network/internet access, inadequate technical assistance, help or services, computer viruses, worms, Trojan horses and spam, inadequate time allocations and frequent breakdown of resources/facilities as well as little help from their teachers in learning of welding and fabrication at the vocational training centers.

5.4 Recommendations

5.4.1 Types, Quantities, Functionality and Accessibility of ICT Resources

The study recommended for the increase of ICT resources including computers, radios, local area network, projectors, TVs and tablets that are mainly used in learning and instruction of welding and fabrication in vocational training centers in Mandera county.

5.4.2 Teachers' Skills in Integrating ICT in Teaching and Learning of Welding and Fabrication

The study recommended that training of instructors to make them up-to date on how different ICT resources available should be done frequently through seminars and workshops to help them offer good services and quality instruction to the trainees. Frequent and comprehensive training on ICT would go a step further in enhancing productivity of the teachers in these institutions.

5.4.3 Methods used by teachers when integrating ICT into the Teaching and Learning of Welding and Fabrication

The study recommended for the use of technology in making illustrations of figures, maps, videos, assigning of reading assignment, discussions as well as for reference purposes.

5.4.4 Teachers' and Learners' Attitude towards ICT

The study recommended for a more comprehensive approach to the use of ICT in teaching welding and fabrication because the learners and instructor feel that the

introduction of ICT has brought more resources into learning and making classroom activities enjoyable.

5.4.5 Experiences Gained, problems and solutions to problems while integrating the ICT Based Pedagogy into the Curriculum

The institution also need to bring up to date ICT resources to cope with challenge of breakdown, the institutions also need to configure good access points and also find reliable internet providers, the institutions should also hire technicians on repairs as well as instructing the users. Also regular check-ups on the ICT equipment to test their status would avoid their breakdowns.

5.5 Suggestion for Further Studies

This study has raised certain issues concerning integration of ICT in teaching and learning of wilding and fabrication in vocational training Centres in Mandera, Kenya. In this respect, the study recommends that further research should be done in the following areas:

- i) The impact of integrating ICT in teaching and learning of wilding and fabrication on the students' competence.
- ii) Relationship between Teachers' perceptions of the ICT and actual integration in teaching and learning of wilding and fabrication
- iii) Correlation between the teachers ICT skills acquired and the actual practices in the classroom.
- iv) Iv. A study should be conducted on the teacher's professional development especially in use of ICTs.

REFERENCES

- Alharbi, E. (2014). *A Study on the Use of ICT in Teaching in Secondary Schools in Kuwait* (Doctoral dissertation).
- Arteaga Sánchez, R., Duarte Hueros, A., & GarcíaOrdaz, M. (2013). E-learning and the University of Huelva: a study of WebCT and the technological acceptance model. *Campus-Wide Information Systems*, 30(2), 135-160.
- Asubiojo, R. O., & Ajayi, J. A. (2017). The Role of Information and Communication Technology in Enhancing Instructional Effectiveness in Teachers' Education in Nigeria. *KIU Journal of Social Sciences*, 3(2), 289-295.
- Banerjee, A., & Chaudhury, S. (2010). Statistics without tears: Populations and samples. *Industrial psychiatry journal*, 19(1), 60.
- Baruch, Y., & Holtom, B. C. (2008). Survey response rate levels and trends in organizational research. *Human relations*, 61(8), 1139-1160.
- Bingimlas, K. A. (2009). Barriers to the successful integration of ICT in teaching and learning environments: A review of the literature. *Eurasia Journal of Mathematics, Science & Technology Education*, 5(3).
- Blackmore, J., Hardcastle, L., Bamblett, E., & Owens, J. (2013). Effective use of information and communication technology (ICT) to enhance learning for disadvantaged school students. *Deakin Centre for Education and Change, Institute of Disability Studies, Deakin University and Institute of Koorie Education, Deakin University, Australia*.
- Blumenfeld, P. C., Soloway, E., Marx, R. W., Krajcik, J. S., Guzdial, M., & Palincsar, A. (2011). Motivating project-based learning: Sustaining the doing, supporting the learning. *Educational psychologist*, 26(3-4), 369-398.
- Bransford, J. D., Brown, A. L., Cocking, R. R., Donovan, M. S., Pellegrino, J. W., & Learn, H. P. (1999). Committee on Developments in the Science of Learning.
- Chai, C. S., Koh, J. H. L., Tsai, C. C., & Tan, L. L. W. (2011). Modeling primary school pre service teachers' Technological Pedagogical Content Knowledge (TPACK) for meaningful learning with information and communication technology (ICT). *Computers & Education*, 57(1), 1184-1193.
- Cheok, M. L., Wong, S. L., Ayub, A. F., & Mahmud, R. (2017). Teachers' Perceptions of E-Learning in Malaysian Secondary Schools. *Malaysian Online Journal of Educational Technology*, 5(2), 20-33.
- Cortazzi, M., & Jin, L. (1996). English teaching and learning in China. *Language teaching*, 29(2), 61-80.
- Dagkakis, G., & Heavey, C. (2016). A review of open source discrete event simulation software for operations research. *Journal of Simulation*, 10(3), 193-206.
- De Vaus, D. (2013). *Surveys in social research*. Routledge.
- Drache, D., & Cameron, D. (2015). *The Other MacDonald report: the consensus on Canada's future that the Macdonald Commission left out*. James Lorimer & Company
- Druin, A. (2012). The role of children in the design of new technology. *Behaviour and information technology*, 21(1), 1-25.

