UNIVERSITY OF NAIROBI
SCHOOL OF COMPUTING AND INFORMATICS

The Impact of use of ICT in Secondary Schools on Future Employability in Kenya

Emmanuel Olisa Okwuosa
P/56/P/8240/04

Supervisor
Dr. Robert Oboko

September 2015

Submitted in partial fulfilment of the requirements for the degree of Master of Science in Information Systems

DECLARATION

This project, as presented in this report, is my original work and has not been presented for any other university award.

Signature _____ Date _____

Emmanuel Olisa Okwuosa
P56/P/8240/2004

This project has been submitted in partial fulfillment of the requirements of the degree of Master of Science in Information Systems at the University of Nairobi with my approval as the University supervisor.

Signature _____ Date _____

Dr. Robert Oboko
School of Computing and Informatics

DEDICATION

I dedicate my work to my wife **Judith Alela** and my mother **Evelyn Nanga**.

A special feeling of gratitude to my five sisters, Ikuni, Adobi, Ufeli, Eddah and Damaris whose words of encouragement and push for tenacity ring in my ears.

ACKNOWLEDGEMENT

I wish to sincerely thank the following for their contributions towards the successful completion of this project.

First, the **Almighty God** for the strength, good health and grace HE granted me throughout the duration of the project.

I am greatly indebted to my supervisor **Dr. Robert Oboko** for introducing me to this topic and supporting me with useful comments, remarks, highly valued criticism, and deep insights. He provided resourceful information that contributed to the quality of this project.

I like to thank the participants in my survey, who have willingly shared their precious time during the process of interviewing.

Last but not least, I would like to thank **Judith** my wife, **Evelyn** my mother and my five sisters, for praying for me, supporting all my endeavors and encouraging me through the learning process.

ABSTRACT

According to the UNESCO Institute of Statistics report on the Education profile in Kenya (1999), our Secondary School Gross Enrolment ratios (GER) stands at 41% while our tertiary GER stands at only 4%. An analysis of the labour market shows that the 15-19 years youth cohort represents the entry node of the Kenyan labour market. This study sought a clearer understanding of the employability of this youth cohort in today's 21st century workplace, where ICT is central. In particular, the study sought to find out how the youth's prior use to ICT in secondary school affected their employability. It related how prior use of ICT in secondary school empowered students with 21st century workplace skills such as digital-age literacy, inventive thinking, effective communication and high productivity and the contribution that these skills made to their employability.

A survey design was used in this research. Data and Information was collected from a sample of employers, workers and self-employed entrepreneurs. The introduction of ICT into secondary schools is a relatively new practice in Kenya, therefore there are only a few currently working or self-employed Kenyans who were exposed to ICT in secondary school. They are also difficult to locate as no formal register is available. This posed a challenge in locating a suitable sample population However, the few Kenyans who were exposed to ICT while in secondary school know one another and can easily make referrals.

As a result the snowball (or chain-referral) sampling technique was therefore used to collect data since it is most suited for data sources that are limited, hard to find but one source has leads to more sources, ending up with a sample size of 50. Quantitative data was collected using questionnaires and analyzed by the use of descriptive statistics, factor analysis and regression.

Based on this research model, the study established that the use of ICT in schools contributed to the acquisition of relevant skills and competencies since the beta value was positive. It was also found that self-motivated students acquired these skills faster and better compared to those who were not. However, the environment was not found to have any moderating effect on acquisition of skills and competencies. There also

exists a direct link between the acquisition of these skills and competencies and employability. The 21st century workplace was also found to have a moderating effect on the eventual employability.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

1   CHAPTER ONE: INTRODUCTION

1.1   Background to the Problem

Employment creation has remained a policy priority of the Kenya government since independence in 1963. The aspiration is contained in all relevant government policy documents and national development agenda, the latest being the Kenya Vision 2030 and the country's new constitution. Good and sustainable employment is seen as one of the key ingredients to improving livelihoods and the quality of life across the country. "Jobs are the essential bridge between economic growth and people's lives" – Kenya Human Development Report, 1999

Employability refers to a person's capability for gaining and maintaining employment (Hillage and Pollard, 1998). For individuals, employability depends on the knowledge, skills and abilities (KSAs) they possess, the way they present those assets to employers, and the context (e.g. personal circumstances and labour market environment) within which they seek work (Hind and Moss, 2011).

As the Government makes effort to create jobs on one hand, it is also important on the other hand that citizens possess appropriate knowledge, skills and competencies to satisfactorily perform the jobs. The required knowledge, skills and competencies are mainly impacted through the country's education system which comprises of primary education for eight years, secondary education for four years and tertiary education of four years.　The eventual employability of the citizens is dependent on what they get exposed to, learn and use during the years they spent going through the education system, amongst other factors.

Diffusion of Information and Communication Technologies (ICTs) across all economic sectors is placing new demands on workers' skills and competencies and changing the skill set required in the 21st century workplace. This changing skill set is both expanding employment opportunities and imposing new demands on employees. Basic ICT skills are now considered essential for people entering the workforce and for those trying to find a better job. Governments now consider an ICT skilled workforce a strategic asset that spurs economic growth, promotes competitiveness, and improves business productivity. A nation's economic well-being depends "on both the effective use of ICT for businesses and industrial processes and on the knowledge, competencies, and skills of current and new employees" (European Commission, 2004).

In response to this changing skill requirement, the Kenyan government has in the recent past invested heavily in integrating Information and Communication Technologies (ICT) in education at secondary school given that students at this age need to focus on subject-specific content and develop greater critical thinking skills. Students are expected benefit greatly from the analytical, creative, and collaborative power of computers to map out and analyse assumptions, present ideas, and participate in projects with peers from around the country and around the world. ICT integration is expected to take students beyond seeing ICTs as computer studies and computer literacy skills. Although these are important skill sets, they are not sufficient in leveraging the true potential of ICTs to improve creativity, innovation and collaboration – key capacities in the new knowledge economy.

1.2   Problem Statement and Purpose of the Project

According to the latest UNESCO Institute of Statistics report on the Education profile in Kenya, our Secondary School Gross Enrolment ratios (GER) stands at 41% while our tertiary GER stands at only 4%. An analysis of the labour market shows that the 15-19 years youth cohort represents the entry node of the Kenyan labour market. This implies that most secondary school leavers do not continue with their academic studies but instead directly enter the job market. This study seeks a clearer understanding of the employability of this youth in today's 21st century workplace, where ICT is central, and in particular, how their prior use to ICT in secondary school affects their employability. It will relate how prior use of ICT in secondary school empowers students with 21st century workplace skills such as digital-age literacy, inventive thinking, effective communication and high productivity and the contribution that these skills make to their employability

Understanding the links between exposure to and use of ICT and employability is also relevant to the study of ICT and development (ICTD). Most of the ICTD literature that addresses ICT skills in the context of employment focuses on the IT sector- for example, the software industry - and the economic opportunities available through business process outsourcing, such as in India (Schware, 2009; Vigneswara, 2007). A few studies have looked beyond the IT sector (Donner, 2004; Galperin and Bar, 2007), but more research is needed, especially on basic computer skills for basic and intermediate users (as opposed to specialists). The impact of ICT

use in school and student exposure to ICTs, and the nature of use and exposure, on student employability in developing has not been well documented. (http://www.infodev.org/en/Publication.106.html). This research is intended to help fill these gaps too.

1.3   Research Outcomes and Significance

This study will provide tangible evidence of the linkage between use of ICT in schools and improvement in future employability of the students. This outcome will be applied in emphasizing the importance of investing in ICT in secondary schools and urge the Government, policy makers and development partners to both broaden the current investments and extend this to those schools that still do nto have ICT facilities. It will also convince the budget owners that investing in ICT in secondary schools is an economically viable and rewarding investment.

The study will also provide detailed documentation on the impact of use of ICTs in schools on future employability and hence help fill in the existing knowledge gaps on available literature as identified by the World Bank's global partnership program, infoDev.

1.4   Objective of Study

The objectives of this study are as follows:
1. To establish whether availability and use of ICT in schools leads to acquisition of relevant skills and competencies
2. To establish the moderating effect of self-motivation on acquisition of these skills and competencies.
3. To establish the moderating effect of Environment on acquisition of these skills and competencies.
4. To study the relationship between the acquisition of relevant skills and competencies and employability
5. To establish the moderating effect of the 21st century workplace on employability

1.5   Research Questions

The specific research questions that will be addressed by this study are:
1. Does use of ICT in schools guarantee acquisition of relevant skills and competencies?

2. Does self-motivation affect the acquisition of these skills and competencies in schools?

3. Does the ICT environment affect acquisition of these skills and competencies in schools?

4. What skills and competencies are desired in the 21st century workplace?

5. Is there a relationship between 21st century workplace and employability?

1.6   Research Hypothesis

1. H_1 Use of ICT in secondary schools leads to acquisition of relevant skills and competencies.

2. H_2 Self-motivation has a moderating effect on acquisition of relevant skills and competencies.

3. H_3 The environment has a moderating effect on acquisition of relevant skills and competencies.

4. H_4 There is a direct relationship between the acquisition of relevant skills and competencies and employability.

5. H_5 The 21st century workplace has a moderating effect on employability.

1.7   Scope and Limitation of Study

This study is limited to analyzing the employability of students who enter the job market after completing secondary education, without pursuing tertiary education. From the UNESCO estimates, this is a large portion of the Kenyan workforce. It will include those seeking to be employed and those seeking to be self-employed too.

The research will be limited to the Kenyan secondary education system and employability in the Kenyan labour market.

1.8   Definitions of Important Terms

Information and Communications Technology (ICT) refer to the convergence of audio-visual and telephone networks with computer networks through a single cabling or link system. The term is often used as an extended synonym for information technology (IT), but is a more specific manner that stresses the role of unified communications and the integration of telecommunications (telephone lines and wireless signals), computers as well as necessary enterprise software, middleware, storage, and audio-visual systems, which enable users to access, store, transmit, and manipulate information.

Employability refers to a person's capability for gaining and maintaining employment, whether employed by himself/herself or by another person. It is a 'synergic combination of personal qualities, skills of various kinds and subject understanding'

Use is the act or practice of employing or utilizing something to perform a task.

Gross Enrollment Ratio (GER) is a statistical measure used in the education sector and by the UN in its Education Index to determine the number of students enrolled in school at several different grade levels (like elementary, middle school and high school), and examine it to analyze the ratio of the number of students who live in that country to those who qualify for the particular grade level.

UNESCO is the United Nations Educational, Scientific and Cultural Organization, a specialized agency of the United Nations (UN) whose aim is to contribute to the building of peace, the eradication of poverty, sustainable development and intercultural dialogue through education, the sciences, culture, communication and information.

2 CHAPTER TWO: LITERATURE REVIEW AND THEORY

2.1 What Is Employability

Employability is a difficult concept to define – it is a multi-dimensional concept, and there is a need to distinguish between factors relevant to obtaining a job and factors relevant to the preparation for work (Little, 2001). Employability is not just about students making deposits in a bank of skills (Morley, 2001). Knight (2001) and Yorke (2001) consider the concept of employability to be **a 'synergic combination of personal qualities, skills of various kinds and subject understanding'.** It is a concept that is much more complex than the relatively restrictive key skills agenda, as focussed on by Dearing (1997) which has obscured a greater understanding of employability (Yorke, 2001; Knight and Yorke, 2001). Yorke (2001) also suggests that traditionally, little emphasis has been placed upon a student's personal qualities, but that these could have considerable bearing on a particular student's success.

Therefore, there are two main concepts of employability (Yorke, 2001, Knight and Yorke, 2001), these are:

1) The educational conception relating to the ability of graduates to tackle 'graduate' jobs. This is related to the notion of 'capability' whose development was sponsored by the RSA in the late 1980s - 'Higher Education for Capability'. This means that employability of graduates relates to their being equipped for a job and capable of being employed, rather than job acquisition (Harvey, 2001; van der Heijden, 2001).

2) The ability of the graduate to get a job – any job.

Over the last two years, the Center for Information and Society at the University of Washington has conducted research into the above questions to understand the role of basic ICT skills among the myriad of factors that affect employment prospects and the pathways people take into the labour market. In framing this issue, we posit that employability is not the same as employment. Employment is a binary concept—you can count employment rates. Employability, on the other hand, describes "a set of factors, processes, [and training opportunities] that enable people to progress towards or get into employment, to stay in employment, to move on in the workplace, [or to find entrepreneurial opportunities]" (Government of Scotland, 2007). We believe this broad definition of employability provides a more appropriate construct to explore if, as well as the extent to which, ICT skills play a role in helping school graduates improve their economic opportunities.