- Duarte, A., & Van den Brink, K. (2013). Learning and teaching with ICT. *M. Barajas (Ed.), Learning innovations with ICT: Socio-economics perspectives in Europe*, 99-110.
- Dunne, M. (2005). School Enterprises: Combining Vocational Learning with Production. International Project on Technical and Vocational Education (UNEVOC).
- Edmunds, R., Thorpe, M., & Conole, G. (2012). Student attitudes towards and use of ICT in course study, work and social activity: A technology acceptance model approach. *British journal of educational technology*, 43(1), 71-84.
- Elder, M., Bengtsson, M., & Akenji, L. (2016). An optimistic analysis of the means of implementation for sustainable development goals: Thinking about goals as means. *Sustainability*, 8(9), 962.
- Eseryel, D. (2012). Approaches to evaluation of training: Theory & practice. *Educational Technology & Society*, 5(2), 93-98.
- Evers, F. T., Rush, J. C., & Berdrow, I. (1998). *The Bases of Competence. Skills for Lifelong Learning and Employability*. Jossey-Bass Publishers, 350 Sansome Street, San Francisco, CA 94104.
- Farrell, G., Isaacs, S., & Trucano, M. (2007). The NEPAD e-Schools Demonstration Project: A Work in Progress: A Public Report.
- Geoffrey, O. (2010). Effects of Information and Communication Technology on Students' learning: A Case of Gulu University (Doctoral dissertation, Makerere University).
- Geoffrey, O. (2010). *Effects of Information and Communication Technology Students' learning: A Case of Gulu University* (Doctoral dissertation, Makerere University).
- Graduates' skills and higher education: The employers' perspective. *Tertiary Education and Management*, 15(1), 1-16.
- Gross, M., & Latham, D. (2012). What's skill got to do with it?: Information literacy skills and self-views of ability among first-year college students. *Journal of the American Society for Information Science and Technology*, 63(3), 574-583.
- Gudanescu, S. (2010). New educational technologies. *Procedia-Social and Behavioral Sciences*, 2(2), 5646-5649.
- Guskey, T. R. (2012). Professional development and teacher change. *Instructors and Teaching: theory and practice*, 8(3), 381-391
- Haddad, W., & Jurich, S. (2002). ICT for education: Potential and potency. *Technologies for education: Potential, parameters and prospects. UNESCO and Academy for Educational Development*, 28-40.
- Hofer, M., & Swan, K. O. (2012). Technological pedagogical content knowledge in action: A case study of a middle school digital documentary project. *Journal of Research on Technology in Education*, 41(2), 179-200.
- Holton, E. F. (2010). The flawed four-level evaluation model. *Human resource development quarterly*, 7(1), 5-21.