There are a variety of factors that influence the progress toward employability beyond an individual's ICT knowledge, skills, and attitudes, such as level of formal education, social networks, a region or community's economic viability, social class, caste, gender stereotypes, learning styles, and labor market dynamics, among others. A community's social and cultural fabric also plays a decisive role in attracting and retaining the most competitive workers (Sullivan, 2009). Precisely because employability encompasses the combination of factors that demand contextualization, it creates a fertile ground for innovative research that explores the role of exposure to ICT and acquisition of working skills to this process. The challenge for researchers in this field is to talk about employability by drawing from particular cases and examples, but also by extrapolating the findings to make them relevant and transferable across settings.

2.1.1 Basic ICT Skills and Employability

Research done by Sullivan (2009) has further identified three roles that basic ICT skills play in promoting progress toward employability:

1. **Gateway skills.** People can be excluded from consideration for employment just by virtue of not being able to demonstrate basic ICT knowledge, such as might be shown by a certificate. In these cases, no amount of effort to conduct an online job search, write a résumé, or receive assistance in other areas will make a noticeable difference. ICT skills are often a gateway that enables the possibility of employment.

2. **One among many necessary skills.** ICT skills can be a necessary element of the set of requisite skills. Communication, critical thinking, and teamwork are examples of others that are frequently cited (Conference Board, 2006). Many organizations that promote employability weave ICT skills into a larger curriculum of such foundational skills. In these cases, ICT skills may tip the balance, or they may "keep the applicant in the running," so that some other variable can come into play.

3. **Catalyst for *key* skill development.** In some settings, basic ICT skills have become so prevalent that, once the gateway function is satisfied, ICT skills are never referenced again. They are taken for granted, like reading and numeracy, particularly in settings saturated by training opportunities and exposure to technology. In these settings, domain expertise or some other differentiating characteristic is the key. Exposure to ICT in school sometimes attracts students, catalyzing the pursuit of other skills and

services. For example, someone may enroll in a computer class because it is modern and attractive. Perhaps they may have a positive learning experience and decide to pursue advanced education at a trade school or community college. In instances like these, the computer skills did not tip the balance per se, but the computer training program catalyzed a series of events that did.

2.1.2 The Importance of having some ICT Skills

The changing skill demands in today's knowledge economy have been the subject of thorough policy and academic discussions. The diffusion of ICTs across industrial sectors, along with changing business models, has induced "skill-biased organizational and technological change" (de Grip and Zwick, 2005; Green, 2009; Machin, 2001). Workers in a wide variety of fields have had to adapt and incorporate ICT into their jobs (Green, 2009; Machin, 2001). These changes increase the complexity of skills required by today's workforce and threaten the position of low-skilled workers "when they do not succeed in adjusting their skills according to the shifts in the skills demanded in their job or sector of industry" (de Grip and Zwick, 2005).

In addition to ICT competence, other skills are often required in today's labor market, including communication skills, teamwork, collaboration, critical thinking, decision making, and general social skills (Chapple, 2006; Green, 2001; Stasz, 2001). In this environment, low-skilled, long-term unemployed and older workers are more vulnerable to skill obsolescence than are other groups. Moreover, during economic downturns these workers must compete with higher-skilled workers who are suddenly willing to take lower-paid jobs. Lower-skilled workers risk being "crowded out" (de Grip and Zwick, 2005) of the labor market or trapped in dead-end and low-wage jobs.

Other relevant literature on the relationship between ICT skills and employability focuses on the effect of computer skills on compensation and opportunities for upward mobility. Green et al., (2007) argue that the effect of ICT skills on productivity and wage differentials is greater for employees who have the ability to assess "the potential benefits to be gained from successful ICT use and [are] able to persuade, influence, and educate others in the workplace". In their analysis, computer skills have a significant impact on pay (5.3% and 6% for men and women, respectively), but this effect depends on what the authors define as "influence skills" (Green et al., 2007).

Benefits of ICT exposure is not limited to improved computer skills only. Exposure often draws users into an environment where they develop nontechnical workplace skills (Sullivan et al., 2008). Exposure can also catalyse self-directed learning and participation with extended social networks that promote employability (Granovetter, 1973).

2.1.3   Employability as a Conceptual Frame for Development

Employment is an important outcome in the context of basic computer training because it represents a concrete contribution to economic well-being and quality of life. Employment can provide predictable income and is sometimes accompanied by other benefits associated with work in the formal economy such as social security, health insurance, and legal protections.

In many communities where unemployment is high and informal economic activity dominates, employment outcomes are difficult to achieve. Even under ideal circumstances—where individuals possess a variety of personal assets and NGOs provide high-quality employment services—clients may still not find jobs. As a measure of organizational efficacy, employment per se can be an insufficient metric because it relies on labour market variables over which service providers have little or no control. A different conceptual approach is required that recognizes that interventions may improve employment prospects, even when employment is not achieved.

Employability is commonly defined as the combination of factors and processes that enable people to progress toward or find employment, to remain employed, and/or to advance in the workplace (Brown, Hesketh, and Williams, 2003; Fugate, Kinicki, and Ashforth, 2004; Houston, 2005). As persons enhance their skills, develop experience, and become more competitive job applicants, their employability improves. Even if their position in the labour market never changes, their employability may have been enhanced.

The concept of employability emphasizes an individual's skills and skill development (Brown et al., 2003; Fugate et al., 2004; Houston, 2005). The popularity of this concept has grown as global business has moved away from a workforce based on long-term tenure in favour of shorter-term, transitory arrangements. Workers today average only a few years at a job in contrast to past generations who may have spent entire careers with one company (Sullivan, Carden, and Martin, 1998; Waterman, 1994). Employability represents a conceptual and policy

shift away from collective workforce approaches, such as full employment, and toward individual employee assets (Berntson, Sverke, and Marklund, 2003).

For the highly skilled workers for whom employers compete, employability tends to be a useful framework; additional skills (when a prospective employee is already desirable) sweeten the pot. For these workers, whose skills are not seen as easily substitutable or interchangeable, having additional skills prized by employers increases bargaining power and economic gain (de Grip and Zwick, 2005). Against the backdrop of a globally interconnected knowledge economy, with technology skills and processes at the heart of economic transactions, ICT knowledge is closely connected to employability.

But among lower-skilled workers, the marginal benefit to employability from additional skills may be muted. While it is generally recognized that upgraded skills are required to participate in the job market (Brown et al., 2003; Green, Ashton, and Felstead, 2001; Stasz, 2001; West and Garrido, 2007), demand for particular skills depends on the employer. Thus, day labourers with computer skills are only more employable if a potential employer values those skills.

2.2   21st Century Workplace and the Skills for Success

It is agreeable that the workplace is changing and that the skills necessary for success in the 21st century workplace are different from those needed in the 20th century. In his book *A Whole New Mind*, author Daniel H. Pink writes that we are "moving from the Information Age to the Conceptual Age" (Pink, 2005). He argues that the workplace is changing and that to remain competitive workers will need new skills (Pink, 2005). According to Pink "in the Conceptual Age, what we need . . . is a whole new mind"--one that incorporates both right brain and left brain directed aptitudes (Pink, 2005). Where the left brain is "sequential, logical, and analytical," the right brain is "nonlinear, intuitive, and holistic." He notes that while the "defining skills of the previous era are necessary," they are "no longer sufficient." Instead he argues, the "right brain qualities of inventiveness, empathy, joyfulness, and meaning increasingly will determine who flourishes and who flounders" (Pink, 2005).

2.2.1   The Changing Workplace

Pink's findings concur with those of other experts and researchers who have studied the changing workplace and the skills that will be needed for continued work success. The enGauge

21st Century Skills notes in its report on Literacy in the Digital Age that "The influence of technology will go beyond new equipment and faster communication, as work and skills will be redefined and reorganized'" (enGauge, 2003). The enGauge report asserts that "rapid change and increased competition require that workers use their 'soft skills' to adapt quickly to changing technologies and organizational structures" (enGauge, 2003).

According to this study "As society changes, the skills needed to negotiate the complexities of life also change. In the early 1900s, a person who had acquired simple reading, writing, and calculating skills was considered literate. Only in recent years has the public education system expected all students to build on those basics, developing a broad range of literacies. To achieve success in the 21st century, students also need to attain proficiency in science, technology, and culture, as well as gain a thorough understanding of information in all its forms" (enGauge, 2003).

The workplace and employer expectations have changed over time. "For businesses, it's no longer enough to create a product that's reasonably priced and adequately functional. It must also be beautiful, unique, and meaningful...," writes Pink (Pink,2005)
"The future belongs to a very different kind of person with a very different type of mind," warns Pink. Workers will need to build on the skills of the 20th Century by mastering a new and different set of skills in the 21st Century. "We must perform work that overseas knowledge-workers can't do cheaper, that computers can't do faster, and that satisfies the aesthetic, emotional, and spiritual demands of a prosperous time," writes Pink. For example, "engineers and programmers will have to master different aptitudes, relying more on creativity than competence, more on tacit knowledge than technical manuals, and more on fashioning the big picture than sweating out the details," Pink writes. In their book The new division of labor: How computers are creating the next job market, Frank Levy and Richard Murnane argue that two categories of skills will be more valued: "expert thinking--solving new problems for which there are no routine answers" and "complex communication--persuading, explaining, and in other ways conveying a particular interpretation of information" Schools must prepare students for a different workplace--one that values innovation, imagination, creativity, communication, and emotional intelligence

2.2.2 The 21st Century Workplace Skills

The enGauge report identified four skill clusters as essential to success in the 21st Century workplace. The four skill clusters are:

1. **Digital-age literacy**, which includes the various competencies expected in a 21st century workplace.

2. **Inventive thinking**, which includes the ability to think outside the box.

3. **Effective communication**, which is the ability to clearly communicate with a wide range of audiences.

4. **High productivity**, which will be a requirement of success in the 21st Century workplace.

2.2.3 Mastering the Skills

Within these skill clusters are a subset of skills and competencies that workers will be expected to have mastered. EnGauge further defines the subset of skills for each skill as follows:

1. **Digital-age literacy** encompasses:

    a. Basic literacy: This is defined as the ability to read, write, listen and speak as well as to compute numbers and solve problems.

    b. Scientific literacy: This is defined as a general knowledge and understanding of scientific concepts and processes.

    c. Economic literacy: This includes an understanding of basic economic concepts, personal finance, the roles of small and large businesses, and how economic issues affect them as consumers and citizens.

    d. Technological literacy: This includes an understanding about technology and how it can be used to achieve a specific purpose or goal.

    e. Visual literacy: This includes good visualization skills and the ability to understand, use, and create images and video using both conventional and new media.

    f. Information literacy: This includes the ability to find, access, and use information as well as the ability to evaluate the credibility of the information.

    g. Cultural literacy: This includes the ability to value diversity, to exhibit sensitivity to cultural issues, and to interact and communicate with diverse cultural groups.

    h. Global awareness: This is an understanding of how nations, individuals, groups, and economies are interconnected and how they relate to each other.

2. **Inventive thinking** will be prized in the 21st Century and a successful individual needs to develop and cultivate these essential life skills:

   a. Adaptability and managing complexity: This is the ability to recognize and understand that change is a constant, and to deal with change positively by "modifying one's thinking, attitude or behavior" to accommodate and handle this new environment.

   b. Self-direction: This is the ability to work independently, whether developing goals or plans, managing one's time and work, or evaluating one's knowledge or learning process.

   c. Curiosity: This is the desire to learn more about something and is an essential component of lifelong learning.

   d. Creativity: This is the means of producing something new or original that is either personally or culturally significant

   e. Risk taking: This is a willingness to think about a problem or challenge, to share that thinking with others, and to listen to feedback. It is a willingness to go beyond a safety zone, to make mistakes, to creatively tackle challenges or problems with the ultimate goal of enhancing personal accomplishment and growth.

   f. Higher-order thinking and sound reasoning: The higher-level thinking processes include the ability to analyze, compare, infer, interpret, evaluate, and synthesize. Sound reasoning applies common sense and acquired knowledge and skills to ensure good problem solving and decision making.

3. **Effective communication** is the ability to communicate with both individuals and groups in a positive manner. Effective communication involves:

   a. Teaming and collaboration: Teaming is a situation in which individuals share a common goal, bring unique capabilities to the job of achieving, work in a structured environment and exhibit trust and respect towards one another. Collaboration is the cooperative interaction between the members of the team as they work together to achieve their goal.

   b. Interpersonal skills: This is the ability to manage one's behaviour, emotions, and motivations to foster positive interactions with other individuals and groups. The ability to effectively manage conflict is also an important interpersonal skill necessary for success in the 21st Century workplace. These skills are exhibited

both in one-on-one situations and in emails, conference calls, and videoconferences.

    c. Personal responsibility: Personal responsibility in the 21st Century workplace requires one to understand the legal and ethical issues related to technology and to manage and use technology in a responsible manner.

    d. Social and civic responsibility: This requires that individuals use and manage technology to promote the public good and to protect society and the environment.

    e. Interactive communication: This requires that individuals learn to communicate using a wide range of media and technology. They must select the most effective method of communication for the intended audience and use it responsibly and effectively to enhance the dissemination of information.

4. **High productivity** is expected of workers in the 21st Century workforce. Individuals need to master these skills if they are to be productive.

    a. Prioritizing, planning, and managing for results: These organizational skills help an individual achieve the goals that have been set through efficient management of time and resources, effective problem solving, and strong leadership skills.21st Century Workplace: Skills for Success http://www.learningaccount.net/Course_Files/T21C001_050.htm

    b. Effective use of real-world tools: This requires that individuals master current and new technology to communicate and collaborate with others, to effectively problem solve, and to accomplish tasks. They must learn how to select the appropriate tools for the task at hand and to apply these tools efficiently and effectively to achieve results.

    c. Ability to produce relevant, high-quality products: This is the "ability to produce intellectual, informational, or material products that serve authentic purposes and occur as a result of students using real-world tools to solve or communicate about real-world problems" (enGauge, 2003).

2.3   Analysis of the Labour Market and Policy Interventions in Kenya

Past employment creation interventions in Kenya include Kenyanization policies implemented in 1963-1979; Active Labour Market Policies (1980-1989) and Macroeconomic Management (1990-present). These interventions were augmented with short and medium-term measures

meant to provide quick fixes in employment creation. The measures included wage restraint through minimum wage regulation, wage guidelines and Industrial Court; economic growth; industrial and agricultural promotion; public works programmes through Kazi Kwa Vijana, Kenya Youth Empowerment Programme and Women Enterprise Programme; and provision of labour market information.

Long term trends and dynamics of employment in Kenya reveal a declining number of jobs being created in the formal sector as compared to those in the informal sector. Total employment in Kenya increased from 0.804 million workers in 1972 to 10.96 million workers in 2010 with an increasing number of jobs being created in the informal sector. Over the last three decades to 2010, formal sector employment in Kenya grew at an average of 2.8 per cent per annum as compared to 14.3 per cent for the informal sector.

The number of new jobs created by the informal sector appears to have leveled off at an average of 463 thousand jobs per year since 2000. Employment growth in the sector declined from an average of 27.7 per cent per year in the 1990s to 8.1 per cent per annum in the period 2000-2010. From a sectoral perspective, community, social and personal services stands out as the key provider of wage employment in Kenya. The share of the sector in total employment increased from 28.8 per cent in 1977 to 40.95 per cent in 2010. The importance of the agricultural sector in providing wage employment declined from 32.65 per cent in 1977 to 16.69 per cent in 2010 while that of the manufacturing sector has been constant at about 13 per cent. The other sectors that contribute to wage employment in Kenya are wholesale and retail trades, restaurants and hotels (8.77%); transport and communication (5.51%); building and construction (4.91%); and finance, insurance, real estate and business services (4.68%). Mining and quarrying sector continues to be the least contributor of wage employment at about 0.3 per cent.

Kenya has also been experiencing shifts in forms of employment that includes casualization of work, contract engagement, outsourcing of jobs, subcontracting and temporary employment. The proportion of casual workers in wage employment increased gradually from 17.9 per cent in 2000 to 30.1 per cent in 2010. Casualization of jobs and other contemporary forms of employment more often than not do not facilitate the workers to enjoy the fundamental rights at work. Such rights include freedom of association and collective bargaining, right to paid

leave, and the right to social protection as provided under the National Social Security Fund and the National Hospital Insurance Fund.

The employment challenge in Kenya has grown over time. The level of open unemployment in the country increased from 6.7 per cent in 1978 to 14.6 percent in 1998/1999 before easing to 12.7 percent in 2005/2006. In 2005/2006, Kenya had a disguised or under employment rate of 21 per cent and a working poor of 46 per cent of the employed. The unemployment data reveal considerable variations amongst different age cohorts. The open unemployment rate amongst the youth cohorts 15-19; 20-24; 25-29; and 30-34 averaged 28 per cent, 24.75 per cent, 11.15 per cent and 5.75 per cent, respectively over the period 1978-2005/2006. The 15-19 years youth cohort represent the entry node of the labour market. The high rates of open unemployment amongst this entry group emphasize the magnitude of the country's employment problem. The youth unemployment in Kenya is also characterized by lack of employable skills.

The incidence of Kenya's open unemployment also varies according to gender, regions, type of job sought, season and the job search methods used. In 2005/2006, the level of open unemployment amongst females was relatively higher (14.3%) than that of males (11.2%). Similarly, the rate of open unemployment in urban areas was 19.9 per cent compared to 9.8 per cent for the rural areas. In terms of seasons, highest rates of seasonal unemployment occur in mid-July to September, and December to February. In respect to the type of jobs sought, up to 94 per cent of the unemployed in 1998/1999 were looking for paid employment. Only 3 per cent were searching for entrepreneurship related jobs. The implication is that while the rate of creation of formal jobs has reduced over time, the mindset of majority of job seekers is still fixed on paid employment. It also shows the deep rooted culture of job-seeking instead of job creation and self-employment amongst most job seekers.

The employment challenge in Kenya is aggravated by population pressures. Kenya's population increased from 5.4 million in 1948 to 39.8 million in 2010. The population is projected to reach 66 million by 2030. The country's population growth rate increased from 2.5 per cent in 1948 to 3.8 per cent in 1980s before declining to 3 per cent by 1999-2009. The country's demographic structure has also led to a youth bulge that has increased from 62.7 per cent of the adult population in 1979 to 66.6 per cent of the adult population in 2009. This

structure has led to a youthful labour force and high rates of unemployment, particularly of the youth.

2.4 The Conceptual Framework

This project will be guided by the following conceptual framework.
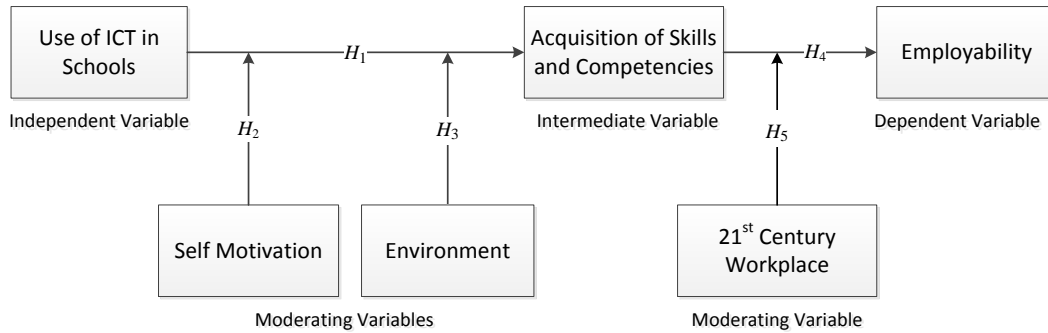
Figure 1: The Conceptual Framework

The use ICT is school leads to the student acquiring relevant skills and competencies which are suitable for working in the 21st century workplace such as digital-age literacy, inventive thinking, effective communication and high productivity.

The level of acquisition of these skills and competencies is moderated by other external variables such as the self-motivation and inquisitiveness of the student, the environment in which the student is schooling, the nature of the ICT systems that the student using and their capabilities e.g. if the computers at school have an internet connection or not, if the students are allowed to send emails and meet peers on social networks or not, etc.

The 21st century workplace defines a new skillset that is desired of people entering the job market. The match of this new skillset, and the skills acquired due to use of ICTs determine employability.

3 CHAPTER THREE: RESEARCH METHODOLOGY AND DESIGN

3.1 Introduction

This chapter presents the methods and modalities that were used to collect data on the impact of use of ICT in secondary schools on future employability in Kenya. It describes the type of research design that was used, the population of the research study, target population, sample size and the sampling design of the research study.

3.2 Research Design

This study was conducted for the purpose of testing the hypothesis derived from the conceptual framework presented. Studies employing hypothesis testing usually tend to explain the nature of certain relationships, or establish the differences among groups or the independence of two factors or more in a situation. Hypothesis testing offers an enhanced understanding of the relationships that exist among variables.

This research used a survey technique in the collection of data. Survey research uses scientific sampling and questionnaire design to measure characteristics of the population with statistical precision.

Table 1: Research Design Summary

Objective	Hypothesis	Variables	Data Collection	Instruments	Scale	Data sources
To establish whether availability and use of ICT in schools leads to acquisition of skills and competencies	H_1	Dependent- acquisition of IT skills and competencies	Survey Interviews	Questionnaires	Nominal scale (Yes/No) Ordinal-5point likert	Employees Employers Self-Employed
		Independent- Use of ICT in School	Survey Interviews	Questionnaires	Nominal scale (Yes/No) Ordinal-5point likert	Employees Employers Self-Employed
To determine whether acquisition of IT skills and competencies in high school leads to acquisition 21st century workplace skills	H_2	Dependent- the 21st century workplace skills	Survey Interviews	Questionnaires	Nominal scale (Yes/No) Ordinal-5point likert	Employees Employers Self-Employed
		Independent- acquisition of IT skills and competencies	Survey Interviews	Questionnaires	Nominal scale (Yes/No) Ordinal-5point likert	Employees Employers Self-Employed
To establish the moderating effect of self-motivation on		Dependent- the 21st century workplace skills	Survey	Questionnaires	Nominal scale (Yes/No)	Employees Employers

Objective	Hypothesis	Variable	Method	Instrument	Scale	Respondents
acquisition of skills and competencies			Interviews		Ordinal-5point likert	Self-Employed
	H_3	Independent- Self-motivation	Survey Interviews	Questionnaires	Nominal scale (Yes/No) Ordinal-5point likert	Employees Employers Self-Employed
To establish the moderating effect of Environment on acquisition of skills and competencies		Dependent- the 21st century workplace skills	Survey Interviews	Questionnaires	Nominal scale (Yes/No) Ordinal-5point likert	Employees Employers Self-Employed
	H_4	Independent- ICT environment	Survey Interviews	Questionnaires	Nominal scale (Yes/No) Ordinal-5point likert	Employees Employers Self-Employed
To study the relationship between the 21st century workplace skills and employability		Dependent - Employability	Survey Interviews	Questionnaires	Nominal scale (Yes/No) Ordinal-5point likert	Employees Employers Self-Employed
	H_5	Independent - 21st century workplace skills	Survey Interviews	Questionnaires	Nominal scale (Yes/No) Ordinal-5point likert	Employees Employers Self-Employed

3.3 Data and Information Sources

Data and Information was collected from a sample of employers, workers and self-employed entrepreneurs who had exposure to ICT while in secondary school.

3.4 Sampling Technique

Introduction of ICT into secondary schools is a relatively new practice therefore there are only a few currently working or self-employed Kenyans who were exposed to ICT in secondary school. They are also difficult to locate as there is no formal register is available. However, the few know one another and can easily make referrals.

Snowball (or chain-referral) sampling technique was therefore used to collect data since it is most suited for the data sources are limited, hard to find but one sample has leads to a second sample

3.5   Data Collection Tools and Procedure

Interviews and questionnaires were used to collect the data. The questionnaires and interviews were designed to bring out the relevance of the skills and competencies identified in the literature review. They were also pre-tested before being applied.

I used contacts from colleagues, friends and social media to identify an initial set of 5 respondents. I interviewed and directly administered the questionnaire on the initial 5 respondents and then requested them to identify other respondents and administer the questionnaires on my behalf. Initially, I received back 57 questionnaires. However, 7 questionnaires were not completed correctly so I removed them from my collection and ended up with a sample size of 50

4   CHAPTER 4: DATA MANAGEMENT AND ANALYSIS

4.1   Initial Data Analysis and Data Cleaning

I began the data analysis with an informal examination of the data in order to get a feel of it and generally check for data quality. Initial data analysis (IDA) was used to look for and highlight problem areas in the data. At this stage, I was guided by the following questions:

1. What does the distributions for key variables look like?
2. To what extent does the data need cleaning for consistency?
3. Should outliers (values that are far from the other values in the distribution) be included or excluded in the analyses?
4. Are there many cases and variables with missing data, and how should such missing data be handled?

4.1.1   Data Cleaning

During the initial data analyses we assessed the need to clean our data. Data cleaning is extremely important, and especially when the data collection method allows inconsistencies. Data cleaning includes, among others, the following

1. Removal of invalid, impossible, or extreme values. Records with such data were removed from the dataset
2. Labeling missing values: It was necessary to label each missing value with the reason it is considered missing in order to guarantee accurate bases for analysis.

In our survey, missing values corresponded to skipped questions or impossible options. In some cases, missing values were perfectly normal eg in situations where the question was not applicable to a particular respondent. However, in some cases missing values for important variables led to exclusion a record from certain analyses

4.1.2   Demographics Analysis
4.1.2.1   Gender

It was necessary to measure the gender of respondents in the research in order to understand how balanced the responses were between the two genders. Demographic statistics on the data revealed that 58% of the population was male while 42% was female.