- Huang, L., Morency, L. P., & Gratch, J. (2010, May). Parasocial consensus sampling: combining multiple perspectives to learn virtual human behavior. In *Proceedings of the 9th International Conference on Autonomous Agents and Multiagent Systems: volume 1 Volume 1* (pp. 1265-1272). International Foundation for Autonomous Agents and Multiagent Systems.
- International Labour Organization (2011). *A Skilled Workforce for Strong, Sustainable and Balanced Growth*. Geneva; ILO publications.
- James, J., & Monica, V. (2004). *The National Evaluation of the Youth Justice Board's Education, Training and Employment Projects*.
- Jamieson-Proctor, R. M., Burnett, P. C., Finger, G., & Watson, G. (2016). ICT integration and teachers' confidence in using ICT for teaching and learning in Queensland state schools. *Australasian Journal of Educational Technology*, 22(4).
- Johanson, R. (2014). *Technical Education and Vocational Training Strategies in the Asia Region*.
- Kinuthia, W. (2009). Educational development in Kenya and the role of information and communication technology. *International Journal of Education and Development using ICT*, 5(2).
- Kipsoi, E. J., Chang'ach, J. K., & Sang, H. C. (2012). Challenges facing adoption of Information Communication Technology (ICT) in educational management in schools in Kenya. *Journal of sociological Research*, 3(1), 18-28.
- Kothari, C.R. (2006). *Research methodology: Methods & techniques*. (1st Edition). New York: New Age International Publishers
- Krippendorff, K. (2012). *Content analysis: An introduction to its methodology*. Sage.
- Leberman, S., McDonald, L., & Doyle, S. (2014). *The transfer of learning: Participants' perspectives of adult education and training*. Gower Publishing, Ltd.
- Lohr, S. (2009). *Sampling: design and analysis*. Engage Learning.
- Majiyagbe, O. D. (2009). *Work Skill Needs of Fabrication and Welding Craftsmen As Perceived By Related Industries in Kaduna State*.
- Majiyagbe, O. D. (2009). *Work Skill Needs of Fabrication and Welding Craftsmen As Perceived By Related Industries in Kaduna State*.
- Mathieu, J. E., Tannenbaum, S. I., & Salas, E. (2012). Influences of individual and situational characteristics on measures of training effectiveness. *Academy of management journal*, 35(4), 828-847.
- Maushak, N. J., & Ou, C. (2008). Using Synchronous Communication to Facilitate Graduate Students Online Collaboration. *Quarterly Review of Distance Education: Volume 8 Book*, 8(2), 161.
- Metcalf, D. H. (2012). *The Economics of Vocational Training: Past Evidence and Future Considerations*. *World Bank Staff Working Papers Number 713*. Publications Sales Unit, Dept. T, World Bank, 1818 H Street, NW, Washington, DC 20433..
- Mikre, F. (2011). The roles of information communication technologies in education: Review article with emphasis to the computer and internet. *Ethiopian Journal of Education and Sciences*, 6(2), 109-126.
- Moyle, K. (2010). *Building innovation: Learning with technologies*.

- Mugenda, O. & Mugenda, A. (2008). *Research Methods: Quantitative & Qualitative Approaches*. Nairobi: Acts Press.
- Ogbaunya, T. C., & Usoro, A. D. (2011). Quality teacher preparation for effective implementation of technical education in Nigeria. *Nigerian Vocational Journal*, 14(1), 41-51.
- Ogongo, J. B. (2015). *Factors influencing integration of information communication technology in management of public secondary schools in Kikuyu sub county, Kenya* (Doctoral dissertation, University of Nairobi).
- Olelewe, C. J., & Okwor, A. N. (2017). Lecturers' perception of interactive whiteboard for instructional delivery in tertiary institutions in Enugu State, Nigeria. *Journal of computers in Education*, 4(2), 171-196.
- Oliver, R. (2012). The role of information and communication technology (ICT) in higher education for the 21st century. *Science*, 1(1), 30-41.
- Ololube, N. P. (2016). Appraising the relationship between ICT usage and integration and the standard of teacher education programs in a developing economy. *International Journal of Education and Development using ICT*, 2(3), 70-85.
- O'Mara, J. (2014). Becoming L (IT) erate: Pre-service English Instructors and ICTs. *English in Australia*, 41(3), 44.
- Osguthorpe, R. T., & Graham, C. R. (2013). Blended learning environments: Definitions and directions. *Quarterly Review of Distance Education*, 4(3), 227-33.
- Page, T. & Thorsteinsson, G. (2013). Technology Enhanced Learning in Design and Technology Education. *Journal of Education Technology. Special Issue on The world of technology where education meets boundless heights*, 4 (2), 23-35.
- Pahl-Wostl, C. (2009). A conceptual framework for analyzing adaptive capacity and multi-level learning processes in resource governance regimes. *Global Environmental Change*, 19(3), 354-365.
- Palmer, R. (2015). Skills for work? From skills development to decent livelihoods in Ghana's rural informal economy. *International journal of educational development*, 27(4), 397-420.
- Perrons, D. (2014). *Globalization and social change: People and places in a divided world*. Psychology Press.
- Praslova, L. (2010). Adaptation of Kirkpatrick's four level model of training criteria to assessment of learning outcomes and program evaluation in higher education. *Educational Assessment, Evaluation and Accountability*, 22(3), 215-225.
- Rajeswari, M. & Saravanakumar, A. R. (2013). Computing and ICT as a Change Agent For Education. *Education*, 2(12).
- Rosenberg, M. J. (2011). *E-learning: Strategies for delivering knowledge in the digital age* (Vol. 3). New York: McGraw-Hill.
- Rossi, M. T. (2016). Re-thinking education: the self-learning technology environment. Ito, M., Horst, H. A., Bittanti, M., Stephenson, B. H., Lange, P. G., Pascoe, C. J. ... & Martínez, K.
- Rowe, A. D., & Zegwaard, K. E. (2017). Developing graduate employability skills and attributes: Curriculum enhancement through work-integrated learning.