Table 2: Gender

What is your gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	male	29	58.0	58.0	58.0
	female	21	42.0	42.0	100.0
	Total	50	100.0	100.0	
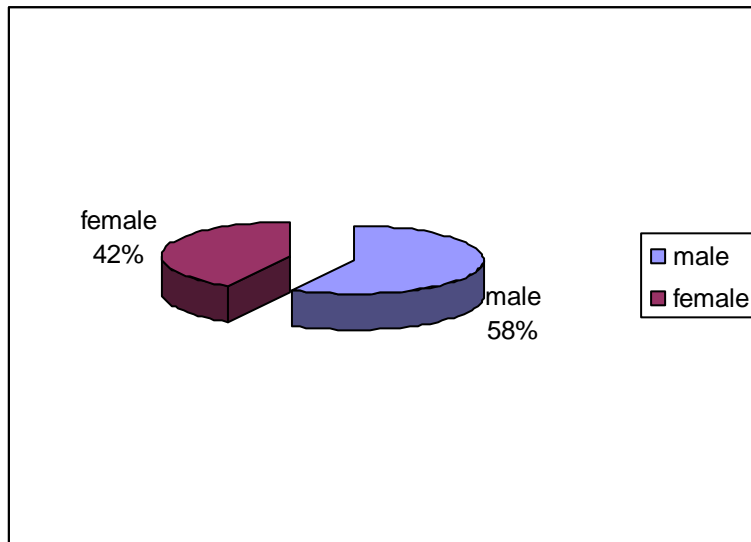
Figure 2: Gender Demographics

4.1.2.2   Work sector

The research being done on workers, employers and self-employed entrepreneurs, it was necessary to understand the sectors represented by the respondents. It was therefore found that 34% of the respondents were from the educational sector,12% from government institutions, 24% from NGOs and 16% in business.

Table 3: Work Sector

What sector do you work in?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	EDUCATIONAL	17	34.0	39.5	39.5
	GOVERNMENT	6	12.0	14.0	53.5
	BUSINESS	8	16.0	18.6	72.1
	NGO	12	24.0	27.9	100.0
	Total	43	86.0	100.0	
Missing	System	7	14.0		
Total		50	100.0		

4.1.2.3 Duration of Employment

It was also important for the researcher to determine the duration that employees had stayed in the current job. From the data, 66% of the respondents have worked in their current job for not more than five years while 30% have worked for a duration of between 6-10 years.

Table 4: Employment Duration

How long (years) have you worked on the current job

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1-5	33	66.0	68.8	68.8
	6-10	15	30.0	31.3	100.0
	Total	48	96.0	100.0	
Missing	System	2	4.0		
Total		50	100.0		

4.1.2.4 Use of ICT at Work

The main focus of this research was to study the use of ICT at workplace in order to determine those who use ICT at their workplace and those who do not. It was found that 86% of the respondents use ICT at their work place while 14% do not use ICT at their workplace. The 86% was a good figure as the analysis was majorly geared towards establishing if the skills that these respondents were using at workplace had been acquired at high school.

Table 5: Use of ICT at Work

Do you use ICT in your work

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	YES	43	86.0	86.0	86.0
	NO	7	14.0	14.0	100.0
	Total	50	100.0	100.0	

4.1.3 Descriptive Statistics

In order to determine the descriptive statistics of the sample data, the researcher did a univariate analysis on the case. Univariate analysis involves an examination across cases of one variable at a time. Usually we concentrate on the following three major characteristics of a single variable:

1. The distribution - a summary of the frequency of individual values or ranges of values for a variable.

2. The central tendency - The central tendency of a distribution is an estimate of the "center" of a distribution of different values. This is achieved by the mean, median and mode.

3. The dispersion - refers to the spread of the values around the central tendency. The **Standard Deviation** is the most common, the most accurate and a very detailed estimate of dispersion.

The table below was obtained after running descriptive statistics test on the sample data.

Table 6: Descriptive Statistics

Descriptive Statistics				
	N	Mean	Std. Deviation	Variance
How long (years) have you worked on the current job	40	1.18	.385	.148
Do you use ICT in your work	50	1.14	.351	.123
Has your department made computer usage skills necessary currently and even previously?	50	1.14	.351	.123
What type of school were you in?	50	1.10	.463	.214
What type of curriculum did you undertake Kenya	50	.94	.240	.058
How many of your teachers trained you in the applications?	50	1.32	1.039	1.079
Were there any Computer studies assistants within the school?	50	1.36	.598	.358
What kind of ICTs did you use in school?	50	2.14	1.088	1.184
Did you study Spreadsheets in high school?	50	1.00	.000	.000
Did you study Data processing in high school?	50	1.00	.000	.000
Did you study Word Processors in high school?	50	1.00	.000	.000
Did you study Social Media in high school?	50	1.50	.505	.255
Did you study Databases in high school?	50	1.10	.303	.092
Did you study Email for communication in high school?	50	1.06	.240	.058
Did you study Internet / web based research in high school?	50	1.34	.479	.229
Did you study Programming and system development skills in high school?	50	1.74	.443	.196
How long did you use Worksheets in high school?	50	2.76	1.598	2.553
How long did you use Data processing e.g. MS Excel or SPSS in high school?	50	2.80	1.604	2.571
How long did you use Word Processors e.g. Microsoft Word in high school?	50	2.86	1.629	2.653
How long did you use Social Media e.g. Facebook & WhatsApp in high school?	50	2.90	1.403	1.969
How long did you use Databases e.g. Microsoft Access in high school?	50	3.32	1.477	2.181
How long did you use Email for communication in high school?	50	3.36	1.575	2.480
How long did you use Internet / web based research in high school?	50	2.82	1.438	2.069
How long did you use Programming and system development in high school?	50	3.26	1.139	1.298
How well had you mastered Worksheets in high school?	50	1.44	.675	.456
How well had you mastered Data processing e.g. MS Excel or SPSS in high school?	50	1.32	.471	.222
How well had you mastered Processors e.g. Microsoft Word in high school?	50	1.40	.857	.735
How well had you mastered Social Media e.g. Facebook & WhatsApp in high school?	50	1.80	1.107	1.224
How well had you mastered Databases e.g. Microsoft Access in high school?	50	1.96	1.049	1.100
How well had you mastered Email for communication in high school?	50	1.74	1.121	1.258
How well had you mastered Internet / web based research in high school?	50	1.88	1.118	1.251
How well had you mastered Programming and system development in high school?	50	2.96	.832	.692
How did you acquire the skills Worksheets in high school?	50	1.14	.351	.123
How did you acquire Data processing skills in high school?	47	1.21	.414	.171
How did you acquire Processors skills in high school?	50	1.34	.717	.515
How did you acquire Social Media skills in high school?	50	1.68	.794	.630
How did you acquire Databases skills in high school?	50	1.46	.813	.662
How did you acquire Email for communication skills in high school?	50	1.60	.808	.653
How did you acquire Internet / web based research skills in high school?	50	1.62	.602	.363
How did you acquire Programming and system development skills in high school?	50	1.82	.962	.926

Did you apply Worksheets skills in your post-secondary training?	50	.94	.240	.058
Did you apply Data processing skills in your post-secondary training?	50	.94	.240	.058
Did you apply Processors skills in your post-secondary training?	50	.94	.240	.058
Did you apply Social Media skills in your post-secondary training?	50	.94	.240	.058
Did you apply Database skills in your post-secondary training?	50	.94	.240	.058
Did you apply Email for communication skills in your post-secondary training?	50	.94	.240	.058
Did you apply Internet / web based research skills in your post-secondary training?	50	.94	.240	.058
Did you apply Programming and system development skills in your post-secondary training	50	.94	.240	.058
Do you apply Worksheets skills at your workplace?	50	.94	.240	.058
Do you apply Data processing skills at your workplace?	50	.94	.240	.058
Do you apply Processors skills at your workplace?	50	.94	.240	.058
Do you apply Social Media skills at your workplace?	50	.94	.240	.058
Do you apply Database skills at your workplace?	50	.94	.240	.058
Do you apply Email for communication skills at your workplace?	50	.94	.240	.058
Do you apply Internet / web based research skills at your workplace?	50	.94	.240	.058
Do you apply Programming and system development skills at your workplace?	50	.94	.240	.058
How has the high school computer skills assisted you to acquire additional skills in post-secondary education?	50	.94	.240	.058
How has the high school computer skills assisted you to acquire additional skills in Other trainings?	50	.94	.240	.058
How has the high school computer skills assisted you to acquire additional skills at your work place?	50	.94	.240	.058
How have the computer skills acquired in high school assisted you in current work place?	50	.94	.240	.058
Have the ICT skills acquired in high school contributed to your employability?	50	1.28	.573	.328
Were there any job adverts for which you were advantaged/could apply because of the high School ICT skills?	50	1.38	.602	.363
Do you think that you got your first job engagement because of having the ICT skills acquired in high school?	50	1.60	.606	.367
Have you every missed out on a job which you feel you could have got if you had studied computer skills in high school?	50	1.82	.523	.273
Have you been able to maintain your job position because of the ICT skills you developed in high school and/or enhanced thereafter?	50	1.40	.606	.367
Did you get a job promotion because of the ICT skills you developed in high school and/or enhanced thereafter?	50	1.66	.593	.351
Basic literacy: The ability to read, write, listen and speak as well as to compute numbers and solve problems	50	4.22	1.266	1.604
Scientific literacy: i.e. a general knowledge and understanding of scientific concepts and processes.	50	3.76	1.364	1.860
Economic literacy: An understanding of basic economic concepts, personal finance, the roles of small and large businesses, and how economic issues affect them as consumers and citizens	50	4.22	1.266	1.604
Technological literacy: An understanding about technology and how it can be used to achieve a specific purpose or goal	50	3.50	1.403	1.969
Visual literacy: Good visualization skills and the ability to understand, use, and create images and video using both conventional and new media.	50	3.50	1.632	2.663
Information literacy: The ability to find, access, and use information as well as the ability to evaluate the credibility of the information	50	3.68	1.477	2.181
Cultural literacy: The ability to value diversity, to exhibit sensitivity to cultural issues, and to interact and communicate with diverse cultural groups.	50	3.76	1.271	1.615
Global awareness: An understanding of how nations, individuals, groups, and economies are interconnected and how they relate to each other	50	3.56	1.312	1.721
Adaptability and managing complexity: The ability to recognize and understand that change is a constant, and to deal with change positively by "modifying one's thinking, attitude or behavior" to accommodate and handle this new environment.	50	3.82	1.508	2.273
Self-direction: The ability to work independently, whether developing goals or plans, managing one's time and work, or evaluating one's knowledge or learning process.	50	3.66	1.451	2.107
Curiosity: The desire to learn more about something and is an essential component of lifelong learning.	50	4.26	1.382	1.911
Creativity: The means of producing something new or original that is either personally or culturally significant	50	4.04	1.384	1.917

Risk taking: A willingness to go beyond a safety zone, to make mistakes, to creatively tackle challenges or problems with the ultimate goal of enhancing personal accomplishment and growth.	50	3.66	1.507	2.270
Higher-order thinking: Ability to analyze, compare, infer, interpret, evaluate, and synthesize.	50	3.54	1.729	2.988
Sound reasoning: Applies common sense and acquired knowledge and skills to ensure good problem solving and decision making.	50	3.60	1.666	2.776
Teaming: Individuals share a common goal, bring unique capabilities to the job of achieving, work in a structured environment and exhibit trust and respect towards one another.	50	3.98	1.436	2.061
Collaboration: The cooperative interaction between the members of the team as they work together to achieve their goal.	50	4.48	1.282	1.642
Interpersonal skills in one-on-one situations and in emails, conference calls, and videoconferences: Ability to manage one's behavior, emotions, and motivations to foster positive interactions with other individuals and groups. Also ability to effectively	50	3.66	1.451	2.107
Personal responsibility: Personal responsibility in the 21st Century workplace requires one to understand the legal and ethical issues related to technology and to manage and use technology in a responsible manner.	50	3.48	1.693	2.867
Social and civic responsibility: This requires that individuals use and manage technology to promote the public good and to protect society and the environment.	50	2.56	1.327	1.762
Interactive communication: This requires that individuals learn to communicate using a wide range of media and technology. They must select the most effective method of communication for the intended audience and use it responsibly and effectively to enhance	50	2.82	1.587	2.518
Prioritizing, planning, and managing for results: These organizational skills help an individual achieve the goals that have been set through efficient management of time and resources, effective problem solving, and strong leadership skills	50	3.84	1.503	2.260
Effective use of real-world tools: This requires that individuals master current and new technology to communicate and collaborate with others, to effectively problem solve, and to accomplish tasks. They must learn how to select the appropriate tools for	50	3.80	1.471	2.163
Ability to produce relevant, high-quality products: Ability to produce intellectual, informational, or material products that serve authentic purposes and occur as a result of students using real-world tools to solve or communicate about real-world proble	50	3.86	1.539	2.368

4.2   Actual Analysis

Exploratory and data cleaning and preliminary treatments on the data. After these two processes, there was need to further analyse the data. From the descriptive data above, it was clear that the number of cases (components) were many. There was therefore need to adopt a technique that would 'reduce' the components into fewer, manageable but representative components.

4.2.1   Factor Analysis

Factor analysis is a statistical analysis approach that can be used to analyze interrelationships among large number of components and to explain those components in terms of their common underlying dimensions (factors). Factor analysis involves condensing of information contained in original variables into smaller set of dimensions with minimum loss of information.

This research used principal component analysis with varimax rotation to analyze the data using SPSS 19. The results comprised of tests carried out on quantitative data including Cronbach's Alpha and Factor Analysis

Pre Factor Analysis Tests

For a sample data to qualify for factor analysis, it has to meet the following requirements

Linearity

In order to do factor analysis of a sample data, that data must be linear. Examining the residual scatter is the most common way to identify any nonlinear patterns in the data. The scatter plot of standardized residuals versus the fitted values was visually inspected (appendix 2). The plots did not reveal any nonlinear patterns in the data indicating a linear relationship in all the regression models in this study.

Normality Analysis

Multivariate normality is the most fundamental assumption in multivariate analysis. Normality is the correspondence to the normal distribution which is the benchmark for statistical methods. Normal is used to describe a symmetrical, bell shaped curve, which has the greatest frequency of scores in the middle, with smaller frequencies towards the extremes.

Normality can be assessed by obtaining skewness and kurtosis values. Skewness indicates the symmetry of a distribution while kurtosis provides information about the peakedness of the distribution. Negative kurtosis indicates a flatter distribution while a positive kurtosis indicates a peaked distribution.
A positive skewness indicates a distribution shifted to the left while a negative skewness reflects a shift to the right. In general skewness of 1 indicates moderate skewness. Kurtosis values less than 1 are negligible, values from 1-10 indicate moderate non-normality while values greater than 10 indicate severe non-normality.

Table 7: Normality Test Results

	N	Skewness		Kurtosis	
	Statistic	Statistic	Std. Error	Statistic	Std. Error

How long (years) have you worked on the current job	40	1.778	.374	1.220	.733
Do you use ICT in your work	50	2.140	.337	2.684	.662
Has your department made computer usage skills necessary currently and even previously?	50	2.140	.337	2.684	.662
What type of school were you in?	50	.386	.337	1.652	.662
What type of curriculum did you undertake Kenya	50	-3.821	.337	9.240	.662
How many of your teachers trained you in the applications?	50	2.723	.337	7.922	.662
Were there any Computer studies assistants within the school?	50	-.324	.337	-.626	.662
What kind of ICTs did you use in school?	50	-.586	.337	-1.415	.662
Did you study Social Media in high school?	50	.000	.337	-2.085	.662
Did you study Databases in high school?	50	2.750	.337	5.792	.662
Did you study Email for communication in high school?	50	3.821	.337	9.232	.662
Did you study Internet / web based research in high school?	50	.697	.337	-1.580	.662
Did you study Programming and system development skills in high school?	50	-1.128	.337	-.759	.662
How long did you use Worksheets in high school?	50	.223	.337	-1.220	.662
How long did you use Data processing e.g. MS Excel or SPSS in high school?	50	.124	.337	-1.236	.662
How long did you use Word Processors e.g. Microsoft Word in high school?	50	.028	.337	-1.349	.662
How long did you use Social Media e.g. Facebook & Whats App in high school?	50	.092	.337	-.623	.662
How long did you use Databases e.g. Microsoft Access in high school?	50	-.622	.337	-.349	.662
How long did you use Email for communication in high school?	50	-.596	.337	-.813	.662
How long did you use Internet / web based research in high school?	50	-.271	.337	-.952	.662
How long did you use Programming and system development in high school?	50	.065	.337	-.562	.662
How well had you mastered Worksheets in high school?	50	1.264	.337	.368	.662
How well had you mastered Data processing e.g. MS Excel or SPSS in high school?	50	.796	.337	-1.425	.662
How well had you mastered Processors e.g. Microsoft Word in high school?	50	2.147	.337	3.577	.662
How well had you mastered Social Media e.g. Facebook & Whats App in high school?	50	.979	.337	-.586	.662
How well had you mastered Databases e.g. Microsoft Access in high school?	50	.745	.337	-.679	.662
How well had you mastered Email for communication in high school?	50	1.084	.337	-.471	.662
How well had you mastered Internet / web based research in high school?	50	.793	.337	-.926	.662
How well had you mastered Programming and system development in high school?	50	.077	.337	-1.556	.662
How did you acquire the skills Worksheets in high school?	50	2.140	.337	2.684	.662
How did you acquire Data processing skills in high school?	47	1.450	.347	.106	.681
How did you acquire Processors skills in high school?	50	1.803	.337	1.532	.662
How did you acquire Social Media skills in high school?	50	.649	.337	-1.098	.662
How did you acquire Databases skills in high school?	50	1.319	.337	-.128	.662
How did you acquire Email for communication skills in high school?	50	.870	.337	-.891	.662
How did you acquire Internet / web based research skills in high school?	50	.390	.337	-.626	.662
How did you acquire Programming and system development skills in high school?	50	.377	.337	-1.862	.662
Have the ICT skills acquired in high school contributed to your employability?	50	-.068	.337	-.450	.662

Were there any job adverts for which you were advantaged/could apply because of the high School ICT skills?	50	-.390	.337	-.626	.662
Do you think that you got your first job engagement because of having the ICT skills acquired in high school?	50	-1.260	.337	.623	.662
Have you every missed out on a job which you feel you could have got if you had studied computer skills in high school?	50	-2.903	.337	7.424	.662
Have you been able to maintain your job position because of the ICT skills you developed in high school and/or enhanced thereafter?	50	-.458	.337	-.608	.662
Did you get a job promotion because of the ICT skills you developed in high school and/or enhanced thereafter?	50	-1.579	.337	1.542	.662
Basic literacy: The ability to read, write, listen and speak as well as to compute numbers and solve problems	50	-2.318	.337	5.534	.662
Scientific literacy: i.e. a general knowledge and understanding of scientific concepts and processes.	50	-1.657	.337	2.201	.662
Economic literacy: An understanding of basic economic concepts, personal finance, the roles of small and large businesses, and how economic issues affect them as consumers and citizens	50	-2.318	.337	5.534	.662
Technological literacy: An understanding about technology and how it can be used to achieve a specific purpose or goal	50	-.692	.337	.216	.662
Visual literacy: Good visualization skills and the ability to understand, use, and create images and video using both conventional and new media.	50	-.719	.337	-.584	.662
Information literacy: The ability to find, access, and use information as well as the ability to evaluate the credibility of the information	50	-1.001	.337	.160	.662
Cultural literacy: The ability to value diversity, to exhibit sensitivity to cultural issues, and to interact and communicate with diverse cultural groups.	50	-1.578	.337	2.684	.662
Global awareness: An understanding of how nations, individuals, groups, and economies are interconnected and how they relate to each other	50	-.984	.337	1.219	.662
Adaptability and managing complexity: The ability to recognize and understand that change is a constant, and to deal with change positively by "modifying one's thinking, attitude or behavior" to accommodate and handle this new environment.	50	-1.356	.337	.852	.662
Self-direction: The ability to work independently, whether developing goals or plans, managing one's time and work, or evaluating one's knowledge or learning process.	50	-.874	.337	.226	.662
Curiosity: The desire to learn more about something and is an essential component of lifelong learning.	50	-2.084	.337	3.658	.662
Creativity: The means of producing something new or original that is either personally or culturally significant	50	-1.660	.337	2.347	.662
Risk taking: A willingness to go beyond a safety zone, to make mistakes, to creatively tackle challenges or problems with the ultimate goal of enhancing personal accomplishment and growth.	50	-.880	.337	-.118	.662
Higher-order thinking: Ability to analyze, compare, infer, interpret, evaluate, and synthesize.	50	-.823	.337	-.876	.662
Sound reasoning: Applies common sense and acquired knowledge and skills to ensure good problem solving and decision making.	50	-.927	.337	-.457	.662
Teaming: Individuals share a common goal, bring unique capabilities to the job of achieving, work in a structured environment and exhibit trust and respect towards one another.	50	-1.559	.337	1.627	.662
Collaboration: The cooperative interaction between the members of the team as they work together to achieve their goal.	50	-2.802	.337	7.331	.662
Interpersonal skills in one-on-one situations and in emails, conference calls, and videoconferences: Ability to manage one's behavior, emotions, and motivations to foster positive interactions with other individuals and groups. Also ability to effectively	50	-.874	.337	.226	.662

Personal responsibility: Personal responsibility in the 21st Century workplace requires one to understand the legal and ethical issues related to technology and to manage and use technology in a responsible manner.	50	-.726	.337	-.842	.662
Social and civic responsibility: This requires that individuals use and manage technology to promote the public good and to protect society and the environment.	50	.438	.337	-.110	.662
Interactive communication: This requires that individuals learn to communicate using a wide range of media and technology. They must select the most effective method of communication for the intended audience and use it responsibly and effectively to enhance	50	.021	.337	-1.287	.662
Prioritizing, planning, and managing for results: These organizational skills help an individual achieve the goals that have been set through efficient management of time and resources, effective problem solving, and strong leadership skills	50	-1.406	.337	.978	.662
Effective use of real-world tools: This requires that individuals master current and new technology to communicate and collaborate with others, to effectively problem solve, and to accomplish tasks. They must learn how to select the appropriate tools for	50	-1.323	.337	1.047	.662
Ability to produce relevant, high-quality products: Ability to produce intellectual, informational, or material products that serve authentic purposes and occur as a result of students using real-world tools to solve or communicate about real-world problems	50	-1.331	.337	.706	.662

As seen in table 5 above, the maximum skewness value in this research was 3.821 and the maximum kurtosis for the data was 9.232. The above results are therefore acceptable in this research.

Test for Outliers

This research used Mahalanobis distance to identify cases which were multivariate outliers. The Mahalanobis distance being the distance between a data point and the overall mean. The Mahalanobis values for the data were close to each other and that there was no strange values in the results obtained. The data was therefore fit for factor analysis.

Factorability of correlation matrix

There are several methods to determine the appropriateness for applying factor analysis to the data set. First it will be important to inspect whether the correlation matrix is appropriate for factor analysis. The researcher must look for correlations which are greater than 0.3. If several values in the correlation matrix exceed 0.3 then it is appropriate to use factor analysis.

Both Bartlett's test of sphericity and Kaiser Meyer-Olkin (KMO) measure of sampling adequacy can be used to determine the factorability of the matrix as a whole. If Bartlett's test of sphericity is significantly large among some of the variables, and Kaiser Meyer-Olkin index is greater than 0.5 then factorability is assumed.

From the research data analyzed, a KMO value of 0.576 and a Bartlett's test of sphericity value of 1371.744 were obtained thus factor analysis was assumed.

Table 8: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.576
Bartlett's Test of Sphericity	Approx. Chi-Square	1371.744
	Df	45
	Sig.	.000

Reliability Analysis

Before to conducting factor analysis it was necessary to check reliability of the scale used to confirm that it used consistently reflected the variables being measured. Cronbach's Alpha was used to measure the scale of reliability.

Cronbach's Alpha value varies from 0-1, with higher values being desirable. The average Cronbach's Alpha for our data was 0.976 therefore it was within the acceptable reliability margins.

The above preliminary tests confirmed that our data was fit for further factor analysis. The data was therefore taken through factor analysis followed by factor rotation. It is after factor rotation that we were able to identify the factors that were suitable for regression analysis.

4.2.1.1 Factor Extraction

Factor analysis was run on the sample. The extraction method used was principal component analysis (PCA) with varimax rotation method.

Table 9: Factor Extraction by Principal Component Analysis

Total Variance Explained						
	Initial Eigenvalues			Rotation Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	19.528	59.175	59.175	11.663	35.344	35.344
2	3.733	11.311	70.486	7.861	23.820	59.164
3	2.604	7.892	78.377	3.600	10.909	70.073
4	2.176	6.594	84.972	2.707	8.204	78.276
5	.855	2.592	95.665			
6	.741	2.244	97.910			
7	.333	1.010	98.920			
8	.258	.783	99.702			

9	.098	.298	100.000			
10	.000	.000	100.000			
11	.000	.000	100.000			
12	.000	.000	100.000			
13	.000	.000	100.000			
14	.000	.000	100.000			
15	.000	.000	100.000			
16	.000	.000	100.000			
17	.000	.000	100.000			
18	.000	.000	100.000			
19	.000	.000	100.000			
20	.000	.000	100.000			
21	.000	.000	100.000			
22	.000	.000	100.000			
23	.000	.000	100.000			
24	.000	.000	100.000			
25	.000	.000	100.000			
26	.000	.000	100.000			
27	.000	.000	100.000			
28	.000	.000	100.000			
29	.000	.000	100.000			
30	.000	.000	100.000			
31	.000	.000	100.000			

In running factor analysis not all factors are retained in the analysis. The eigenvalues associated with each factor represent the variance explained by that particular linear component and SPSS also displays the eigenvalues in terms of variance e.g. factor 1 explains 59.17% of variance. SPSS extracts all factors with eigenvalues greater than 1 thus leaving 4 factors which are displayed in the columns labeled *Extraction Sums of Squared Loadings*. The values which are not moved to the above column are discarded. The factors after rotation are displayed in the columns Rotation Sums of Squared Loadings. Rotation optimizes the factor structure thus the relative importance of the four factors is equalized.