- Schank, R. C. & Kass, A. (2015). A goal-based scenario for high school students. *Communications of the ACM*, 39(4), 28-30.
- Shane, H. C., Laubscher, E. H., Schlosser, R. W., Flynn, S., Sorce, J. F. & Abramson, J. (2012). Applying technology to visually support language and communication in individuals with autism spectrum disorders. *Journal of autism and developmental disorders*, 42(6), 1228-1235.
- Sife, A., Lwoga, E., & Sanga, C. (2017). New technologies for teaching and learning: Challenges for higher learning institutions in developing countries. *International journal of education and development using ICT*, 3(2), 57-67.
- Singh, M. (2011). School Enterprises: Combining Vocational Learning with Production. International Project on Technical and Vocational Education (UNEVOC).
- Sparks, E., & Waits, M. J. (2011). Degrees for What Jobs? Raising Expectations for Universities and Colleges in a Global Economy. *NGA Center for Best Practices*.
- Sreekumar, T. T. (2011). *ICTS and development in India: Perspectives on the rural network society*. Anthem Press.
- Stav, J. B. (2010, September). Experiences with activity based training methods in vocational education. In *Proceedings of the 11th IASTED International Conference* (Vol. 614, No. 136, p. 385).
- Steel, C. H., & Levy, M. (2013). Language students and their technologies: Charting the evolution 2006–2011. *ReCALL*, 25(3), 306-320.
- Nye, D. E. (2017). *Technology matters: Questions to live with*. MIT Press.
- Tedd, L. A., & Large, J. A. (2014). *Digital libraries: principles and practice in a global environment*. Walter de Gruyter.
- Tella, A., Tella, A., Toyobo, O. M., Adika, L. O., & Adewuyi, A. A. (2010). An assessment of secondary school Instructors uses of ICT's: Implications for further development of ICT's use in Nigerian secondary schools. *TOJET: The Turkish Online Journal of Educational Technology*, 6(3).
- Thomas, J. R., Nelson, J. K., & Silverman, S. J. (2011). *Research methods in physical activity*. Human Kinetics.
- Union, A. (2012, May). Strategy to revitalize technical and vocational education and training (TVET) in Africa. In *Meeting of the Bureau of the Conference of Ministers of Education of the African Union (COMEDAF II+)* (pp. 29-31).
- Unwin, T. (2015). Towards a framework for the use of ICT in teacher training in Africa. *Open Learning: The Journal of Open, Distance and e-Learning*, 20(2), 113-129.
- Üstün, B., Compton, W., Mager, D., Babor, T., Baiyewu, O., Chatterji, S. E. E. A. & Pull, C. (2012). WHO Study on the reliability and validity of the alcohol and drug use disorder instruments: overview of methods and results. *Drug and alcohol dependence*, 47(3), 161-169.
- Walsh, K. (2015). ICT's about Learning: School leadership and the effective integration of information and communications technology.

- Watson's, C. S. (2011). Participation in ICT-enabled meetings. *Journal of Organizational and End User Computing (JOEUC)*, 23(2), 15-36. *Human rights in Africa: from the OAU to the African Union*. Cambridge University Press.
- Wims, P., & Lawler, M. (2007). Investing in ICTs in educational institutions in developing countries: An evaluation of their impact in Kenya. *International Journal of Education and Development using Information and Communication Technology*, 3(1), 5.
- World Bank Group (Ed.). (2012). *World Development Indicators 2012*. World Bank Publications.
- Yang, S. C., & Chung, T. Y. (2009). Experimental study of teaching critical thinking in civic education in Taiwanese junior high school. *British Journal of Educational Psychology*, 79(1), 29-55.

APPENDICES

Appendix One: Introduction Letter

My Name is Yakub Mohamed Abdi, currently pursuing my masters degree. As a requirement by the university am required to undertake a research thesis in partial fulfilment of the requirements for the award of masters degree of education in the department of educational, communication and technology at the school of education at Kenyatta University. I have therefore prepared this questionnaire to collect data on integration of ICT in teaching and learning of welding and fabrication in vocational training colleges in Mandera County. I' am kindly requesting you to fill in the spaces provided or tick where necessary. Any information given will be treated with confidentiality and will only be used for academic purposes.

Yours,

Yakub Mohamed Abdi

0723624749

Appendix Two: Questionnaire for Welding and Fabrication -Instructors

PART I: DEMOGRAPHIC INFORMATION

- 1 Experience in teaching welding and fabrication course.
 15 years [] 6-10 years [] 11-15 years [] 16-20 years [] over 20years
- 2 Highest academic qualification.
 [] KCSE [] KACE [] Diploma [] Degree []
 Others.....

PART II: PRACTICES USED IN TEACHING OF WELDING AND FABRICATION

3. Please indicate the extent to which the following teaching practices are used in teaching welding and fabrication in vocational training centers. Using a scale of 1 to 5 where 1= not at all, 2= little extent, 3= moderately, 4= great extent, 5= very great extent.

Statement	1	2	3	4	5
Use of demonstrations in class rooms					
Discussion approach					
Carrying out field trip for learning					
Attachment on work industrial method and Apprenticeship					
Assignment and continuous assessment tests					
Assignment of Projects					
Lecturing in classrooms					
Problems solving methods					
Use of models and computer simulations in teaching practical skills					

PART III: ICTs INTEGRATION PRACTICES IN TEACHING THAT INFLUENCES STUDENTS' ACHIEVEMENT

4. Do you use ICT in your teaching of welding and fabrication?
 [] Yes [] No
5. If yes please indicate how you integrate ICT facilities into your teaching and learning activities welding and fabrication?

6. Have you been trained/in-serviced on the use of ICT resources in pedagogy?

- a) Yes [] b) No []

.....

7. How often do you use the project resources in your teaching?

- a) Daily/during every lesson []
b) At least once a week []
c) At least once a month []
d) At least once a term []
e) Whenever there is need []
f) Rarely/never []
g) Any other (specify)

8. Which ICT resources do you prefer using more often than others in your teaching?

.....

9. Please indicate the main use(s) of the instructional resources during your lessons?

- (a) As the main sources of instructional content []
(b) To illustrate major ideas during lessons []
(c) To give learners assignments []
(d) As marginal aids to teaching (rarely used) []
(e) Any other (specify)

10. State the factors that you consider when selecting and using the resources in your teaching.

.....

.....

11. Have the ICT resources helped you teach some topics better or created important teaching-learning opportunities that did not exist before? Please explain your answer.

.....

12. Do you think using the ICT resources has generally helped you to become a better classroom teacher than before? Please explain your answer.

.....

13. In your opinion, is it worthwhile for you or any other teacher to adopt the use of the new technology in their teaching? Please explain your answer.

.....