This preliminary analysis therefore resulted in a solution of 4 factors selected for further analysis.

4.2.1.2 Factor Rotation
An important feature of factor analysis is that the axes of factors can be rotated within the multidimensional variable space. The goal of rotation is to obtain a simpler factor loading pattern that is easier to interpret than the original factor pattern.

The rotated component matrix was examined for items and the factors further tested with varimax rotation method. This resulted in the table 8 below

Table 10: Rotated Component Matrix

Rotated Component Matrix				
	Component			
	1	2	3	4
Basic literacy: The ability to read, write, listen and speak as well as to compute numbers and solve problems	.603	.512	.201	.213
Scientific literacy: i.e. a general knowledge and understanding of scientific concepts and processes.	.200	.911	-.149	.089
Economic literacy: An understanding of basic economic concepts, personal finance, the roles of small and large businesses, and how economic issues affect them as consumers and citizens	.357	.671	.221	-.132
Technological literacy: An understanding about technology and how it can be used to achieve a specific purpose or goal	.775	.484	.090	-.226
Visual literacy: Good visualization skills and the ability to understand, use, and create images and video using both conventional and new media.	.753	.329	-.189	-.256
Information literacy: The ability to find, access, and use information as well as the ability to evaluate the credibility of the information	.902	.015	-.108	.115
Cultural literacy: The ability to value diversity, to exhibit sensitivity to cultural issues, and to interact and communicate with diverse cultural groups.	.257	.906	-.184	.145
Global awareness: An understanding of how nations, individuals, groups, and economies are interconnected and how they relate to each other	.860	.413	-.038	-.067
Adaptability and managing complexity: The ability to recognize and understand that change is a constant, and to deal with change positively by "modifying one's thinking, attitude or behavior" to accommodate and handle this new environment.	.677	.616	-.311	-.050
Self-direction: The ability to work independently, whether developing goals or plans, managing one's time and work, or evaluating one's knowledge or learning process.	.797	.514	-.213	.123
Curiosity: The desire to learn more about something and is an essential component of lifelong learning.	.504	.676	-.366	-.006
Creativity: The means of producing something new or original that is either personally or culturally significant	.828	.253	-.219	.273
Risk taking: A willingness to go beyond a safety zone, to make mistakes, to creatively tackle challenges or problems with the ultimate goal of enhancing personal accomplishment and growth.	.830	.230	-.125	.173
Higher-order thinking: Ability to analyze, compare, infer, interpret, evaluate, and synthesize.	.924	.175	-.075	.268
Sound reasoning: Applies common sense and acquired knowledge and skills to ensure good problem solving and decision making.	.328	.100	-.007	-.526
Teaming: Individuals share a common goal, bring unique capabilities to the job of achieving, work in a structured environment and exhibit trust and respect towards one another.	.780	.141	.132	.343
Collaboration: The cooperative interaction between the members of the team as they work together to achieve their goal.	.397	.387	-.120	.097
Interpersonal skills in one-on-one situations and in emails, conference calls, and videoconferences: Ability to manage one's behaviour, emotions, and motivations to foster positive interactions with other individuals and groups. Also ability to effectivel	.797	.514	-.213	.123
Personal responsibility: Personal responsibility in the 21st Century workplace requires one to understand the legal and ethical issues related to technology and to manage and use technology in a responsible manner.	.929	.076	.061	.285
Social and civic responsibility: This requires that individuals use and manage technology to promote the public good and to protect society and the environment.	.287	.434	-.204	.799
Interactive communication: This requires that individuals learn to communicate using a wide range of media and technology. They must select the most effective method of communication for the intended audience and use it responsibly and effectively to enha	.298	-.023	.066	.902
Prioritizing, planning, and managing for results: These organizational skills help an individual achieve the goals that have been set through efficient management of time and resources, effective problem solving, and strong leadership skills	.651	.626	-.390	.009
Effective use of real-world tools: This requires that individuals master current and new technology to communicate and collaborate with others, to effectively problem solve, and to accomplish tasks. They must learn how to select the appropriate tools for	.733	.472	-.135	.044
Ability to produce relevant, high-quality products: Ability to produce intellectual, informational, or material products that serve authentic purposes and occur as a result of students using real-world tools to solve or communicate about real-world proble	.685	.682	-.138	.029
How well had you mastered Worksheets in high school?	.058	-.226	.880	-.189
How well had you mastered Data processing e.g. MS Excel or SPSS in high school?	-.075	-.015	.806	.244
How well had you mastered Processors e.g. Microsoft Word in high school?	-.393	-.749	.296	-.096
How well had you mastered Social Media e.g. Facebook & Whats App in high school?	-.111	-.670	.517	-.202
How well had you mastered Databases e.g. Microsoft Access in high school?	-.423	-.415	.634	-.180
How well had you mastered Email for communication in high school?	-.238	-.590	.715	-.091
How well had you mastered Internet / web based research in high school?	-.460	-.282	.101	-.354
How well had you mastered Programming and system development in high school?	-.089	-.108	.098	.060
Did you get a job promotion because of the ICT skills you developed in high school and/or enhanced thereafter?	.405	.587	-.155	.139

Normally researchers accept a loading of an absolute value of more than 0.3 to be important. Where the scale has an acceptable loading on more than one component, one of these loadings can be reduced to the component with the highest value. E.g. Basic Literacy is loaded on component 1 (0.603) and 2 (0.512), therefore the loading on component 2 is eliminated since it is less than component 1.

The scree plot below was also obtained having rotated the components using varimax rotation.
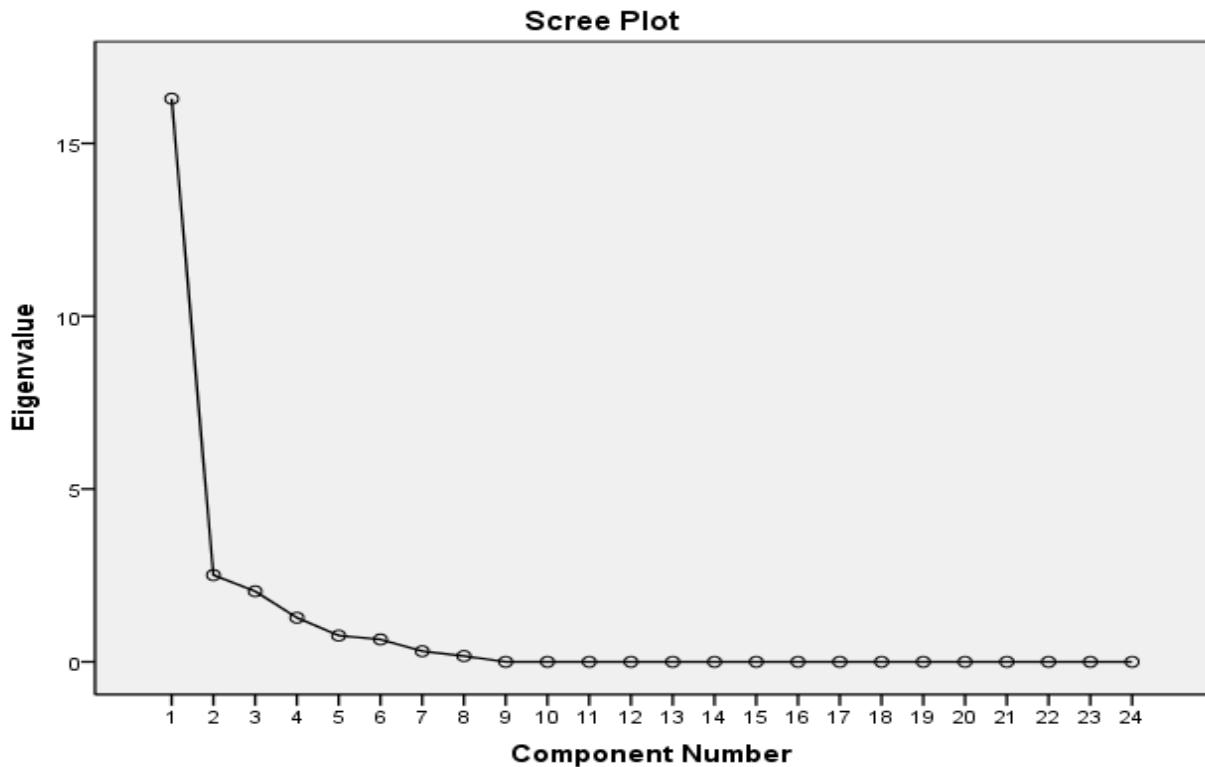
Figure 3: Scree Plot of rotated components

The scree plot is a graphical representation of the extracted and rotated components. It is the plot of eigenvalues against the component numbers with component one having the highest eigenvalue and component 24 having the smallest. The gradient is high from component one and starts levelling at component four. We therefore take the first four components where the gradient is high.

Table 11: Key of the Components

COMPONENT 1	Basic literacy: The ability to read, write, listen and speak as well as to compute numbers and solve problems
COMPONENT 2	Scientific literacy: i.e. a general knowledge and understanding of scientific concepts and processes.

COMPONENT 3	Economic literacy: An understanding of basic economic concepts, personal finance, the roles of small and large businesses, and how economic issues affect them as consumers and citizens
COMPONENT 4	Technological literacy: An understanding about technology and how it can be used to achieve a specific purpose or goal
COMPONENT 5	Visual literacy: Good visualization skills and the ability to understand, use, and create images and video using both conventional and new media.
COMPONENT 6	Information literacy: The ability to find, access, and use information as well as the ability to evaluate the credibility of the information
COMPONENT 7	Cultural literacy: The ability to value diversity, to exhibit sensitivity to cultural issues, and to interact and communicate with diverse cultural groups.
COMPONENT 8	Global awareness: An understanding of how nations, individuals, groups, and economies are interconnected and how they relate to each other
COMPONENT 9	Adaptability and managing complexity: The ability to recognize and understand that change is a constant, and to deal with change positively by "modifying one's thinking, attitude or behavior" to accommodate and handle this new environment.
COMPONENT 10	Self-direction: The ability to work independently, whether developing goals or plans, managing one's time and work, or evaluating one's knowledge or learning process.
COMPONENT 11	Curiosity: The desire to learn more about something and is an essential component of lifelong learning.
COMPONENT 12	Creativity: The means of producing something new or original that is either personally or culturally significant
COMPONENT 13	Risk taking: A willingness to go beyond a safety zone, to make mistakes, to creatively tackle challenges or problems with the ultimate goal of enhancing personal accomplishment and growth.
COMPONENT 14	Higher-order thinking: Ability to analyze, compare, infer, interpret, evaluate, and synthesize.
COMPONENT 15	Sound reasoning: Applies common sense and acquired knowledge and skills to ensure good problem solving and decision making.
COMPONENT 16	Teaming: Individuals share a common goal, bring unique capabilities to the job of achieving, work in a structured environment and exhibit trust and respect towards one another.
COMPONENT 17	Collaboration: The cooperative interaction between the members of the team as they work together to achieve their goal.
COMPONENT 18	Interpersonal skills in one-on-one situations and in emails, conference calls, and videoconferences: Ability to manage one's behavior, emotions, and motivations to foster positive interactions with other individuals and groups. Also ability to effectively
COMPONENT 19	Personal responsibility: Personal responsibility in the 21st Century workplace requires one to understand the legal and ethical issues related to technology and to manage and use technology in a responsible manner.
COMPONENT 20	Social and civic responsibility: This requires that individuals use and manage technology to promote the public good and to protect society and the environment.
COMPONENT 21	Interactive communication: This requires that individuals learn to communicate using a wide range of media and technology. They must select the most effective method of communication for the intended audience and use it responsibly and effectively to enhance
COMPONENT 22	Prioritizing, planning, and managing for results: These organizational skills help an individual achieve the goals that have been set through efficient management of time and resources, effective problem solving, and strong leadership skills
COMPONENT 23	Effective use of real-world tools: This requires that individuals master current and new technology to communicate and collaborate with others, to effectively problem solve, and to accomplish tasks. They must learn how to select the appropriate tools for
COMPONENT 24	Ability to produce relevant, high-quality products: Ability to produce intellectual, informational, or material products that serve authentic purposes and occur as a result of students using real-world tools to solve or communicate about real-world proble
COMPONENT 25	How well had you mastered Worksheets in high school?
COMPONENT 26	How well had you mastered Data processing e.g. MS Excel or SPSS in high school?
COMPONENT 27	How well had you mastered Processors e.g. Microsoft Word in high school?
COMPONENT 28	How well had you mastered Social Media e.g. Facebook & Whats App in high school?
COMPONENT 29	How well had you mastered Databases e.g. Microsoft Access in high school?
COMPONENT 30	How well had you mastered Email for communication in high school?
COMPONENT 31	How well had you mastered Internet / web based research in high school?
COMPONENT 32	How well had you mastered Programming and system development in high school?
COMPONENT 33	Did you get a job promotion because of the ICT skills you developed in high school and/or enhanced thereafter?