PART IV: TEACHERS' ATTITUDE TOWARDS ICTS

14. Below are a series of statements about the e-Schools project. Please tick on which you agree with

Statement	
a) My Age is not a limitation in using the new technology in my teaching	
b) My colleagues are happily using the project resources while teaching	
c) My teaching has improved thanks to the new technology	
d) The new technology are an idea whose time has come	
e) I am enthusiastic and willing to use the new technology in teaching	
f) Anyone can easily grasp the terms and concepts related to the new technology	
g) I can confidently use new technology in front of my students	
h) The new technology have made my teaching more enjoyable	
i) Frequent changes in technology have made me to be more informed	
j) The new technology are good for any teacher, irrespective of their academic/professional qualifications and teaching experiences	
k) I am too old to use the new technology in my teaching	
l) My peers feel uncomfortable using the new technology while teaching	
m) I can still teach better without the new technology	
n) Using the new technology is a time consuming activity	
o) I was not yet ready for the new technology	
p) The terms and concepts related to the new technology are beyond my understanding	
q) Technology changes too fast for me to cope with	
r) The frequent need to be updated in technology is too demanding	
s) The new technology is an obstacle on the way of my productive, better teaching life	
t) I produce results with or without using the new technology	
u) The new technology is interfering with my established, productive teaching routine	
v) I fear being let down by the new technology in front of my students	

PART V CHALLENGES OF INTEGRATING THE ICTS INTO PEDAGOGY

15. Please outline some of the most outstanding experiences that you have gained while integrating the ICT based pedagogy into the curriculum.

- a).....
- b).....
- c).....
- d).....

Appendix Three: Trainees' Questionnaire

Instructions

Please tick (where appropriate

I. Background Information

I. Levels to which the project is preparing learners for the ICT world

1. Who teaches you how to use ICT resources provided to your school? (Please tick all those which are applicable to you.)

- a) Yourself
- b) Fellow students
- c) Your class teacher
- d) All your school teachers
- e) Your school computer studies teacher
- f) Your school ICT Champion/teacher in charge of the computer lab
- g) Others (specify)

4. Why do you learn how to use the ICT resources provided to your school? (Please tick all those which are applicable to you.)

- a) I am personally interested in knowing how to use ICT resources
- b) It is now fashionable knowing how to use ICT resources
- c) My friends are influencing me to do so
- d) Because I am doing Computer Studies as a subject
- e) It is a class requirement
- f) Because the resources are available
- g) Because my teachers are encouraging me to do so
- h) I am interested in a future career in ICT
- i) Knowledge of ICT is now a basic requirement by employers
- j) It is enabling me to communicate with others
- k) Just for fun; to pass time; for a hobby
- l) Don't know/not sure

6. Approximately how many hours each week do you normally spend using the ICT resources?

- a) Do not use

- b) Less than an hour []
- c) 1 – 2 hours []
- d) 3 – 5 hours []
- e) 6 – 10 hours []
- f) Not sure []
- g) Above 10 hrs

7. Can you use the project ICT resources efficiently to perform your different tasks in the course?

- a) Yes [] b) No [] c) Not sure []

8. If you use ICT resources please tick against the different purposes for which you use these ICT resources.

- a) To do classroom activities []
- b) Doing assignments []
- c) Personal/group studying []
- d) Writing documents for your course/ subjects []
- e) Writing documents for pleasure []
- f) Surfing the Internet for information on your subject areas []
- g) Surfing the Internet for pleasure []
- h) Creating, sending and receiving e-mail and instant messages/chats []

9. How would you rate your ICT skills?

- a) Totally unskilled []
- b) Much less skilled []
- c) Less skilled []
- d) About the same skill level []
- e) More skilled []
- f) Much more skilled []
- g) Can't rate []

10. Please tick against the aspects that describe how the use of ICTs has helped you.

- a) It has not helped me []
- b) It has helped me to understand complex ideas better []
- c) It has helped me to understand and communicate better with my teachers []

- d) It has helped me collaborate and communicate better with my classmates []
- e) It has helped me to improve in my overall academic performance []
- f) It has made me to better understand the world outside school []
- g) It has made me to improve in the presentation of my work and ideas []
- h) It has helped me take greater control of my time and activities []
- i) It has increased my self-confidence and general view of life []

11. Please describe your overall experience using the project ICT resources.

- a) No experience []
- b) Very negative []
- c) Negative []
- d) Neutral []
- e) Positive []
- f) Very positive []

III. Learners' attitude towards ICTs

12. Below are a series of statements about the E-Schools project. Please tick the appropriate cell that you feel is most applicable to you.

Statement	
a) My colleagues are happily using the ICT resources while learning	
b) My studies have improved thanks to the new technologies	
c) The new technologies are an idea whose time has come	
d) I am enthusiastic and willing to use the new technologies	
e) I can confidently use new technologies in front of my classmates	
f) The new technologies have made my learning more enjoyable	
g) Any willing learner can cope up with the fast changes of ICTs	
h) Fast changes in technologies make me smarter and more informed	
i) The new technologies are good for any learner	
j) My peers feel uncomfortable using the new technologies	
k) I can learn better without the new technologies	
l) I was not yet ready for the new technologies	
m) Using the new technologies is boring and time consuming	
n) My learning would be more enjoyable without the new technologies	
o) Technologies change too fast for me to cope with	
p) The frequent need to be updated in technologies is too demanding	
q) Any learner would be better off without the new technologies	

VI. Challenges of using the e-Schools ICTs

13. i) Which of the following are challenges facing you as a user of the ICT resources? (Please tick all those which are applicable to you.)

- a) Inadequate access to the facilities []
- b) Out-dated computer hardware and software []
- c) Slow, inadequate and/or unreliable network/internet access []
- d) Computer viruses, worms, Trojan horses, spam etc. []
- e) Inadequate technical assistance, help or services []

- f) Competition for the scarce ICT resources []
- g) Inadequate time allocations []
- h) Inadequate online literature on my subject areas []
- i) Inadequate support/guidance from my teachers on the use of resources []
- j) Frequent breakdown of resources/facilities []
- k) Any other (please specify)

ii) Please suggest what you think are the possible solutions to the challenges you have identified above.

- a).....
- b).....

14. i) In your opinion, what challenges is your college facing concerning ICT resources?

- a).....
- b).....

ii) Please suggest what you think are the possible ways of overcoming these challenges.

- a).....
- b).....

Thank you

Appendix Four: College Principals' Interview Schedule

I. PREPAREDNESS TO INTEGRATE ICTS

1. As the school's Principal, have you been trained on the use of the ICT?
 - a) Yes []
 - b) No []
2. i) If your answer to 1 above is 'No', why?
- ii) Would you desire to be trained? Why?
3. i) If your answer to 1 above is 'Yes', approximately how many training sessions have you attended?
- iv) In your opinion, have these training sessions sufficiently prepared you to successfully use ICT in your administrative duties? Please explain your answer.
.....
.
4. i) Can you use the ICT resources efficiently in performing your managerial tasks?
 - a) Yes []
 - b) No []
 - c) Not sure []ii) What tasks can you perform effectively using the project ICT?
 - a)
 - b)
 - c)
 - d)
5. Which challenges do you face in ICT in your school?
 - a.....
 - b.....
 - c.....

II. ADOPTION OF ICTS RESOURCES

6. How often do you use the ICT resources?
 - a) Daily []
 - b) At least once a week []
 - c) At least once a month []
 - d) At least once a term []

e) Whenever there is need []

7. Which ICT resources do you prefer using more often than others?

- a)
- b)
- c)

8. Are there specific administrative problems that the ICT resources can help you to solve which could not be solved by the use of the traditional resources? Please explain your answer.....

9. Have the project ICT resources helped you to be a better manager than before? Please explain your answer.

10. How often does the use of the ICT resources negatively affect your otherwise traditionally normal administration?

- (a) Always []
- (b) Regularly []
- (c) Rarely []
- (d) Never []

11. (i) In your opinion, how have the ICT facilities/ transformed the instructional processes of this college?.....

.....

IV Challenges of integrating the e-Schools ICTs into the curriculum

12. What challenges is are you facing concerning ICT for pedagogy in the following area?

13. i) Provision of infrastructure (computers, communications, networking, power, etc)

- a)
- b)
- c)

14) Training and in-servicing of teachers

- a)
- b)

c)

15) Please suggest what you think are the possible solutions to these problems.

a)

b)

c)

d)

.....

Thank you

Appendix five: Classroom Observation Schedule

Name of School: _____

Class: _____

Subject: _____

Lesson topic: _____

1. Teacher’s qualifications: _____

2. Does the teacher have a lesson plan?

a) Yes [] b) No []

3. List the ICT resources the teacher brings to class.

(i).....

(ii).....

(iii).....

(iv).....

4. List the ICT resources the teacher actually uses during the lesson.

(i).....

(ii).....

(iii).....

5. How does the teacher use the instructional resources during the lesson?

(i) As the main source of instructional content []

(ii) To illustrate a major idea during the lesson []

(iii) To give learners assignment []

(iv) As marginal aids to teaching (rarely used) []

(v) Any other (specify).....