4.2.1.3   Interpretation of the Factors

From the factor extraction and rotation of the components, three variables were identified and these include:

1. Use of ICT is school
2. Acquisition of skills and competencies
3. 21st century work place
4. Employability-dependent variable

As earlier explained, researchers accept a loading of an absolute value of more than 0.3 to be important. The above factors loaded absolute values of more than. Therefore all the variables were considered for regression analysis.

4.2.2   Regression Analysis

Regression analysis is a statistic technique used to investigate the relationships between a dependent variable and one or more independent variables. Multiple linear regression is used in this study investigate the relationship between the behavioral intention and the four independent variables.

Multiple regression analysis was used in this study to test the research variables. The regression model can be presented as follows;

$$E = \beta A + Bw + \rho$$

Equation 1 Regression Equation

Where:

E = Employability

A= Acquisition of Skills

W=21st Century workplace

B = Coefficient of regression. The value of β will represent the strength of the relationship

We use multiple linear regression to calculate how much the dependent variable changes when other variables (independent) change.

Regression will therefore be used to test the hypothesis and validation of the conceptual framework.

4.3 Hypothesis Testing

Hypothesis was tested by examining the following:

1. The relationship between use of ICT and acquisition of skills,
2. The relationship between acquisition of skills and competencies and 21st century workplace skills,
3. The moderating effects of self-motivation on acquisition of skills and competencies
4. The moderating effect of environment on acquisition of skills and competencies
5. The relationship between 21st century workplace skills and employability.

The independent variables were regressed against the dependent variable and the results obtained assessed. In regression we focused on the regression coefficient, Beta.

In the equation E= βA+Bw+ρ, the strength of the relationship between E (dependent variable) and A (independent variable) is determined by the β value. For there to be a relationship between the dependent variable and the independent variable, β must be positive. The Beta values should not be less than 0.1 and if they go beyond 1, there is a sign of Multicollinearity.

4.3.1 The relationship between use of ICT in secondary school and acquisition of relevant skills and competencies

Coefficients a

Model		Unstandardized Coefficients		Standardized Coefficients	Sig.
		B	Std. Error	Beta	
1	(Constant)	.364	.555		.515
	Did you study Social Media in high school?	.440	.224	.310	.056
	Did you study Databases in high school?	-.526	.470	-.222	.269
	Did you study Email for communication in high school?	-.684	.576	-.229	.242
	Did you study Internet / web based research in high school?	.684	.219	.456	.003
	Did you study Programming and system development skills in high school?	.404	.218	.250	.070

Explanation of Results

Regression of use of ICT in schools and acquisition of skills and competencies, we obtain the results above. Looking at the beta values, the average beta value is 0.113 at an average

significance is 0.1, implying that indeed use of ICT in schools leads to acquisition of skills and competencies of IT.

Therefore the regression equation of the two variables can be expressed as follows:

Acquisition of relevant skills and competencies =
0.113* Use of ICT in secondary schools + Error terms

The beta value is positive thus there is a relationship between use of ICT in schools and acquisition of skills and competencies.

This result therefore validates hypothesis H_1 which states that Use of ICT in schools leads to acquisition of relevant skills and competencies

4.3.2 The moderating effects of self-motivation on acquisition of relevant skills and competencies

The moderating power of self-motivation was also assessed. The results below were obtained;

Coefficients a

Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	Sig.
1	(Constant)	2.094	.000		.000
	How long did you use Word Processors e.g. Microsoft Word in high school?	-.247	.000	-.540	.000
	How long did you use Social Media e.g. Facebook & Whats App in high school?	-.174	.000	-.311	.000
	How long did you use Programming and system development in high school?	.113	.000	.179	.000
	How well had you mastered Worksheets in high school?	-.025	.000	-.024	.000
	How well had you mastered Data processing e.g. MS Excel or SPSS in high school?	-.499	.000	-.347	.000
	How well had you mastered Processors e.g. Microsoft Word in high school?	.904	.000	.736	.000
	How well had you mastered Internet / web based research in high school?	-.136	.000	-.200	.000
	How well had you mastered Programming and system development in high school?	.773	.000	.915	.000
	How did you acqire Processors skills in high school?	1.457	.000	1.558	.000
	How did you acqire Programming and system development skills in high school?	-.614	.000	-.842	.000

Discussion of Results

The results obtained above produced an average beta value of 0.113. The positive beta value indicates a moderating effect of self-motivation in the acquisition of skills and competencies that meet the requirements of the 21st century workplace skills.

This implies that self-motivated students acquire skills and competencies faster and better than students who are not. The results therefore confirms our hypothesis H_3 of there being a moderating effect of self-motivation on the acquisition of skills and competencies.

4.3.3 The moderating effect of environment on acquisition of relevant skills and competencies

The variable environment was regressed against the acquisition of skills and competencies. The results below were obtained:

Model		Unstandardized Coefficients		Standardized Coefficients	
		B	Std. Error	Beta	Sig.
1	(Constant)	11.405	.000		.000
	How long did you use Data processing e.g. MS Excel or SPSS in high school?	-.391	.000	-.842	.000
	How long did you use Social Media e.g. Facebook & WhatsApp in high school?	-.379	.000	-.679	.000
	How long did you use Programming and system development in high school?	-.103	.000	-.163	.000
	How well had you mastered Worksheets in high school?	-.351	.000	-.347	.000
	How well had you mastered Processors e.g. Microsoft Word in high school?	1.017	.000	.829	.000
	How well had you mastered Internet / web based research in high school?	.293	.000	.431	.000
	How well had you mastered Programming and system development in high school?	-.799	.000	-.946	.000
	How many of your teachers trained you in the applications?	.057	.000	.085	.000
	What type of school were you in?	-3.552	.000	-1.962	.000
	What kind of ICTs did you use in school?	.376	.000	.532	.000

Discussion of Results

An average beta value of -0.306 was obtained at a significance of 0.0 and a standard error of 0.00. From literature, a relationship between two variables is considered as existing if the beta value is positive. Therefore from the results of the analyzed data on these variables, it was found that there is no moderating effect of the environment on the acquisition of skills and competencies. The acquisition of skills and competencies does not depend on the environment that an individual is.

This finding therefore rejects the alternative hypothesis H4 which had stated that the environment has a moderating effect on the acquisition of skills and competencies.

4.3.4 The relationship between acquisition of skills and competencies and employability

Acquisition of skills and competencies were regressed against employability and the results below obtained.

Model		Unstandardized Coefficients		Standardized Coefficients	
		B	Std. Error	Beta	Sig.
1	(Constant)	4.959	.000		.000
	Digital-age literacy (Basic literacy, Scientific literacy, Economic literacy, Technological literacy, Visual literacy, Information literacy, Cultural literacy)	1.962	.000	4.226	.000
	Inventive thinking (Adaptability and managing complexity, Self-direction, Curiosity, Creativity, Risk taking, Higher-order thinking and sound reasoning)	1.775	.000	3.177	.000
	Effective communication (Teaming and collaboration, Interpersonal skills, Personal responsibility, Social and civic responsibility, Interactive communication)	7.253	.000	5.053	.000
	High productivity (Prioritizing, planning, and managing for results, Effective use of real-world tools, Ability to produce relevant, high-quality products)	1.374	.000	2.568	.000

Discussion of Results

From the results, the average beta value is 0.026 at a significance of less than 0.05 and a standard error of 0.00. This value implies that the skills acquired in schools match the skills that the 21st century workplace requires. Having achieved a beta value of 0.026 makes our regression equation look as below:

Employability = 0.026* Acquisition of Skills and competencies + std error.

Even though the beta value obtained was positive, it is not very strong. This may be due to the fact that, it is not only in high school that the skills used in 21st century workplace are obtained. Other skills can also be obtained in other institutions of higher learning like universities and colleges.

This result therefore confirms hypothesis H_4 which states that there is a direct relationship between the acquisition of relevant skills and competencies and employability

4.3.5 The relationship between 21st century workplace skills and employability.

The data for 21st century workplace skills and employability were regressed against each other. The results below were obtained.

Coefficients a					
		Unstandardized Coefficients		Standardized Coefficients	
Model		B	Std. Error	Beta	Sig.
1	(Constant)	.012	1.853		.995
	Digital-age literacy (Basic literacy, Scientific literacy, Economic literacy, Technological literacy, Visual literacy, Information literacy, Cultural literacy)	-.144	.258	-.079	.581
	Inventive thinking (Adaptability and managing complexity, Self-direction, Curiosity, Creativity, Risk taking, Higher-order thinking and sound reasoning)	-.644	.301	-.730	.039
	Effective communication (Teaming and collaboration, Interpersonal skills, Personal responsibility, Social and civic responsibility, Interactive communication)	1.659	.470	1.175	.001
	High productivity (Prioritizing, planning, and managing for results, Effective use of real-world tools, Ability to produce relevant, high-quality products)	.189	.201	.218	.353

Discussion of Results

An average beta value of 0.058 was obtained. Such a positive value is an indication that 21st century workplace skills are required for employability. The regression equation for the two variables would therefore look as follows

Employability = 0.058*21st century workplace skills.

This finds therefore validates the hypothesis H_5 which states that there is a direct relationship between the 21st century workplace skills and employability

4.4   The Resulting Model

This study intended to test five hypotheses below:

1. H_1 Use of ICT in schools leads to acquisition of skills and competencies.
2. H_2 Self-motivation has a moderating effect on acquisition of skills and competencies.
3. H_3 The environment has a moderating effect on acquisition of skills and competencies.
4. H_4 There is a direct relationship between the acquisition of skills and competencies and employability.
5. H_5 The 21st century workplace has a moderating effect on employability.

After the analysis of the collected data it was found that the use of ICT in schools contributed to the acquisition of relevant skills and competencies since the beta value was positive. It was also found that self-motivated students acquired these skills faster and better compared to those who were not. However, the environment was not found to have any moderating effect on acquisition of skills and competencies. There also exists a direct link between the acquisition of these skills and competencies and employability. The 21st century workplace was also found to have a moderating effect on the eventual employability.

The resultant models is as shown in figure 4 below
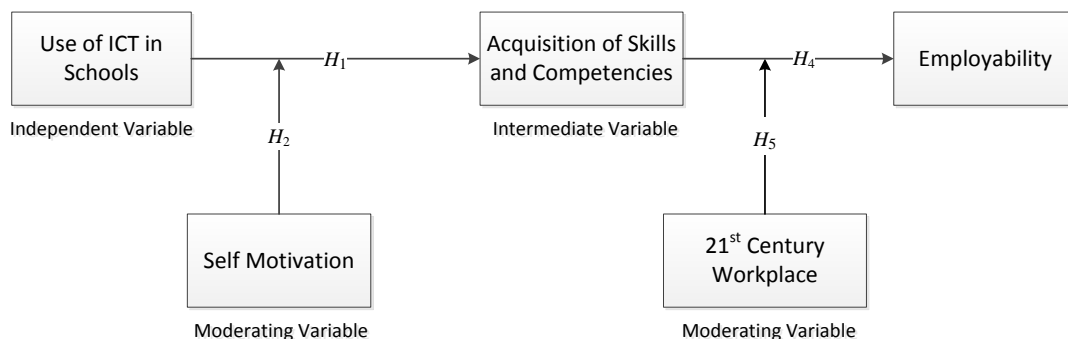
Figure 4 Resultant model

Hypotheses H_1, H_2, H_4 & H_5 were accepted after the analysis of the results while H_3 was dropped since the test outcome contained a negative beta value. We therefore ended up with four hypotheses as below:

1. H_1 Use of ICT in schools leads to acquisition of skills and competencies
2. H_2 Self-motivation has a moderating effect on acquisition of skills and competencies.
3. H_4 There is a direct relationship between the acquisition of skills and competencies and employability.
4. H_5 The 21st century workplace has a moderating effect on employability

5 CHAPTER 5: RESEARCH CONCLUSIONS AND IMPLICATIONS

This project presented and discussed the findings of a study that focused on the impact of use of ICT in secondary schools on future employability in Kenya. The background of the study providing the general introduction and definition of the research problem was presented in chapter one while chapter two focused on the literature related to the study. The research methodology detailing sampling procedures and data collection methods employed by the study was presented in the third chapter. The fourth chapter focused on the statistical procedures and their interpretation, presentation and discussion of the research findings.

In this chapter, we focus on the research conclusions, limitations of the research and contributions of the research to the body of knowledge.