6. How does the teacher organize the students when using the resources during the lesson?

(i) Individually []

(ii) In pairs []

(iii) In groups []

(iv) Whole class []

(v) Any other (specify).....

7. How do the students use the instructional resources in the classroom?

- (i) Hands on practice []
- (ii) For individualized instruction []
- (iii) To do group assignment []
- (iv) As marginal aids to learning (rarely used) []
- (v) Any other (specify).....

8. Relevance of the used resources to the topic.

- (i) Very relevant []
- (ii) Fairly relevant []
- (iii) Not relevant []

10. Other relevant observations made during the lesson.

- (i).....
- (ii).....
- (iii).....

End.

Appendix Six: ICT Resources Checklist

Name of Centre _____

List of Resources, Infrastructure and systems expected at the vocational training centres

No.	Components	Available	Quantity	Functional	Accessible
1.	Electricity supply				
2.	Computer Laboratory				
3.	Multimedia centre				
4.	Servers				
5.	Desktop Computers				
6.	e-Content Applications				
7.	Smart Boards				
8.	Fully established LAN (Routers & Access Points)				
9.	Fully established Internet connectivity and access				
10.	Televisions				
11.	Printers				
12.	Multi-functional Printers/ Copiers/Scanners/Faxes				
13.	Projectors				
14.	Radio facilities				
15.	Tablets and ipads				
16.	Mobile phone				
15.	Others (Specify)				

Appendix Seven: Introduction to Research Authorization



**KENYATTA UNIVERSITY
GRADUATE SCHOOL**

E-mail: dean-graduate@ku.ac.ke

Website: www.ku.ac.ke

P.O. Box 43844, 00100
NAIROBI, KENYA
Tel. 8710901 Ext. 57530

Our Ref: E55/CE/25474/2014

DATE: 9th October, 2017

Director General,
National Commission for Science, Technology
& Innovation
P.O. Box 30623-00100,
NAIROBI

Dear Sir/Madam,

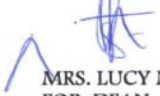
RE: RESEARCH AUTHORIZATION FOR YAKUB M. ABDI – REG. NO. E55/CE/25474/2014

I write to introduce Mr. Yakub M. Abdi who is a Postgraduate Student of this University. He is registered for M.Ed. degree programme in the Department of Educational Communication and Technology.

Mr. Yakub intends to conduct research for an M.Ed. Proposal entitled, “Integration of Information Communication and Technologies in Teaching and Learning of Welding and Fabrication in Vocational Training Centres Manderu County, Kenya”.

Any assistance given will be highly appreciated.

Yours faithfully,


MRS. LUCY N. MBAABU
FOR: DEAN, GRADUATE SCHOOL

JG/ewm

Appendix Eight: Research Approval



KENYATTA UNIVERSITY
GRADUATE SCHOOL

E-mail: dean-graduate@ku.ac.ke

P.O. Box 43844, 00100
NAIROBI, KENYA
Tel. 020-8704150

Website: www.ku.ac.ke

Internal Memo

FROM: Dean, Graduate School

DATE: 9th November, 2017

TO: Yakub M. Abdi
C/o Educational Communication and Technology
Department

REF: E55/CE/25474/2014

SUBJECT: APPROVAL OF RESEARCH PROPOSAL
=====

We acknowledge receipt of your revised Research Proposal as per our recommendations raised by the Graduate School Board 18th October, 2017 entitled "Integration of Information Communication and Technologies in Teaching and Learning of Welding and Fabrication in Vocational Training Centres Mandera County, Kenya".

You may now proceed with your Data collection, subject to clearance with the Director General, National Commission for Science, Technology and Innovation.

As you embark on your data collection, please note that you will be required to submit to Graduate School completed Supervision Tracking Forms per semester. The form has been developed to replace the Progress Report Forms. The Supervision Tracking Forms are available at the University's Website under Graduate School webpage downloads.

Thank you.

JACKSON LUVUSI
FOR: DEAN, GRADUATE SCHOOL

CC. Chairman, Educational Communication and Technology Department

Supervisors:

1. Dr. Bernard Mugo
C/o Educational Communication and Technology Department
Kenyatta University
2. Dr. Michael Waititu
C/o Educational Communication and Technology Department
Kenyatta University

JL/rwm

Appendix Nine: Map for Mandera County