5.1 Research Conclusions

Here the researcher presents how the current research objectives have been achieved. A research model was developed and validated. Based on this research model, the study established that ICT use in schools was the main contributor to the acquisition of skills and competencies. The study also confirmed that skills and competencies acquired in schools matched those required by the 21st century workplace. It was also confirmed that self-motivation was key to acquisition of skills and competencies. It was however found that the environment does not have any moderating effect on the acquisition of skills and competencies. Finally it was confirmed that the 21st century workplace skills determine employability.

5.2 Research Limitations

The research focused on the acquisition of skills and competencies in secondary schools in Kenya and how these skills match the 21st century workplace skills. However, this skills can also be acquired in post-secondary institutions like colleges and universities. An individual may not have acquired these skills in high school, but later acquired them in college thus affecting generalization of the study results.

5.3 Contributions to Knowledge

This research studies the impact of use of ICT in secondary schools on future employability. A clear understanding the determinants will enable education stakeholders make necessary decisions geared towards developing and improving relevant ICT related curriculum in high.

In conclusion, this study has contributed to knowledge with respect to theoretical extension and practical implementations.

6   REFERENCES

NCREL and Metiri Group. (2003). "enGauge 21st century skills: Literacy in the digital age." Napierville, IL and Los Angeles.

Sullivan, J. (2009). Constructing Employability. Center for Information & Society Thought Piece Series.

Pink, Daniel H. (2005). A whole new mind: Moving from the Information Age to the Conceptual Age. New York: Penguin Group.21st Century Workplace:

Information Technologies and International Development journal. *Deconstructing ICT Skills and Employability,* http://itidjournal.org/itid/article/viewFile/356/157

The Government of Kenya and UNDP. Kenya Human Development Report 2013. Available from http://hdr.undp.org/sites/default/files/knhd_report_2013.pdf

infoDev, ICT in Education in Kenya, extracted from *Survey of ICT and Education in Africa* (Volume2). http://www.infodev.org/en/Publication.409.html

Dahlman, C. (2007) Issues Paper: Innovation in the African Context in *A Forum for Policymakers*, sponsored by Development Cooperation Ireland and the World Bank Institute, March 6-8, Dublin, Ireland

Assessment and Teaching of 21st Century Skills - ATC21S (2012). ATC21S Project Overview, July 2012

Berntson, E., Sverke, M., & Marklund, S. (2003). Predicting perceived employability: Human capital or labour market opportunities? *Economic and Industrial Democracy*

Butcher, N (2011). ICT, Education, Development, and the Knowledge Society. Prepared for Global eSchools and Communities (GeSCI)'s African Leadership in ICT Program. http://www.gesci.org/assets/files/ICT,%20Education,%20Development,%20and%20the%20Knowledge%20Society%281%29.pdf.

Palmer, R (2005). Skills Development and Poverty Reduction. Centre of African Studies, University of Edinburgh. Presentation at FAO, Rome, 09.11.05. www.fao.org/sd/erp/IWGSDNovember2005/Palmer%20NORRAG.ppt Retrieved on 4 September, 2012

7   APPENDIX 1: QUESTIONNAIRE

QUESTIONNAIRE FOR THOSE WHO STUDIED COMPUTER STUDIES IN SECONDARY SCHOOL

Date: _____   **Questionnaire No_____**

INTRODUCTION

This study seeks to establish the link between studying computer Studies in secondary school and employability in the 21st century workplace. You are kindly requested to participate in the study because of having studied this subject. The results are aimed at making suggestions for the improvement of the curriculum for the course especially in the face on the government's emphasis on the role of technology and innovation in the achievement of national development goals, including Vision 2030.

The results will only be used for the stated purpose by the ICT for Education and ICT for Development research group at the School of Computing and Informatics, University of Nairobi

SECTION A: BACKGOUND INFORMATION

1   What is your gender   Female ☐   Male ☐

2   What is your line of professional training after secondary school

    ……………………………………………………………………...……………….

3   What sector do you work in?
    Educational/government/finance and banking/ business/research/NGO/Any other
    ……………………………………...

4   Which department?
    ……………………………………………………………………………………

5   What is your job title?
    ………………...

6   How long (years) have you worked on the current job

    …………………………………………………...

7   Do you use ICT in your work   Yes ☐   No ☐

8   Has your department made computer usage skills necessary currently and even

    previously? Briefly explain.

    …………………………………………………………………………………

    …………………………………………………………………………………

SECTION B: COMPUTER STUDIES TRAINING IN SECONDARY SCHOOL

1. What type of school were you in? Tick one. Public ☐   Private ☐

2. What type of curriculum did you undertake?
                          Kenya National (KCSE) ☐   International ☐

3.   How many of your teachers trained you in the applications? State the total
    number
    …………………………………………………………………………………

4. Were there any Computer studies assistants within the school? Yes ☐   No ☐
    If Yes, how many?
    ……………………………………………………………………………………….

5. What kind of ICTs did you use in school? Tick all ICTs used.
      Desktops ☐   Laptops ☐   Mobile devices e.g. phones and iPads ☐

    Other..

6.   Did you learn to use ICT for the following purposes in high school?
    Tick Yes or No

Computer Skill Area/Purpose	YES	NO
Worksheets e.g. Microsoft Excel		
Data processing e.g. MS Excel or SPSS		
Word Processors e.g. Microsoft Word		
Social Media e.g. Facebook & WhatsApp		
Databases e.g. Microsoft Access		
Email for communication		
Internet / web based research		
Programming and system development skills		

7. How long did you use any of the above applications in high school? **Tick one**

Computer Skill Area/Purpose	1 Year	2 Years	3 Years	4 Years	Other
Worksheets e.g. Microsoft Excel					
Data processing e.g. MS Excel or SPSS					
Word Processors e.g. Microsoft Word					
Social Media e.g. Facebook & Whats App					
Databases e.g. Microsoft Access					
Email for communication					
Internet / web based research					
Programming and system development					

8. At the time you finished your fourth form, how well had you mastered each of the skills in high school? Please tick appropriately (√)

Computer Skill Area	Very good	Good	Average	Poor
Worksheets e.g. Microsoft Excel				
Data processing e.g. MS Excel or				
Word Processors e.g. Microsoft				
Social Media e.g. Facebook &				
Databases e.g. Microsoft Access				
Email for communication				
Internet / web based research				
Programming and system				

9. Tick (√) appropriately how you acquired the skills were acquired while in high school. Also provide a brief explanation of your answer

Computer Use Area	Formally (class arrangements with teachers, peers, self-learning)	Informally (self-learning, peers, other friends outside of planned learning activities)
Worksheets e.g. Microsoft Excel		
Data processing e.g. MS Excel or SPSS		
Word Processors e.g. Microsoft Word		
Social Media e.g. Facebook & Whats App		
Databases e.g. Microsoft Access		
Email for communication		
Internet / web based research		
Programming and system development skills		

SECTION C: USE OF THE SKILLS

1. Did you use any of the above applications during your post-secondary training e.g. in college? Yes ☐   No ☐

If yes, please list the ones used.

…………………………………………………………………………………………

…………………………………………………………………………………………

…………………………………………………………………………………………

…………………………………………………………………………………………

…………………………………………………………………

2. Which of the above skills do you still use at work place? Please provide brief details?

3. Please provide brief explanations on how much you still are able to remember the skills and use them?

4. How has the high school computer skills assisted you to acquire additional skills?

SN	Academic Level	Explain briefly the Professional skills acquired
a)	During college training (post-secondary training)	
b)	Other trainings	
c)	Trade area (i.e. work place)	

5. How have the computer skills acquired in high school assisted you in current work place?

……………………………………………………………………………………………

……………………………………………………………………………………………

SECTION D: Acquisition of relevant skills and competencies

1. **To what extent did you acquire the following relevant skills and competencies, due to exposure and use to ICT in secondary school?**
   KEY   5: Sufficiently acquired /prepared to acquire
   4: Fairly but not sufficiently acquired /prepared to acquire
   3: To a small extent acquired /prepared to acquire
   2: Mentioned but did not acquire/nor prepared to acquire the skill
   1: Did not hear or see anything at all related to acquisition / preparedness for acquisition of the skill

Select the most appropriate choice by ticking (√)

21ST CENTURY WORKPLACE SKILL	5	4	3	2	1
Digital-age literacy					
1) **Basic literacy**: The ability to read, write, listen and speak as well as to compute numbers and solve problems					
2) **Scientific literacy**: i.e. a general knowledge and understanding of scientific concepts and processes.					
3) **Economic literacy:** An understanding of basic economic concepts, personal finance, the roles of small and large businesses, and how economic issues affect them as consumers and citizens					
4) **Technological literacy:** An understanding about technology and how it can be used to achieve a specific purpose or goal					
5) **Visual literacy:** Good visualization skills and the ability to understand, use, and create images and video using both conventional and new media.					
6) **Information literacy**: The ability to find, access, and use information as well as the ability to evaluate the credibility of the information					
7) **Cultural literacy**: The ability to value diversity, to exhibit sensitivity to cultural issues, and to interact and communicate with diverse cultural groups.					
8) **Global awareness**: An understanding of how nations, individuals, groups, and economies are interconnected and how they relate to each other					
2. Inventive thinking, which includes the ability to think outside the box					
a) **Adaptability and managing complexity**: The ability to recognize and understand that change is a constant, and to deal with change positively by "modifying one's thinking, attitude or behaviour" to accommodate and handle this new environment.					

21ST CENTURY WORKPLACE SKILL	5	4	3	2	1
b) **Self-direction**: The ability to work independently, whether developing goals or plans, managing one's time and work, or evaluating one's knowledge or learning process.					
c) **Curiosity:** The desire to learn more about something and is an essential component of lifelong learning.					
d) **Creativity:** The means of producing something new or original that is either personally or culturally significant					
e) **Risk taking:** A willingness to go beyond a safety zone, to make mistakes, to creatively tackle challenges or problems with the ultimate goal of enhancing personal accomplishment and growth.					
f) **Higher-order thinking:** Ability to analyse, compare, infer, interpret, evaluate, and synthesize.					
g) **Sound reasoning**: Applies common sense and acquired knowledge and skills to ensure good problem solving and decision making.					
3. Effective communication, which is the ability to clearly communicate with a wide range of audiences					
a) **Teaming:** Individuals share a common goal, bring unique capabilities to the job of achieving, work in a structured environment and exhibit trust and respect towards one another.					
b) **Collaboration:** The cooperative interaction between the members of the team as they work together to achieve their goal.					
c) **Interpersonal skills** in one-on-one situations and in emails, conference calls, and videoconferences: Ability to manage one's behaviour, emotions, and motivations to foster positive interactions with other individuals and groups. Also ability to effectively manage conflict.					
d) **Personal responsibility**: Personal responsibility in the 21st Century workplace requires one to understand the legal and ethical issues related to technology and to manage and use technology in a responsible manner.					
e) **Social and civic responsibility**: This requires that individuals use and manage technology to promote the public good and to protect society and the environment.					

21ST CENTURY WORKPLACE SKILL	5	4	3	2	1
f) **Interactive communication:** This requires that individuals learn to communicate using a wide range of media and technology. They must select the most effective method of communication for the intended audience and use it responsibly and effectively to enhance the dissemination of information.					
4. High productivity					
a) **Prioritizing, planning, and managing for results:** These organizational skills help an individual achieve the goals that have been set through efficient management of time and resources, effective problem solving, and strong leadership skills					
b) **Effective use of real-world tools:** This requires that individuals master current and new technology to communicate and collaborate with others, to effectively problem solve, and to accomplish tasks. They must learn how to select the appropriate tools for the task at hand and to apply these tools efficiently and effectively to achieve results.					
c) **Ability to produce relevant, high-quality products**: Ability to produce intellectual, informational, or material products that serve authentic purposes and occur as a result of students using real-world tools to solve or communicate about real-world problems					

SECTION E: Relation with EMPLOYABILITY

1. Have the relevant skills and competencies acquired in high school contributed to your employability? Please tick as appropriate.

21ST CENTURY WORKPLACE SKILL	Strongly agree	Agree	Not Sure	disagree	Strongly disagree
1. Digital-age literacy					
a) Basic literacy					
b) Scientific literacy					
c) Economic literacy					
d) Technological literacy					
e) Visual literacy					
f) Information literacy					

21ST CENTURY WORKPLACE SKILL	Strongly agree	Agree	Not Sure	disagree	Strongly disagree
g) Cultural literacy					
h) Global awareness					
2. Inventive thinking					
a) Adaptability and managing complexity					
b) Self-direction					
c) Curiosity					
d) Creativity					
e) Risk taking					
f) Higher-order thinking					
g) Sound reasoning					
3. Effective communication					
a) Teaming					
b) Collaboration:					
c) Interpersonal skills					
d) Personal responsibility:					
e) Social and civic responsibility:					
f) Interactive communication:					
4. High productivity					
a) Prioritizing, planning, and managing for results:					
b) `Effective use of real-world tools:					
c) Ability to produce relevant, high-quality products:					